Putting Perspectives into Participation

Constructive Conflict Methodology
for problem structuring in stakeholder dialogues

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About the cover: "Everyone looks from his or her own colored perspective. The more you are open to other ideas and opinions, the more you can learn about your own ideas and opinion. And by talking with other persons in a structured way, you will be able to frame the problem and to have a better notion of the bigger picture." (Maartje Jansen, 2009)

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Preface

Putting perspectives into participation. This title has two connotations. Firstly, it refers to the very reason why participatory processes are valuable. The interaction between stakeholders with different perspectives is needed to better understand and deal with particular complex policy issues, such as the transition to a sustainable energy system. This book presents *Constructive Conflict Methodology* as an overarching approach to the design and facilitation of stakeholder dialogue. Articulation and confrontation of divergent perspectives is central in this methodology; as such it explicitly brings perspectives into a stakeholder dialogue. Secondly, the title refers to the idea of 'putting something into perspective'. Participation is a means to an end rather than an end in itself. This means that we should be critical as regards the quality of participation and as to whether it serves the intended goal. A stakeholder dialogue does not automatically include and benefit from the broad range of stakeholder perspectives. Methodological rigor is needed to make sure that divergent perspectives are included in a dialogue and used for learning about the problem at hand, and to make sure that the effect of dialogue can be evaluated. This idea was the starting point for my research. *Constructive Conflict Methodology* provides methods to make sure that divergent perspectives can enter and play a role in a stakeholder dialogue in order to make participation worthwhile

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Eefje, Rotterdam 2009

Voor Mina Schraven

Contents

Chapter 1

Unstructured problems and the need for methods to facilitate stakeholder dialogues

Unstructured problems and the need for methods to facilitate stakeholder dialogues

This study is about methods. Methods to facilitate stakeholder dialogues on complex problems. Participation of stakeholders, or to be more precise, interaction between different stakeholders to exchange knowledge, ideas and opinions has frequently been proposed as a way to deal with complex societal issues.

Society faces multiple complex environmental problems, such as those related to climate, energy, infrastructure, food, biodiversity and water. This kind of complex problems without a straightforward solution has been referred to as 'wicked' (Rittel & Webber, 1973), 'wicked problems of organized complexity' (Mason & Mitroff, 1981), 'ill-structured' (Simon, 1973; Dunn, 1988; Mitroff & Sagasti, 1973), 'messy' (Ackhoff, 1974) and 'unstructured' (Hisschemöller, 1993; Hisschemöller & Hoppe, 2001). This type of problems forms the starting point for this study.

The particular area considered in this study is sustainable energy. Climate change, growing energy demands and an increasing world population, decreasing oil reserves and instable geopolitical relations all put pressure on the timely development of renewable energy sources. However, renewable energy sources do not come without drawbacks. Investments may be high and there are many (scientific) uncertainties, such as those related to efficiency and land-use. On the one hand there are actors for whom the introduction of renewable energy sources cannot come quickly enough and on the other hand there are actors who have strong interests in maintaining the status quo. Typically, the introduction of renewable energy sources can be understood as an unstructured problem. The empirical parts in this study focus in particular on two renewable energy sources: hydrogen and biomass.

This chapter forms the introduction to the study. It starts in section 1.1 with a discussion of characteristics of the unstructured problem. Section 1.2 discusses the role of stakeholder participation for structuring unstructured problems on the basis of three

rationales for participation. Section 1.3 explains the role of stakeholder dialogue as a scientific exercise that can contribute to the policy process on an unstructured problem. Section 1.4 discusses the issue of learning and defines this concept in order to enable an evaluation of stakeholder dialogues. In section 1.5 one of the central concepts in this study is defined: perspectives. Section 1.6 argues why methods are needed to facilitate stakeholder dialogues. Based on the challenges for methods outlined in the previous sections, section 1.7 presents the aim and research questions of this study. Finally, section 1.8 gives an outline of the study.

1.1 What is an unstructured problem?

A problem can be defined as a gap between the existing situation and a norm or desired situation. Hence, problems are always subjective, in the sense that they are socially and politically constructed. That means that they can be defined in different ways, and that different people can have different ideas about what the problem is and which knowledge is needed to solve the problem. This is expressed in the typology of policy problems depicted in Figure 1.1 (Hisschemöller, 1993; see also Hisschemöller & Hoppe, 2001).

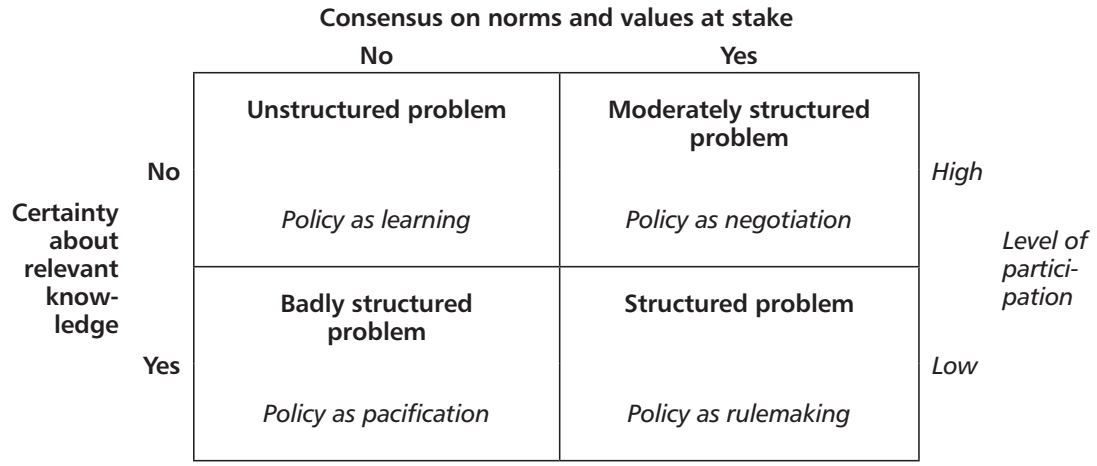

Figure 1.1 Typology of policy problems and types of interaction (Source: Hisschemöller, 1993; see also Hisschemöller & Hoppe, 2001)

The typology of policy problems is based on two dimensions. The first dimension concerns the question whether there is consensus on the relevant norms and values. This dimension refers to the goal of policy. The other dimension concerns the question whether there is certainty with regard to the knowledge that is needed for dealing with the prob-

lem. This dimension refers to the means of policy.[1] Based on the two dimensions, four types of policy problems can be distinguished: a structured problem and three types of complex problems. The complex problems are referred to as the moderately structured, the badly structured and the unstructured problem. Each problem type implies a particular type of policy process, with either a high or a low level of stakeholder participation. The types of policy processes are printed in italics in Figure 1.1. When there is no certainty about relevant knowledge, participation of stakeholders is high (policy as learning and policy as negotiation). When there is certainty about the relevant knowledge, participation of stakeholders is low (policy as pacification and policy as rulemaking).

A structured problem is generally technical by nature, and is characterized by consensus on the relevant values and on the knowledge needed to solve the problem. Participation is low, and policy takes the form of rulemaking. The moderately structured problem is characterized on the one hand by consensus on the values at stake and on the other hand by dissent on the relevant knowledge. In fact, there is consensus on what the problem is, but not on the solution to the problem. In this case, participation is high and takes the form of negotiation. The badly structured problem is characterized by dissent on the values at stake and by consensus on the relevant knowledge. This means that there is no consensus on what the problem is, but people can agree on the means to deal with the problem. Participation is low, and policy takes the form of pacification in order to resolve the conflicting value-orientations on the level of solutions. A problem is unstructured when there is no certainty with regard to both dimensions of the typology. Not only the means, but also the goals of policy are subject to discussion. In this case, participation is high and takes place in order to learn about the problem and its potential solutions.

To illustrate the four types of problems and their policy processes, consider a specific plan for building a small-scale bioenergy plant in a particular village. This is a structured problem when everyone agrees that it should be dealt with on the basis of law and regulation (i.e. consensus about norms at stake) and when it is clear who can provide the knowledge in order to live up to the law and rules. For instance, there may be rules on what the distance from an urban area should be and what the maximum allowed emissions from the plant are and there is an engineering office specialized in dealing with this. Suppose that the people living in the village start opposing the plans, because they do not like the idea of having an ugly building at the border of their city. The problem then shifts to a moderately structured type or a badly structured type. In case of a mod-

1 The distinction between the two dimensions in Hisschemöller's typology (1993) is ideal typical. According to the social constructivist notion, knowledge and values do not exist independently from one another in practice, as facts and values are strongly interwoven in problems. Hisschemöller (1993) stresses that "it is important to realize that what is a value to be strived for in the one problem type, can achieve the status of 'factual information' in the other problem type, and vice versa".

erately structured type, it is clear that the involved parties (the energy company and the citizens) have different interests (i.e. consensus on values at stake) that cannot be served at the same time but which can be negotiated. It is not clear whether there is a solution that can solve the problem, in that it serves both parties' interests (i.e. no certainty on means/relevant knowledge). For instance, when the board of the energy company fears that the opposition of the citizens will hamper their plans, it can offer the citizens money to pay off the negative consequences of building the plant. In case of a badly structured problem however, there is no consensus on what the problem actually is and which goals should be strived after (i.e. no consensus on norms and values at stake), but there is consensus on the solution or the means (i.e. relevant knowledge). Although there is disagreement on the relevant policy goals, conflicting values can be pacified by reaching agreement on the level of solutions, i.e. a compromise. The problem regarding the bioenergy plant is for instance badly structured when it is uncertain or unclear what the exact positions are of people favoring or opposing the plans to build the bioenergy plant, but everyone can agree that the plant is built, for example under the condition that its architecture fits the environment. The reasons for building the plant may still differ; some people may like the idea that by building this plant the city can be self-sufficient in terms of their energy-use, for some people it might be important that the plant generates sustainable electricity, for others it might be important that the plant offers many new employment opportunities, and still other people might be 'okay' with it as it does not spoil the environment too much.

Lastly, in case of an unstructured problem, such a compromise does not work, as people do no longer agree on the means, i.e. building the plant under certain conditions. There is no longer certainty on the knowledge that is needed to solve the problem, neither is there agreement on what the problem actually is and which values are at stake. The badly structured problem regarding the bioenergy plant may for instance shift to an unstructured problem when someone proposes to compare different types of energy plants or energy sources, in order to investigate whether there is a better alternative, for instance in terms of efficiency, employment opportunities or sustainability. It is in that case no longer certain that the proposed bioenergy plant is actually the solution to the problems; there may be other options that serve particular goals better. In this case, a learning approach is needed, that is aimed at getting a better understanding of the problem as well as its solutions.

1.2 Stakeholder participation as problem structuring

A learning approach is referred to as *problem structuring:* "socio-political interaction aimed at becoming aware of a problem through generating, using, exchanging, confronting, evaluating and integrating as much (contradictory) information as possible, which is enclosed in causal, normative and means-end presumptions about the problem and its solution" (Hisschemöller, 1993). Problem structuring gives more insight into the problem and its solutions (see Dunn, 2004). Hisschemöller and Hoppe (2001) emphasize the importance of problem definition as part of the problem solving strategy. Identifying a problem and solving it go hand in hand, and can therefore not be treated as separate activities or policy stages. Problem structuring prevents type III errors - solving the wrong problem (Mitroff, 1974; Raiffa, 1970: p264, cited in Dunn, 2001)[2] - as specific positions, interests, values or knowledge are not ignored and excluded from the policymaking process.

Unstructured problems therefore require stakeholder participation in order to enrich the policy process with new perspectives, knowledge and values. As it is not sure which expertise is needed for problem solving, stakeholders, both within and outside the scientific domain, may own relevant expertise.

There is a wide literature on participation, from which three rationales for stakeholder participation can be distilled: the substantive rationale, the instrumental rationale and the normative rationale (Fiorino, 1990). In a nutshell, whereas the substantive rationale is about 'making an integrated decision', the instrumental rationale focuses on 'making a decision work', and the normative rationale focuses on 'making a democratic decision'.[3] The notion of problem structuring is overlapping the three rationales.

Problem structuring most obviously reflects the substantive rationale. The substantive rationale is based on the idea that a technocratic orientation is too narrow for decision-making on complex societal issues (Fiorino, 1990). Presuming that complex problems can be framed in different ways, and that they involve many (scientific) uncertainties and different values, there is a legitimate need to 'integrate' and 'assess' complex and uncertain expert knowledge (Gough et al., 2003). The substantive rationale can be found in the field of interdisciplinarity (Funtowicz & Ravetz, 1993; Gibbons et al., 1994; Nowotny, Scott, & Gibbons, 2003). The rationale is based on the notion that lay people

2 Type III errors are different from Type I and Type II errors, which involve setting the significance level too high or too low in testing the null hypothesis (Dunn, 2001: p434).

3 The rationales are not mutually exclusive; more than one rationale can be salient for a particular participatory process. In practice, this will often be the case. After all, what is the quality of an integrated decision if it does not 'work' and it does not reflect a democratic basis?

are experts with respect to their own problems (Mitroff, Mason, & Barabba, 1983). This implies that the input of lay people is needed for an integrated assessment of complex societal problems. Hence, participation by stakeholders is needed to improve the 'quality' of knowledge, where 'quality' is defined as integrated, or 'extended peer-reviewed' knowledge (Funtowicz et al., 1993).

The instrumental rationale focuses on outcomes, rather than on process based norms (Pellizzoni, 2001; Stirling, 2008). From a policy-making perspective, there is a risk that policy gets stalled early in the implementation phase if the points of view of stakeholders are not integrated (Kasemir, et al., 2003). The acceptance of, and compliance with, decisions might increase as they take into account the different views and interests of stakeholders. Participation of stakeholders in decision-making can increase the legitimacy and accountability, both of the decision-making process as well as of the outcomes (Van Kersbergen & Van Waarden, 2004), thereby increasing the likelihood that the outcome is useful. The instrumental rationale can be found in conflict management and consensus building approaches (Susskind & Elliot, 1984), in which finding an acceptable outcome for all participants is key. Problem structuring reflects the instrumental rationale in that it aims at searching for a *congruent* rather than a shared definition of the problem. Common action does not require fully shared meanings or problem definitions, but only congruent meanings (Grin & Van de Graaf, 1996b). Congruency means that a policy option that incorporates different viewpoints can be envisaged.

The normative rationale refers to the ideal of deliberative democracy (e.g. Dryzek, 2000). According to this rationale, participation in policy processes is a political right for citizens and a prerequisite for democracy (Laird, 1993; Bohman, 1996; Fischer, 2000). The rationale is based on notions derived from Rousseau that citizens have a right to directly take part in decision-making rather than being represented and that their view should be based on an open argument on what is best for the common good rather than on partiality and self-interest. It presumes that "citizens are the best judges of their own interests" (Fiorino, 1990). The normative rationale is strongly linked to the concept of 'empowerment'. Empowerment refers to the process of gaining influence over events and outcomes of importance (Fawcett et al., 1995; see also Florin & Wandersman, 1990; Price, 1990). If an actor is 'empowered' it means that this actor attains the necessary resources, methods, competences and willingness to exercise influence (Avelino & Rotmans, forthcoming). Following a normative rationale, problem structuring is desirable for two reasons. Firstly, it is a way to articulate, include and empower minority viewpoints in the policymaking process. Secondly, as a process of opening-up will result in alternative options for policy-making, people have something to choose from, rather than the possibility to (dis) approve of only one specific option.

1.3 Stakeholder dialogue: Participatory integrated assessment

Unstructured problems require a political learning process. This study focuses on participatory processes set up by (social) scientists in order to contribute to this learning process. Participation is understood as a *transdisciplinary* research approach for unstructured problems. 'Transdisciplinary' means that this approach not only integrates different scientific disciplines -as an interdisciplinary method does- but also knowledge, values and interests of stakeholders outside the scientific domain. This has been referred to as participatory integrated assessment (Hisschemöller, Tol, & Vellinga, 2001; Van de Kerkhof, 2004). Whereas *integrated assessment* combines different scientific disciplines (Rotmans & Dowlatabadi, 1998), *participatory integrated assessment* also includes stakeholders from outside the scientific domain.

In this study I will refer to such a participatory process as a *stakeholder dialogue*. A stakeholder dialogue is defined as an organized meeting of stakeholders with different perspectives, knowledge and backgrounds, who would otherwise not meet (or not all together), structured to a greater or lesser extent by means of specific methods, tools or techniques. A stakeholder is defined as someone involved in, affected by, knowledgeable of, or having relevant expertise or experience on the issue at stake (based on Van Asselt & Rijkens-Klomp, 2002). This definition is intended to be as broad as it sounds. It encompasses different types of actors, such as scientists, citizens, actors from large companies, small entrepreneurs, policy makers, NGOs et cetera, who are not selected because of their affiliation but because of their perspectives. This definition is not of direct assistance when it comes to the identification and selection of stakeholders for a participatory process, as it is the diversity of perspectives that is important for stakeholder identification and selection. An important question is how diversity of perspectives can be taken as the starting point for the identification and selection of stakeholders.

1.4 Learning in stakeholder dialogues: improved understanding

Now we have framed stakeholder dialogue as a transdisciplinary research method, it is important to more specifically define 'learning' as the aim of stakeholder dialogue.

Learning is a frequently used concept in studies on participation in relation to innovation processes and sustainability (e.g. Webler, Kastenholz, & Renn, 1995; Grin & Van de Graaf, 1996b; De Marchi, Funtowicz, Lo Cascio, & Munda, 2000; The Social Learning Group, 2001; Robinson, 2003; Van de Kerkhof & Wieczorek, 2004; Blackstock, Kelly, & Horsey, 2007). See for an overview of the concept 'learning' in relation to stakeholder dialogues Van de Kerkhof (2004), who extensively reviews literature from organizational theory (Argyris & Schön, 1978; Argyris, 1982b), policy science (Sabatier, 1988; Sabatier & Jenkins-Smith, 1993) and political science (Heclo, 1974; Hall, 1993), and reports on learning in a stakeholder dialogue aiming to develop strategic insights for Dutch climate policy making.

In a stakeholder dialogue, learning takes place through interaction with other actors. This has been referred to as 'social learning' in social psychology (Bandura, 1971; Bandura, 1986). The idea that interaction between people with different perspectives can lead to the emergence of new insights is generally accepted in literature (Jehn, Northcraft, & Neale, 1999; Levine & Resnick, 1993; Hoffman, 1959; Hoffman & Maier, 1961; Hisschemöller, Hoppe, Dunn, & Ravetz, 2001; Hisschemöller, 2005; Webler, 1995; Gibbons et al., 1994; Funtowicz et al., 1993).

Problem structuring is about gaining a better understanding of a problem and its potential solutions. This implies that learning in stakeholder dialogues is defined as 'gaining an improved understanding of divergent perspectives on the problem and its solutions' (see also Renn, Blättel-Mink, & Kastenholz, 1997). Especially in the case of unstructured problems, stakeholders are often unaware of their own and each other's perspectives (Argyris & Schön, 1974; Argyris, 1982a; Schön & Rein, 1994; Van de Kerkhof, 2006b). Learning does not necessarily imply a 'from-the-outside' observable change, for instance a change in behavior (Mathews, 1994 in: Stringer et al., 2006); learning is an important condition, but not a guarantee for changing behavior (Grin & Van de Graaf, 1996a).[4]

An important challenge for research in the field of participation relates to the evaluation of learning. This study takes this challenge on by trying to find an answer on the question how to evaluate whether participants in a stakeholder dialogue improved their understanding of the diversity of perspectives as a result of taking part in the dialogue.

1.5 Perspectives

Learning in stakeholder dialogues means that participants gain a better understanding of the diversity of perspectives. But what exactly are perspectives? A perspective is the integrated whole of beliefs, values and presumptions that a person, or group of persons, uses to get to grips with a particular problem. A perspective shapes people's perceptions and determines how someone perceives a particular problem and its solution (see also Linstone, 1989)[5]. As such, it represents a way of making sense of and acting upon reality.[6] Perspectives are shaped by underlying value orientations and worldviews, by knowledge and experience, and by the interests of an individual. They embrace an individual's beliefs and presumptions with regard to a specific issue. As perspectives often remain tacit and belong to our taken-for-granted world, we are often unaware of their role in organizing our perceptions, thoughts and behavior (see also Argyris, 1995; Rein, 1986).

Unlike worldviews or values, perspectives are dynamic. People can take on multiple perspectives, dependent on the specific situation one is in. For example, a person's perspective on nuclear energy as an environmental policy maker may be different from his perspective at home as a father, and may be different from his perspective as a citizen. Perspectives can change over time as a result of new experiences or information.

The understanding of the term 'perspective' in this study is different from that of Linstone (1989), who argues that it is possible to distinguish 'how we are looking' from 'what we are looking at'. Rather, perspectives provide an 'entrance' to understand 'what we are looking at'. This reflects a notion articulated by Schön and Rein (1994: p30) that "there is no way of perceiving and making sense of social reality than through a [perspective]".

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4 Learning in terms of improved understanding is necessary for enhancing people's capacity to reflect. As such, it is indispensable for both first-order and higher-order learning processes (cf. single and double loop learning: Argyris et al., 1978; first and second-order learning: Sabatier et al., 1993; instrumental and political learning: Van de Graaf, Van Est, & Eberg, 1996). In first-order learning processes, reflection leads to improvement of actions or strategies without changing underlying theories, perspectives or goals. In higher-order learning processes, reflection leads to transformation of underlying theories, perspectives or goals (Brockband, McGill & Beech, 2002; see for an overview of literature on first-order and higher-order learning Van de Kerkhof, 2004).

5 Linstone (1989) distinguishes three perspectives in the context of Technology Assessment: the technical perspective, the organizational or societal perspective and the personal/individual perspective. Together they constitute the 'multiple perspective approach', "advanced to help the systems practitioner bridge the gap between analysis and action, between model and real world".

6 The concept of perspective is similar to that of a frame, as identified by Rein (1986) and Schön & Rein (1994) and to a policy theory, as identified by Hoogerwerf (1990).

1.6 The need for methods to facilitate participation

A vast amount of methodologies, procedures, or models have been developed and applied in order to facilitate participation. Methodologies differ in the extent of detail (how well is each step defined), number and type of participants, the aim and scope, the level of involvement, et cetera (see for an overview Beierle & Konisky, 2000; Van Asselt & Rijkens-Klomp, 2002; Rowe & Frewer, 2005). I refer to these methodologies as 'participatory methodologies'. Participatory methodologies prescribe a procedure, steps, (combination of) tools or techniques, to facilitate a participatory process on a societal issue.

The use of methodologies to facilitate stakeholder dialogues is not uncontested. Their acceptance differs between cultures. Renn et al. (1997) found for instance that citizens from the US and citizens from (former) West Germany and Switzerland reacted quite differently to the application of a methodology to facilitate participation. Whereas citizens from West Germany and Switzerland "…were almost grateful and pleasantly surprised that someone made the effort to pre-plan and structure a procedure for their participation, US citizens distrust pre-fabricated participatory models and suspect hidden agendas with such an approach" (Renn et al., 1997). The idea that the facilitation of stakeholder dialogues is a social scientific matter, is also not commonly accepted (Cuppen, Hisschemöller, & Midden, 2006). From an empowerment perspective, one may argue that the use of social science methodologies to structure participatory processes actually substitutes social science for a political process, "with the risk of empowering an unaccountable social scientific elite" (Dryzek & Niemeyer, 2008). From the standpoint of scientists, especially in the fields of natural sciences and economics, it might be put forward that participatory integrated assessment is not a scientific exercise and methodologies do not stand the test of scientific rigor (Engels, Hisschemöller, & Von Moltke, 2006). Price (1990) also observes a tension for scientists engaging in participatory research between on the one hand scientific rigor and on the other hand the desire for improvement in the quality of the community life.

Yet methods are needed to facilitate stakeholder dialogues. We know from social scientific literature that an open exploration of divergent ideas is not something that happens 'automatically' when people are put together in a room. Pellizzoni (2001) argues that an open dialogue is a myth, as there are external factors, such as people's ability to disregard a speaker or a discourse, which render an open dialogue impossible. There are all kind of mechanisms that hamper an open dialogue (these will be more closely examined in section 2.2). These hampering mechanisms exist because of an intrinsic characteristic of stakeholder dialogues: the interaction between people with different

perspectives, interests, background, expertise and status. So, ironically, the very reason why stakeholder dialogues are thought to be valuable (Amason, Hochwarter, Thompson, & Harrison, 1995) is also a reason why an open dialogue is difficult to achieve. People for instance tend to take up information that underlines their initial ideas, rather than information that conflicts their initial ideas. Also the influence of jargon may lead to situations in which some people fully understand what is discussed and others not at all (this is for instance even the case when different scientific disciplines interact). In order to facilitate problem structuring in stakeholder dialogues, participatory methodologies should include methods to address these hampering mechanisms (see also Stirling & Mayer, 2001; Stirling, 2008; Massey & Wallace, 1996).

A participatory methodology for problem structuring should firstly incorporate methods to select stakeholders in such a way that a diversity of perspectives can be reflected in the dialogue. Stakeholder selection for problem structuring processes is a difficult and yet critical step in the design of such a process. Different from a negotiation or consensus building process, in a problem structuring process it is not clear who owns relevant expertise and what stakeholders' positions and preferences exactly are. This is inherent to the unstructured character of the problem and the reason why a learning approach is needed. The importance of stakeholder selection is illustrated by an evaluation of a stakeholder dialogue on watermanagement in Tholen and St. Philipsland, an agriculture and nature area in the Delta region in the southwest of the Netherlands.[7] This evaluation underlined the importance of including a broad range of perspectives on the issue, as well as the difficulty of doing so. The project team that organized the stakeholder dialogue aimed to include a broad selection of stakeholders, but mainly focused on stakeholders from agriculture and nature organizations. In the second and most decisive workshop mainly local farmers and national nature organizations were present. The nature organizations were mainly interested in the national nature condition and not so much in the nature condition in Tholen and St. Philipsland. The farmers' interest was to have fresh water for local agriculture. The two actor groups had well-articulated and well-known stakes, and they negotiated a solution that served both interests: a salty Volkerak Zoommeer and the installation of a fresh water pipeline for agriculture. However, local nature organizations were not present in the dialogue and if they were, this would probably not have been the outcome of the dialogue. The dialogue and its results were criticized by non-involved stakeholders for a too narrow view on the freshwater supply for agriculture. According to the critiques, the negotiated solution was based too strongly on strengthening current practice in agriculture rather than taking into account that the future for agriculture will be different. The salination and other consequences

7 Hisschemöller, M., Cuppen, E. & Van der Pol, C. (2007). Evaluatie dialoog Tholen/St. Philipsland. Amsterdam: VU/IVM.

of climate change gained too little attention in the process. Lastly, it was suggested that the solution might be good for agriculture on Tholen, but that integrated solutions should be found for the Delta as a whole. So, whereas the two actor groups managed to find a solution in the dialogue, this solution could not be implemented as it ignored relevant other perspectives on the issue. The stakeholder selection procedure did not fit the unstructured nature of the problem; it steered the process towards a (failing) negotiation process between nature organizations and farmers. A stakeholder selection procedure that would have done justice to the unstructured character of the problem, i.e. that prepared for a problem structuring process rather than a negotiation process, would have been more appropriate. This example shows that the identification of relevant stakeholders is not straightforward. A participatory methodology for unstructured (environmental) problems should incorporate a method or technique for stakeholder selection that fits the aim of problem structuring, i.e. that enables the identification and inclusion of diverse perspectives.

Secondly, once a diversity of perspectives is brought to the process, these should all have an equal opportunity to play a role in the dialogue. As the hampering mechanisms noted earlier may prevent specific perspectives from being articulated, methods should be used to create equal opportunities for all perspectives. A participatory methodology should thus incorporate methods that can help to put the broad range of viewpoints, knowledge and values on the table and that can make sure that these are being clarified for, and evaluated by participants in the dialogue. A participatory methodology for problem structuring should encourage participants to evaluate competing options for problem solving. This means that confrontation of competing options and knowledge claims plays a central role.

Many participatory methodologies exist, but not many live up to these two requirements. In most participatory methodologies, diversity of perspectives is not explicitly addressed as a design issue. Exceptions are for example ‘deliberative mapping’ (Burgess et al., 2007) and ‘multicriteria mapping’ (not to be mistaken with multicriteria approaches that are used in a prescriptive rather than a heuristic way, see Stirling et al., 2001). Of course, there are more participatory methodologies that aim at mapping diversity (see e.g. Van Asselt et al., 2002), but these methods do not incorporate techniques to make sure that all viewpoints have an equal opportunity to play a role in the dialogue. Take a focus group for instance. A focus group is probably one of the most obvious examples of a participatory methodology with a high susceptibility to mechanisms that can hamper an open dialogue. A focus group provides no structure whatsoever for addressing new,

marginal, or counter-preference information[8]. The confrontation of divergent knowledge claims is probably even less articulated in participatory methodologies. A large part of participatory methodologies aims at consensus building, conflict-resolution or negotiation. In this type of methodologies, confrontation is something that should be avoided rather than encouraged (Guba et al., 1989 state for instance that "it is engagement not confrontation that leads to reconstruction" of claims, concerns and issues). The dialectical approach (Mason, 1969; Mason et al., 1981) is probably the only example that explicitly puts confrontation in a central role.

Yet not only the design of stakeholder dialogues is in need of methodical rigor. Methodical rigor is also necessary for evaluating stakeholder dialogues and participatory methodologies (Dunn, 1997). If we adopt a methodical approach to the design of stakeholder dialogues in order to enhance learning, we should also be able to assess to what extent learning took place as a result of adopting this methodical approach. Such an evaluation firstly requires an operationalization of the desired effect of dialogue, i.e. learning about the diversity of perspectives. Secondly, such an evaluation should make it possible to determine to what extent learning was actually brought about through participation in the dialogue rather than through external factors. As dialogues often take place over long time-spans, it is fairly difficult to attribute observed changes to participation in the dialogue. Learning takes place through all kinds of experiences, and it is very likely that people learn in a given period, even if they did not participate in any stakeholder dialogue. Methods for evaluation should therefore include a reference situation or condition, to which the effect of dialogue can meaningfully be compared.

In conclusion, there is a need for methods to facilitate problem structuring processes. The challenge for this study is to identify and combine methods that can help to bring to the table and clarify a diversity of perspectives, and that encourage participants to evaluate competing knowledge claims. In addition, the challenge for this study is to identify methods that allow for a methodical evaluation of the learning effect of a stakeholder dialogue.

8 One particular advantage of focus groups in terms of the communication biases is that groups tend to be small (4-12 persons). As will be discussed in chapter 2 (section 2.2), the dissemination of unique/unshared information becomes higher when group size decreases.

1.7 Research questions

This study takes on the challenge identified in the previous section by developing an overarching participatory methodology for problem structuring in stakeholder dialogues: *Constructive Conflict Methodology*. Firstly, *Constructive Conflict Methodology* should incorporate specific methods that can be used to identify and select stakeholders who reflect a diversity of perspectives. Secondly, it should incorporate methods to facilitate problem structuring through 1) the articulation of diversity in terms of divergent perspectives and, 2) confrontation of claims that result from these divergent perspectives. Thirdly, *Constructive Conflict Methodology* should be assessable, so that its application can be evaluated. The evaluation of *Constructive Conflict Methodology* concerns the question whether *Constructive Conflict Methodology* enhances learning in stakeholder dialogue, i.e. whether it supports participants' understanding of the diversity of perspectives.

This study aims to answer the following four research questions:

1. Which characteristics should *Constructive Conflict Methodology* have in order to enhance learning about perspectives?

2. Which methods can be used to identify divergent perspectives and how can these be applied to select participants for a stakeholder dialogue?

3. Which methods can be used to articulate and confront divergent claims, and how can these be applied in a stakeholder dialogue?

4. To what extent does a stakeholder dialogue designed according to *Constructive Conflict Methodology* result in participants gaining an improved understanding of the diversity of perspectives?

1.8 Outline of this study

The research questions will be answered as follows. Chapter 2 continues on the basis of the theoretical starting points presented in this chapter in order to set the stage for the development of the *Constructive Conflict Methodology* in chapter 3. Chapter 2 first discusses literature that shows the value of diversity and constructive conflict for stakeholder dialogues. Subsequently, the barriers to constructive conflict will be elaborated upon in section 2.2. The literature review shows that although diversity and constructive conflict can encourage learning, groups often fail to benefit from their diversity as a

consequence of a number of communication biases. Methods should be able to address the biases in order to stimulate constructive conflict. Sections 2.3 and 2.4 discuss how methods should deal with stakeholder identification and selection respectively. Section 2.5 discusses how stakeholder dialogues should deal with interests.

The insights that are derived from the literature discussed in chapters 1 and 2 are used to develop the *Constructive Conflict Methodology* in chapter 3. *Constructive Conflict Methodology* is presented as an overarching approach to the design of stakeholder dialogues, consisting of four steps: 1) stakeholder identification and selection, 2) articulation of divergent perspectives, 3) confrontation and evaluation of divergent claims, 4) synthesis. A selection of methods is discussed that can be used within *Constructive Conflict Methodology* to support one or multiple steps of the methodology. Especially the first two steps impose a challenge for the methodology, as there are not many methods available that can guide these steps, and that can deal with the communication biases identified in chapter 2.

Chapter 4 therefore addresses the second step of the *Constructive Conflict Methodology*. It shows how *Repertory grid technique* can be used within the *Constructive Conflict Methodology* to articulate divergent perspectives. Repertory grid technique was applied in a stakeholder dialogue on the prospects for a hydrogen economy firstly to identify the concepts that stakeholders use when thinking about future hydrogen visions and secondly to be able to identify three divergent visions. These three visions were used to structure the dialogue in three subgroups.

Chapter 5 introduces the Biomass Dialogue: a stakeholder dialogue on energy options from biomass in the Netherlands. The Biomass Dialogue was designed according to *Constructive Conflict Methodology*. As such, it served as an empirical case for the application and evaluation of *Constructive Conflict Methodology*. Chapters 6, 7 and 8 address specific methodological elements of the Biomass Dialogue.

Chapter 6 explains how *Q methodology* was applied within *Constructive Conflict Methodology* to identify the diversity of perspectives on energy options from biomass and to select participants for the Biomass Dialogue.

Chapter 7 elaborates upon the Biomass Dialogue into more detail, and describes how each of the four steps of the *Constructive Conflict Methodology* was taken, and which methods and tools played a role. It also discusses the outcomes of the dialogue (in the synthesis step).

Chapter 8 presents a quantitative evaluation of the Biomass Dialogue. It shows how a repeated Q analysis was used to evaluate the application of *Constructive Conflict Methodology* in the Biomass Dialogue. It is analyzed whether participants gained an improved understanding of their own and other participants' perspectives as a result of their participation in the dialogue. The quantitative results are interpreted on the basis of qualitative data from the Biomass Dialogue.

Finally, chapter 9 summarizes the answers on the research questions formulated above. It presents and discusses the main conclusions of the study. Based on reflections on the use of *Constructive Conflict Methodology* for stakeholder dialogues, recommendations for further research are developed.

The structure of this book, and the relation of each of the chapters to the *Constructive Conflict Methodology,* is visualized in Figure 1.2.

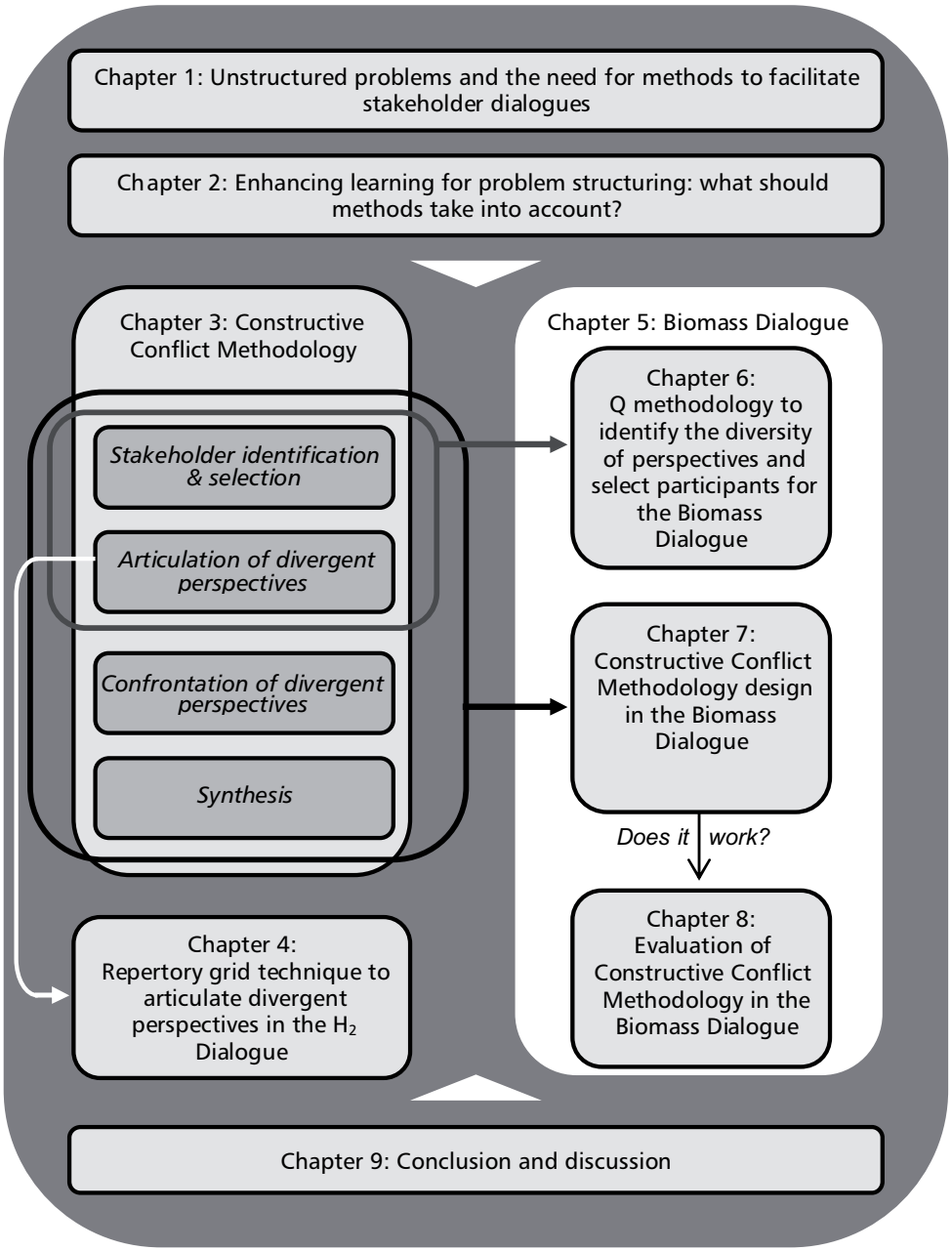


Figure 1.2 Outline of this study

Chapter 2

Enhancing learning: what should methods take into account?

Enhancing learning: what should methods take into account?

Now we have concluded that there is a need for methods to facilitate problem structuring in stakeholder dialogues, the next question is *how* methods can do this. In order to answer this question, this chapter discusses in more detail how learning about the diversity of perspectives can be enhanced in stakeholder dialogues, and what methods therefore should focus on. The arguments that are built up in this chapter are used to develop *Constructive Conflict Methodology* in chapter 3. First, section 2.1 discusses the value of diversity for problem structuring in stakeholder dialogues. It defines the concept 'diversity', and discusses how diversity is beneficial for problem structuring through creating an atmosphere of constructive conflict. Although there is much value in diversity, groups do not automatically benefit from their diversity. The barriers for benefiting from diversity, and thus for constructive conflict, are discussed in section 2.2. The next three sections then take stock, and discuss the implications of what has been discussed so far in relation to prevalent thinking and practice with regard to participation. Sections 2.3 and 2.4 present an argument on stakeholder identification and selection in relation to constructive conflict and highlight some important differences with common procedures for stakeholder identification and selection. Section 2.3 discusses the question how to identify stakeholders with relevant expertise. Section 2.4 discusses the question how to deal with representativeness in stakeholder selection. Section 2.5 focuses on the role of interests in stakeholder dialogues and argues against a common notion that interests should be eliminated from the participatory process. The chapter wraps up with a short conclusion in section 2.6.

2.1 The value of diversity for learning in stakeholder dialogues

What is diversity?

Stirling (1998) did an extensive review of literature from different disciplines (history, economy, sociology) on diversity. Based on this review, he distinguishes three properties of diversity: variety, balance and disparity. I will discuss these properties here, as they will be used to understand what aspects of diversity stakeholder dialogues should focus on. They will play a role in chapter 3, where the *Constructive Conflict Methodology* is presented.

Variety refers to the number of categories into which the elements can be divided. *Balance* refers to how the elements are distributed among the categories. *Disparity* refers to the degree and nature to which the categories themselves are different from each other. As an illustration of these three properties of diversity, imagine a zoo whose director has to decide on which animals to buy. Let us suppose that the director's aim is to have a diversified zoo. He can then decide to buy several animal species, thereby increasing the *variety* of animals in his zoo. The bigger the variety of species is, the bigger is the diversity of the zoo. But his zoo will be also more diversified when the number of animals per species is *balanced*. For instance, a crocodile farm with only a few birds is not very diversified. Finally, his zoo will also be more diversified if there is a certain extent of *disparity* between the animals. For instance, a zoo that has only aquatic animals is less diversified than a zoo that has both aquatic and land animals. Disparity is a qualitative dimension of diversity. So whereas anyone would probably agree that a fish and a lion are more different than a tiger and a lion, disparity will often involve a (personal) evaluative judgment. However, the same can be said for variety, as the categorization of elements is not fixed. It will depend on someone's particular perspective how variety and disparity are constituted.

Diversity in stakeholder dialogues

Rather than focusing on consensus or compromise, stakeholder dialogues should allow for diversity of perspectives, preferences, (policy) options and goals. This does not mean that a stakeholder dialogue cannot result in consensus. Rather, it means that participants are not forced to reach a consensus, as this may put impediments to the creation of useful insights for policy makers and stakeholders and may lead to the adoption of invalid assumptions and/or inferior (policy) choices (Janis, 1972; Mason et al., 1981;

Gregory, MacDaniels, & Fields, 2001; Stasser & Titus, 1985; Hisschemöller et al., 2001; Coglianese, 1999, cited in Van de Kerkhof, 2006b). Mitroff and Emshoff (1979: p10) state that: "the danger is not in reaching compromise, but in reaching it too soon and for the wrong reasons, e.g. because of the inability to tolerate conflict as a sometimes necessary and valuable tool for policy making". Instead of focusing on consensus, a focus on confrontation of competing viewpoints prevents shifting away from reaching a quality decision towards reaching an agreeable one (Coglianese, 1999; cited in Van de Kerkhof, 2006b). Stakeholder dialogues should do justice to, and even more importantly, *benefit* from the diversity of perspectives that is present within the dialogue. A dialogue should be aimed at reaching an agreement on a course of action, rather than on a consensus on which perspective is 'best' to approach the issue at hand. This was referred to earlier as *congruency* of definitions (Grin & Van de Graaf, 1996b).

Why is diversity so important for stakeholder dialogues? From research on working groups it appears that diversity can improve the quality of group decision-making: heterogeneous groups produce higher quality solutions (better strategies) than homogeneous groups (Hoffman, 1959; Hoffman et al., 1961, who assigned numerical scores to solutions based on specific criteria). Although the working groups in these two studies were heterogeneous with regard to personality rather than perspective, this effect also seems to hold for groups that are heterogeneous with regard to perspectives. The inclusion of a diversity of perspectives induces more divergent thinking, consideration of multiple perspectives, and consideration of higher proportions of unshared information (Brodbeck, Kerschreiter, Mojzisch, Frey, & Schulz-Hardt, 2002). According to Dunn (2001), marginal viewpoints, or rarely mentioned hypotheses, have more probative value than hypotheses mentioned more frequently – those on which there is substantial consensus. Highly probable or predictable hypotheses do not challenge accepted knowledge claims. In other words, I will probably learn more from something I have never heard than from something I am already familiar with.

So, not only is it important that a *variety* of perspectives is included in a stakeholder dialogue, but the inclusion of *marginal* perspectives, is critical for learning. This refers to the *disparity* property of diversity: the more different an idea is, the larger its learning effect will be. This idea is supported by research by Brodbeck et al. (2002). According to the authors, "minority influence facilitates open-mindedness towards alternative solutions". They showed that the likelihood that a group identifies new and qualitatively superior decisional alternatives increases as a result of "minority-induced divergent thinking". This idea can also be found in innovation systems literature and institutional analyses, in which it is argued that it is important to involve e.g. small entrepreneurs because incumbent system players are usually not the first to initiate successful system innovations

(Agterbosch, 2006; Breukers & Wolsink, 2007; Hekkert, Suurs, Negro, Kuhlman, & Smits, 2007). Marginality refers to the *newness* of perspectives for stakeholders: a marginal perspective is a perspective that is not often heard in the dominant debate about the issue under study. This does not necessarily mean that there are only a small number of stakeholders adhering to the perspective; neither does it mean that a perspective that only a small number of stakeholders adhere to cannot be dominant.

In addition, the *balance* property of diversity is important. It appears that groups in which variety is balanced are more likely to disseminate unshared information than unbalanced groups (Brodbeck et al., 2002). Furthermore, it has been argued that the balanced inclusion of perspectives reduces groupthink (Janis, 1972; Dryzek et al., 2008). This means that each perspective should be represented by an equal number of participants in the dialogue, regardless how dominant or marginal the perspective is. As the share of marginal perspectives in the dialogue is equal to that of other perspectives in terms of number of participants, the distribution in the dialogue, i.e. the sample, does not reflect the distribution in the stakeholder population.

Constructive conflict in stakeholder dialogues

Diversity is critical for enhancing learning processes on complex issues (Schweiger, Sandberg, & Ragan, 1986; Jehn et al., 1999, who also showed that this is not the case for routine tasks). Learning in this sense starts with realizing that not only one unique opinion exists, but at least two opinions (Müller-Merbach, 2004). I refer to the learning processes that are provoked by diversity and conflict as *constructive conflict* (Amason et al., 1995; Müller-Merbach, 2004, who refers to this as 'creative conflict'; De Dreu, 1997, who refers to this as 'productive conflict' Jehn, 1997, idem). Although the word 'conflict' may have negative connotations, diversity of perspectives is actually the reason why stakeholder dialogues are thought to be effective in the first place (Amason, et al., 1995). Constructive conflict refers to an open exploration and evaluation of competing ideas and knowledge claims in order to achieve new ideas, insights and options for problem solving. It takes place through a process in which participants confront each other's claims with their own claims, unravel argumentations, make (implicit) assumptions explicit, and jointly develop new ideas that are more robust (see also Fransen, forthcoming).

Conflict is not in every form beneficial to group processes (see e.g. De Dreu & Van de Vliert, 1997; Jehn & Mannix, 2001; Jehn et al., 1999; Jehn, 1995; Kruglanski & Webster, 1991). Three particular issues appear to be important when it comes to constructive conflict in groups. First, when it comes to learning from minority dissent, learning seems to

benefit more from *authentic* conflict than from artificial conflict, as is the case in (some instances of) the devil's advocate approach (Nemeth, Brown, & Rogers, 2001; Nemeth, Personnaz, Personnaz, & Goncalo, 2004). Nemeth et al. (2001) investigated in their study whether groups in which someone was assigned the role of devil's advocate and who was known to believe that position (the so-called 'consistent devil's advocate condition') produce similar results as groups in which someone was not assigned a particular role in the group (the so-called 'authentic minority condition'). In both conditions the person advocated a dissenting minority viewpoint. Their study shows that groups in the consistent devil's advocate condition produce fewer solutions to a specific problem than groups in the authentic minority condition. In addition, the number of quality solutions (as judged by two independent raters) is higher for groups in the authentic minority condition than for groups in the consistent devil's advocate condition. This means that the mere fact that someone is assigned the role of devil's advocate makes groups less productive in the sense that these groups produce fewer solutions and fewer good solutions to a specific problem than groups in which the dissenter is not role-playing. This may be very specific for minority dissent, as other role-playing and gaming literature suggests that role-playing is a powerful tool for learning (see for an overview of literature Crookall, 1995). For stakeholder dialogues this is an important finding, as it means that devil's advocate methods are not very suitable for stimulating constructive conflict.

Second, conflict enhances learning only when it is issue-related rather than personal. These two types of conflict have been referred to as *cognitive* conflict and *affective* conflict (Jehn, 1997; Amason et al., 1995). Cognitive conflict "pertains to conflict about ideas in the group and disagreement about the contents and issues of the task" (Jehn, 1997), whereas affective conflict "exists when personal and relationship components within the group are characterized by friction, frustration and personality clashes within the group" (Jehn, 1997). It appears that in groups performing non-routine tasks (which a stakeholder dialogue is too), cognitive conflict is beneficial for task performance (Jehn, 1995; Jehn, 1997). Groups that debate and criticize each other's ideas are more creative than groups that do not allow conflict (Nemeth et al., 2004). However, affective conflict appears to be detrimental for group performance (Jehn, 1995; Jehn, 1997). Affective conflict typically includes tensions, animosity and annoyance among members within a group (Jehn, 1995). It is of course the question to what extent in practice issue-related (cognitive) and personal (affective) conflict can be separated. Persistent issue-related conflict may very well lead to conflict on the personal level, including all kind of affective reactions such as annoyance and animosity (De Dreu, 1997).

Third, conflict needs to be *manageable*, in the sense that people do not feel overwhelmed by it (Jehn, 1995). It is likely that there is an optimum relation between conflict

intensity and group performance (De Dreu, 1997). Similarly, there is an optimum relation between "newness" and "familiarity" of information, which is referred to as 'optimal cognitive distance' (Nooteboom, Van Haverbeke, Duysters, Gilsing, & Van den Oord, 2007). The concept 'optimal cognitive distance' suggests that there is an inverted U-shaped relation between 'cognitive distance' and 'innovation performance': "In first instance, as cognitive distance increases, it has a positive effect on learning by interaction. When people with different knowledge and perspectives interact, they stimulate and help each other to stretch their knowledge for the purpose of bridging and connecting diverse knowledge. […] However, at a certain point cognitive distance becomes so large as to preclude sufficient mutual understanding needed to utilize those opportunities." (Nooteboom et al., 2007). The concept 'optimal cognitive distance' is also important in relation to the learning potential of new or marginal perspectives. It was argued above that one would learn more from something never heard before than something already familiar with. The concept 'optimal cognitive distance' suggests that this is only the case when the information is not *too* different or new, but rather 'sufficiently' different or new. For example, I could have difficulties understanding, and therefore learning from, an advanced MSc astronomy course, because this information is *too* new or unfamiliar to me. A way to deal appropriately with the newness of information in a dialogue might be to include people who can bridge disparate perspectives or claims and as such can serve as mediators or translators of specific information.

2.2 Barriers to constructive conflict

Although diversity and constructive conflict are essential characteristics for stakeholder dialogues, groups often fail to benefit from their diversity and tend to avoid conflict (Schweiger et al., 1986). This has been labeled the 'diversity paradox' (Joldersma, 1997). Stasser and Titus (1985) state: "discussion is rarely a systematic and balanced exploration of the relevant issues. On the contrary, it is often thematic and consensus confirming; that is, discussion tends to focus on particular issues and to support an existing or emergent consensus".

On the level of information distribution within groups, it appears that groups fail to share *unique* information (Stasser et al., 1985; Stasser, Taylor, & Hanna, 1989; Stasser & Stewart, 1992; Wittenbaum, Hubbel, & Zuckerman, 1999; Wittenbaum, 2000). Stasser and Stewart (1992) state that the outcome of group processes "often reflect the common knowledge shared by members before discussion, and not the diverse knowledge emanating from their unique perspectives and experiences"[9]. This tendency of groups to focus in their discussions on shared information, i.e. a group's common knowledge,

increases under four conditions: when group size increases, when the total information load increases, when there is a high proportion of unshared information (Gigone & Hastie, 1993; Stasser et al., 1985; Stasser et al., 1989; Stasser et al., 1992), and when group members do not know one another (Gruenfeld, Mannix, Williams, & Neale, 1996). This is worrying, taking into consideration that the issues of stakeholder dialogues are unstructured. This means that there are many ideas about it, i.e. a high information load, and that stakeholder dialogues include stakeholders from different networks all with their own knowledge and information, i.e. involve a high proportion of unshared information and group members who do not know one another. Furthermore, a study by Stasser and Titus (1985) suggests that the failure to consider new (unique) information is most likely when information *counters* the prevailing sentiment in the group. Ironically, this is a situation in which new information actually contributes to problem structuring.

The fact that we are dealing with unstructured problems raises another irony. Inherent to the unstructured character, there is not *one* correct way to deal with this type of issues. This creates a need for stakeholder dialogues in order to reflect upon existing knowledge claims and to exchange diverse arguments, ideas and perspectives. However, in cases where people think there is not *one* correct answer to a group's decision task, they are guided in their decision-making process by the attempt to reach a consensus[10] (Stasser et al., 1992) and the decision-making process is guided by the 'rule-of-the-majority' rather than a 'truth-wins' rule (Laughlin & Ellis, 1986). So, whereas unstructured problems require group processes that are not driven by an attempt to reach a consensus, these issues ironically evoke more consensus-driven, and less data-driven processes (Stasser et al., 1992). The fact that unstructured problems involve diverse values in addition creates group processes that are lower in efficiency, effectivity, satisfaction and intention to remain committed (Jehn et al., 1999).

The failure of groups to engage in an open exchange and exploration of unique information has been labeled 'biased information sampling' (Stasser et al., 1985). A bias is a heuristic: a judgmental rule of thumb that a decision maker uses to simplify complex decision-making situations (Das & Teng, 1999). Although heuristics are often necessary

9 This phenomenon is known as 'hidden profile' (Stasser & Titus, 2003). In hidden profile experiments, groups have to perform a judgmental task. Information needed for the task is distributed among the members of the group. In the hidden profile condition, information is distributed in such a way that participants all receive a subset of the total information. This means that each participant owns different (unique) information which needs to be shared in order to make the "best" judgment. Participants in the control groups receive the complete set of information, which means that all information is shared.

10 This finding appears from experiments in which power was equally distributed among members of the group and there were no particular interests at stakes. In situations where this is not the case, seeking a consensus may not be the prevailing strategy, but powerful participants may for instance use information selectively to rationalize decisions that are in their particular interest (Flyvbjerg, 1998; cited in Avelino et al., 2009).

and useful, they can also lead to cognitive biases that can result in severe and systematic errors in decision-making (Kahneman & Tversky, 1982). According to the 'biased sampling model' (Stasser et al., 1985) there are two biases taking place in information processing in groups: the *bias of shared* information and the bias of preferences. For the specific context of stakeholder dialogues, two important elements are missing in the biased sampling model: who is bringing in the information and how is it phrased? These questions are important as in a stakeholder dialogue stakeholders with different positions and status are involved, who all use their 'own' language for expressing themselves, and all have their own perspectives. In an earlier paper (Cuppen, Hisschemöller, & Midden, 2009) we have introduced three biases that may prevent an open exploration of knowledge claims and arguments in a dialogue: the bias of source, the bias of attitude (which is similar to the bias in favor of preferences) and the bias of phrasing. The combination of the 'biased sampling model' and the three biases identified in our earlier paper results in four biases that may prevent an open exploration of knowledge claims and arguments in a dialogue: the bias of shared information, the bias of attitude, the bias of phrasing, and the bias of source.

Bias of shared information

This bias of shared information (Gigone et al., 1993; Greitemeyer & Schulz-Hardt, 2003; Stasser et al., 1989; Brodbeck et al., 2002) basically means that groups tend to focus on the information that they share, rather than unique information that is owned by only one of them. This bias has been explained along two different lines. Firstly, it has been traced back to the probabilistic sampling advantage of shared information (Greitemeyer et al., 2003), also labeled the 'common knowledge effect' (Gigone et al., 1993): the more people in a group own a particular piece of information, the more likely it is that at least one of them will recall and mention it. Once a piece of information has been mentioned, it is also repeated more. Hence, "the influence of a particular item of info is directly and positively related to the number of group members who have knowledge of that item before the group discussion and judgment" (Gigone et al., 1993). This bias seems to be amplified by the tendency of participants who own unique information to claim "fewer speaking terms and [to contribute] fewer information-based comments during discussion" (Sargis & Larson, 2002). Secondly, the bias has been traced back to social psychological processes, such as 'mutual enhancement'. Mutual enhancement is the tendency of person A to positively evaluate person B if person B mentions something that person A already knows. According to the argument, shared information holds greater importance than unshared information, because others can validate it as relevant ('Yes, that is a good point that you are making there, I have heard that

before'). Hence, shared information serves to validate other participants' knowledge (Wittenbaum et al., 1999). Furthermore, *minority* viewpoints tend to be disregarded for two reasons (Nemeth, 1986). Firstly, people assume that judgments give information about reality; majority judgments are therefore likely to be correct ('If everyone thinks so, it is probably right'). Secondly, individuals in general want to be accepted in groups and therefore wish to avoid the disapproval that emanates from maintaining a minority viewpoint.

Bias of attitude

The bias of attitude means that an item of information is more likely to enter the discussion if it favors rather than opposes the existing perspective, preference or attitude of participants. According to Gigone and Hastie (1993), this induces a process of 'premature preference negotiation'; which means that participants primarily use the group discussion to exchange preferences and to negotiate the final group decision based on these preferences. As is known from social psychology, a person's attitude can serve as a strong determinant for the evaluation of information (Sherif & Hovland, 1961; White, Pahl, Buehner, & Haye, 2003; Poortinga & Pidgeon, 2005; Meijnders et al., 2005). This phenomenon can be interpreted as a particular type of confirmation bias, in that it presumes that people are more open to information that is in line with their attitude or that confirms their own ideas, than to information that conflicts their attitude or ideas.

Bias of phrasing

The bias of phrasing means that an item of information is more likely to enter the discussion if it is phrased in a way that a participant is familiar with. In a stakeholder dialogue stakeholders with different backgrounds interact. These people employ different perspectives for making sense of the issue, and accordingly, they may be accustomed to communicate in different ways and through different types of language. Jargon is not uncommon among certain types of stakeholders. From the literature on interdisciplinarity (Gibbons et al., 1994; Thompson Klein, 2004) we know for instance that experts from different disciplines may have difficulties to understand one another, because similar expressions have different meanings in different fields of research. An example where different types of phrasing may be problematic is when scientists and citizens interact. Whereas scientists are trained to use scientific concepts, citizens may make use of other reference frames, such as their personal experience. This is illustrated by the way scientists and 'laypersons' assess risks, which has extensively been researched in the risk

literature (Fischhoff, Slovic, & Lichtenstein, 1983; Slovic, Fischhoff, & Lichtenstein, 1985; Slovic, Finucane, Peters, & MacGregor, 2004).

Bias of source

The bias of source means that the information of a specific source is (not) acknowledged because of perceived characteristics of the source, rather than because of the content or value of information. The bias of source for instance takes place when the input of a high-status (or similar-status) person is more likely to enter and to be used in the discussions than the information of lower-status persons. This bias is especially relevant for stakeholder dialogues, because the inclusion of people with different perspectives almost undoubtedly implies people with different positions, status and power. Furthermore, when stakeholders are invited and addressed as being a representative of their function, ie. "a scientist" or "a citizen", this might induce "thinking-in-boxes". This may lead to stereotyping (Hamilton & Trolier, 1986; Linville, Salovey, & Fischer, 1986) and accordingly to biases in information processing (see e.g. Bodenhausen, Macrae, & Sherman, 1999; Bodenhausen & Lichtenstein, 1987).

These four biases explain on a psychological level how certain information or perspectives can be disregarded when people in groups interact. They can occur intentionally as well as unintentionally. It can be a deliberate choice for someone to refuse to acknowledge the contribution of specific participants in a dialogue, but it can also be that this contribution is not acknowledged because it is meaningless to the other (Pellizzoni, 2001). These biases can be seen as psychological parallels to the concept 'external power', which Pellizzoni (2001) uses to explain similar phenomena. Pellizzoni distinguishes external power from internal power. *Internal* power is the power of argument. It "consists in the ability of an argument to assert itself by virtue of its greater forcefulness". In short, it is "the power to override other arguments merely by the force of what one says" (Pellizzoni, 2001). In 'an ideal speech situation' (Habermas, 1970) only this kind of power exerts influence in communication. *External* power can be distinguished in power exercised *over* communication (who is allowed to participate?) and power exercised *in* communication (what type of arguments, expressed by whom, are acknowledged? See also Barnes, Newman, Knops, & Sullivan, 2003). The four biases discussed above may be interpreted as the psychological equivalents of this latter type of power, i.e. external power exercised in communication.

2.3 How to identify relevant stakeholders?

The previous two sections discussed particular opportunities and barriers to problem structuring in stakeholder dialogues. The current and next two sections elaborate more specifically on the implications of framing stakeholder dialogue as a problem structuring exercise. They do so by zooming in on three particular issues that become apparent when looking at prevalent approaches in participatory research. The current section discusses a question that is critical with regard to methods for stakeholder identification and selection: how to identify relevant stakeholders? The next section deals with the issue of representativeness in stakeholder selection and section 2.5 discusses the question how to deal with interests in stakeholder dialogues.

When a problem is unstructured, it is not only uncertain what the problem is, but it is also not certain what kind of expertise is relevant for dealing with the problem. That means that it is not clear who the 'experts' are. This situation is for example different from a negotiation process, in which it is clear who the stakeholders are, what their positions are, and what they want to achieve. As a consequence, the identification of relevant stakeholders is a difficult task. It is important to avoid relying on assumptions on who owns relevant expertise. Rather, this should be treated as an empirical question that is part of the problem structuring process.

I will illustrate this on the basis of a specific type of participatory methodologies. An important share of participatory methodologies has been developed to involve citizens in the decision-making process. This concerns methods such as consensus conference (Joss, 2000; Einsiedel & Eastlick, 2000; Oughton & Strand, 2004), planning cell (Dienel, 1978), cooperative discourse (Renn, 1999; Renn, 2004), and citizens' jury (Crosby, 2003; Huitema, Van de Kerkhof, & Pesch, 2007).

These methods are based on the idea that participatory methodologies are a way to combine technical expertise and rational decision-making with public values and preferences (see e.g. Renn, Webler, Rakel, Dienel, & Johnson, 1993). This presumption reflects a sharp distinction between experts and laypeople and attributes 'technical expertise' to the domain of experts, and 'values and preferences' to the domain of laypeople. As such, these methods do not reflect the constructivist notion that knowledge ('facts') and values are strongly interwoven. Furthermore, this presumption seems to be based on the idea that conflicts arise through conflicting values and preferences. However, especially in the case of complex problems such as environmental problems, there are often many scientific uncertainties. In cases of uncertainties or knowledge gaps, scientists have to revert to assumptions in order to assess risks. Based on the assumptions made, these

assessments will differ with regard to the estimation of specific risks. As assumptions are inherently subjective, and therefore involve value-based decisions, the assessment of risks is not a value-free exercise (Kloprogge, Van der Sluijs, & Petersen, 2005). Consequently, conflicting knowledge claims are often strongly interwoven with conflicting values, and as such, conflicts can arise through conflicting values as well as through conflicting knowledge claims.

The distinction between experts and laypeople seems to reflect a perception of the problem as badly structured, rather than unstructured (see Figure 1.1). In case of a badly structured problem, there is certainty on the relevant expertise. The distinction between experts and laypeople resonates this certainty, although no such certainty may really exist. Moreover, as many differences as there may be between experts and laypeople, just as many differences may there be *among* experts and *among* laypeople. Rather that presuming which groups can contribute in what ways, the question 'who has relevant expertise and would be willing to contribute?' is more interesting. In that sense, Collins and Evans' proposal to abandon the oxymoron 'lay expertise' is quite appealing (Collins & Evans, 2002)[11]. They argue that - as the dictionary definition of 'layman' includes the meaning 'someone who is not an expert'- it makes more sense to talk about 'experts' than 'lay experts'. Lay people are experts with respect to their own problems (Mitroff et al., 1983), although the expertise of these (former lay-) experts has not been recognized by certification (Collins et al., 2002). Expertise is not restricted to technical or scientific expertise, but it can be experience-based or related to particular values or interests.

The notion that laypeople have particular expertise to offer will probably not be denied by the scholars working on the methods mentioned above. The central point is however that stakeholder dialogues on unstructured problems should go beyond the lay-expert distinction. Instead the aim should be to identify who has relevant expertise, regardless of whether he is an 'expert' or a 'layperson with expertise'.

2.4 How to deal with representativeness and stakeholder selection?

Much attention is paid in literature to the representativeness of participatory processes, "offering criticism of their frequent failure to reflect the characteristics of wider society in the groups used" (Martin, 2008). It is however rarely clear which criteria are used to judge whether a selection procedure is representative (Crawford, Rutter, & Thelwall,

11 Their proposal was part of a proposal for a 'third wave of science studies' which evoked a number of critical reactions by Jasanoff (2003), Rip (2003), and Wynne (2003).

2003: 46, cited in Martin, 2008). Representativeness in this study is understood as a stakeholder sample reflecting a balanced inclusion of the variety of perspectives that exists within the stakeholder population. Dryzek and Niemeyer (2008) refer to this as 'discursive representation'.

Random sampling

Random sampling is a common approach for dealing with representativeness in a statistical sense. Mostly, sampling is not completely random, but random within certain socio-demographic classes (random stratified sampling). This should ensure that the invited group of people is representative for the wider public in terms of socio-demographic variables, such as socio-economic class, ethnicity, age, and gender. Random sampling is originally used in quantitative research methods. These quantitative methods make use of random sampling and large sample sizes in order to ensure that the results are 'true', and not due to coincidence (using test of significance). Random sampling *combined* with large sample sizes is a means to sample a group of respondents that is (assumed to be) representative for the population. However, as opposed to quantitative survey research based on large samples, the sample numbers that are involved in participatory methodologies are in general too small to be able to achieve statistically significant results.

The question is whether a random sampling procedure based on socio-demographic variables actually reflects the diversity of perspectives of the intended stakeholder group. That is, the focus on socio-demographic variables in stakeholder sampling is based on the assumption that people who diverge in terms of socio-demographic variables will also diverge in terms of their opinions, preferences and perspectives. There is however no fundamental reason to assume that representativeness in terms of socio-demographic variables guarantees representativeness in terms of perspectives (Martin, 2008), neither does it guarantee representativeness in the electoral sense (Huitema et al., 2007; Goodin & Dryzek, 2006). Random sampling is based on the implicit assumption that relevant expertise is evenly distributed among the whole population (within socio-demographic classes). However, the notion that interests and values articulate knowledge and vice versa implies that this assumption is not correct. Particular knowledge, values and interests can be found among particular people, working and living in particular groups, institutions or part of the population (see also Collins et al., 2002; Hisschemöller, 2005; Schön & Rein, 1994).

Renn (1999: p3051) advocates the use of random sampling, not to be representative for the population, but rather "to provide an equal opportunity to all people affected

and have them decide whether they want to take advantage of this opportunity or not". He recommends random selection for four reasons: "First, random selection provides legitimacy to the process since all potentially affected persons have an equal chance to be drawn into the sample. Second, it provides an opportunity for those people who are normally underrepresented in either conventional or activist procedures of collective decision-making such as unemployed workers, retired persons, or women with small children. Third, the random selection process attracts many persons who have not made up their mind on the issue under consideration and are thus willing to engage in a mutual learning process. Last, but not least, the presence of people with non-polarized views provides a communicative atmosphere that facilitates mutual understanding and consensus seeking."

Reflecting on Renn's four reasons to advocate random sampling, a number of things can be said. First, rather than to provide an equal opportunity to 'all people affected', stakeholder dialogue as a problem structuring method requires a more specific approach to stakeholder sampling. As problem structuring involves the articulation and confrontation of divergent perspectives it is critical to *identify*, rather than *assume* that divergent perspectives are involved. Second, random sampling does no more provide "an opportunity for those people who are normally underrepresented" as non-random sampling would do. That is, if one is able to identify divergent perspectives, one might also be able to identify marginal positions and make sure that these are represented in the stakeholder dialogue. Third, the notion that values and interests articulate knowledge as well as vice versa implies that people with specific interests are included for the reason that they own a specific body of knowledge *because of their biased position*. I agree with Renn (1999) that an important criterion for selecting participants is whether people are willing to engage in a learning process in which they openly engage in an exploration of divergent options and viewpoints. It is the question however if this concerns only people who have not made up their mind yet. Lastly, the presence of people with non-polarized views, if they exist, cannot only be secured through random sampling but also through non-random sampling methods. Here, equally to the inclusion of marginal positions, a sampling procedure that is based on the inclusion of the diversity of perspectives can be a better alternative.

My impression is that Renn (1999) advocates random sampling not so much because it is the *best* method to address the above four challenges, but rather because he considers the alternatives as *worse*. An alternative is for instance self-selection: putting an advertisement to recruit participants for example. A self-selection procedure is –perhaps more than random sampling- susceptible to biases that are based on existing power relations. This refers to the participation paradox: on the one hand participation can be aimed at

empowering certain groups or interests because they are assumed to lack power, but on the other hand one needs power resources, i.e. access to relevant information and a 'voice' loud enough to get heard by the decision makers, in order to participate effectively (Seley, 1983; cited in Van de Kerkhof, 2006a). Self-selection will attract participants that are eager to participate, and it might be the case that these are the people that have a strong position with regard to the issue under consideration, and who feel the need to 'expose' their point of view and want to see it incorporated in the decision. Although this is not necessarily problematic, Renn (1999) might be right that the risk of polarized discussions is higher in processes that rely on self-selection rather than random sampling.

Sampling on the basis of actor type

Another common approach for stakeholder selection is a sampling procedure based on actor types. This procedure aims to include stakeholders that are representative in terms of affiliation, such as science and academia, NGOs, industry, government, etcetera. The critique on this type of procedure is similar to that on random sampling, as it presumes that representativeness in terms of actor types guarantees representativeness in terms of perspectives. Although there may very well be high correlations between specific actor types and specific perspectives, it is an empirical question whether actor type is a good proxy for perspective. Stakeholder sampling based on actor type might perhaps work better for participatory processes that are organized around a local issue or problem than for more complex, large-scale issues. In the case of a local issue, the issue is often more demarcated, the group of stakeholders is smaller and can more easily be identified than in the case of national or even global complex issues (e.g. a sustainable energy supply for the Netherlands). But even in small scale, local issues it remains an empirical question whether there is a high correlation between type of actor and type of perspective.

Snowball sampling

Another commonly used approach for stakeholder selection is snowball sampling. When using snowball sampling, the researcher starts with a small number of stakeholder(s), and then asks them to mention other interesting stakeholders. Snowball sampling can also be combined with an actor typology. This is for instance the case in fourth generation evaluation (Guba et al., 1989), in which first the relevant actor types are identified, and then the snowball sampling is used to identify stakeholders with diverse perspectives within an actor type. The snowball sampling methodology has some limitations. It is difficult for the researcher to know to what extent diversity is actually covered by

the method or to understand what diversity actually entails (what is the variety and balance of perspectives, and how are the perspectives different?). Another limitation of the snowball sampling method is the correlation between network size and selection probabilities (Biernacki & Waldorf, 1981): stakeholders from larger, dominant networks have a higher probability of being selected for participation than stakeholders from small, relatively marginal networks. This is problematic, given the importance of the inclusion of marginal perspectives. Hence, snowball sampling does not guarantee representativeness of perspectives. It is unlikely that snowball sampling as such results in a balanced inclusion of the variety of perspectives.

Congruent and replicable methods

An important question for stakeholder sampling methods in terms of representativeness is: how do we know whether a sampling procedure will result in a balanced inclusion of the variety of perspectives?

Representativeness requires that methods for stakeholder sampling are congruent and replicable (Dunn, 1997; 1998). 'Replicability' refers to the reliability of sampling methods. A replicable method involves "specific and readily comprehensible prescriptions for carrying out a sequence of operations" rather than "general and vague guidelines" as is the case for methods with low replicability (Dunn, 1997, p283). 'Congruency' refers to the validity of sampling methods. It means that methods should fit the level of the problem under investigation. A congruent method for stakeholder selection is based on the empirical identification of perspectives. Random sampling for example is not congruent, as it is based on invalid problem perceptions, such as an even distribution of relevant perspectives among the stakeholder population. It is important to realize that an intrinsic characteristic of unstructured problems is that the problem boundaries are not well defined and hence that it is difficult to know whether the problem boundaries have been approximated. Dunn (1997) refers to this difficult task for problem structuring as 'estimating the boundaries of ignorance'. However, this does not mean that there is an infinite number of problem elements; in fact, it has been shown that problem elements are finite. According to Dunn (1997; based on Heclo, 1976), the range of problem representations can be captured within 15-25 interviews in a specific context.

For reasons of congruency and replicability, the focus in this study is on combined qualitative and quantitative social science methods for stakeholder sampling. That is, methods with a quantitative character in general have a higher replicability than qualitative methods as they mostly involve specific prescriptions for carrying out specific procedures. The qualitative character of methods allows for staying close to the level of the

problem under investigation, for example the way respondents phrase particular ideas. The quantitative character of Q methodology for example (see chapter 6) allows for a replicable, transparent and valid statistical analysis of the diversity of perspectives, as well as stakeholders' positions with regard to the perspectives. The qualitative character of Q methodology allows participants to use their own frame, phrasing and ideas as input for the analysis, which makes the method highly congruent.

2.5 How to deal with interests in stakeholder dialogues?

This study makes a stand against a commonly accepted notion in literature on participation, which is that interests, either of individuals, organizations or sectors, should be eliminated from the participatory process. This will be illustrated on the basis of citizen participation methods such as consensus conference, planning cell, cooperative discourse, and citizens' jury.

Citizen participation methods generally presume that "each participant can contribute to the common good if the settings of the discourse encourages the generation of shared values and discourages strategic reasoning" (Renn et al., 1993; Renn et al., 1997). This perceived tension between the 'common good' and 'particular interests' resonates the idea that people make choices based on a particular interest that conflicts with collective interest: a social dilemma (Hisschemöller, 1993). Social dilemmas are characterized by two properties: 1) the payoff to each individual for behavior that is in the self-interest is higher than the payoff for behavior that is in the common interest, regardless of what other individuals do, yet 2) all individuals receive a lower payoff if all behave in their own interest rather than the common interest (Dawes, 1980). A social dilemma is based on the assumption that individuals rationally calculate the pay-offs of decision options. Following Hisschemöller's typology of policy problems (Figure 1.1), the presumption of a social dilemma reflects the moderately structured problem type, rather than the unstructured problem type. In case of a moderately structured problem, individuals act as (economically) rational actors, who weigh costs and benefits in order to make decisions. It assumes a transitivity of preferences: one can negotiate by exchanging a certain amount of value A for a certain amount of value B. It furthermore assumes that the positions of the actors are clear and known to the other actors.

The notion that citizen participation methods should discourage strategic reasoning reflects a 'Habermasian' tradition in participation. According to Habermas' theory of communicative action "actors seek to reach common understanding and to coordinate actions by reasoned argument, consensus and cooperation rather than strategic action

strictly in pursuit of their own goals" (Habermas, 1984, p86). In order to address the social dilemma, participatory processes should, according to Habermas, pursue an 'ideal speech situation': a powerless environment, with strictly egalitarian rules of discourse, in which every participant has the same status in the group, the same rights to speak, make proposals, or evaluate options (Renn et al., 1997). Rawls (1971) developed a similar 'rule of discourse'. He proposed a 'veil of ignorance' to eliminate the pursuit of individual interests. The veil of ignorance represents a procedure of reasoning without personal biases; people momentarily 'forget' who they are (their gender, profession, education, age, etcetera) in order to eliminate biases based on their personal situation.

Although some of the elements in the above line of thinking seem to hold for unstructured problems, participatory methodologies should not focus on eliminating interests (Hisschemöller, 2005). The presumption that power and status differences can be excluded from a dialogue in pursuit of rational decision-making on the common good has been questioned by literature that emphasizes the centrality of power relations (Bachrach & Baratz, 1962; Elkin, 1985; Hindess, 1996; cited in Abelson et al., 2003, Pellizzoni, 2001). This 'inability' to eliminate personal interests from a dialogue is however not the primary reason for arguing that participatory methodologies should not focus on eliminating personal interest. In fact, rather than perceiving personal interests as something that blocks a rational decision-making process, interests are a source of knowledge. The social constructivist notion that values and interests articulate knowledge claims and vice versa, stresses the interwoven character of values, knowledge and interests. Hence, not only is it difficult (or even impossible) to isolate knowledge claims from values and interests and vice versa, this notion actually implies that "stakeholders do possess specific knowledge *because* of their interested position that other stakeholders for the same reason don't" (Hisschemöller, 2005).

This brings me to the element in the 'Habermasian' line of thinking that does appear relevant for unstructured problems. Learning in stakeholder dialogues requires an *open dialogue*. Not in the sense of the ideal speech situation in which personal interests are 'switched off' and status differences do not exist, but in the sense of a situation in which stakeholders are taken "as interested persons and groups who have, not in spite but because of their biased position, specific knowledge to offer" (Hisschemöller, 2005).

2.6 Conclusion

Stakeholder dialogues should take place in an atmosphere of *constructive conflict*: a process in which participants confront each other's ideas with their own ideas, unravel argumentations, make assumptions explicit, and jointly work out new ideas for problem solving. The review of the value of diversity for and the barriers to constructive conflict has important implications for the design of stakeholder dialogues.

In facilitating a process of constructive conflict, stakeholder dialogues seem to be better off when focused on authentic rather than on artificial conflict, and on issue-related rather than on personal conflict. Furthermore, conflict needs to manageable. This means that the 'optimal cognitive distance' between divergent perspectives should be taken into account.

An atmosphere of constructive conflict is not something that happens automatically. In this chapter, it was shown that groups in general fail to get all perspectives, ideas and information on the table, thereby hampering constructive conflict. The literature review showed that this can be explained on the basis of a number of biases in communication. Groups tend to focus on shared information rather than unshared information and participants may prefer a specific type, source or phrasing of information. Methods should deal with these biases by creating an equal opportunity for all perspectives and ideas to enter and play a role in the dialogue.

This starts with stakeholder selection. Stakeholder selection should be representative in such a way that the variety of perspectives, also marginal perspectives, is included in a balanced way. The identification of relevant stakeholders should be based on an empirical analysis of the diversity of perspectives. Common sampling procedures such as random sampling, sampling based on actor type and snowball sampling are therefore not sufficient. Also, the expert-laypeople distinction is not useful for stakeholder dialogues, as this distinction is based on the assumption that the relevant experts can be identified in an objectified manner. In addition, this distinction does no justice to the heterogeneity of experts and laypeople or to the entanglement of values and knowledge. Furthermore, as particular knowledge can be found among particular people, who have particular interests, these people should be included because of their interested position. Interests cannot and should not be excluded from a dialogue.

Chapter 3

Constructive Conflict Methodology for stakeholder dialogues

Constructive Conflict Methodology for stakeholder dialogues

This chapter introduces *Constructive Conflict Methodology* as an overarching approach for the design and facilitation of stakeholder dialogues. *Constructive Conflict Methodology* relies on the use of specific social science methods to support each of the steps within the methodology. This chapter discusses a selection of methods and explains how these methods can be used within the *Constructive Conflict Methodology*.

This chapter starts by explaining the aims of the methodology in section 3.1. Section 3.2 describes the steps of *Constructive Conflict Methodology*. Section 3.3 lists a selection of social science methods that can be used to support specific steps of *Constructive Conflict Methodology* and explains why and how these methods are relevant. In section 3.4 the role of the researcher organizing the stakeholder dialogue will be discussed. The chapter wraps up with conclusions in section 3.5.

3.1 Aims of Constructive Conflict Methodology

The *Constructive Conflict Methodology* should facilitate:

1. Stakeholder selection in order to include a diversity of perspectives in the dialogue,

2. The articulation of divergent perspectives,

3. The confrontation of presumptions and knowledge claims by stakeholders with divergent perspectives.

As regards the first point, *Constructive Conflict Methodology* aims to identify stakeholders on the basis of their perspective. No assumption is made on who owns relevant expertise. Rather, this is an empirical question. This means that the first and second aim are closely related. *Constructive Conflict Methodology* aims to identify the diversity of

perspectives in a *bottom-up* fashion rather than using top-down methods for addressing diversity. This means that methods should assist the empirical identification of the classes within the diversity (i.e. perspectives), rather than assuming diversity through some kind of category system[12]. Examples of methods that assume diversity through a category system are for instance a stakeholder selection based on socio-demographic variables (see section 2.4), actor types, personality traits, or value orientations (such as cultural theory, Douglas & Wildavski, 1982; Thompson, Ellis, & Wildavsky, 1990).

The three properties of diversity (Stirling, 1998) explained in chapter 2 help to understand how the *Constructive Conflict Methodology* deals with diversity. *Variety* refers to the number of categories into which the elements can be divided. *Balance* refers to how the elements are distributed among the categories. *Disparity* refers to the degree and nature to which the categories themselves are different from each other. The *Constructive Conflict Methodology* firstly aims to cover the *variety* of perspectives that exist in the stakeholder field and make sure that *disparate* perspectives are included. Secondly, these perspectives should be equally *balanced* in the dialogue.

As regards the articulation of divergent perspectives, the emphasis is on *implicit* or *taken-for-granted* elements of perspectives, such as implicit assumptions. People are often unaware of their own perspectives, and their behavior is often guided by tacit, implicit or taken-for-granted beliefs and presumptions. By making implicit elements explicit, perspectives can be unraveled, and as such learning about how different people look at reality and how they define a problem can be enhanced. This helps to understand what a particular perspective encompasses and how perspectives differ from, and relate to one another.

Constructive Conflict Methodology aims to enhance constructive conflict by confrontation on a specific level. This means that the objects of discussion are specific technological or policy options, and that confrontation takes place on the level of knowledge claims rather than perspectives. Confrontation of perspectives will not result in a fruitful dialogue; there is no possibility of falsifying perspectives, as perspectives are the lenses through which people make sense of social reality (Schön & Rein, 1994). Confrontation of perspectives will therefore result in conflict, but not in constructive conflict. Rather, it will create a deadlock, because no one perspective is 'better' or 'more true' than another. Confrontation of perspectives will result in value-based (affective) conflict, which has been shown to be detrimental for group processes (see for example Jehn, 1995; 1997).

12 This is not to say that it is possible to avoid imposing some structure or frame on participants in a dialogue. A facilitator, researcher, or organizer for instance imposes a frame by deciding that there needs to be a dialogue on a particular issue (and not on another issue), by choosing a particular method, and by selecting stakeholders in a particular way.

It is only at the level of specific technological or policy options that people with different perspectives can 'find' each other (Grin & Van de Graaf, 1996b; Guba & Lincoln, 1989). Both articulation and confrontation enable analyzing the *disparity* of perspectives: how are they different and similar?

Constructive Conflict Methodology is based on authentic rather than artificial conflict. This means that methods that are based on artificial conflict, such as role-playing, are not considered here.[13] Furthermore, in order to manage conflict, it is emphasized that participants are not required to reach a consensus or an agreement. Another way to manage conflict is by dividing participants into smaller subgroups, each of which is chaired by an external chairperson. This chairperson should be someone who is perceived as being knowledgeable and independent, in the sense that he or she can engage openly in an exploration of competing viewpoints, and when necessary, can bridge disparate perspectives or ideas.

3.2 Constructive Conflict Methodology: Four steps

The *Constructive Conflict Methodology* consists of four steps (see Figure 3.1):

1. Stakeholder identification & selection
2. Articulation of divergent perspectives
3. Confrontation of claims by stakeholders with divergent perspectives
4. Synthesis

These steps are not necessarily taken in complete linear order or one by one. Multiple steps can take place at the same time or in an iterative fashion. This is indicated with the feedback arrows in Figure 3.1. Articulation of divergent perspectives feeds back to stakeholder selection, as stakeholder selection should be based on an identification of the diversity of perspectives. Confrontation of claims feeds back to articulation of divergent perspectives as confrontation leads to a further articulation of perspectives, for instance by surfacing assumptions. Synthesis feeds back to both the articulation and confrontation step. This is because synthesis can be used as an intermediate step in a dialogue, for instance when a dialogue consists of multiple workshops or meetings. Each workshop

13 Of course there also ways to use artificial conflict in role-playing and simulation and gaming approaches. Role-playing another person's authentic role can for instance help to improve someone's understanding of the other person's position.

can have its own synthesis, which is then used as input for the next workshop in which further articulation and confrontation can take place.

The challenging part of this methodology comprises mainly steps 1 and 2. After all, these are the steps that set the stage for constructive conflict. When a stakeholder dialogue does not include the diversity of perspectives, problem structuring is problematic and there is a risk of type III error: solving the wrong problem as a result of a limited problem perception (see section 1.2). Therefore, the identification of the diversity of perspectives and stakeholders who identify with those perspectives is critical.

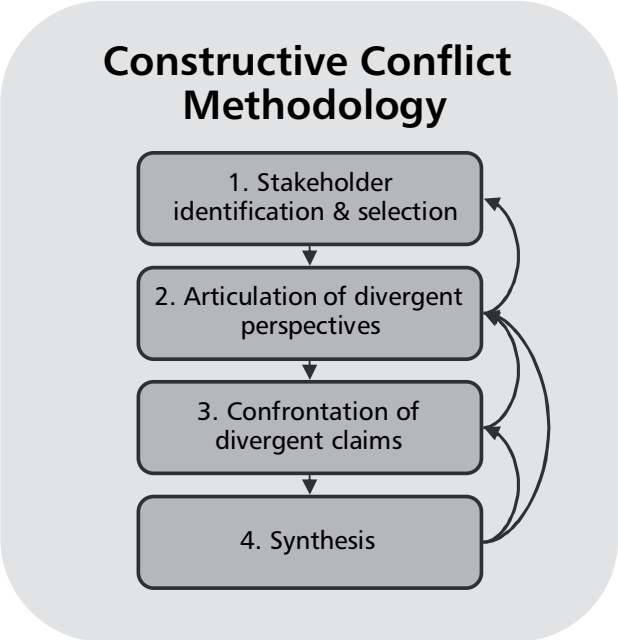


Figure 3.1 Constructive Conflict Methodology

Stakeholder identification & selection

Stakeholder selection should enable a balanced inclusion of the variety of perspectives. 'Balanced' means that each perspective is in principle, or as much as possible, present on an equal footing in the dialogue (stakeholder sample), regardless of how marginal or dominant the perspectives are in the wider stakeholder field (stakeholder population). This means that, in terms of balance between perspectives, the distribution of perspectives in the stakeholder sample does not equal the distribution in the stakeholder population. *Constructive Conflict Methodology* makes use of bottom-up methods for identifying the diversity of perspectives, which make it possible to link stakeholders to perspectives. In a sense, participants are then put in an expert role with regard to their perspective. From a study by Stasser and Titus (1985) it appears that making partici-

pants' expert roles explicit increases a group's tendency to discuss unshared information. Hence, explicitly linking people to perspectives may be useful in stimulating constructive conflict. This means that the first and second steps of Constructive Conflict Methodology are closely related. That is, both stakeholder selection and articulation of perspectives require that the perspectives are identified in the preparation of a dialogue.

In order to be able to identify the diversity of perspectives, it is important to cut across stakeholder networks. Within networks people know each other and each other's ideas, hence knowledge and perspectives are likely to be more redundant than diversified (Granovetter, 1973). It is therefore less likely that people from the same network will be confronted with new ideas or perspectives than when they discuss with people from other networks. This refers to the *disparity* property of diversity. Hence, in order to make sure that disparate perspectives are included, it is important to identify stakeholders from different networks.

Articulation of divergent perspectives

Articulation of divergent perspectives entails the identification and clarification of the *variety* of perspectives, and an initial analysis of the *disparity* of perspectives. Hence, it means answering the questions: which perspectives exist among stakeholders, and how are these similar and different? Articulation of divergent perspectives can be thought of as a process of unraveling perspectives; it should results in a clarification of knowledge claims and presumptions relating to the perspectives. Therefore, methods should be able to uncover the implicit or taken-for-granted elements of perspectives, such as implicit assumptions.

In the dialogue, articulation of perspectives takes place in homogeneous subgroups (in line with assumptional analysis, see Mitroff, Emshoff, & Kilmann, 1979; Mitroff & Emshoff, 1979). This means that participants with similar perspectives can jointly work out argumentations for specific knowledge claims based on their particular perspective.

The operationalization of perspectives depends on the specific aim, context and topic of the participatory process one is engaging in. To use the two examples that are explained in this study: in the H_2 Dialogue the aim was to explore the prospects for a hydrogen economy in the Netherlands. Diversity of perspectives was operationalized in that project as a diversity of (competing) visions of the future. In the Biomass Dialogue the aim was to develop ideas about sustainable biomass chains for the Netherlands. Diversity was articulated in terms of attitudinal 'narratives' about sustainable biomass in the Netherlands. As compared to biomass, hydrogen is a 'newer' topic and discussions

evolve mainly around future applications and technologies. As regards biomass, there is already a world market, there are strong links to the existing system, and therefore the topic is more 'in the present' than is hydrogen. Diversity of visions seems to be a relevant starting point for a dialogue on prospects of hydrogen, whereas diversity of attitudinal perspectives seems to be a relevant starting point for a dialogue on sustainable biomass chains.

Confrontation of divergent knowledge claims

The third step in the *Constructive Conflict Methodology* is the confrontation of knowledge claims and presumptions that resulted from the articulation of perspectives. Prepared by the first two steps, this is the step in which constructive conflict should now fully evolve. It involves the challenging of ideas and claims, and it should stimulate participants to engage in a process of reflection, rethinking, or frame reflection (Schön & Rein, 1994). The presumption is that when challenged to consider other, maybe even conflicting perspectives, participants will develop a better understanding of other ideas as well as their relation to their own ideas. This may either strengthen or change their own ideas.

Synthesis

Synthesis is the result of the confrontation and evaluation of divergent perspectives. It shows were similarities and differences are, and hence includes a final assessment of the *disparity* of perspectives. Depending on the aim of the participatory process, a synthesis can entail for instance an assessment of the problem that takes the different perspectives into account, or an overview of alternative options for dealing with the problem. Synthesis is a process of closing down after three steps of opening up. However, closing down does not mean that a decision has to be taken, or that an agreement or consensus has to be achieved. Neither does it mean that diversity is aggregated. After all, this would mean that relevant information (in terms of different perspectives, preferences or options) is lost. It is actually even questionable whether a definitive and coherent way to aggregate diversity can be found for this type of issues (Berkhout, Smith, & Stirling, 2003). Rather, the maximum outcome of a dialogue is an agreement on a course of action. Grin and Van de Graaf (1996b) refer to this as *congruency* of meanings. They argue that common action does not require fully shared perspectives, but only *congruent* perspectives. Congruency means that a policy option that incorporates the different perspectives can be envisaged.

Synthesis involves questions such as: what have we learned? How does the problem structure look like at this moment? Which conclusions can we draw, given or despite the divergent perspectives? Did the articulation and confrontation of divergent perspectives improve the understanding of those perspectives? Hence, it has a 'contents' component (e.g. overview of alternative options) and a 'learning' component (did the understanding of perspectives improve?), which are closely related.

Not many methods for synthesis exist that keep diversity intact. In contrast, there are numerous methods that aggregate divergent perspectives, e.g. in the form of an agreement or consensus, for instance by means of voting or averaging preferences e.g. as in multicriteria methodologies. Whereas methods for aggregation might be mainly associated with quantitative methods to average diversity[14], synthesis in the *Constructive Conflict Methodology* relies on qualitative methods and methodologies.

3.3 Methods to stimulate constructive conflict

This section discusses a selection of methods that can be used within *Constructive Conflict Methodology* to support one or multiple steps within the methodology. Each of the presented methods is able to contribute, to a greater or lesser extent, to the aims of *Constructive Conflict Methodology* as formulated in section 3.2. The methods have in common that they facilitate the elicitation of the implicit dimensions of perspectives in a (more or less) bottom-up way, with the exception of Multicriteria mapping, which is nonetheless discussed because it is one of few methods that explicitly addresses diversity.

Repertory grid technique

Repertory grid technique is a good example of a method that can be used for the articulation of divergent perspectives, and linked to that, the selection of stakeholders. Repertory grid technique has been developed in the field of psychology to analyze an individual's 'construct system', which is the way an individual makes sense of a particular issue (Kelly, 1991; Bonarius, Holland, & Rosenberg, 1981; Fransella & Bannister, 1977; Ryle, 1975). A construct system is similar to a perspective. Repertory grid technique involves individual interviews with a limited number of respondents. Respondents repeatedly

14 Aggregation is not necessarily quantitative, but can also take place in qualitative terms. Stirling (2006) states that there are different types of aggregation of divergent perspectives: 1) a mechanistic fix: a final precise collective picture of option performance, 2) a heuristic frame: an envelope spanning the range of actual positions, 3) a focus for settlement by subsequent deliberation of an overall collective view, 4) establishment of an anchor for reconsideration and aid to negotiation of individual perspectives.

compare triads of elements and are asked to specify some important way in which two of the elements are similar and different from the third (Fransella et al., 1977; Jankowicz, 2004). The method is both qualitative and quantitative by nature. This makes it possible on the one hand to statistically analyze the disparity of perspectives, i.e. how different perspectives are. On the other hand, the qualitative elements of the methods make it possible to interpret perspectives and their differences on the basis of respondents' open answers. Repertory grid technique hardly involves any steering by the researcher. Chapter 4 presents a detailed description of the method and an empirical analysis in a stakeholder dialogue on the prospects of a hydrogen economy in the Netherlands.

Q methodology

Also Q methodology is a good example of a method that can be used for the first two steps of *Constructive Conflict Methodology*. Q methodology was developed originally to study people's subjectivity (Stephenson, 1935; Brown, 1980). As such, it can be used to analyze the range of perspectives on a particular issue. Q methodology involves individual interviews with a limited number of respondents. Respondents are asked to sort a set of subjective statements on a particular issue. Q methodology is both qualitative and quantitative by nature. This makes it possible to statistically analyze the diversity of perspectives. Q methodology is a bottom-up method to identify the diversity of perspectives: the perspectives emerge from the quantitative data and are interpreted on the basis of qualitative data from the interviews. Importantly, Q methodology allows for a statistical analysis of stakeholders' positions with regard to the identified perspectives. This enables a stakeholder selection procedure on the basis of perspectives. Chapter 6 presents a detailed description of Q methodology and an empirical analysis of Q methodology for the first two steps of *Constructive Conflict Methodology* in a stakeholder dialogue on energy options from biomass in the Netherlands.

Policy Delphi

The (classical) Delphi method was originally invented "to overcome undesirable effects of group interaction while retaining the positive effects of interactive group judgments" (Van Dijk, 1990). The method explicitly aims to deal with the communication biases explained in chapter 2, in particular the bias of source, by having participants contribute anonymously to the process. A Policy Delphi (see e.g. De Loe, 1995) is different from the classical Delphi, in that it does not focus on consensus or agreement on judgments, but on the underlying assumptions and argumentations that cause divergent judgments. Policy Delphi can serve a number of objectives (Turoff, 1970), of which the most relevant

for the *Constructive Conflict Methodology* are to "determine or develop a range of possible alternatives", and to "explore or expose underlying assumptions or information leading to differing judgments". According to Turoff (1970: 84) the main objective is to "generate the strongest possible opposing views on the potential resolutions of a major policy issue", which hinges strongly on the disparity property of diversity. In a number of sequential rounds, participants anonymously give their estimation of the probability of a certain event to happen. They also give a short argumentation for this estimation. After each round, divergent estimations are read and discussed by the participants, after which they can adjust their initial estimations. This takes place a couple of times. The Policy Delphi can be a useful tool to uncover hidden assumptions. As such, it is a method to articulate divergent perspectives. It does so by confronting different estimations of the event to happen in order to generate the range of views on alternative directions for problem solving, which may be interpreted as a synthesis. Policy Delphi hence can be used for steps 2, 3 and 4 of *Constructive Conflict Methodology*. It does however not include any guidelines or procedures for stakeholder identification and selection.

Value focused thinking

Value-focused thinking was developed as a method to stimulate creativity in decision-making (Keeney & Raiffa, 1976; Keeney, 1997). The method is based on the idea that values should be the primary focus of decision-making, rather than the generation and evaluation of alternatives. The assumption behind this is that alternatives serve only as means to values (Keeney, 1994). Value-focused thinking aims at making (implicit, and often unconscious) values explicit. It starts with the construction of a value tree and then looks at the implications of these values for the selection of alternatives. The elicitation of values and the construction of a value-tree are useful elements for step 2 of *Constructive Conflict Methodology*: the articulation of divergent perspectives. As regards the properties of diversity, this method mainly addresses the variety of values, rather than disparity and balance.

Cognitive mapping

Like the Repertory Grid Technique, Cognitive mapping (Axelrod, 1976; Kitchin, 1994) is based on Kelly's construct psychology (Kelly, 1991). Cognitive mapping is a method to generate, structure and visualize information (constructs), in order to enhance a discussion of complex problems and their solutions. It can for instance represent causal relations between constructs. The tool can be used to articulate hidden assumptions and as such is relevant for step 2 of *Constructive Conflict Methodology*: the articulation

of divergent perspectives. It depends on the procedure and the type of cognitive map whether attention will be paid to conflicting positions. If so, it may also be relevant for step 3 of *Constructive Conflict Methodology*: the confrontation of divergent perspectives. The method mainly deals with the variety property of diversity. It may also give some information about the disparity of perspectives when the relations between elements in a cognitive map are made explicit.

Multicriteria mapping

Multicriteria mapping (Stirling et al., 2001) is a specific variant of a participatory multicriteria procedure (e.g. Roca, Gamboa, & Tàbara, 2008). It is developed as a heuristic tool to explore the main dimension of a risk issue, and to establish the key characteristics, relationships and relative importance of those issues. As opposed to the regular multicriteria procedures, multicriteria mapping does not result in one outcome based on the individual inputs, but in showing diversity of these inputs. This means that also subjective and qualitative aspects, such as the framing of uncertainties, can be dealt with in a relatively open, systematic and pluralistic way (Stirling et al., 2001). Besides an elicitation element, it also includes other steps: problem framing, option scoping, criteria elicitation and option appraisal (and so does Deliberative Mapping, which is a combination of Multicriteria mapping and stakeholder decision analysis, see Burgess et al., 2007). In that sense, it seems to cover multiple steps of the *Constructive Conflict Methodology*.

Multicriteria mapping is discussed here because it is one of few methods that explicitly aims to address diversity (variety, disparity and balance) and as such is very interesting. However, it does not completely fit the requirements for methods as imposed by the *Constructive Conflict Methodology*. More specifically, it does not elicit underlying, implicit, or taken-for-granted dimension of perspectives, but rather the more explicit elements for the appraisal of policy options. The procedure of Multicriteria mapping allows participants to decide on the options and criteria to include in the analysis, which is a bottom-up feature. However, by asking participants which criteria they think are important to appraise the options, the focus is on *explicit*, rather than *implicit*, i.e taken-for-granted, criteria[15]. Implicit criteria would be derived from, or emerge from an evaluation, as is for example the case in Repertory grid technique and Policy capturing (see below). This procedure seems to be based on two assumptions. Firstly, the assumption that appraisal in the human mind is a structured process that starts with the definition

15 In Stirling and Mayer's (2001) study on genetically modified crops participants mentioned criteria such as 'sustainability', 'precaution', and 'efficiency', which are rather obvious criteria to start from when asked to judge genetic modification. I would expect that other (or additional) criteria would have been found when people were not asked to mention criteria, but rather to evaluate different cases, and see which (taken-for-granted) criteria are then used to evaluate the cases.

of criteria, which are subsequently used to judge several options. This suggests that people rationally calculate the pay-offs of decision-options in order to make their decision or to determine their preferences. This is however not always the case (Wilke, 1989, 1990, 1991 cited in Hisschemöller, 1993). But more importantly, it suggests that the categories for appraisal (criteria) are *clear* to the participant[16], which is, especially in the case of complex, multifaceted issues doubtful.

Although this tool seems not to address the 'right' diversity (not the implicit dimensions) for the aim of problem structuring and the generation of new insights, it might be a useful tool when there is more interest in *explicit*, rather than implicit dimensions of perspectives. For instance, in a negotiation process it might be useful to focus on explicit categories; after all, explicit categories are negotiable because everyone knows them (although they may be interpreted differently!).

Policy capturing

Policy Capturing (Hobson & Gibson, 1983; Zedeck, 1977; see also Slovic & Lichtenstein, 1971) is a method that has some similarities to multicriteria methodologies. Although not completely bottom-up in its methodology, it focuses (more than multicriteria mapping) on implicit elements of perspectives.[17] It can be used for the second step of *Constructive Conflict Methodology*: the articulation of perspectives. The method aims to examine how individuals use the information available to them when making evaluative judgments. It starts with a series of performance profiles, consisting of scores on the major dimensions of performance. These dimensions have been defined beforehand, so they are not identified in a bottom-up fashion. Examples of dimensions of energy performance profiles could for instance be energy-efficiency, CO_2-reduction, cost, impact on landscape, impact on employment, extent of self-supportiveness, payback time, impact on food supply, external effects, et cetera. A series of profiles is then composed that each combines different values for each dimension. Participants then read the profiles and assign ratings to the profiles. A statistical analysis (multiple regression analysis) is used to compute the relative importance of each single dimension in determining overall ratings. Hence, the importance of dimensions, expressed as weightings of criteria, emerges from the data. This is different from a multicriteria methodology, in which the weightings of criteria are defined by the respondent. The statistical equation that results

16 Stirling & Mayer (2001) note hat participants could add criteria during the interview. So, it is not that the list was fixed, which means that there was a possibility to deviate from the initial categories/criteria. Participants were furthermore asked to explain 'in as much detail as possible what each individual criterion meant to them'. This requires, or seems to assume, rather well worked-out appraisal structures.

17 According to Hitt & Tyler (1991), it actually allows for an assessment of 'theories-in-use' as opposed to 'espoused theories of action'.

from the multiple regression analysis is defined the 'captured rating policy' for that individual. Hence, the word 'policy' in the title of the method refers to an individual judge's decision-making policy.

When data of multiple 'captured rating policies' are grouped and analyzed by means of statistical clustering techniques, the method can also be used to analyze whether there are systematic differences within groups (Hobson et al., 1983). This would allow for assigning 'people to policies' and as such it can be used as a method to select stakeholders on the basis of their policies, i.e. perspectives. This might also be a good way to feed the results of the method into the stakeholder dialogue, since it not only shows variety of perspectives, but also disparity and balance.

Dialectical methodology

The dialectical methodology (Mason, 1969; Mason and Mitroff, 1981) was developed to stimulate people to challenge assumptions. The dialectical methodology attempts to make optimal use of conflict as a problem formulation strategy for handling ill-structured problems (Mitroff et al., 1973). First the prevailing strategic plan or option is identified. This plan or option is the thesis. Next, a counterplan, or antithesis, is identified which rests on assumptions that conflict the assumptions of the thesis. Deliberation takes place to surface and test strategic planning assumptions. Hence, it can be used for steps 2 and 3 of *Constructive Conflict Methodology*, as it aims to articulate divergent perspectives through the confrontation of divergent knowledge claims.

Assumptional analysis was developed as a specific dialectical methodology for dealing with ill-structured organizational issues (Mitroff et al., 1979; Mitroff & Emshoff, 1979). Assumptional analysis is based on the idea that the articulation and confrontation of competing viewpoints is necessary for learning about complex problems and, as such, comes closest to *Constructive Conflict Methodology*. Assumptional analysis is based on the idea of a dialectic: the confrontation of two (or more) competing strategies should give a better understanding of "the critical role that the postulation of very different assumptions about the nature of the problem plays in its basic definition" (Mitroff et al., 1979: p584). Assumptional analysis consists of three steps which resemble the steps of *Constructive Conflict Methodology*: 1) formation of different groups, 2) assumption surfacing, 3) dialectical debate between group policies and synthesis. The focus on competing strategies implies that there should be clearly identifiable alternative strategies (problem solutions) for which assumptions can be surfaced. This is illustrated by the example that Mitroff and Emshoff (1979) discuss in their article (see also Mitroff et al., 1979). The example concerns a drug company faced with a major pricing policy

decision on an important product. Three groups of managers within the firm had a different policy with respect to the pricing of the drug: one group was in favor of high pricing, one group in favor of low pricing, and one group in favor of a mid-price. "Each group was making, unbeknownst to themselves and to the others, very different macro assumptions regarding important stakeholders and had very different detailed micro-assumptions about the problem" (Mitroff et al., 1979: p6). For unstructured problems it is however rarely evident who the relevant stakeholders are and moreover, stakeholders are often searching for their position and for ways to deal with the issue. As a consequence, it may be difficult to identify a set of competing strategies and to identify stakeholders that support or oppose those strategies. Hence, assumptional analysis is about strategy testing, whereas *Constructive Conflict Methodology* is about strategy seeking, as there may not (yet) be clearly identifiable strategies for dealing with the issue.

There has been a debate in the literature about whether either the dialectical approach or the *devil's advocate methodology* is better in generating assumptions and recommendations for strategic problems (Cosier, 1978; Cosier, Ruble, & Aplin, 1978; Cosier & Aplin, 1980; Cosier, 1983; Mason et al., 1981; Mitroff, 1982b; Mitroff, 1982a; Schwenk et al., 1980; Schwenk, 1982). The devil's advocate methodology also aims to confront competing ideas in order to stimulate constructive conflict. However, unlike the dialectical approach it does not make use of diametric sets of plans and assumptions, but of critiques of single sets of plans and assumptions (Schweiger et al., 1986). This means that a plan is developed, and the devil's advocate plays an adverse of the plan and constructively criticizes this plan. The devil's advocate attempts to determine what is wrong with the plan and why it should not be adopted (Cosier, 1978; Schwenk et al., 1980). The idea is that the critiquing process leads to a higher quality of plans. While Cosier and colleagues claim a devil's advocate methodology is superior, Mason and Mitroff reserve that position for the dialectical methodology. Differences between their (empirical) findings and arguments seem to revolve mainly about operationalization and conceptualization of both methods, and inadequate experimental tasks (Schweiger & Finger, 1984). The claim of Cosier and colleagues that a devil's advocacy methodology is better in generating assumptions and recommendations for strategic problems seems to be incongruent with the finding from Nemeth and colleagues (2001), who show that constructive conflict benefits more from someone holding an authentic minority viewpoint (which is the case in dialectical methodology) than from someone role-playing a devil's advocate. This even appeared to be the case when the devil's advocate advocated an authentic position, i.e. his or her own opinion. Merely the fact of being assigned the role of devil's advocate made a difference in their study. The devil's advocate is however operationalized differently in the studies of Cosier and colleagues and of Nemeth and colleagues. In the study of Nemeth et al. the devil's advocate is one of the members in

the decision-making group. In the studies of Cosier and colleagues the devil's advocate is not a group member, but the respondent receives a written recommendation from an expert, which is critiqued (also on paper) by another expert (the devil's advocate). Hence, incongruence may have to do with differences in operationalization, as explained by Schweiger and Finger (1984).

Constructive Conflict Methodology involves the confrontation of divergent perspectives of stakeholders who participate in the dialogue. The situation is therefore comparable to the situation in the study by Nemeth et al. (2001), in which the devil's advocate is a group member. In a dialogue, constructive conflict takes place in an interactive setting in which participants challenge each other's assumptions and ideas and not through written critiques or counterplans of external advisors. Nemeth et al. showed that in such situations constructive conflict benefits more from authentic conflict than role-played conflict, even when dissenters agree with the advocated position. For this reason, devil's advocate methodology does not appear a relevant method for *Constructive Conflict Methodology.*

Toulmin model of argument

Toulmin was interested in the question whether assertions and opinions concerning all kind of topics can be rationally justified. The Toulmin model of argument (Toulmin, Rieke, & Janik, 1979; Toulmin, 2003) distinguishes six elements that together form an argument. The 'claim' (C) is the conclusion of the argument. The claim is based on information ('datum', D), the basis on which the conclusion can be drawn. The 'warrant' (W) justifies the step from information to claim and is backed by a 'backing' (B). The 'qualifier' (Q) indicates the probability of the claim. The 'rebuttal' (R) states the condition in which the claim does (not) hold. Originally not meant as such, the Toulmin model of argument layout can be used as a tool for eliciting arguments (see Dunn, 2004; Dunn, 1982; Fransen, forthcoming). As such it can be used for step 2 of *Constructive Conflict Methodology*: the articulation of divergent perspectives. It can support participants in a dialogue to work out argumentations for a specific viewpoint. It can also be used for step 3 of *Constructive Conflict Methodology*: the confrontation of divergent perspectives. When used to map conflicting arguments, this model can show how people arrive at different claims based on the same assumptions or, the other way around, how people arrive at similar claims based on different assumptions. As regards the confrontation of divergent perspectives, the rebuttal is an important element in the model as it challenges claims by stating the instances in which a claim does not hold.

Backcasting

Backcasting was developed as an alternative approach to forecasting and planning methods (Robinson, 1982; Robinson, 2003). As a "backwards-looking-analysis" (Lovins, 1976) the methodology aims to answer the question how desirable futures can be achieved. Instead of forecasting how the future will look like, it starts from a desirable future situation, and then works backwards to the present in order to analyze the feasibility of that future situation and in order to identify the policy measures that are needed to attain the future situation. As such, backcasting is aimed to stimulate out-of-the-box thinking, whereas forecasting techniques may be based more on business-as-usual scenarios. Backcasting was originally not developed as a participatory approach. Participatory approaches to backcasting pay more attention to defining the future scenario itself, whereas traditional backcasting tends to take the desired future scenario for granted. Through an iterative process in which the future scenario is developed, stakeholders can learn about what is desirable through confrontation with the consequences of specific initial preferences (Robinson, 2003).

Backcasting is not an exemplary method for one or multiple steps of *Constructive Conflict Methodology*. It does not comprise elements that explicitly deal with the articulation or confrontation of divergent perspectives. It should be thought of as an approach rather than a method (Dreborg, 1996), which can be interpreted and applied within the context of *Constructive Conflict Methodology* and which itself can make use of methods to support the bakcasting process. Backcasting was applied in both of the empirical cases described in this study. In the H_2 dialogue, backcasting was used in three subgroups that were formed on the basis of three competing alternative visions of the future. After the subgroups had worked out their future visions and scenarios by means of backcasting, the scenarios were confronted in order to challenge participants' ideas and to come up with improved insights (see Chapter 4). As such, backcasting was used for the articulation and confrontation of competing hydrogen visions. In the Biomass Dialogue, backcasting was applied to identify opportunities and obstacles for sustainable biomass chains, and to formulate strategies to seize opportunities and to overcome obstacles (see Chapters 5 & 7). The backcasting exercise was part of the synthesis phase, in which the aim was to come up with shared ideas about strategies. So rather than articulating or confronting divergent perspectives on future scenarios, backcasting was used in the Biomass Dialogue to synthesize divergent perspectives into shared ideas about how to proceed with biomass options in the Netherlands. These two examples show that backcasting may support *Constructive Conflict Methodology*, but that its use depends on the way it is applied and the methods with which it is combined within a dialogue.

Reporting

So far, the methods discussed in this section covered mainly the first three steps of *Constructive Conflict Methodology*. Some of the methods mention synthesis as the result of the procedure, such as dialectical approach and policy Delphi, but none of them describes a specific procedure for achieving synthesis. Although reporting may not look like a very sophisticated method, it is an indispensable tool for achieving synthesis in a stakeholder dialogue. A synthesis report focuses on the questions such as: What have we learned? How does the problem structure look like at this moment? Which conclusions can we draw, given or despite the divergent perspectives? Did the articulation and confrontation of divergent perspectives improve the understanding of those perspectives? A dialogue that consists of multiple workshops needs reporting in between the workshops. Interim reports are needed to feed the results of a workshop into the next workshop. A final synthesis report can for instance take the form of a policy document. This report can either be written by (a delegation of) the participants or the researchers organizing the process (or a combination of both groups). The advantage of the former option is that participants will probably feel more responsible and accountable for the conclusions. This might lead to more commitment to the conclusions of the stakeholder dialogue. The advantage of the latter option is that the researcher is in a position that is less 'in the middle' of the discussions. He might therefore be better able at overseeing the main issues, which might make integration and synthesis an easier task. The report is then a synthesis of what the researcher 'heard' from the participants throughout the process, and can be based on interim reports, transcripts or tapes. Of course, this is not an objective report, but it is guided by the frame and perspective of the researcher. This is not problematic, as long as the researcher is clear about this. An iterative process can be started to check whether the interpretations and analyses of the researcher resonate the ideas of the participation (as in fourth generation evaluation, see Guba et al., 1989).

The synthesis step is also the stage in which the results are communicated to relevant others. Besides the synthesis report, also newspaper articles, presentations etcetera can be used for this. Communication is not only an activity that is intentionally undertaken by the organizers, but it also takes place (throughout the process) when participants talk to others about their experiences in and the findings of the stakeholder dialogue.

3.4 The researcher

Constructive Conflict Methodology is not a silver bullet for stimulating an open dialogue and enhancing learning in a stakeholder dialogue. The success of the methodology obviously depends on the way and the context in which it is applied. Of course there are

limits to what methods can do, and one important limit relates to the fact that methods are not humans: they lack sensitivity to contingencies. The role of the researcher (organizer) should therefore not be neglected.

On the one hand, the researcher needs to have an open attitude, in the sense that he does not take a position in favor of specific perspectives, options for problem solving, or specific stakeholders. In that sense, it may be argued that a researcher needs to be 'blank' with regard to the issue under consideration: he or she should have no prior knowledge of, or experience with the issue under consideration as this may bias the researcher's role and position in the dialogue. On the other hand however, it may be argued that the researcher should have knowledge of the issue under consideration, because otherwise he cannot understand what is being said. One needs to have knowledge on the dominant perspectives in order to know what a marginal perspective is for example. As a consequence stakeholder selection and facilitation of the process can be quite difficult. This raises a dilemma.

My 'solution' to this dilemma would be a combination of both arguments. It does not make sense to say that a researcher should be completely 'blank' with regard to the issue under consideration, if only because 'unbiased' minds do not exist. Taking this into consideration, the argument that one needs background knowledge in order to assess the diversity and marginality of perspectives outweighs the argument that one needs to be blank in order to be 'unbiased'. As a researcher, you reflect on what you hear participants say, and give this back to the group. It is helpful to have some knowledge and background on the issue in order to do this in such a way that participants feel they are being heard and taken seriously, and to not overlook issues because you did not understand them. Acknowledging that an 'unbiased' mind does not exist, it is at the same time still of critical importance that the researcher has an open attitude and is committed to give each participant an equal opportunity to do his or her say. So, although the researcher may have personal preferences for particular topics to be discussed, for specific decision-options or even for specific participants, he or she should not behave accordingly (unless it is in the interest of the dialogue, for instance when a particular position or person is being neglected). It should be recognized that this does not really 'solve' the dilemma stated above. Rather, it rephrases the dilemma into the question how the researcher, having background knowledge on the issue, should balance between on the one hand being open-minded and behaving 'unbiased' and on the other hand intervening in the dialogue, for instance to make sure that particular viewpoints gain sufficient attention.

3.5 Conclusion

This chapter introduced *Constructive Conflict Methodology* as an overarching approach to the design of stakeholder dialogues. *Constructive Conflict Methodology* aims to stimulate an atmosphere of constructive conflict by the articulation of divergent perspectives, and the confrontation and evaluation of knowledge claims based on these perspectives. In doing so, it focuses on the implicit dimension, or taken-for-granted elements of perspectives. It aims to address diversity in a bottom-up fashion rather than a top-down fashion (i.e. assuming which categories can be used to cover diversity). Furthermore, it is based on the notion that constructive conflict should be enhanced, not by confronting perspectives on an abstract or generic level, but on a specific level. Hence, the objects of discussion are specific technological or policy options.

Constructive Conflict Methodology aims to enhance constructive conflict on the basis of four steps. The first step is stakeholder identification and selection. The selection of stakeholders should represent the variety of perspectives that exist in the stakeholder field, and include them on an equal footing (i.e. balance them) in the dialogue. Emphasis is on the inclusion of marginal perspectives as these have a larger 'learning effect' than well-known, or dominant perspectives. Furthermore, one should make sure that different networks are cut across, as this increases the chance that people are faced with new ideas or perspectives. Stakeholder selection is closely related to the second step of *Constructive Conflict Methodology*, articulation of divergent perspectives, which is aimed at unraveling perspectives and making claims and assumptions explicit. Both stakeholder selection and articulation of diversity require the identification of perspectives in the preparation phase of a dialogue. Relevant methods are those that enable a bottom-up identification of the diversity of perspectives and that enable linking stakeholders to the identified perspectives. Q methodology is a good example of a method that is able to do so, and as such is a promising method for stakeholder selection and articulation of diversity. Also repertory grid technique and policy capturing can be used for the first two steps of *Constructive Conflict Methodology.* These three methods have in common that they are (partly) quantitative. Repertory grid technique and Q methodology will be applied and discussed in chapter 4 and 6 respectively.

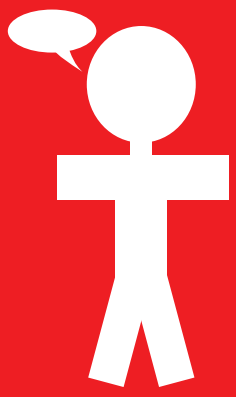
Methods that are relevant for the second step of *Constructive Conflict Methodology*, but that do not easily allow for a combination with stakeholder selection, are policy Delphi, value-focused thinking, cognitive mapping, dialectical methodology and the Toulmin model of argument. These methods have in common that they facilitate the surfacing of implicit elements of perspectives, such as assumptions, values and arguments. Two of these methods also include confrontation between competing viewpoints: policy Delphi

and dialectical methodology. Confrontation is used in those methods to articulate claims or viewpoints. This is relevant for step 3 of *Constructive Conflict Methodology*. This step involves the challenging of ideas and claims, and stimulates participants to engage in a process of reflection and rethinking. Also the Toulmin model of argument can be used for this step. It can be used to show how people arrive at different claims based on the same assumptions or how people arrive at similar claims based on different assumptions. To a lesser extent, also cognitive mapping can be used for step 3 of *Constructive Conflict Methodology.* When it takes competing viewpoints into account it can be used to unravel the cognitive maps belonging to those viewpoints.

The last step of the *Constructive Conflict Methodology* is synthesis. Synthesis includes a final assessment of the disparity of perspectives. Synthesis is not supposed to aggregate diversity. Depending on the aim of the participatory process, a synthesis entails for instance an assessment of the problem that takes the different perspectives into account, or an overview of alternative options for dealing with the problem. At most, synthesis results in a shared course of action that incorporates the various (non-aggregated) perspectives. Synthesis relies on qualitative methods such as reporting. A synthesis report is a reflection of what is being discussed by the participants and can for instance take the form of a policy document. Synthesis is the first step of the implementation trajectory that may start after the dialogue.

Chapter 4

Repertory Grid Technique to articulate divergent perspectives in the H_2 Dialogue



Repertory Grid Technique to articulate divergent perspectives in the H_2 Dialogue[18]

In chapter 3 it was argued that the challenges for the *Constructive Conflict Methodology* mainly concern the development and application of methods with regard to the first and second step ((stakeholder identification & selection and articulation of divergent perspectives) of the methodology. This chapter shows how *Repertory grid technique* (RGT) can be used as a method to articulate diversity within the *Constructive Conflict Methodology* (step 2, see Figure 4.1). RGT was used in a stakeholder dialogue on the prospects for a hydrogen economy in the Netherlands 1) to identify the *variety* of concepts that stakeholders use in order to frame future hydrogen visions, and 2) to analyze *disparity* of ten future hydrogen visions in order to identify three most different visions that were to be used to structure the dialogue.

Section 4.1 will first describe the case in which RGT was applied: the H_2 Dialogue. Section 4.2 will discuss the aim and procedure of RGT and its application in the H_2 Dialogue. In section 4.3 the results of the application of RGT in the H_2 Dialogue will be discussed. Section 4.4 discusses how the results of RGT were used in the H_2 Dialogue. Finally, the chapter will wrap up with conclusions and discussion in section 4.5.

18 This chapter is based on: van de Kerkhof, M., Cuppen, E., & Hisschemöller, M.(2009). The repertory grid to unfold conflicting positions: The case of a stakeholder dialogue on prospects for hydrogen. Technological Forecasting and Social Change, 76, 422-432.

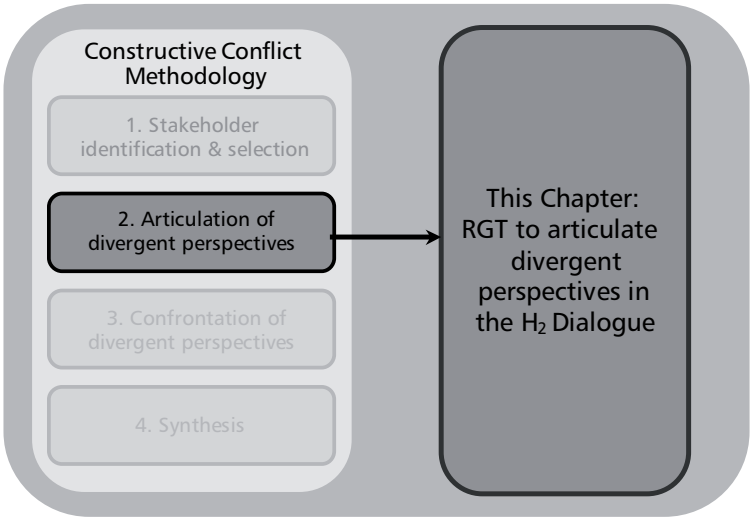


Figure 4.1 This chapter discusses how Repertory grid technique can be used for step 2 of Constructive Conflict Methodology

4.1 The H_2 Dialogue

The H_2 Dialogue is a stakeholder dialogue that was set up in order to explore the possibilities of a hydrogen economy for the Netherlands (in an international context), and to explore what kind of strategies and interventions can be developed to stimulate the transition towards a hydrogen economy in the Netherlands[19]. More specifically, the aim was formulated as: "To investigate to what extent, and under which conditions, hydrogen is a viable option to make the energy system in the Netherlands more sustainable; what kinds of hydrogen options would be most interesting for the Netherlands; and which strategies are needed to implement these options". The dialogue did not take a predisposed position towards hydrogen but intended to be an open process in the sense that also non-hydrogen scenarios were taken into account.

The H_2 Dialogue ran from 2004-2008. The dialogue consisted of an extensive preparation phase and a series of six workshops. These six workshop took place in a time span of 1,5 years. In the preparation phase of the dialogue, 60 interviews were conducted with stakeholders: representatives of business, industry, government, academia and NGOs in the Netherlands (and a few in Belgium). In the identification of respondents, the project

19 It concerns the project 'H_2 Dialoog' (2004-2008), see http://www.h2dialoog.nl. This project is supported by the research program 'Advanced Chemical Technologies for Sustainability' (ACTS) of the Netherlands Organization for Scientific Research (NWO) (see http://www.nwo.nl/acts), and works together with the project PROFILES in the research program 'Investing in Knowledge Infrastructure' (BSIK), Climate *Changes* Spatial Planning, IC8, see http://www.klimaatvoorruimte.nl).

team aimed to ensure that a diversity of perspectives on the prospects of hydrogen was included, by making use of snowball sampling and through newspaper articles and websites. In the interviews, stakeholders were asked which elements a future vision on hydrogen should include and how 'their' desirable future vision on hydrogen looks like. Ten hydrogen visions were derived from the interviews, which, by making use of RGT, were reduced to three after the kick-off workshop (see section 4.3). Based on these visions, three groups of stakeholders were formed. The number of three was chosen for reasons of feasibility and manageability. In the second workshop the three groups explored in parallel sessions how the three visions could be realized by means of a backcasting exercise. In the third workshop the three groups used the results of the backcasting exercise to formulate a strategy, including both technological and governance components (strategy workshop). In the fourth and plenary workshop the three strategies were confronted and discussed among the groups (confrontation workshop). Subsequently, in the fifth workshop (conclusion workshop) the three groups met in parallel sessions to refine their strategies based on the results of the confrontation workshop, and to formulate short-term actions, recommendations, and initiatives. The H_2 Dialogue concluded with a plenary integration workshop, which aimed at analyzing to what extent it is possible and desirable to develop one hydrogen strategy for the Netherlands. The set-up of the dialogue is visualized in Figure 4.2. For an elaborate description of the results and outcomes of the H_2 Dialogue I refer to the final report of the H_2 Dialogue (Hisschemöller, Bode, Van de Kerkhof, & Stam, 2007).

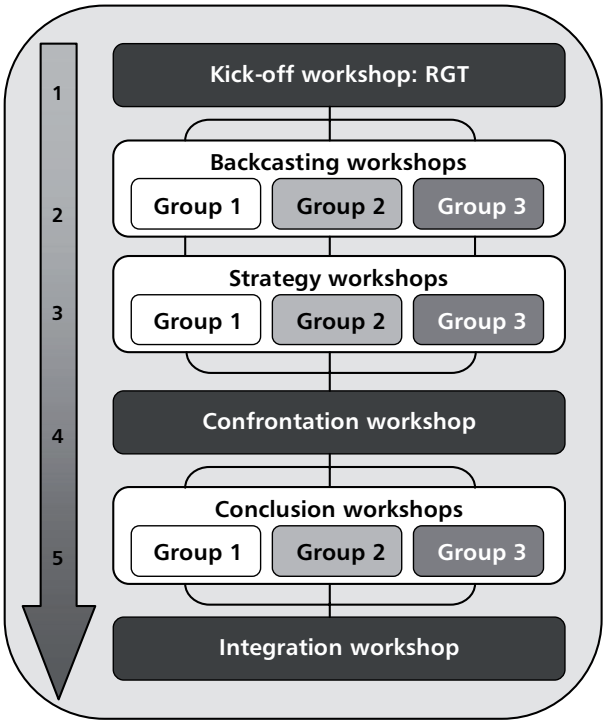


Figure 4.2 Set-up of the H2 Dialogue

The *Constructive Conflict Methodology* (chapter 3) was not fully developed by the time of the H_2 Dialogue and as a consequence the four steps of *Constructive Conflict Methodology* were not taken explicitly as starting points for the design of the dialogue. However, the design of the dialogue shares the basic rationale of the *Constructive Conflict Methodology*. That is, the H_2 Dialogue was based on the notion that a process of opening-up is fruitful for learning, and that confrontation of divergent perspectives can enhance an atmosphere of constructive conflict. There was also a strong emphasis on argumentation. The way in which diversity was addressed in the H_2 Dialogue was however slightly different from the *Constructive Conflict Methodology*. Rather than articulating the *variety* of perspectives and involving these in a *balanced* fashion in the dialogue, the H_2 Dialogue focused on the articulation of *disparate* (most different) perspectives (i.e. three particular visions of a hydrogen-future) in the dialogue.

Hydrogen as an unstructured problem

Most policy makers and scientists agree that the current energy system has a number of unsustainable characteristics, such as the depletion of fossil energy sources, the dependency on oil from politically instable regions, the emission of greenhouse gasses, air pollution and so on. Hydrogen is mentioned as one of the potential solutions to these problems.

Many see hydrogen as a promising energy carrier that, when combined with a fuel cell that converts hydrogen into energy, can reduce significant amounts of greenhouse gas emissions (Lovins, 2004). The only emission from a hydrogen-fuel cell is water (H_2O). However, as opposed to coal or oil, hydrogen cannot be extracted from the earth, but needs to be produced. Dependent on the energy source that is used to produce hydrogen, the emission of greenhouse gases is reduced to a larger or smaller extent. When produced from sustainable energy sources (wind, solar, biomass) the production of hydrogen is obviously emitting less greenhouse gas emissions than when it is produced from fossil fuels. However, producing hydrogen from fossil fuels and storing carbon underground, is also seen as a promising option by some (Bleischwitz & Fuhrmann, 2006). Hydrogen has multiple applications. It can be applied in transport (cars), as well in the stationary sector (electricity for e.g. household usage). The 'hydrogen economy' (Rifkin, 2003), its elements and the way to get there are complex. Scientific uncertainties are high, most applications are still on a laboratory scale, and (further) technological innovation is needed to broaden and upscale applications. Also the stakes of different actors in the energy field are high, and not necessarily in line with the idea of a hydrogen economy.

There are many different views, ambitions, and expectations in both the science and the policy domain on the potential role of hydrogen as an energy carrier in the future energy system, the time frame in which this can be realized, the infrastructure that is needed for this, the energy sources that should be used to produce hydrogen, etcetera. These viewpoints are based on different assumptions about cost effectiveness, availability of alternatives, incentive structures, pace of technological innovation, and so on. The unstructured character of the issues makes it difficult to develop a clear insight into the actual state of affairs and the alternative hydrogen pathways, which is needed as a basis to develop energy policy. What is more, many of the different views and assumptions are hidden below the surface of a discourse, which is either quite optimistic about the hydrogen future (whenever this may come) or overly skeptical. A mainstream pro-hydrogen position holds that hydrogen is most likely to break through in the transport sector with the introduction of the hydrogen fuel cell vehicle, since the advantages of hydrogen vehicles compared to conventional vehicles are most salient. This position is held by the major stakeholders united in the European Union Technology Platform on Hydrogen, as well as by the American, Japanese and European car manufacturers, who all expect to be ready for commercial introduction of the hydrogen fuel cell vehicle somewhere between 2015 and 2020.

Aim of RGT in the H2 Dialogue

The application of RGT arose from the need for a structured approach to the articulation of diversity that is able to ensure that each person can bring his or her own ideas and perspectives on the table. Repertory grid technique was used in the kick-off workshop to articulate diversity of perspectives, by 1) identifying the *variety* of concepts that stakeholders use in order to frame future hydrogen visions, and 2) by identifying three *disparate* (most different) future hydrogen visions out of the ten visions that were derived from the interviews in the preparation phase. These three visions were supposed to be used to form subgroups within the dialogue that each worked out one of the three visions in the course of the dialogue. The dialogue also involved a confrontation between these three groups and their worked-out vision.

4.2 Repertory Grid Technique: Method

Repertory grid originates from construct psychology and has mainly been used in clinical settings to increase the psychologist's understanding of how an individual (a patient) views the world (Kelly, 1991; Bonarius et al., 1981; Fransella et al., 1977; Ryle, 1975). Since its introduction the method has been applied in the fields of artificial intelligence,

education, human learning and, more recently, also in the field of policy analysis (Van de Kerkhof, 2006b; Van der Sluijs, Hisschemöller, De Boer, & Kloprogge, 2001; Dunn, 2001; Dunn & Ginsberg, 1986). The basic idea of the method is that the minds of people are composed of 'construct systems', which reflect their constant efforts to make sense of the world. According to Kelly (1991, p9) "man creates his own ways of seeing the world in which he lives; the world does not create them for him". Construct systems are similar to the notion of 'perspectives' that is central in the *Constructive Conflict Methodology* (see section 1.2 for the definition of perspective). Referred to as 'constructive alternativism' (Kelly, 1991), different people use different construct systems to make sense of reality. Hence, construct systems are highly individual in nature. People observe, draw conclusions about patterns of cause and effect, and behave according to those conclusions. People's construct systems are not static but are continuously confirmed or challenged. Hence, they change through experience. Moreover, although the systematization of elements within a construct system should help a person to avoid contradictory predictions (Kelly, 1991), construct systems are not always internally consistent. People can (and do) live with a degree of internal inconsistency within their construct system. Repertory grid aims to unfold systemizations by articulating the individual construct systems of people. This helps to better understand the meaning that people give to the world around them and to specific problems or issues that affect them.

Repertory grid includes four components: 1) topic, 2) elements, 3) constructs, 4) ratings (Jankowicz, 2004). The first component, *topic*, obviously refers to the issue under study. In the case of the H_2 Dialogue, the topic is the role of hydrogen in a sustainable energy supply for the Netherlands. An *element* is an example of, or occurrence within a particular topic. *Constructs* reflect the dichotomies that people use to distinguish elements and relate them to their personal, individual world. An essential characteristic of constructs is that they are bipolar: a construct has two opposite sides (e.g. black - white, large - small). In the first applications of repertory grid, in the field of interpersonal relationships, the elements were people important for the respondent, for instance relatives or friends (Fransella et al., 1977), and constructs were the qualities used to describe these persons, for instance, 'nice' or 'aggressive'. In the case of the H_2 Dialogue, the elements are ten different hydrogen visions, and the constructs are the qualities that stakeholders use to distinguish between the hydrogen visions, for instance 'sustainable' versus 'not sustainable'. The fourth component, *rating*, concerns an evaluation of the elements on the basis of the construct. As constructs are bipolar, a construct can be represented as a scale, e.g. from 'sustainable' to 'unsustainable'. The elements can then be rated on that scale, resulting e.g. in an evaluation of the sustainability of the hydrogen visions.

The repertory grid procedure is best characterized as a structured interview in which the respondent is confronted with a triad of elements and is then asked to specify some important way in which two of the elements are similar and different from the third (Fransella et al., 1977; Jankowicz, 2004). The bipolar construct, reflecting the similarity and difference, is then presented on a scale (e.g. a five-point scale, with one pole of the construct at score 1 and the other pole at score 5). The respondent is asked to rate the elements (that are possible/desirable to rate) on the scale that represents the construct, and to indicate which pole of the construct he or she prefers. After this, the interviewer moves on to a next triad of elements. Typically, these steps are repeated until the respondent mentions no new constructs anymore. In any case, the interview lasts for an hour at most.[20]

Repertory grid is a participatory method when it is used as a tool to facilitate a stakeholder dialogue on a societal issue. It appears a suitable method for the *Constructive Conflict Methodology*, as it is able to make explicit the taken-for-granted elements of construct systems. In addition, it is characterized by a very open way of questioning and the interviewer, due to his or her minimal role, does not steer the respondents through questioning (Van der Sluijs et al., 2001)[21]. Hence, the requirement of *Constructive Conflict Methodology* that diversity is articulated in a bottom-up fashion can also be met with RGT. Respondents can use their own words to talk about a topic. The elements, constructs and ratings provide the researcher with "a kind of mental map: a precise statement of the way in which the individual thinks of, gives meaning to, construes, the topic in question" (Jankowicz, 2004, p14). The method's claim is furthermore that it is efficient in that it manages - with only 15 to 25 RGT interviews- to identify the full range of constructs that people use for evaluating an issue in a particular context (Dunn, 2001).

RGT elements in the H_2 Dialogue: Ten visions

On the basis of the sixty interviews that were conducted in the preparation phase of the dialogue, together with information from the first Conference of the Dutch National

20 Although not developed as such, RGT can also be used on the group level. We (Van de Kerkhof, M., Cuppen, E., & Hisschemöler, M.) experimented with this in an interactive session on repertory grid that we organized during the scientific conference 'Participatory Approaches to Science & Technology' (PATH, 4-6 June in Edinburgh). In that session, we used different types of fruit as elements. We showed a group of about 25 participants a series of three pictures of different pieces of fruits and asked them to compare these and to mention constructs. Doing the elicitation of constructs on the group level triggered the creativity of participants. Apparently the participants had a large associative network on the issue of fruit in their minds as, after six triads of fruits, we had already generated 85 constructs (and our frequency analysis showed that saturation point had not even been reached yet).

21 It depends on the goal of the exercise whether the elements are chosen by, or in cooperation with, the respondent, or whether the interviewer chooses the elements. In the latter case, the interviewer will conduct a certain degree of steering.

Sustainable Hydrogen Research program, ten hydrogen visions were identified. These visions are:

1. All H_2 - Centrally produced from clean fossil: *"A brand new network! Let's do it again":*
   H_2 in the Netherlands is centrally produced from fossil sources (natural gas) with carbon capture and storage (CCS). H_2 is distributed through a heavy H_2-infrastructure. On site (in buildings) it is converted into heat and power through micro-combined-heat-power (CHP). The national electricity and natural gas infrastructure have become redundant.

2. Central all electric: *"H_2 from fossil sources: it's electrifying!":*
   Electricity in Europe is centrally produced from fossil sources (natural gas, in combination with CCS) and to some extent from nuclear and renewables. Electricity distribution uses an extended grid. Electricity surplus is converted into H_2 as reserve. The natural gas grid has become redundant.

3. All Electric: Decentralized and renewable: *"Many a little makes a mickle":*
   Electricity is produced at the level of dwellings or neighborhoods from renewable sources, e.g. advanced solar PV with heath/cold storage, and advanced heat exchange systems. The surplus of electricity is converted into H_2. This is used for private car transport. If there is H_2 left, it is stored in a 'light' H_2-network.

4. Adding H_2 to the natural gas grid: *"The Dutch do it their own way":*
   H_2 is added to the national natural gas grid and is distributed to the households through the existing gas infrastructure. H_2 from biomass and coal is imported. Because of the mix with natural gas, H_2 is not necessarily of high quality. As the amount of H_2 in the grid increases, the household appliances and infrastructure are gradually adjusted.

5. Global H_2 from non-fossil sources: *"CO_2 is the problem and the solution must be large scale":*
   Electricity is produced at large scale in Northern Africa and Europe from non-fossil sources (large-scale solar in the Sahara, offshore wind in the Atlantic Ocean, hydro and nuclear). Where a heavy infrastructure for electricity is not available, H_2 is transported through pipelines and tankers. H_2 is then locally converted into electricity or delivered for transport or micro-CHP.

6. H_2 for the mobile sector: *"It's mobility, you fool!":*
   Transport uses H_2 combined with fuel cells. H_2 is carried trough pipelines and tankers to fuel stations or is produced on site. There, it is delivered to the consumers. Cars are fully electric and light in weight.

7. H_2 without fuel cell: *"H_2 makes it, fuel cells won't":*
   H_2 is used in stationary and mobile applications but without a fuel cell. Instead, H_2 is converted into useful energy through conventional combustion technologies. Hence, quality requirements for H_2 are less, which enables a greater variety of sources for the production of H_2.

8. H_2 Cartridge system: *"Clique-claque, over the counter":*
   H_2 is stored in portable cartridges that can easily be refilled. Small end users, such as households and small companies use them for stationary and mobile applications. The cartridges are filled at industrial sites or at fuel stations, which enables the use of the heat while refilling. Empty cartridges are exchanged.

9. Recycling of industrial H_2: *"From what we now blow into the air, industries can be energized!":*
   H_2 from industrial activities is used as a secondary source of energy or as raw material for industrial processes. The H_2-infrastructure is located on industrial sites. The surplus is delivered to other users.

10. Gasification without H_2: *"We do not need H_2 to solve the problems!" :*
    The focus is on natural gas and biogas, as well as biofuels for the entire energy system. For the production of electricity also renewables and nuclear are used. Innovations in renewable technologies are developed and used at an increasing scale. Through CCS and biofuels the major problems for the energy system, climate change and security of supply, are solved without a major role for hydrogen as an energy carrier.

These visions reflect a diversity of perspectives; their scope is much larger than would be expected according to the mainstream view of hydrogen (i.e. hydrogen as a fuel for transportation). Vision 3, for instance, assumes an important role for hydrogen in the housing sector on the basis of small-scale renewables. The visions also differ with regard to the future energy infrastructure, the level of hydrogen production, and the energy sources that are used to produce hydrogen. For instance, vision 1 assumes central production of hydrogen from fossil sources and a brand new hydrogen infrastructure, whereas vision 4 assumes the use of the existing natural gas infrastructure to distribute hydrogen to the households. In vision 9 hydrogen is produced and used at industrial

sites and distributed by means of a local, industrial, hydrogen infrastructure. In vision 3, only renewable energy sources are used and hydrogen serves as a buffer to store the surplus of electricity. The H_2 Dialogue also included a non-hydrogen vision (vision 10 in Box 1), which served as a reference vision to compare hydrogen options with competing (non-hydrogen) options.

RGT construct elicitation in the H_2 Dialogue

Repertory grid technique was applied in the kick-off workshop to systematically compare the hydrogen visions and to structure stakeholders' ideas about these visions. Twenty-four participants were involved in the kick-off workshop, representing industry, government, NGOs and knowledge institutions. During this workshop a self-developed software application of repertory grid was used. It was planned initially to use an existing application[22], but although all are quite advanced, none of these existing software packages met the requirements of the H_2 Dialogue. The first requirement was that the software needed to be an interface for the respondent rather than an aid for the interviewer. The software also needed to enable the respondent to indicate a preference to one of the construct's poles and to rank the elements according to this preference. To have a software program that includes these features, existing software packages were used as inspiration for the development of a new software tool.

During the workshop, each participant conducted a repertory grid exercise on a computer. The participants compared the elements (i.e. ten hydrogen visions) and formulated characteristics (constructs), which they used to distinguish the elements in several rounds. In each round the software tool 'quasi-randomly' generated three hydrogen visions. Quasi-randomly means that in the first round vision 1 was presented with two random other visions, in the second round vision 2 was presented with two random other visions, etcetera. This was done to make sure that the ten visions were presented in a balanced way. The participants followed the instructions that appeared on the screen in front of them, the project team was present to support the participants where needed.

For every triad, the participants were posed the following questions:

1. 'Please compare the three visions. In what respect are two of these visions similar and do they differ from the third? Please click with your mouse on the two visions that you think are similar.' This automatically moved the two similar visions to the

22 Such as GridSuite (see: http://www.uni-stuttgart.de/pae/gridsuite), Omnigrid (see: http://www.psyctc.org/grids/omnigrid.htm) or Enquire Within (see: http://www.enquirewithin.co.nz/)

left side of a five-point scale and the other vision to the right side of that scale visualized on the screen, the scale representing the bipolar construct.

2. A pop-up screen appeared, in which the question was asked: 'What kind of characteristic do the two visions share, and what is the characteristic of the third vision? Please make sure that the characteristic is bipolar.'

3. Then, the participant was asked to: 'Assign all visions a value on the five-point scale by dragging them with your mouse to a certain position on the scale. The three initial visions can also be moved to other positions. The visions that you think are not possible or desirable to place on the scale can be left aside.'

4. When this part was completed another pop-up screen appeared, asking: 'Which of the two characteristics (left side or right side of the scale) would you prefer for the long term?'

5. The last question was: 'Would you like to draw another comparison on the same three visions, or would you like to continue with the next triad?' If the participant chose to continue with a new triad, the software tool quasi-randomly generated a new triad.

Traditionally, the elicitation of constructs takes as long as necessary. It stops when the respondent does not come up with new constructs anymore, assuming that the complete construct system has by then been covered. Due to the group setting, and the computerized way of interviewing, this procedure was not possible for this repertory grid exercise. Therefore, the project team planned one hour for the elicitation of constructs. Participants that were finished before the end of the hour were allowed to stop. This turned out to be sufficient, all participants finished within the hour.

4.3 Repertory Grid Technique: Results

This section presents the results of two analyses. First, a frequency analysis was conducted to analyze the variety of constructs that participants used to make sense of the hydrogen visions. Second, a HOMALS analysis was conducted to identify the disparity of the ten hydrogen visions.

Frequency analysis: Identifying the variety of constructs

To analyze the variety of constructs that participants used to make sense of the hydrogen visions a frequency analysis was conducted. This analysis consisted of two steps. As a first step, the number of unique constructs mentioned by each participant was determined. This involved counting the (new) constructs that each participant added. In total, the participants mentioned 171 constructs, which amounts to an average of over seven constructs per participant (if a participant mentioned the same construct more than one time, this was counted as one construct). Several constructs were mentioned by more than one participant, in the same or in a different wording. We decided to categorize the constructs, which means that constructs with a slightly different wording but the same meaning were placed within one category (e.g. 'H_2-No H_2' and 'Based on H_2-Possible without). To enlarge the reliability of the categorization, three 'judges' from within the project team conducted the categorization independently from each other. Divergent judgments were solved by means of discussion[23]. Categorizing the constructs resulted in forty-three unique construct categories. The forty-three construct-categories are presented in Table 4.1, sorted by decreasing order of frequency. By far the most mentioned construct was 'H_2 - no H_2' (mentioned by 17 out of 24 participants). Other often-mentioned constructs relate to the infrastructure, the time frame of solutions, the centrality of hydrogen production and the context of application. The majority of all forty-three constructs was mentioned by less than five participants. This confirms the notion from the literature (a.o. Kelly, 1991) that the construct systems that people use to make sense of an issue are quite different and often highly individual. It shows the wide variety of constructs that are used to understand and distinguish between hydrogen visions.

23 In some cases, the categorization of constructs was very easy. For example 'H2-No H2' and 'Based on H2-Possible without H2' were placed in the same category, because both refer to the role of hydrogen in the future energy system. However, in some cases, e.g. 'Households-No households' and 'Mobile applications-Stationary applications', it was harder to categorize the constructs because they referred to different contexts. In this case, it was solved by placing both in the category 'Focus on sector-Focus on system'.

Table 4.1 The 43 unique construct categories

Nr.	N*	Construct label **	Nr.	N*	Construct label **
1	17	H_2 (16) – No H_2 (1)	23	2	Existing markets (0) – New markets possible (2)
2	14	New infrastructure (6) – Existing infrastructure (8)	24	2	Energy mix (2) – No energy mix(0)
3	12	Short term solution (3) – Long term solution (9)	25	1	H_2 use (0) - H_2 production (1)
4	12	Central (3) – Local (9)	26	1	Possible (1) – Impractical (0)
5	11	Focus on sector (6)– Focus on system (5)	27	1	Network technologies (1) – Conversion technologies (0)
6	10	Flow (8) – Batch (2)	28	1	Fuel specified (0) – Fuel not specified (1)
7	9	Existing technology (4) – New technology (5)	29	1	Sources not mentioned (0) – Sources are local and sustainable (1)
8	8	Fossil (3) – Non-fossil (5)	30	1	Continuous supply possible (1) – Discontinuous supply (0)
9	7	H_2 as energy carrier (2) – Electricity as energy carrier (5)	31	1	Energy in liquid phase (1) – Energy only electric (0)
10	7	Existing system (2) - New system (5)	32	1	Energy mix (1) – Based on electricity (0)
11	6	Small scale (4) – Large scale (2)	33	1	Use of Dutch natural gas (1) – No use of Dutch natural gas (0)
12	6	With fuel cell (5) – Without fuel cell (1)	34	1	Partial overlap H_2 (1) – No role H_2 (0)
13	6	Sustainable (6) - Not sustainable (0)	35	1	No goal (0) – Goal (1)
14	6	Many advantages for the environment (6) - Few advantages for the environment (0)	36	1	No large growth H_2 (0)– Increase H_2 applications (1)
15	5	National (2) – International (3)	37	1	H_2 with possibility other appliances (1) - H_2 without other appliances (0)
16	4	Partial solution (0) - Total solution(4)	38	1	With PV (photovoltaic) (1) – Without PV (0)
17	3	CO_2 storage (1) – No CO_2 storage (2)	39	1	Underground infrastructure needed (1) – No underground infrastructure needed (0)
18	3	H_2 infrastructure (1) - Electricity infrastructure (2)	40	1	Solution (1) – No solution (0)
19	3	H_2 as buffer (2) – H_2 as carrier (1)	41	1	Retail H_2 (1)– No retail H_2 (0)
20	3	High cost (1) – Low cost (2)	42	1	Power surplus in H_2 (0)– No power surplus in H_2 (1)
21	2	Electricity as energy-carrier (0) – Natural gas as energy-carrier (2)	43	1	Question marks safety with public (0) – Acceptation without problems (1)
22	2	Plausible (2) – Not plausible (0)			

** N: number of people who mentioned the construct*
*** Between brackets is the number of participants who preferred this side of the construct*

To analyze to what extent the full range of constructs was elicited in the grid exercise, the cumulative number of unique constructs was calculated. To have a random order of participants, participants were listed according to alphabetical order. Figure 4.3 shows the cumulative number of new constructs in the form of a graph. As mentioned above, repertory grid claims to elicit the full range of relevant concepts. This claim implies that the line should flatten out, as after a certain number of participants no new constructs will be added to the list (saturation). Examining Figure 4.3, it seems indeed that saturation was achieved. After sixteen participants the line starts flattening out, then participant 20 mentions five new constructs, and then it flattens out again. It indeed looks like the repertory grid exercise elicited all constructs that this group of participants uses to make sense of the hydrogen visions.

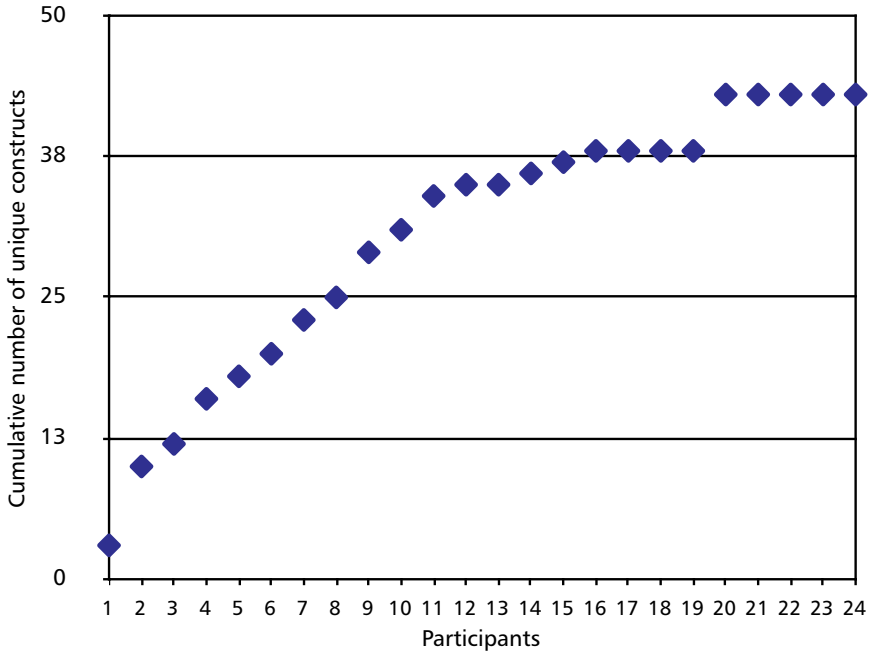


Figure 4.3 Cumulative number of unique constructs

Identifying three disparate hydrogen visions

The frequency analysis facilitated the identification of the relevant themes in the hydrogen discourse and, in that way, helped to shape the agenda for the dialogue. But since repertory grid method was applied mainly to be able to reduce the ten hydrogen visions to three, an additional analysis is needed that can give insight into how the elements (the hydrogen visions) relate to each other and to the constructs, i.e. the disparity of the ten visions. In order to identify what are, according to the participants, the most disparate visions a HOMALS analysis was conducted. The analysis was conducted with the statistical software package SPSS.

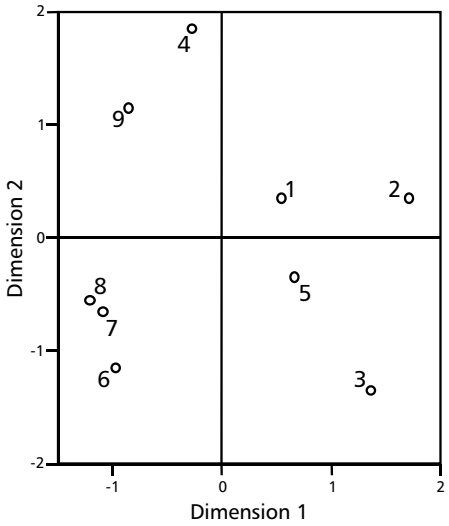
HOMALS is an acronym for 'HOMogeneity Analysis by means of Alternating Least Squares'. HOMALS reduces the dimensionality of data, without ignoring underlying relations (see e.g. De Leeuw & Van Rijckevorsel, 1980). In the HOMALS analysis, hydrogen visions that are evaluated by participants as being similar with regard to specific constructs are placed close to each other, while visions that are evaluated as being different are placed far apart. In order to do this, HOMALS divides the visions in homogeneous subsets for every variable. The variables are the participants' ratings of the visions on the constructs. For instance, variable 1 is the rating of the visions by participant 1 on construct 1; variable 2 is the rating of the visions by participant 2 on construct 1; variable 3 is the rating of the visions by participant 3 on construct 1, etcetera[24]. Based on these homogeneous subsets per variable, the relations between the visions can be represented in a two-dimensional plot.

The matrix that was used for the HOMALS analysis contains 251 variables. Not the construct-categories from Table 4.1 were used, but the original constructs as mentioned by the participants, as these give more detailed information. Furthermore, the matrix contains nine hydrogen visions; vision 10 (the non-H_2 vision) was not included in the analysis. First, a HOMALS analysis was conducted that included all ten visions but in the plot that resulted from this, vision 10 was an outlier and the plot was very difficult to interpret. Repeating the analysis without the outlier resulted in a new plot (see Figure 4.4) that was easier to interpret. The fact that vision 10 was an outlier indicates that the participants evaluated vision 10 differently from the rest of the visions. Therefore, it was decided to use vision 10 as a reference vision (i.e. no H_2) for each of the three dialogue groups later on in the dialogue.

Figure 4.4 shows the resulting two-dimensional plot for the HOMALS analysis on the nine hydrogen visions.[25] The two axes (dimensions) can be understood as 'meta-constructs' or 'higher-level constructs', overarching the constructs mentioned by the participants. Figure 4.4 shows that the visions are fairly equally distributed over the four quadrants. Visions 6, 7 and 8 form a cluster, as well as visions 4 and 9. For the other visions the clustering is less clear.

24 Construct 1' means 'first mentioned construct' (note that the first construct mentioned by participant 1 is not likely to be the same as the first construct mentioned by participant 2). Since each variable is a participant's rating of the ten visions on a construct, each variable consists of 10 levels.

25 Eigenvalue dimension 1: .485; Eigenvalue dimension 2: .411



1. All H_2 - Centrally produced from clean fossil
2. Central all electric
3. All electric: Decentralized and renewable
4. Adding H_2 to the natural gas grid
5. Global H_2 from non-fossil sources
6. H_2 for the mobile sector
7. H_2 without the fuel cell
8. H_2 cartridge system
9. Recycling of industrial H_2

Figure 4.4 Result of the HOMALS analysis: vision 1 to 9 in a two-dimensional space (object scores)

To interpret the plot, two things are important. Firstly, the axes can be rotated around the origin. This means that examining the distances between the visions is an additional or sometimes even a better way to interpret the results than examining the distances between a vision and the x-axis and y-axis. Secondly, visions that are far from the origin are considered most salient as they have a high level of a certain characteristic.

A common way to interpret a HOMALS plot is to find out the meaning of the two axes[26]. However, in this study another way was used to interpret the plot. Since the goal of the HOMALS analysis was to find out possible clusters of elements (visions) and to identify three disparate visions to be explored further in the dialogue process, it was more interesting to investigate which visions were considered to be most disparate and in what way. Disparity translates visually in the HOMALS plot into distances between visions: the further two visions are apart, the more disparate these visions are.

Figure 4.4 shows that vision 4 (adding hydrogen to the natural gas grid) and vision 3 (decentralized and renewable) are most disparate. The constructs that the participants used show that these differences concern among other things the infrastructure. Vision 3 is seen as a long-term solution (construct 3, see Table 4.1) and is associated with a new infrastructure and a new system (constructs 2 and 10, see Table 4.1), at the local level (construct 4), with non-fossil energy sources (construct 8, see Table 4.1). Vision 4,

26 The x-axis (dimension 2) can be interpreted by comparing the visions that are at the right side of the y-axis (dimension 1) to the visions that are at the left side of the y-axis, as the visions at the right side of the y-axis have something in common which distinguishes them from the visions at the left side of the y-axis and vice versa. The y-axis can be interpreted in a similar way.

on the other hand, is associated with the short term, with the existing infrastructure and the existing system, at the central level and with fossil energy sources. The fact that the participants see visions 3 and 4 as very different makes these visions interesting starting points to be explored further in the dialogue process. Since vision 4 is positioned close to vision 9 (recycling of industrial hydrogen) and since these two visions can go well together (e.g. by taking the surplus of industrial hydrogen and add this to the natural gas grid) it was decided to cluster these two visions.

To decide on a third vision for the dialogue, the HOMALS plot was studied again. Note that visions 4 and 3 are not only far away from each other, but also from the cluster of visions 6 (hydrogen for the transport sector), 7 (hydrogen without the fuel cell) and 8 (hydrogen cartridge system), which are all positioned in the lower left quadrant. The results of the frequency analysis were used to decide which of these three visions to take as the third starting point for the dialogue process. Construct 12 (see Table 4.1) makes clear that five out of six participants who mentioned this construct prefer the use of fuel cells, which supports vision 6 instead of 7. Construct 6 (see Table 4.1) indicates that eight out of ten participants who mentioned this construct do not prefer a batch infrastructure (cartridges), but a flow infrastructure, which favors vision 6 instead of 8. In addition to this, vision 6, on hydrogen as a fuel for transportation, reflects the mainstream pro-hydrogen position that is held by the major stakeholders (both in Europe and in the world). It was considered important to include the transport vision (vision 6) in the dialogue, as it would allow to confront this vision with other, less mainstream, views on hydrogen[27]. Also, it would be interesting to explore if and how the internationally organized transport sector (vision 6), compared with e.g. the nationally organized housing sector (vision 3), can be governed at the national level.

So, based on the HOMALS analysis, visions 3 (decentralized, small-scale renewables), 4/9 (adding hydrogen to the natural gas grid and use of industrial hydrogen) and 6 (hydrogen for the transportation sector) were taken as starting points for the dialogue process and for the formation of three dialogue groups that would further work out the three visions.

27 The HOMALS analysis makes clear that vision 2 (all-electric) appears to be almost as salient as transport (vision 6). However, since the project could manage three dialogue groups only, and since application of hydrogen in transport is usually considered, it was decided to leave the all-electric option out. In addition, a more practical argument was that, in case of the Netherlands with its natural gas infrastructure, the all-electric option would be less likely than for a country that heavily relies on an electricity infrastructure, such as France. There, electricity is the primary national energy carrier and the availability of nuclear would justify a connection between electricity and hydrogen. These were all considerations made in advance of the dialogue.

4.4 Use of results: Assigning participants to three dialogue groups

The results of the RGT analyses were used to form three subgroups of participants, formed on the basis of the three disparate visions (vision 3, visions 4/9 and vision 6). Subsequently, the project team had to decide whom to invite for which subgroup. The idea was that the subgroups should be internally heterogeneous with regard to the stakeholders' professional backgrounds, but homogeneous with regard to their willingness to explore the particular pathway and to put effort to build a 'strongest case' for 'their' hydrogen pathway. This should encourage a process of constructive conflict.

There were three categories of stakeholders of which people were invited for taking part in one of the three subgroups of the dialogue: 1) stakeholders who had been interviewed and who had participated in the repertory grid workshop (kick-off workshop), 2) stakeholders who had been involved in the interview round but not in the repertory grid workshop and 3) stakeholders who had been involved in neither of these activities. Invitations for the group of stakeholders who participated both in the interviews as well as in the kick-off workshop were based on the constructs mentioned in the RGT exercise. The constructs were examined to decide which of the three visions would best fit these people's perspectives. This worked well; only a few participants preferred to join another group than the one suggested by the project team (which was allowed). Regarding the second category of stakeholders, the interview reports were used to decide for which group to invite them. This also worked out well. The third category of stakeholders was sent an open invitation to participate in the H_2 Dialogue and they were asked to indicate their preference for a specific group (and related future vision). This approach resulted in the involvement of 56 participants, organized into three groups.

4.5 Conclusion

This chapter presented RGT as a method to articulate diversity in a stakeholder dialogue. This was done on the basis of the H_2 Dialogue; a stakeholder dialogue on the prospects for a hydrogen economy in the Netherlands. More specifically, RGT was used to address two properties of diversity. Firstly, the aim was to identify the *variety* of concepts (in the RGT jargon 'constructs') that stakeholders use to understand and distinguish future hydrogen visions. Secondly, the aim was to analyze disparity of future hydrogen visions in order to identify three most disparate visions. The results of the analysis were used to structure the dialogue and to assign participants to subgroups that were formed around the three visions.

As regards the first aim, the identification of the variety of constructs, RGT enabled the project team to identify the variety of constructs that participants used to understand, compare and distinguish the visions. The frequency analysis shows that the elicitation of constructs had reached its saturation point after about 16 to 20 individual exercises, which is consistent with earlier findings of studies that used RGT (Dunn, 2001). On the basis of these results, it can be concluded that RGT elicited about the full range of constructs that stakeholders in the Netherlands, at least those who participated in the kick-off workshop, actually use to evaluate hydrogen options. In addition, the analysis gave insight into the balance between constructs, i.e. the frequency of constructs. Moreover, the grid computer tool has proven appropriate to elicit the constructs in an efficient way. All constructs from twenty-four stakeholders were elicited within one hour. Using the interview approach, this would have cost at least twenty-four hours, not to mention the time needed for travel and reporting. However, a weakness of the computerized approach as compared to face-to-face interviews is that there is no opportunity to ask participants for clarification. There were constructs that were unclear to the project team. Many were non-bipolar constructs (e.g. electricity versus gas), which in a face-to-face interview could have been prevented. Moreover, in a face-to-face interview the interviewer can check if two constructs are similar to the respondent. This means that, afterwards, less time is needed for the project team to identify unique constructs than in the case of a computerized grid. In conclusion, the software probably saves time and money, but the project team has less control over the individual exercises.

An important lesson that follows from the application of RGT in the H_2 Dialogue relates to the type of elements that were used in the RGT exercise, i.e. the ten hydrogen visions. Participants were provided with a slogan and short description of each of the ten visions. Some of the participants mentioned that they found the descriptions difficult to understand or too long. Participants perhaps did not immediately recognize all the visions as 'familiar' visions. The visions actually reflected quite a broad range of ideas and options. Many of these ideas and options may have been unknown or unfamiliar to quite some stakeholders, which might be related to the novelty of the hydrogen topic. As a consequence, participants regularly needed to check in an accompanying leaflet what each vision exactly concerned. So, the elements were, at least for some participants, perhaps too difficult to grasp to reach full understanding of the visions. Compare these elements to a more traditional (clinical) application of RGT, which is used for instance to study how someone thinks about 'family'. The issue 'family' can be easily operationalized in terms of elements, for instance by identifying people in the person's family, such as father, mother, sister, brother, son, and daughter. Not only are the elements for an issue such as 'family' more apparent than for a future hydrogen economy, more importantly, they have *meaning* to the respondent. Repertory grid technique is developed to

study construct systems: a coherent collection of distinctions and categorizations that people use to think about an issue. The risk of using elements that do not (yet) have meaning to respondents is that respondents do not tap from their construct systems when comparing and distinguishing the elements. Many of the constructs participants mentioned were taken directly from the description of the vision (such as 'H_2-no H_2' or 'centralized- decentralized'). It might be the case that these constructs were not part of an existing construct system, but rather created at the spot. The risk of using non-apparent elements in a Repertory grid exercise is thus that the elements lack meaning to respondents. The result may be that one is not actually *studying* existing construct systems, but *creating* construct systems. It may thus be argued that the method is not as open as was claimed, but involves steering through the selection and construction of the elements. A way to increase the meaning of elements, i.e. visions, for respondents might be to visualize them by means of drawings, cartoons, short movies or pictures. Visualizations stimulate the senses more than only text, and they encourage associations, and may thereby enable participants to get a better grasp of the visions. [28]

As regards the second aim -to analyze disparity of the hydrogen visions in order to identify three most disparate visions - the HOMALS analysis appeared very useful. The method enabled a selection of three disparate future visions that could be explored further in the dialogue and that could be used to form three subgroups accordingly. RGT highlighted not only the mainstream notions of hydrogen, i.e. its application in the transport sector, but also conceptions that for some reason have gained less prominence in the hydrogen discourse, such as small-scale renewables, and adding hydrogen to the natural gas grid. This means that the method can actually be used to identify and include not only dominant, but also marginal notions. This was one of the requirements of the *Constructive Conflict Methodology*.

In conclusion, RGT enabled a bottom-up identification of the variety of constructs relating to a hydrogen economy for the Netherlands and the disparity of hydrogen visions, in a very structured way. The bottom-up approach is characterized by an integrated quantitative and qualitative approach. This makes it possible to statistically analyze disparity and interpret it on the basis of qualitative dimensions. Hence, it is a very rigid way of analyzing disparity, without losing the strength of qualitative methods such as allowing participants to use their own frame, phrasing and ideas as input for the analysis. The method is characterized by a focus on implicit dimensions of perspectives, i.e. taken-for-granted constructs, but the way the elements are constructed needs attention in order

28 The Biomass Dialogue made use of visualizations when presenting different biomass chains. Participants evaluated these visualizations very positively and they seem to have improved the understanding of the biomass chains (see chapter 6).

to fully benefit from this characteristic. Finally, RGT lives up to its claim that it is able to identify the full range of constructs in a relatively short time and by means of a relatively small number of interviews.

Chapter 5

The Biomass Dialogue: application of Constructive Conflict Methodology

The Biomass Dialogue: application of Constructive Conflict Methodology

This chapter introduces the Biomass Dialogue[29]. The Biomass Dialogue served as a testing ground for *Constructive Conflict Methodology.* This chapter forms an introduction to the next three chapters, which discuss in more detail the method used to select stakeholders and articulate divergent perspectives (chapter 6), the full application of *Constructive Conflict Methodology* in the Biomass Dialogue (chapter 7), and the question to what extent participants learned from participating in the Biomass Dialogue (chapter 8). Section 5.1 first discusses why biomass can be considered an unstructured problem. Section 5.2 I will presents the aim of the Biomass Dialogue. Finally, the set-up of the dialogue will be explained in section 5.3.

5.1 Biomass as an unstructured problem

Biomass is all organic material: wood, plants, but also organic waste and offal. When converted to energy, it is an option for mitigating climate change, because, in the ideal case, it is CO_2-neutral (in the non-ideal but more realistic case, it reduces CO_2 emissions as compared to a fossil alternative). The CO_2 released was earlier absorbed from the atmosphere by plants. Wood, for example, incorporates absorbed CO_2 from the air. This CO_2 is released when the wood is combusted, which makes the net CO_2-emission zero. In reality, the story is more complex. Firstly, there are many different elements and options within a biomass-system, and they all influence the CO_2-balance differently. Energy can be made from various sources of biomass, e.g. waste, or energy crops. Energy crops can be oily, woody, or sugary. Biomass can be converted to biofuels (bio-ethanol or biodiesel), or it can be used to make electricity or heat. Many different conversion techniques exist that all impact efficiency differently. Biomass can be applied in large-scale chains, in which for instance energy crops are imported in bulk from South America and converted

29 See for the final report of the Biomass Dialogue: Hisschemöller, M., Breukers, S., Cuppen, E., & Bergsma, E. (2009). *Een dialoog over de duurzaamheid van energie uit biomassa* (Rep. No. W-09/01). Amsterdam: Instituut voor Milieuvraagstukken - Vrije Universiteit Amsterdam.

to energy in Europe, but it can also be applied in small-scale chains, for instance on the level of a village or a number of households. It can involve centralized energy production, or decentralized energy production. All these elements influence the efficiency of biomass applications differently. Secondly, even if there is agreement on the CO_2-balance of a biomass option, it is not the only aspect that impacts the sustainability of that option. Other aspects, such as (socio-) economic impacts and impacts on biodiversity are taken into account as well. Many uncertainties exist with regard to the impacts on the sustainability of biomass options. Thirdly, there are many different actors involved (energy companies, farmers, NGOs, science, etcetera), with many different stakes and interests. They often have divergent perspectives on which aspects and impacts of biomass options should be considered important.

From the 1990s onwards biomass has been put forward as an option for addressing the climate change problem. However, not only is it a complex issue, it also appears to be a controversial issue. In 2003, the EU commissioned a directive, which states that in 2010 5,75% of the volume of transport fuels should be biofuels, with the prospect that this share should increase up to 10% by 2020 (Energietransitie, 2008). In the Netherlands, as from January 1st 2007, oil companies are legally bound to make sure that 2% of their production consists of biofuels[30] (www.energieportal.nl). In the last years however, the use of biomass for energy has been increasingly criticized. Discussions revolve mainly around the use of food crops for the production of biofuels, such as the use of palm oil and rapeseed oil for biodiesel and the use of corn and sugarcane for bio-ethanol. These types of biomass applications are controversial, because they may lead to an increase of food prices and a decrease of access to food for the poor. As a result of the controversies and the difficulties in determining sustainability of biofuel applications, the Dutch minister of Environment decided in October 2008 to lower the Dutch efforts with regard to biofuels from 5,75 to 4% in 2010 (ANP, 2008).

5.2 Aim of the Biomass Dialogue

The Biomass Dialogue was organized under the umbrella of two different projects. It formed a working package in the Climate Changes Spatial Planning project "*An integrated framework to assess spatial and related implications of increased implementation of biomass delivery chains*"[31], which aimed at developing an integrated framework

30 2% of their production in terms of energy

31 The project (ME4) is part of the research program 'Investing in Knowledge Infrastructure' (BSIK). Projectleader is Prof. Johan Sanders (Wageningen University and Research Centre). The following institutes participate in the project: Wageningen University and Research Centre, Utrecht University, Energy Research Centre the Netherlands, KEMA and Vrije Universiteit Amsterdam.

to assess the spatial and environmental impacts of biomass applications. The dialogue was also part of the project "*Strategies for implementing sustainable transition trajectories in the transport sector"*[32], which aimed at a 'backcasting' analysis of biofuels in the transport sector.

The Biomass Dialogue was set up in such a way as to integrate the aims of the two projects. The overall aim was described as:

To develop ideas about sustainable biomass chains for the Netherlands, and to identify what is needed in order to realize these chains.

The dialogue aimed to include a broad range of biomass applications, and hence included biofuel applications as well as applications for electricity and heat. The dialogue focused on specific biomass chains. A chain involves the complete production cycle of the biomass, from crop to endproduct (electricity, heat, fuel and/or materials). The backcasting project directed a focus on strategies for implementation (what is needed in order to realize the chains?), in addition to the development of ideas about sustainable biomass chains.

5.3 Setup and design of the dialogue

The Biomass Dialogue ran from May 2007 to May 2008. It consisted of an extensive preparation phase and three workshops. In the preparation phase Q interviews were conducted with 75 stakeholders to get a better understanding of the diversity of stakeholder perspectives and to be able to select stakeholders for participation in the dialogue (see chapter 6). The first workshop took place on December 13th 2007, the second workshop on February 14th 2008, and the third workshop on April 7th 2008. In addition, an extra meeting was scheduled to discuss the final report of the dialogue. Overall, about 30 people participated in the dialogue.

Constructive Conflict Methodology provided the design guidelines. This will be comprehensively discussed in chapter 7. The overall structure of the Biomass Dialogue was guided by the aforementioned project "*Strategies for implementing sustainable transition trajectories in the transport sector"*, which aimed at a 'backcasting' analysis of biofuels in the transport sector. As discussed in chapter 3, the methodology aims to answer the question how desirable futures can be reached. Instead of forecasting how the future will look like, it starts from a desirable future situation, and then works backwards to the present in order to analyze the feasibility of that future situation and in order to identify

32 Projectleader is Prof. Ruud Smits (Utrecht University)

the policy measures that are needed to attain the future situation. In line with the backcasting methodology, the first workshop was aimed at analyzing the current situation. In the second workshop a desirable future situation was developed, which was taken as a starting point to analyze the implementation trajectory that is needed in order to get there. The aim and setup of each workshop will be shortly discussed below.

The three workshops

The aim of workshop 1 was to gain insight into the ways in which stakeholders evaluate existing biomass chains in terms of sustainability. This insight relates to the criteria that stakeholders use to assess the sustainability of biomass chains. Fifteen participants attended the workshop. The workshop started, after a short introduction, with a presentation of the six perspectives that resulted from the Q analysis (see chapter 6). Subsequently, participants were divided in three subgroups of people with similar perspectives (this will be explained in section 7.2). The participants in the three subgroups were asked to evaluate the sustainability of, at least two out of three, biomass chains that were presented to them. In total, five biomass chains were used in workshop 1:

1. Biomass Energy Plant Sittard:
   Small- scale plant in which residuals from forestry and green areas are used to produce electricity and heat, which are distributed to a neighboring area and to an elderly home.

2. Greenmills:
   Small-scale chain in which biodiesel is produced from used frying oil and fat from restaurants.

3. Dung fermentation:
   A farm uses pig dung to produce biogas and heat. The biogas is used to produce electricity and the heat is distributed to the pig stables.

4. Pure Vegetable Oil:
   Cultivation of rapeseed to produce pure vegetable oil. Diesel cars drive on this oil after a small modification of the engine. Part of the rapeseed is used for feed.

5. Bioethanol blended in gasoline:
   Large-scale chain in which corn from the US and Brazil and sugarcane from other parts of Europe are imported to produce bioethanol. Oil companies blend the bioethanol into (fossil) gasoline.

These chains were chosen as to cover a diversity of biomass chains, which are different in terms of scale, biomass source, technology, end product and organization of the chain. Three of these chains for example use organic waste as a biomass source (Biomass Energy Plant Sittard, Greenmills and Dung fermentation), whereas the other two use cultivated biomass crops as a source. The bioethanol chain is a large scale chain, in which raw biomass, half and end products are transported all over the world. The other chains take place on a smaller scale; the Biomass Energy Plant Sittard for example uses biomass from the municipality Sittard to produce electricity and heat for local use. Three of these chains involve the production of biofuels for transport (Greenmills, Pure Vegetable Oil and Bioethanol blended in gasoline), whereas the other two produce electricity and heat (Biomass Energy Plant Sittard and Dung fermentation). The chains were presented with help of cartoons visualizing the chains and a short text of 1 page at most to explain the chain. As an example the Greenmills chain is shown in Figure 5.1. The initiator of the Pure Vegetable Oil chain was one of the participants in the Biomass Dialogue. He was asked to present this chain. The initiator of the Biomass Energy Plant Sittard was also invited to participate and present the chain. Due to illness, she could however not attend the workshops. In general, participants responded very positively to the use of the cartoons to visualize the chains. It made discussions more vivid and concrete.

The results of the subgroups were used as input for a second round of subgroups after lunch. These subgroups were assembled in a new composition: people with different perspectives were mixed. The task for the new subgroups was to reflect upon the evaluation of the morning groups. The results of the afternoon subgroups were input for a closing plenary discussion.

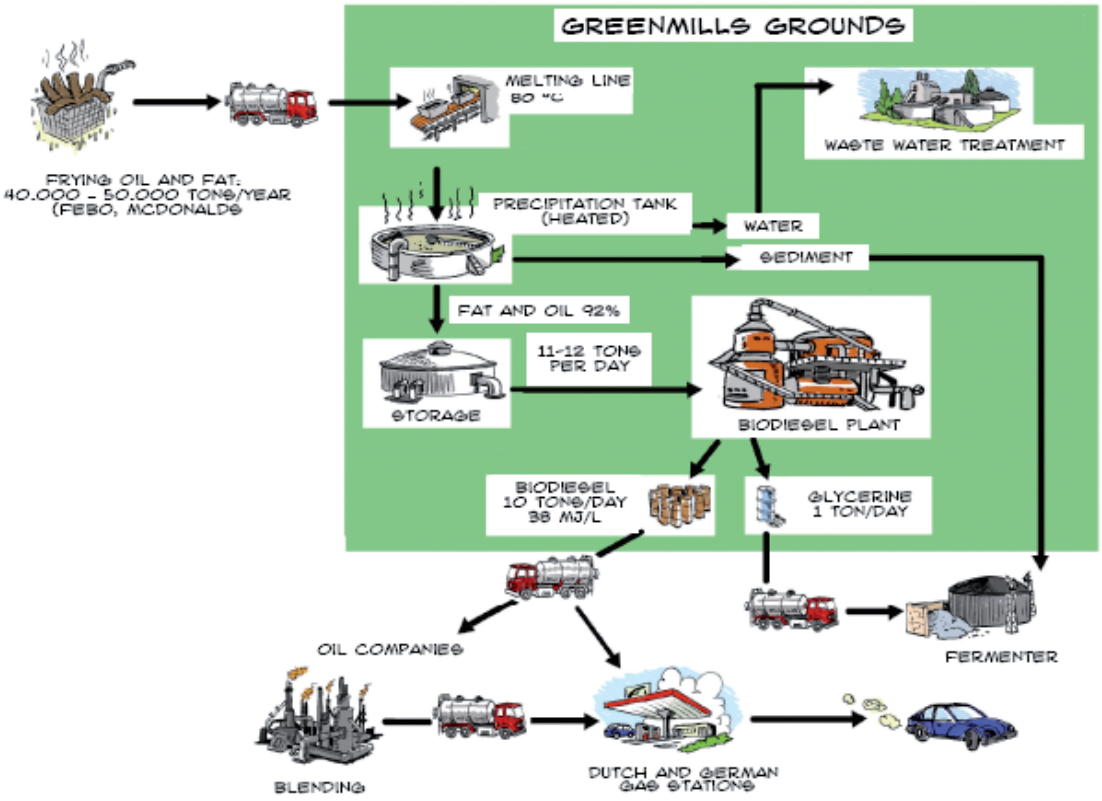


Figure 5.1 An example of a chain that was evaluated by the participants in workshop 1: biodiesel from frying oil and fat (illustrations by Maarten Gerritsen)

The aim of workshop 2 was to develop a desirable vision of the future, describing the role of biomass in a sustainable Dutch energy system in 2025. Seventeen participants attended the workshop. In line with the backcasting structure of the dialogue, the results of workshop 1 (evaluation of the present situation) were used as a starting point for describing the future situation in workshop 2. The program started, after a short introduction, with presentations of six innovative, not (yet) existing biomass chains. These chains were:

1 Algae chain:
An integrated decentralized chain in which algae are grown for the production of biodiesel, electricity and heat. Heat is distributed to a neighboring area and industry. CO_2, a nutrient for algae, is distributed from industry to the algae pond. Nitrogen and phosphorus, also nutrients, are distributed from agriculture and a wastewater treatment plant to the algae pond. The oxygen that algae produce is distributed to a wastewater treatment plant.

2 Biomass-to-liquid with Fischer-Tropsch synthesis:
A centralized large-scale chain in which biomass is converted to liquid biofuels by means of Fischer-Tropsch synthesis. Different types of biomass from different parts of the world are used.

3 Innovative bio-ethanol production from beetroot:
A decentralized chain in which the traditional beetroot chain is adapted to optimize in terms of energy production rather than sugar. Part of the beetroot is used for feed.

4 Pyrolysis chain for developing countries:
A small-scale decentralized chain in which the local population in developing countries collects their (agricultural) organic waste. This waste is pyrolyzed, which results in oil that can either be sold on the world market, or used locally to produce electricity and heat. The minerals that reside after the production process are brought back to the land as nutrients.

5 Neopower: electricity, heat, cold, feed, food production:
A decentralized chain in which agricultural products in developing countries are used to produce oil. Nutrients remain in the country of origin, the oil is transported to a refinery. The oil is refined into 'Neofuel', a liquid energy carrier that is used to produce electricity, heat and cold at the level of districts.

6 Paper chain: recycling or energy production?
This chain presents a dilemma between recycling paper and producing energy from used paper. Recycling paper is the current practice in the paper chain. The dilemma arises when the system boundaries do not include the growth of trees for recycling paper, but when they do include the growth of trees for converting paper to energy after it has been used. In that case, recycling would be evaluated less positively in terms of CO_2 reduction than burning the paper for energy purposes after its usage, despite the fact that recycling paper is more efficient in terms of material and energy use and, not unimportantly, is originally also made from trees.

These chains were chosen as to cover a broad range of possible future biomass chains. The chains differ in terms of scale, biomass source, technology, end product and organization of the chain. Some of these chains are innovative in terms of the technology used, such as the Biomass-to-liquid chain, whereas others are innovative in terms of the biomass source used, such as the algae chain. Because the use of cartoons to visualize the chains was received very positively in workshop 1, the chains were visualized with

cartoons again in workshop 2. A short text (max 1 page) describing the chain accompanied the visualizations. Figure 5.2 shows the algae chain as an example. The biomass chains were introduced and amplified on by representatives (e.g. initiators) of those chains. Based on the chain and the results from workshop 1, participants formulated a desirable future situation in three subgroups. In these subgroups people with different perspectives were mixed. The results of the three subgroups were fed back into three new subgroups of people with similar perspectives (as in workshop 1, see above). The task for this second round of subgroups was to evaluate the visions, and to identify similarities and differences between them. Where differences resulted in conflicts between visions, participants were asked to formulate ways to resolve those conflicts.

The results of the three subgroups were gathered, and presented in a plenary session, in order to see whether it was possible to formulate one or two overarching visions of the future (see section 7.5).

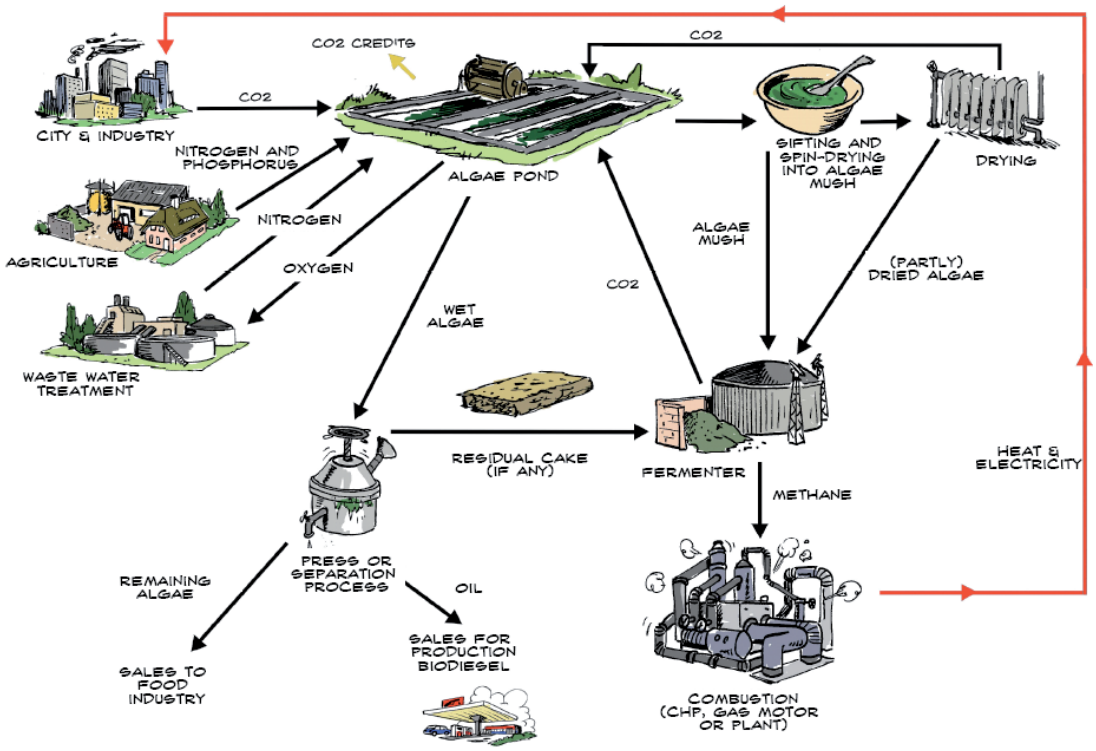


Figure 5.2 An example of a chain that was evaluated by the participants in workshop 2: electricity, heat, biodiesel, and food from algae (illustrations by Maarten Gerritsen)

The aim of workshop 3 was to analyze the implementation trajectory of the vision developed in workshop 2 by reasoning backwards from 2025 to the present. This means that participants jointly analyzed what the most important challenges for the develop-

ment of sustainable biomass chains are. These challenges were identified in order to develop strategies, interventions and actions for the near and the far future. Eleven participants attended the workshop. The workshop took place in a software-supported meeting room (Electronic boardroom supported by GroupSupportSystems). Each participant was behind a computer and used the computer to provide his or her input. After a short introduction, the workshop started with a presentation by one of the members of the project team on the vision that resulted from workshop 2. The task for the first part of the workshop was to define barriers and opportunities for that vision. Participants provided their input individually via the computer. Results were projected on a central screen, and discussed with the participants. This resulted in a list of six biggest challenges for the vision. The second part of the workshop was concerned with finding solutions for, or ways to deal with those challenges. There was however not enough time for the second part of the workshop. The project team suggested organizing an extra meeting, to formulate conclusions, recommendations and actions, which participants agreed upon. This final meeting was used to decide on the conclusions in the final report of the Biomass Dialogue. Only six participants joined the extra workshop.

Chapter 6

Q methodology to identify the diversity of perspectives and to select participants for the Biomass Dialogue

Q methodology to identify the diversity of perspectives and to select participants for the Biomass Dialogue[33]

This chapter is the first of three that is based on the Biomass Dialogue. This chapter discusses how Q methodology was used in the preparation phase of the Biomass Dialogue as a tool within the *Constructive Conflict Methodology*. Step 1 and step 2 of *Constructive Conflict Methodology* were to a large extent integrated in the Biomass Dialogue. Q methodology was used to identify the diversity of perspectives on energy options from biomass in the Netherlands and to select stakeholders on the basis of their perspective (see Figure 6.1). In addition to Q methodology, a number of other tools were used for the articulation of divergent perspectives in the dialogue itself; these will be discussed in the next chapter. Q methodology will again play a role in chapter 7, where it is used to evaluate how participants changed their perspectives as a result of taking part in the dialogue.

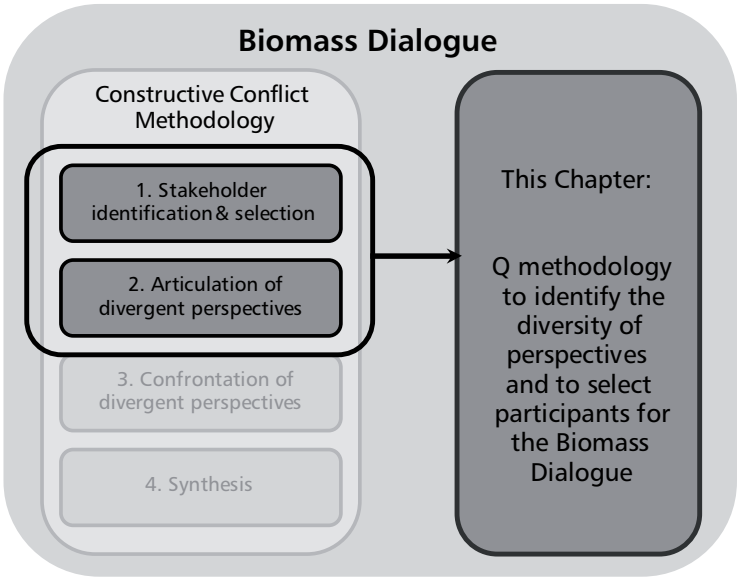


Figure 6.1 This chapter focuses on steps 1 and 2 of Constructive Conflict Methodology

33 This chapter is strongly based on: Cuppen, E., Breukers, S., Hisschemöller, M., & Bergsma, E. (2009). Q Methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands. *Ecological Economics*, *69*. Available online: http://dx.doi.org/10.1016/j.ecolecon.2009.09.005

Section 6.1 starts with an explanation of Q Methodology; its aim and procedure. Section 6.2 discusses how it was used in the Biomass Dialogue. In Section 6.3 the results of the Q Methodology are reported: six stakeholder perspectives on energy options from biomass in the Netherlands. Furthermore, the differences and similarities between the perspectives are analyzed. Section 6.4 explains how the Q results were used to select participants for the Biomass Dialogue. In order to discuss the use of Q methodology for stakeholder selection, section 6.5 empirically compares this stakeholder selection with an alternative stakeholder selection based on actor type, i.e. affiliation such as knowledge institutes, industry, small/medium sized enterprises, NGOs and government). This comparison is important for the discussion on stakeholder selection, as it shows that actor types are not a good proxy for perspectives and hence not an appropriate basis for stakeholder selection. Section 6.6 wraps up with conclusions.

6.1 What is Q methodology?

Q Methodology was developed originally in the 1930s as an innovative way to study people's subjectivity (Stephenson, 1935; Brown, 1980). Since then, it has been applied in various fields of social science (Clarke, 2002; Dryzek et al., 1993; Ellis et al., 2007; Van Eeten, 2001; Webler et al., 2001). For instance, it has been employed to identify views regarding citizenship, the public interest, environmental policy and the quality of participation processes (Barry and Proops, 1999; Davies and Hodge, 2007; Swedeen, 2006; Webler et al., 2001; Wolsink, 2004). Recently, it has also been adopted in studies that particularly address policy and planning of renewable energy sources (Ellis et al., 2007; Breukers, 2006).

Q Methodology can uncover perspectives without imposing predefined categories. The merit of Q methodology is that "by allowing the categories of the analysis to be manipulated by respondents, the researcher loses the exclusive power to signify the reality of the researched" (Robbins and Krueger, 2000: 645). Q methodology differs from R methodology (surveys and questionnaires) in that the latter asks respondents to express views on isolated statements, whereas Q methodology identifies respondents' views on statements in the context of the valuation of all statements presented (see e.g. Dryzek et al., 1993). Furthermore, as opposed to R methodology, Q Methodology traditionally aims to give a picture of the range of perspectives (the *variety* of perspectives) among the population, rather than analyzing the level of support for those perspectives among the population (the *balance* of perspectives). This implies that the procedure for sampling respondents is usually different from that in R methodology. Rather than random sampling and large sample sizes, Q methodology relies on purposive sampling and smaller

sample sizes. The fact that there is a person who is assumed to have a different point of view is enough reason to include him or her in the sample.

Q methodology comprises six stages (Davies and Hodge, 2007). The first stage is the definition of the 'concourse': the full range of discussions and discourses on the particular issue under study. Defining the concourse means identifying sources, either written or spoken, which contain ideas, opinions, values, preferences and knowledge claims on the issue under study. From the concourse, a large set of statements is derived in the second stage of Q methodology. These statements should reflect the diversity of the concourse. This set has to be reduced to a manageable number (usually no more than sixty), while still reflecting the full diversity of viewpoints, claims and ideas. Preferably, the wording of the statements stays as close as possible to the original wording (and thus the original meaning) of that idea or opinion as found in the concourse. The set of statements is referred to as the Q set. The third stage concerns the identification of a group of respondents, referred to as the P sample. As noted above, Q studies rely on purposive sampling, which means that the P sample needs to comprise as many different ideas, preferences and opinions on the issue under study as possible. In the fourth stage, respondents perform the Q sort, which means that they rank the statements on a scale that represents significance or salience (Brown, 1980: p198), such as most agree to most disagree. The scale is usually normally distributed. Data from the Q sorts are factor analyzed in the fifth stage, resulting in clusters of Q sorts that are highly similar in their rankings of the statements, i.e. high correlation. These clusters can be interpreted as perspectives in the sixth stage. The typical way to interpret a factor in Q methodology is to look at the statements that receive the highest and the lowest scores respectively (strongest agreement and disagreement) for that factor. In addition, the statements that distinguish most between one factor and the other factors are useful in interpreting a factor because these indicate how a factor is different from the other factors. Furthermore, the Q sorting task is often accompanied by an interview, in which respondents are asked to explain their sort - this helps to interpret the factors.

Intermezzo: Comparison of Repertory grid technique and Q methodology

Although repertory grid technique and Q methodology are similar types of methods in the sense that they both aim to study subjective constructions of reality, they have their own characteristics that make them particularly useful for specific purposes. Repertory grid technique has been originally developed as a method to analyze the construct system of an *individual*; it can be understood as a cognitive mapping tool. As such, it is able to uncover the implicit categories that people use for framing a particular issue. Based on a respondent's ratings of the elements on the constructs, it can be analyzed how elements relate to each other, how constructs relate to each other, and how elements and constructs relate to each other, according to that particular individual. Q methodology has not been developed as a tool to analyze individuals, but rather to analyze factors, i.e. perspectives or discourses that exist as general patterns within a group of people. Q methodology allows for relating persons to factors, in the sense that it is possible to analyze to what extent a person agrees with each of the identified perspectives (as will be shown later on in this chapter and in chapter 8). However, as the factors, after extraction and rotation, are a product of the aggregated data of all respondents, they presumably provide not the most specific framework for understanding an individual. That is, individual perspectives are analyzed in Q methodology in relation to the general patterns that are discovered in the dataset. Aggregation naturally means that some of the individual specificity gets lost. Hence, if one is interested in a detailed analysis of perspectives of *individuals*, repertory grid technique provides a better framework for assessment than Q methodology.

That is one side of the coin. The other side of the coin is of course that if one is interested in an analysis of perspectives on a particular issue on the aggregated level, i.e. within a particular group of people, Q methodology is a very powerful tool for analysis. Q methodology has been developed for unraveling the general patterns within a dataset that comprises multiple subjectivities. The identification of a perspective relies on its relation to other perspectives, and in that sense Q methodology is different from repertory grid technique, which identifies individual perspectives without relating them to other perspectives. However, although repertory grid technique was originally not developed to analyze perspectives within an aggregated dataset, data from repertory grid technique can also be analyzed on the aggregated level, as was shown in chapter 4. On the aggregated level, it can give information about how, on average, the elements are categorized, and which constructs are important for this categorization. Hence, rather than distinguishing different perspectives within the group of respondents as in Q methodology, the different perspectives are averaged into one subjective categorization of elements and constructs. That is, factor analysis in Q methodology clusters respondents, whereas the HOMALS analysis for repertory grid technique data clusters elements (i.e. hydrogen visions, see chapter 4). In light of the second step of the *Constructive Conflict Methodology* (articulation of divergent perspectives) one might therefore argue that repertory grid technique is only capable of identifying the diversity of perspectives when data are analyzed on the individual level. When analysis takes place on the aggregated level, it is capable of identifying the disparity of elements, both in quantitative terms (as depicted in the HOMALS plot) as well as in qualitative terms (by analyzing which constructs are salient for which elements).

6.2 Q methodology in the Biomass Dialogue

Concourse definition and selection of Q statements

In an attempt to reflect the wide range of ideas and opinions about biomass, about two hundred statements were collected. Statements were taken from transcripts from discussions in the Costa Due stakeholder dialogue on biomass.[34] Furthermore, statements were taken from transcripts from public debates, reports, newspaper articles, etcetera. Definition of the concourse was relatively easy, as the issue of biomass was heavily discussed in the media and at several public debates at the time of this study. As a consequence, the range of ideas and opinions was relatively well articulated. The transcripts from the Costa Due dialogue were furthermore very useful for identifying marginal perspectives, as it included people and ideas that were not all very well represented in the dominant debate on biomass.[35]

In order to reduce the Q set to a manageable number, three members of the project team individually categorized the statements, and then identified unique statements within categories. The three categorizations and sets of unique statements were compared and discussed, and iteratively, this process continued until sixty-two statements remained. The large size of the Q set points to the wide variety of ideas and opinions that exists with regard to biomass in the Netherlands. The Q statements were piloted with five people who were all well acquainted with the biomass debate to make sure that no relevant statements were missing. This resulted in a definite list of sixty statements (see appendix A). Furthermore, to check the representativeness of the statements, the interviewer asked during the Q interview whether the respondent thought important statements were missing. This was in general not the case. Of the few respondents who chose to add statements, it concerned stressing an issue that was already covered by other statements, for instance by rephrasing a statement into its positive or negative counterpart.

34 In the Costa Due (Concrete Steps to a sustainable Eemsmond), coordinated by Hisschemöller (Vrije Universiteit Amsterdam) and Stokman (Groningen University), stakeholders from the northern region in the Netherlands interactively explored investment opportunities for energy options, in particular from biomass.

35 As sufficient material was available, interviews (a common technique for concourse definition) would probably not have added to this broad range of statements. Interviews may be more relevant when the researcher is unfamiliar with the issue under study, or when there is no material (i.e. transcripts) available.

Identification of the P sample

Newspaper articles, and news-websites were used to identify stakeholders. As there was a lot of public debate on the biomass issue at the time of this study, identifying stakeholders was relatively easy. Also earlier contacts of the project team were used to identify relevant stakeholders. Furthermore, the snowball-sampling technique to identify stakeholders was applied: the interviewer asked the respondent to mention someone with a different, and someone with a similar perspective on energy from biomass. This resulted in a group of seventy-five respondents from different sectors and organizations: knowledge institutes and academia, (energy) companies, branch/sector organizations (e.g. sector organization for oil and fat), small/medium sized enterprises (including energy consultants, e.g. working on cultivation or treatment of biomass, or on energy/heat/fuel production), NGOs, national government, regional and local government. But more importantly, this sample was expected to reflect the broadest possible range of knowledge, expertise, interests, and values - in short - perspectives.

Q interview

The interviews took place between August 2007 and October 2007. Interviews typically lasted sixty to ninety minutes. The central task in the interviews was the Q sort, added upon by a number of open questions to gather qualitative data for interpretation of the factors. Before the sort the interviewer asked: "Can you explain briefly what your ideas on biomass are in relation to a sustainable energy supply for the Netherlands?". After the sort the interviewer asked three questions: "Why are these statements at the extremes?", "Do you miss specific statements?" and "Would you like to come back to, or add something to your answer on my earlier question about your ideas on biomass?".

In the interview, the sixty statements were presented to the respondents. Respondents were asked to rank the statements according to a forced normal distribution with eleven positions from most to least 'according to my opinion' (see Figure 6.2). The statements were printed on small cards. Respondents put the cards on the normal distribution that was printed on a sheet of paper.

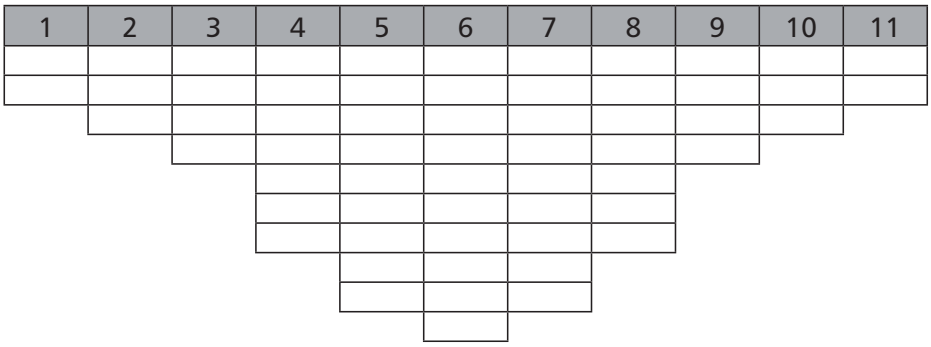


Figure 6.2 Q distribution used for the Q sorting task

Q analysis

When all interviews were finalized, analysis of the Q sorts was done with help of PQ-METHOD 2.11 (Schmolck, 2002). The correlations between the Q sorts of all seventy-five respondents were calculated, creating a seventy-five by seventy-five correlation matrix. The average correlation between Q sorts is .22, which indicates that the seventy-five respondents are rather heterogeneous in terms of their ideas and opinions about biomass. Due to the high variation in Q sorts, factor analysis of the correlation matrix was not straightforward. In order to be able to identify meaningful factors, an iterative approach was followed. Going back and forth from different types of factor extraction and rotation to the qualitative interview data, meaningful factors were eventually identified using the centroid analysis method (with Q sorts/respondents as variables and the statements as cases), and rotated using Varimax. Both are standard procedures in Q methodology. Factors were identified that had at least one significant loading. Six factors could clearly be identified and explained with help of the qualitative interview data. Of the seventy-five respondents, forty-two loaded significantly[36] on one factor and not on others. Of these forty-two respondents, seven respondents loaded significantly on factor 1, fourteen on factor 2, three on factor 3, seven on factor 4, seven on factor 5 and four on factor 6. One respondent did not load significantly on any of the factors, and all of the remaining respondents loaded significantly on more than one factor.

The number of factors extracted is quite high for a Q study (usually two to four factors are extracted). This is mainly due to the high variation in respondents' Q sorts. Total variance explained of the six factors is 46%. Although variance explained is not considered

36 Factor loadings above 0.34 were accepted as statistically significant at the 0.01 level (calculated as: 2,58 * standard error (SE); SE=1/√(number of statements)) (see McKeown and Thomas, 1988).

a relevant measure in Q methodology[37], the relatively low explained variance also points to the high variation of ideas and viewpoints with regard to biomass, which underlines the complexity and uncertainty with regard to the issue.

6.3 Q methodology: Results

The six factors that resulted from the factor analysis were interpreted as six different perspectives on biomass. As noted in section 6.1, the statements that receive the highest and the lowest scores respectively and the statements that distinguish most between one factor and the other factors are useful in interpreting a factor. The respondents that loaded significantly on a factor, i.e. that define a factor, were identified. The qualitative interview data of these respondents were used to interpret the factor. Quotes from the interviews were used to describe and explain the factors. For each factor a table is shown below that lists the ten statements that score highest and lowest on that factor, the most distinguishing statements (indicated with *)[38], and some relevant quotes from the interviews. Each perspective is briefly discussed. The section wraps up with a short discussion of similarities and differences between the perspectives.

Perspective 1: Keep all options open

This perspective focuses on knowledge development. Generic claims about the sustainability of biomass applications are not possible, because the sustainability of an application is very much dependent on the specific situation. Therefore, it does not make sense to exclude specific options in advance, or to embrace others. Biorefinery (refining biomass in order to use all valuable elements within the biomass) is seen as a promising development. Table 6.1 shows the statements with the highest positive and negative scores for this perspective, the distinguishing statements and some relevant quotes from the interviews.

37 In regular R (not Q) factor analysis a total variance explained of 46% is considered low. The relatively low total variance explained is probably a consequence of the large number of respondents (seventy-five compared to usually about thirty in Q studies), as this means that there are more Q sorts (seventy-five) than statements (sixty). In Q methodology however, variance explained is not considered a relevant measure, since one is not interested in the question what the percentage of a perspective in the population is, but Q methodology is developed to show that various factors exist, and what the similarities and differences between these factors are. If the variance explained of factor A is higher than that of factor B, it only means that there are more people of factor A in the sample. Contrary to R methodology, the sample is not randomly selected. The 6 perspectives are salient perspectives that can be recognized in the policy discourse. They can be interpreted as ideal types. Reality is of course more nuanced.

38 Arrays of differences between z-scores of statements on factors above |2.5| were accepted as most distinguishing.

*Table 6.1 Statements that received the highest positive (agree score (11) and (10)) and highest negative scores (disagree score (1) and (2)) for perspective 1. Most distinguishing statements are indicated with *.*

Agree (11):	60: We should concentrate on the use of residuals for biofuel production.
	34: The distinction between 1st and 2nd generation is not as black-and-white as is often posed.
Agree (10):	53: First, try to make high-quality products from a biomass source, and make energy from what is left.
	44: The Netherlands is strong in knowledge development in the area of biomass technology.*
	20: The issue of unsustainable land-use, for example in South America, Africa and South-east Asia also exist without biomass production.
Disagree (1):	7: Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.*
	2: If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.*
Disagree (2):	23: The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
	22: The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment.
	27: Cultivation of energy crops is not favorable because manure and irrigation are needed.
Disagree: Other distinguishing statements	17: The Dutch government mainly has an eye for large companies; there is not enough attention and support for small, innovative players.*
Relevant quotes from interviews	"It is not one particular chain, but each biomass type needs its own chain, that makes it complicated." "It is not either first or second generation biomass. It depends on the place and time." "So much energy is being used that if you would bet on one option, either biomass, solar or wind, you won't make it. You just need everything." "We have just started with it, [biorefinery] is still in its infancy. But if you know how to develop it in a good way, you can produce - in addition to the transportfuels bioethanoel and biodiesel - also various other applications and combine that in such a way that you create raw materials for white chemistry".

Perspective 2: Hit the brakes

This perspective is very skeptical about the possibilities of sustainable biomass applications and calls for a pause. A growing international biomass market increases the risks for developing countries, with regard to environment, socio-economic situation, human rights and food supply. At the moment, there is no biomass that is sustainable

for people, planet and profit. As long as we cannot guarantee sustainable biomass, we should halt the development of new applications. Table 6.2 shows the statements with the highest positive and negative scores for this perspective, the distinguishing statements and some relevant quotes from the interviews.

*Table 6.2 Statements that received the highest positive (agree score (11) and (10)) and highest negative scores (disagree score (1) and (2)) for perspective 2. Most distinguishing statements are indicated with *.*

Agree (11):	40: In the formulation of criteria for certification of biomass also stakeholders from the South should be involved.
	2: If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.*
Agree (10):	1: If the complete lifecycle is taken into account in the analysis, biofuels do not reduce as much greenhouse gas emissions as was hoped for.*
	29: There is a need for generic policy aimed at all clean and efficient vehicles, instead of a policy that is aimed specifically at biofuels.
	21: The production of biomass is only sustainable if it contributes to the socio-economic development of the local community.
Agree: Other distinguishing statements	7: Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.*
Disagree (1):	4: If we want, we can drive clean and fly clean now with biofuels.
	5: Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously.
Disagree (2):	18: The Dutch government should enact tax exemption for biofuels.*
	35: There is no use to develop niche markets; in the end we need large-scale biomass applications, and that niche won't help to reach that.
	24: The cultivation of energy crops contributes to a colorful landscape and to the bee-population.
Disagree: Other distinguishing statements	31: Too much money goes to research, and too little to implementation in the market.*
	19: The potential of degraded and marginal grounds is so large that it can have an economic impact in rural areas.*
	32: Biomass delivers an important contribution to the security of supply, namely less dependency on geopolitically sensitive areas, and a higher degree of self-support for the EU.*
	51: In the long run, biofuels will compete on the world market with fossil fuels.*
	3: If there are no entrepreneurs who want to experiment with biofuel applications, nothing will happen.*

Relevant quotes from interviews	"My fear is that projects on a large scale, with large investments, take place with insufficient eye for the local community." "[large-scale cultivation] has a negative influence on local prosperity and employment. Production is overtaken by large companies, and as a result there is no place for the normal population. Employment for local population is used as an argument, but in practice it is disappointing. (…) Without biomass production for energy the cutting of rainforest is already taking place on a large scale (…). We need to know for sure that we can guarantee sustainable biomass crops first, and only then can we start with it." "It should not be a new sort of colonialism, in which we use their natural resources."

Perspective 3: Support small-scale innovative initiatives

The third perspective focuses mainly on small-scale and decentralized applications in the Netherlands. Initiatives by small innovative entrepreneurs are hard to get off the ground, because the Dutch government mainly has an eye for the large companies. However, we should not expect innovations from these companies, because they benefit from maintaining the existing fossil fuel based system. We should not keep putting money in research, but rather in implementation. Table 6.3 shows the statements with the highest positive and negative scores for this perspective, the distinguishing statements and some relevant quotes from the interviews.

*Table 6.3 Statements that received the highest positive (agree score (11) and (10)) and highest negative scores (disagree score (1) and (2)) for perspective 3. Most distinguishing statements are indicated with *.*

Agree (11):	17: The Dutch government mainly has an eye for large companies; there is not enough attention and support for small, innovative players.*
	31: Too much money goes to research, and too little to implementation in the market.*
Agree (10):	42: Small-scale energy production with biomass can have a huge impact on security of supply in developing countries.
	18: The Dutch government should enact tax exemption for biofuels.*
	60: We should concentrate on the use of residuals for biofuel production.
Disagree (1):	35: There is no use to develop niche markets; in the end we need large-scale biomass applications, and niches won't help to reach that.*
	33: Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.

Disagree (2):	23: The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
	49: Being a small country with limited means, we are forced to make choices; therefore the government should support only the most favorable trajectories.
	55: Technology development is the key to large-scale use of biomass, not an active subsidy policy.*
Disagree: Other distinguishing statements	1: If the complete lifecycle is taken into account in the analysis, biofuels do not reduce as much greenhouse gas emissions as was hoped for.*
	7: Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.*
Relevant quotes from interviews	"Government officials have a risk-aversive attitude. They rather don't do business with small companies that can come and leave from one day to another." "..the government does not have an idea about business. (…) She is too often on the chair of deciding which trajectory is best in terms of environmental efficiency and, also there, major mistakes are made. The government does not have sufficient knowledge about this, so she should not do this." "At a certain point one should do it. And by doing it we have overcome barriers that we otherwise [only on the basis of knowledge development] would not have overcome." "I think that we have in the Netherlands all the solutions to process [residuals and waste]. But we have a history of research and reporting. We keep on driveling, but we don't do anything. So that would be my first approach: make sure that we actually use everything we have at this moment."

Perspective 4: Security of supply with global, certified, 2nd generation biomass

This perspective has a strong market orientation. The most important incentive for the development of biomass applications is the replacement of fossil fuels, i.e. security of supply. This perspective is optimistic about the potential of biomass, especially the 2nd generation biomass[39], and states as a condition that the sustainability of biomass should be guaranteed by means of a certification system. Table 6.4 shows the statements with the highest positive and negative scores for this perspective, the distinguishing statements and some relevant quotes from the interviews.

39 There is no commonly shared definition of 2nd generation biomass. An often-used definition in the Netherlands originates from the Dutch GAVE programme (support for technological development of 2nd generation technologies) and is based on the amount of CO_2 emission reduction: 1st generation biofuels achieve CO_2 emission reductions of around 30-50% compared to fossil fuels and 2nd generation biofuels achieve a CO_2 reduction of 80% or more. However, others define 2nd generation on the basis of the biomass source that is being used: 2nd generation biofuels are made from residuals, and 1st generation from cultivated biomass. Others define 2nd generation biomass as lignocellulose (e.g. woody material), whether or not combined with a specific type of technology to convert the biomass into a fuel.

*Table 6.4 Statements that received the highest positive (agree score (11) and (10)) and highest negative scores (disagree score (1) and (2)) for perspective 4. Most distinguishing statements are indicated with *.*

Agree (11):	52: Over the whole biomass chain, there should be a positive score as regards economic profit, energy- and CO_2-balance.*
	32: Biomass delivers an important contribution to the security of supply, namely less dependence on geopolitically sensitive areas, and a higher degree of self-support for the EU.*
Agree (10):	46: Political pressure, at minimum on the EU level, is needed to make sustainability criteria function.
	51: In the long run, biofuels will compete on the world market with fossil fuels.
	15: The competition between food, feed, and fuel will have a negative financial impact on people.
Agree: Other distinguishing statements	35: There is no use to develop niche markets; in the end we need large-scale biomass applications, and that niche won't help to reach that.*
Disagree (1):	33: Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
	38: Biofuels can only succeed if the government subsidizes until the end of times.
Disagree (2):	45: Dutch farmers will not benefit from a growing use of biomass.
	18: The Dutch government should enact tax exemption for biofuels.*
	5: Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously.
Disagree: Other distinguishing statements	56: 2nd generation biofuels benefit from stimulating the 1st generation (E85 and diesel variant E95) now.*
	2: If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.*
	11: Criteria will not prevent that in the future there will be a number of large agro-companies, that supply biomass without taking social and environmental interests sufficiently into account.*
Relevant quotes from interviews	"[The discussion is about] the scarcity of resources. Not in the sense that we ran out of resources, but it is in places where it is difficult to get and where it becomes at a certain point too expensive to take it out." "Biomass actually opens the door to [sustainability] criteria." "There are also small companies that show bad practices. Large companies can more easily deal with [sustainability] criteria." "[positive impacts on the local community] is what you want to achieve, but you need frameworks [sustainability criteria] for that." "..the idea that first generation infrastructure and network forms a basis for the second generation, I think that that is meanwhile rejected, that it strongly causes problems, and no acceleration."

Perspective 5: Efficiency the goal, biomass a means?

According to this perspective, we should not overestimate the potential of biomass. In the future, other renewable sources (e.g. solar, wind) will be better suited for our energy supply, because the availability of those sources is larger. We should be critical about the sustainability of biomass applications: the whole chain should be taken into account when assessing whether there is a positive energy balance. Energy-efficiency is key. Technology and market have not sufficiently been developed. Table 6.5 shows the statements with the highest positive and negative scores for this perspective, the distinguishing statements and some relevant quotes from the interviews.

*Table 6.5 Statements that received the highest positive (agree score (11) and (10)) and highest negative scores (disagree score (1) and (2)) for perspective 5. Most distinguishing statements are indicated with *.*

Agree (11):	52: Over the whole biomass chain, there should be a positive score as regards economic profit, energy- and CO_2-balance.*
	7: Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.*
Agree (10):	51: In the long run, biofuels will compete on the world market with fossil fuels.*
	60: We should concentrate on the use of residuals for biofuel production.
	37: The precarious Dutch energy policy has resulted in stagnation of the market development concerning biomass.
Agree: Other distinguishing statements	55: Technology development is the key to large scale use of biomass, not an active subsidy policy.*
Disagree (1):	9: Biomass should be used only for electricity production and heat supply, not for transport fuels.
	54: Public resistance is an obstacle for local biomass applications.
Disagree (2):	33: Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
	23: The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
	45: Dutch farmers will not benefit from a growing use of biomass.
Disagree: Other distinguishing statements	2: If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.*
	31: Too much money goes to research, and too little to implementation in the market.*

Relevant quotes from interviews	"The input that we use for the process to make biomass is about just as high as what comes out as energy. The gain is nil. Moreover, it is subsidized. If you realize this, it is actually money thrown away, the subsidy." "Number 1 is efficiency, dealing more efficiently with energy. (…) So if we focus only on CO_2 neutral, things are not going well. In that case, companies will just buy biomass, but as a consequence use twice as much energy." "I see that there are many organic waste flows in the Netherlands that we all can use as a source of energy. That is amongst others dung. (…). We have much [household] waste, from vegetables, fruit and garden, that is composted at the moment because we cannot get rid of it. There is an overproduction of compost. There are various industrial organic waste flows that you can use very easily as a source of energy." "[The fossil energy industry] exists already for such a long time, and as a result their operational costs are much lower than for biomass. They commercialized all their by-products. If biomass wants to compete economically in a healthy way, technology development should take place."

Perspective 6: Just do it, step by step

This perspective is pragmatic. It underlines that we cannot know at this moment what will be the best option in the future. This means that we should act now with the knowledge that we have, instead of postponing actions. All options should be kept open; there should be a broad range of applications. The role of entrepreneurs is very important in this perspective. Table 6.6 shows the statements with the highest positive and negative scores for this perspective, the distinguishing statements and some relevant quotes from the interviews.

*Table 6.6 Statements that received the highest positive (agree score (11) and (10)) and highest negative scores (disagree score (1) and (2)) for perspective 6. Most distinguishing statements are indicated with *.*

Agree (11):	3: If there are no entrepreneurs who want to experiment with biofuel applications, nothing will happen.*
	57: 2nd generation biofuels are for the time being not ready for large-scale application.
Agree (10):	34: The distinction between 1st and 2nd generation is not as black-and-white as is often posed.
	51: In the long run, biofuels will compete on the world market with fossil fuels.*
	41: In the Netherlands, biofuels are discriminated compared to fossil fuels when it concerns the calculation of CO_2-emissions.
Agree: Other distinguishing statements	19: The potential of degraded and marginal grounds is so large that it can have an economic impact in rural areas.*
	56: 2nd generation biofuels profit from stimulating the 1st generation (E85 and diesel variant E95) now.*

Disagree (1):	23: The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
	22: The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment.
Disagree (2):	35: There is no use to develop niche markets; in the end we need large-scale biomass applications, and that niche won't help to reach that.*
	33: Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
	9: Biomass should be used only for electricity production and heat supply, not for transport fuels.
Disagree: Other distinguishing statements	44: The Netherlands are strong in knowledge development in the area of biomass technology.*
	2: If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.*
	52: Over the whole biomass chain, there should be a positive score as regards economic profit, energy- and CO2-balance.*
Relevant quotes from interviews	"Do today what you can do today. Do not postpone it because you are just winding around the plans and trying to achieve the optimal." "One person favors natural gas, the other bioethanol. Factories are making diesel engines ever cleaner, more efficient, and better. In which soot filters are installed. In which NO_x filters are installed. You see that sort of things increasing. So I think it will be a mix of different types."

Similarities and differences between perspectives

To enhance the understanding of the perspectives and the relation between perspectives, correlations between the factor scores were calculated with the software program PQMethod. The higher the correlation between two factor scores, the more similarities there are between two perspectives. Based on these correlations it was examined which perspectives are most similar. Similarities were interpreted based on the descriptions of the perspectives and the relevant statements. Table 6.7 shows the correlations between the factor scores.

Table 6.7 Correlations between factor scores; the higher the correlation between two factors, the more similarity between two factors, i.e. perspectives.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	-	0.11	0.37	0.50	0.46	0.43
Factor 2		-	0.17	0.26	0.39	-0.02
Factor 3			-	0.34	0.40	0.45
Factor 4				-	0.55	0.26
Factor 5					-	0.44
Factor 6						-

The correlations show that perspectives 4 ('Security of supply with global, certified, 2nd generation biomass') and 5 ('Efficiency the goal, biomass a means?') are most alike (r=0.55). Both see biomass as a commodity in a market in which it will eventually compete with fossil fuels, but on the condition that biomass applications have a positive energy balance. Perspective 4 is however more positive about the question as to whether this will be feasible. This perspective sees the solution in 2nd generation, certified biomass. Perspective 5 doubts the feasibility of a positive energy balance, as well as the potential availability of biomass. According to perspective 5, technology and market have not been sufficiently developed, which has negative implications on the efficiency of biomass applications.

Both perspectives correlate considerably with perspective 1 ('Keep all options open'). Perspectives 1 and 4 are both optimistic about the potential of biomass to contribute to a sustainable energy system (perspective 5 is more critical about this), but perspective 1 is more knowledge-oriented, and perspective 4 more market-oriented. Another difference is that perspective 1 calls for keeping all options open, whereas perspective 4 focuses only on 2nd generation, certified biomass. Perspectives 1 and 5 share a focus on residuals as a biomass source and the attention for technology development. However, perspective 5 is more critical about the efficiency of biomass applications and focuses mainly on knowledge development for the market (rather than for science).

Perspective 2 ('Hit the brakes') shows the lowest correlations with all other perspectives. It is also the most critical perspective.

Lastly, perspective 3 ('Support innovative initiatives') and 6 ('Just do it, step by step') are correlated. These perspectives are similar in that they focus on entrepreneurship, and putting things into practice *now*. Perspective 6 takes a more pragmatic, and less ideological stance than perspective 3. Perspective 3 focuses on small scale, decentralized applications in the Netherlands, whereas perspective 6 does not want to make a choice for a specific scale and type of application. In addition, perspective 3 is very critical about the role of the Dutch government and policy; this does not seem to play a very important role for perspective 6.

Based on the correlations displayed in Table 6.7 it seems that perspective 2 is most different from the other perspectives, as it has low correlations to the other perspectives. At the same time, it is a perspective that is well represented in the dominant policy debate on biomass in the Netherlands; it is not an unfamiliar or marginal perspective. Perspectives 3 and 6 however –although they may appear stronger in a statistical sense as expressed by their correlation - reflect marginal perspectives. These perspectives are not frequently expressed in the dominant policy debate in the Netherlands and as such they

present relatively unknown, or unfamiliar ideas. It needs to be emphasized that it still remains an empirical question whether and how stakeholders with divergent perspectives actually differ in terms of their preferences, or whether they can agree on a particular course of action. This question can only be resolved in the dialogue itself.

6.4 Q methodology to select participants

The perspectives that resulted from the Q analysis were used to select participants for the dialogue. For practical reasons, only thirty from seventy-five respondents could take part in the Biomass Dialogue. Therefore, the next was to select forty out of seventy-five people (taking about 10 cancellations into account). For this step the results of Q Methodology were used. Factor loadings were calculated for each respondent. The higher the factor loading of a person on a factor (perspective), the more that person's Q sort resembles the archetypal sort for that factor, and hence, the more that person shares this particular perspective. This resulted in an overview of the respondents and the perspectives they most and least adhered to. Then, for each perspective, respondents who loaded most strongly on that perspective were identified. Furthermore, for each of the perspectives the respondents that showed large similarities with that perspective were identified on the basis of the interview data. This resulted in a list of forty people who represented the six perspectives in a balanced way. These were the persons that were invited to take part in the Biomass Dialogue.[40]

It was argued in chapter 3 that stakeholder selection should not only include a diversity of perspectives, but also cut across networks in order to increase the chance that people meet other people with unfamiliar, or new ideas. To check whether the stakeholder selection procedure for the Biomass Dialogue succeeded in doing this, participants were asked in the evaluation of workshop 1 whether they had met people at the workshop with whom they had never discussed about the biomass issue before. All respondents affirmed to this question. They were furthermore asked with the ideas of whom of the other participants they were already familiar. There was one participant (an entrepreneur in pure vegetable oil) with whose ideas eight of twelve respondents[41] were familiar. In general the picture was very mixed, and most respondents were familiar with some of the other participants and their ideas and unfamiliar with some of others. Hence, stakeholder selection in the Biomass Dialogue was successful in cutting across networks.

40 In the interviews we asked the respondents if they would be willing to take part in the Biomass Dialogue. Self-evidently, their answer on this question was taken into account.

41 Not all participants filled in the evaluation form; there were fifteen participants in workshop 1.

6.5 Comparison of selection based on Q perspectives and on actor type

Stakeholder selection based on affiliation is a commonly used approach for stakeholder dialogues. Stakeholders are often selected in such a way as to represent different actor types or sectors, such as government, industry, NGOs, and science. Although there may very well be high correlations between specific actor types and specific perspectives, it is an empirical question whether this assumption is correct, i.e. whether stakeholder affiliation is a good proxy for perspective. This is what will be investigated in this section. In order to assess the value of Q methodology for stakeholder selection, this section empirically compares the stakeholder selection discussed above with a hypothetical selection based on affiliation.

The six perspectives described above can be interpreted as six salient perspectives in the discourse on biomass. Respondents' Q sorts correlate to a greater or lesser extent with these perspectives. Table 6.8 lists the number of respondents with a 'defining' sort on each of the perspectives. A person's sort is defining for a perspective when that person scores significantly on that perspective and not on others.[42] The respondents are grouped by actor type, i.e. general categories of affiliation: knowledge institutes and academia, energy companies and branch/sector organizations, small and medium-sized enterprises, NGO's, national government, and regional and local government.

42 Thirty-two respondents do not load significantly on one factor, but load (non-significantly) on more than one factor. Hence, they are 'a mix of perspectives'.

Table 6.8 Number of defining sorts per actor type and per perspective

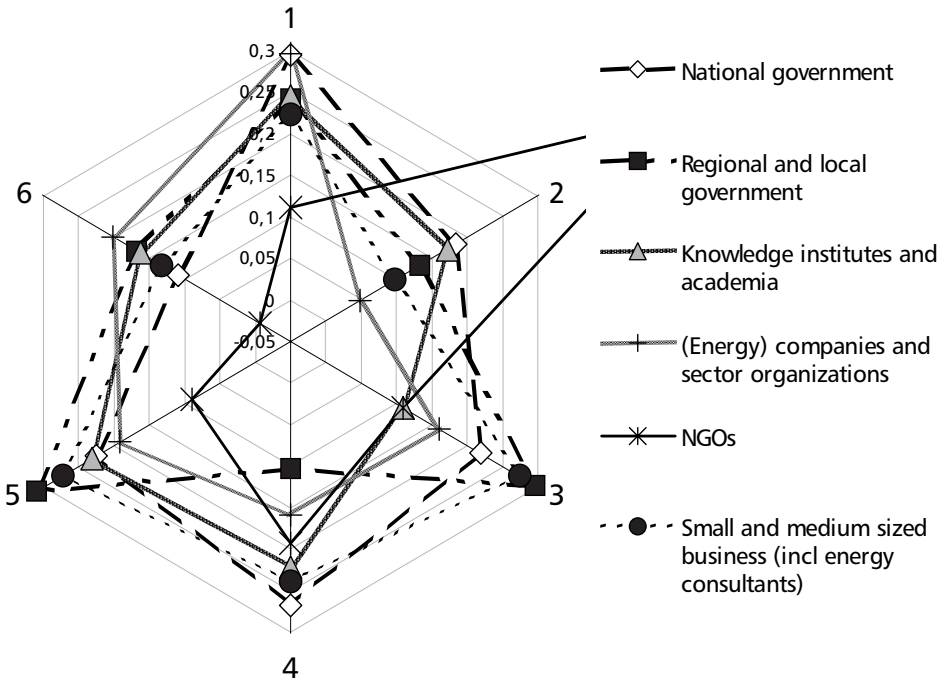
	P1 Keep all options open	**P2** Hit the brakes	**P3** Support small-scale innova-tive initiatives	**P4** Security of supply with global, certified, 2nd genera-tion biomass	**P5** Efficien-cy the aim: biomass a means?	**P6** Just do it, step by step	Total per type of organi-zation
Knowledge institutes and academia	3	2		2	2		9
(Energy) com-panies, sector organizations	2			2	2	3	9
Small/medium sized enter-prises (including energy consul-tants)	1	2	2	1		2	8
NGOs		7		2			9
National govern-ment	1	2					3
Regional/local government		1	1		3		5
Total per per-spective	7	14	3	7	7	5	43

Table 6.8 shows that within one actor type different perspectives can be identified. This means that actor types are heterogeneous with regard to perspectives. For example, respondents from knowledge institutes and academia load on perspectives 1, 2, 4 and 5. In addition, on each perspective respondents from different types of actors appear. For example, on perspective 1 there are respondents from knowledge institutes and academia, (energy) companies and sector organizations, small/medium sized enterprises, and national government.

Table 6.8 shows only the defining sorts, i.e. the respondents who are in significant agreement with a perspective. However, even when a respondent is not defining a perspective, he or she can still support the perspective to a certain extent, which is indicated by

the factor loading. To further investigate to what extent each of the perspectives is represented within actor types, the average factor loadings per actor type on each of the six perspectives were calculated. Factor loadings can be interpreted as a measure of agreement. The higher a factor loading, the more a respondent agrees with the particular perspective. For this analysis all data (seventy-five factor loadings on six perspectives) could be taken into account, and it therefore gives a better image of how heterogeneous or homogeneous actor types are in terms of perspectives on energy from biomass than the analysis summarized in Table 6.8, which is based only on defining sorts (and hence is based on low frequencies). The results of the analysis are displayed in Figure 6.3.

Figure 6.3 Distribution of average factor loadings per actor type across the six perspectives; 1: Keep all options open, 2: Hit the brakes, 3: Support small-scale innovative initiatives, 4: Security of supply with global, certified, 2nd generation biomass, 5: Efficiency the goal: biomass a means?, 6: Just do it, step by step



The six axes represent the six perspectives. Each line represents an actor type. The further from the centre a data point is positioned on an axis, the higher the average factor loading on that factor for that actor type is. The results displayed in Figure 6.3 underline the findings displayed in Table 6.8: actor types are rather heterogeneous in terms of perspectives. After all, the lines are pretty much scattered over the web.

Although our results do not allow for making any definite statements on the degree of support for the perspectives among actor types, Figure 6.3 allows for making some tentative observations as regards the congruence of actor types and perspectives. The most notable observation concerns NGOs. NGOs have a high average loading on perspective 2 (it is so high that it is even positioned outside the figure (0,49)), and low loadings on all the other perspectives, especially on perspective 6 ('Just do it, step by step'). This latter result is not surprising, since perspective 2 calls for a moratorium on the use of biomass for energy as long as sustainability cannot be guaranteed. Perspective 6 however calls for learning-by-doing, and argues that we will not be able to develop sustainable applications as long as we do not act. These are opposite calls[43]. So, NGOs appear to be relatively homogeneous with regard to their perspective, in that they are strongly dominated by perspective 2 ('Hit the brakes').

Also for the other actor types some observations can be made. Regional and local governments load mainly on perspectives 1, 3 and 5, and notably low on perspective 4. As the focus of perspective 4 ('Security of supply with global, certified, 2nd generation biomass') is on large-scale, global biomass chains, it is not surprising that this perspective does not appeal to government officials active at the regional and local level. As regards the results for (energy) companies and sector organizations, the low average factor loading on perspective 2 is notable. Not surprisingly, a critical perspective that stresses negative impacts of biomass applications for developing countries does not prevail among actors of this type.

Then, for knowledge institutes and academia, there seems to be a relative low loading on perspective 3. This is interesting, as it might indicate that knowledge institutions in the Netherlands do not interact on a regular basis with small and medium sized innovative firms. It is however not so surprising that actors from research institutes do not load strongly on a perspective that argues that there is enough knowledge already. According to perspective 3, it is time to put the knowledge into practice, rather than promoting more academic research.

Finally, the results for small and medium enterprises show a rather heterogeneous picture. Loadings are relatively low for perspectives 2 and, to a lesser extent, for perspective 6. Actors from small and medium enterprises probably have a low loading on perspective 2 for similar reasons as the (energy) companies and sector organizations. In addi-

43 In general, this seems to be reflected by the ordering of the actor types on perspectives 2 and 6: on perspective 2 NGOs load most strongly, then national government, knowledge institutes and academia, regional and local government, small and medium sized enterprises, and the lowest loading is for (energy) companies and sector organizations. For perspective 6, this ordering is reversed, except for the rank of small and medium sized enterprises.

tion, these actors are optimistic about small-scale, decentralized biomass applications (perspective 3). As perspective 2 is focused on large-scale, global biomass chains, the skepticism of perspective 2 may not apply to the small-scale, decentralized biomass applications. The low loading on perspective 6 for actors from small and medium sized enterprises is actually surprising, as two of the sorts that defined this perspective were from people from this actor type (see Table 6.8), and because perspective 6 is an entrepreneurial perspective. This underlines the heterogeneity of this actor type.

6.6 Conclusion

The biomass issue is a very controversial and complex issue that involves a huge variety of ideas, preferences, opinions, knowledge claims and values. This is reflected by the relatively high number of identified perspectives (6, as compared to 2 to 4 in most Q studies), and the relatively low total variance explained. Factor analysis was as a result not a straightforward task; it was difficult to identify definitive clusters of Q sorts. Davies, Blackstock and Rauschmayer (2005) also point to this difficulty for complex and uncertain issues. They argue that this should be considered as reflecting the difficulty of identifying different perspectives, rather than as a direct limitation of Q methodology for identifying perspectives and selecting stakeholders. The observation that factor analysis was not a straightforward task raises some new questions however with regard to the procedure for identifying and selecting factors. It was argued that the diversity of perspectives should be reflected in the dialogue. When different procedures for selecting factors (e.g. based on Eigenvalues, scree plot, or on number of significant loadings) result in different numbers of factors, this has consequences for the way diversity is treated and covered in the dialogue. This issue deserves attention in further work.

An important finding from the Q analysis presented in this chapter is that a stakeholder selection based on perspectives results in a different group composition than a selection based on actor type. Actor types are rather heterogeneous in terms of their perspectives on biomass. This implies that actor type is not a good proxy for perspective. However, the analysis also showed that some actor types are more heterogeneous than others. Some perspectives (in particular perspective 2) are dominated by specific types of organizations (NGOs). The finding that particular actor types are ‘over-represented’ on particular perspectives, and ‘under-represented’ on others might indicate that these actors are unfamiliar with some of the perspectives. This underlines the importance of organizing stakeholder dialogues that facilitate mutual learning, i.e. the interaction between stakeholders with different perspectives and from different organizational networks.

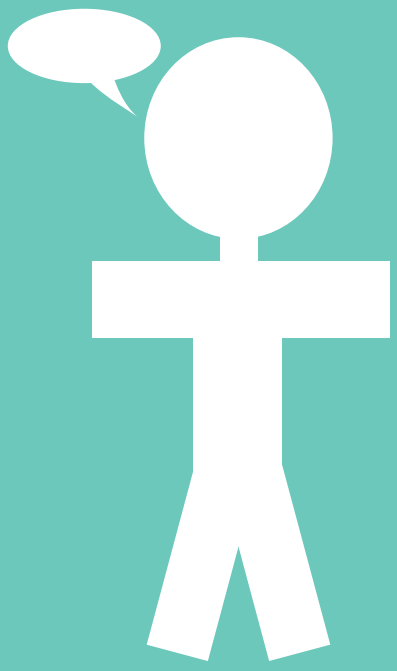
Q methodology proved a useful tool to gain insight into the different perspectives on energy from biomass in the Netherlands, in a more nuanced way than only mapping pro- and con viewpoints. It enabled a bottom-up identification of the variety of perspectives on energy from biomass in the Netherlands that exist among Dutch stakeholders. In addition, it enabled an analysis of the disparity of perspectives by giving insight into the similarities and differences between these perspectives. The value of Q methodology for giving insight in the different positions and opinions that different actors may have on a complex policy issue, is underlined by other studies that used Q Methodology for this purpose (see e.g. Van Eeten, 2001; Ellis et al., 2007; Breukers, 2006).

Importantly, in addition to the identification of the diversity of perspectives, Q methodology proved to be a useful method for identifying and selecting stakeholders with salient perspectives, i.e. a high loading on one of the six perspectives. This enabled a balanced representation of the variety of perspectives in the Biomass Dialogue. The plea for selecting stakeholders on the basis of perspectives rather than affiliation or (stratified) random sampling is not new, and also the idea to use Q methodology for this has been put forward before (see e.g. Davies, Blackstock, & Rauschmayer, 2005; Dryzek et al., 2008). However, I am not aware of any empirical examples in which this idea has been actually employed. This study provides an empirical example and shows that Q methodology is a useful tool for stakeholder selection.

Q methodology is characterized by an integrated quantitative and qualitative approach. This makes it possible to statistically analyze the variety and disparity of perspectives, and to interpret this on the basis of the qualitative data gathered through the interviews. The power of an integrated quantitative and qualitative approach is that it provides a very rigid way of analyzing diversity, without losing the strength of qualitative methods such as allowing respondents to use their own words for explaining their perspective. Moreover, this characteristic makes it possible to statistically identify stakeholders who adhere to a specific perspective.

Chapter 7

Constructive Conflict Methodology design in the Biomass Dialogue



Constructive Conflict Methodology design in the Biomass Dialogue

This chapter describes how *Constructive Conflict Methodology* was applied in the Biomass Dialogue project and which methods were used to support the steps of the *Constructive Conflict Methodology* (see Figure 7.1). This chapter makes use of the reports that were written by the project team in the course of the Biomass Dialogue, and of the evaluations that were done with participants after each of the workshops in the dialogue. Step 1 of *Constructive Conflict Methodology* (stakeholder identification and selection) was already extensively discussed in the previous chapter, as well as the identification of the diversity of perspectives (which is part of step 2). This chapter will explain how steps 2, 3 and 4 of *Constructive Conflict Methodology* were subsequently taken in the Biomass Dialogue. The chapter starts in section 7.1 with explaining some general design characteristics of the Biomass Dialogue that follow from the *Constructive Conflict Methodology*. The subsequent three sections (7.2 to 7.4) zoom in on steps 2, 3 and 4 of *Constructive Conflict Methodology*, and discuss how each of the steps was conducted within the Biomass Dialogue. Section 7.5 wraps up with conclusions and discussion.

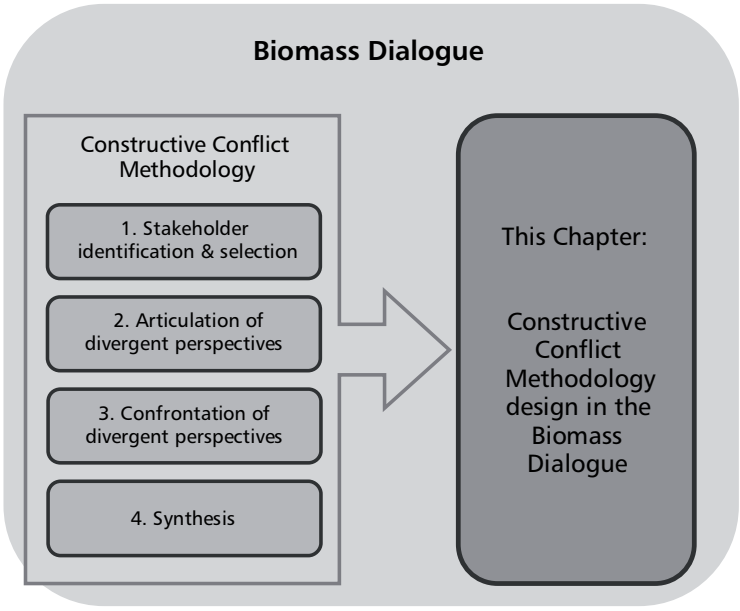
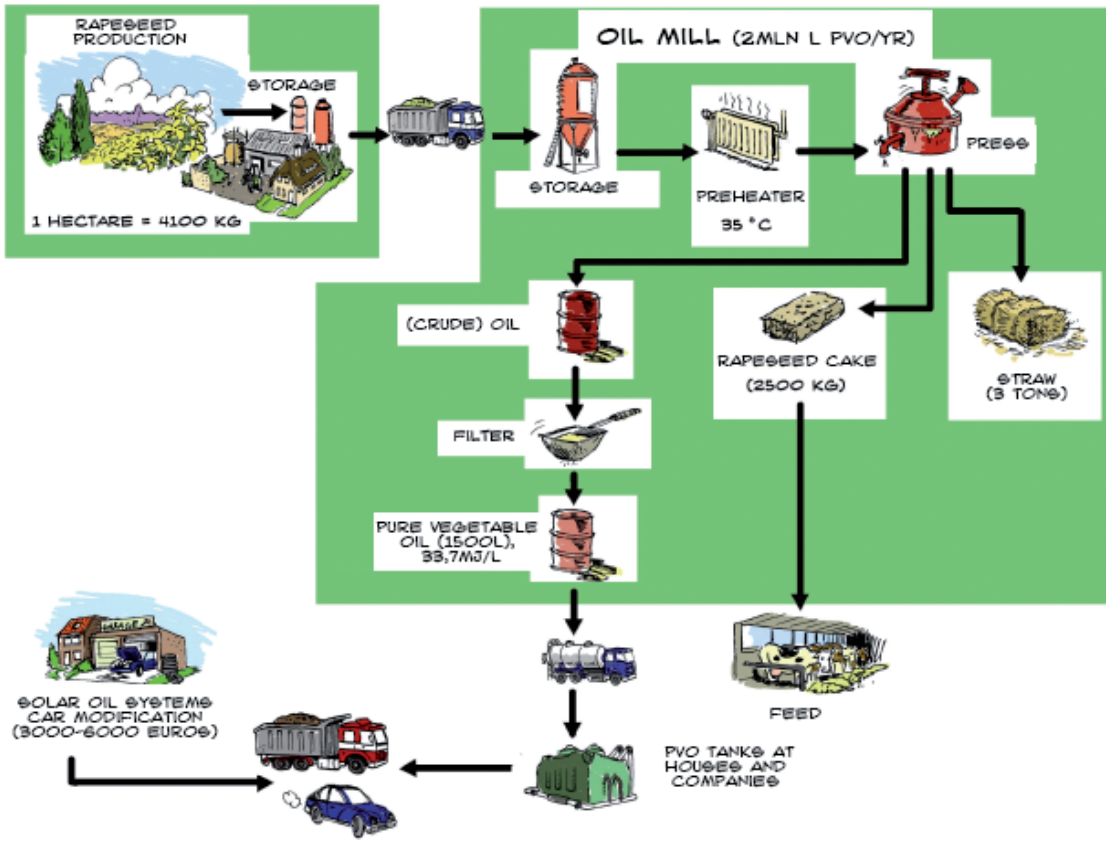


Figure 7.1 This chapter discusses the application of Constructive Conflict Methodology in the Biomass Dialogue

7.1 Constructive Conflict Methodology for the design of the Biomass Dialogue

Constructive Conflict Methodology provided the design guidelines for the Biomass Dialogue. This has two important implications. Firstly, the dialogue was set up in order to facilitate the articulation and confrontation of divergent perspectives. Diversity was addressed in a bottom-up fashion: the variety of perspectives emerged from the Q interview data (see chapter 6) rather than from an a priori assumption on which categories of perspectives exist. Secondly, discussions concentrated on the specific level rather than on abstract sustainability issues. To this end, notes on specific biomass chains were prepared, in cooperation with particular participants and colleagues in the program of which the Biomass Dialogue was part. These chains were presented in a schematic picture, with cartoons for each element in that chain. Figure 7.2 depicts an example that was used in the first workshop. The project team expected that this specific level for discussion would be especially worthwhile because of the controversies and highly contested character of specific applications. The project team anticipated intense discussions based on implicit assumptions, definitions, et cetera, and therefore aimed to make discussions as explicit and specific as possible. In line with *Constructive Conflict Methodology*, there was much emphasis on deliberation and argumentation in the design of the dialogue. This was intended to make taken-for-granted assumptions, definitions and beliefs explicit. The four steps of the *Constructive Conflict Methodology* were not taken in linear order. As noted earlier, the first two steps, stakeholder selection and articulation of divergent perspectives, were both based on the Q results, and hence, were largely integrated. Articulation of divergent perspectives hence partly took place in the preparation phase of the dialogue (as did stakeholder selection; see chapter 6). Further articulation took place in workshop 1. Confrontation of divergent perspectives also mainly took place in workshop 1. Synthesis took place on the level of workshops as well as on the level of the dialogue as a whole.

Figure 7.2 An example of a chain that was evaluated by the participants in workshop 1: pure vegetable oil (PVO) from rapeseed (illustrations by Maarten Gerritsen)



7.2 Constructive Conflict Methodology step 2: Articulation of divergent perspectives

Articulation of divergent perspectives started with the identification of the six Q perspectives in the preparation phase of the Biomass Dialogue. This was explained in chapter 6. In the dialogue further articulation of the perspectives took place.

The project team wrote a report documenting the results of the Q analysis. This report contained an extensive description of the six perspectives. In workshop 1, this report was presented, as well as the analysis of participants' positions with regard to the six perspectives. In general, participants recognized the perspectives. They indicated that the presentation of perspectives clarified the complexity of opinions, claims and arguments. It helped them to better understand other people's statements and ideas. They indicated, after the workshops, that the perspectives contributed to a constructive and open dialogue, because the diversity of perspectives was made explicit and more understand-

able. Most people also recognized their 'analyzed' perspective, but also indicated that they felt being a mix of two perspectives. The persons who indicated so, were in general indeed statistically loading on more than one perspective according to the Q analysis.

Two design tools were used in workshop 1 to facilitate the articulation of perspectives: repertory grid technique and a (simplified) argumentation model. Both tools were applied in subgroups of participants with similar perspectives. Subgroups were formed to stimulate deliberation. That is, average speech time in smaller groups is higher, and shy or cautious persons may be more inclined to speak in a small group than in a large group. The idea behind the formation of 'like-minded' subgroups was that, by means of deliberation, argumentations for specific ideas could be clarified and worked out, without engaging in discussions with different-minded people (see also Mitroff et al., 1979; Mitroff & Emshoff, 1979).

Formation of subgroups

The Q results were used to form the subgroups. Due to practical reasons, only three subgroups could be formed (and not six, according to the perspectives). In chapter 6 I explained the relation between the perspectives, based on a calculation of correlations between factor scores. The correlations between the perspectives were used in order to form subgroups in such a way that the perspectives most alike were combined in one group (see chapter 6). Perspectives 1 ('Keep all options open'), 4 ('Security of supply with global, certified, 2nd generation biomass') and 5 ('Efficiency the goal, biomass a means?') are most alike, and were therefore combined in one subgroup. Perspective 2 ('Hit the brakes') is most different (most critical) from the other perspectives, and was therefore basis for a second subgroup. Perspectives 3 ('Support innovative entrepreneurs') and 6 ('Just do it, step by step') are most alike, and were therefore combined in a third subgroup.

Repertory grid technique

The first tool that was used to support the articulation of divergent perspectives is the Repertory grid technique (Kelly, 1991; Fransella et al., 1977 for further explanation of Repertory Grid Technique see chapter 4). Repertory grid technique was applied in the three 'like-minded' subgroups in workshop 1 of the Biomass Dialogue. Aim of the session was to elicit, in a bottom-up way, the criteria that participants used to assess the sustainability of biomass chains, and to assess the sustainability of five existing biomass chains (these chains were listed in section 5.3). Repertory grid technique facilitated the articulation of argumentations and served as a basis for the arguments about the sus-

tainability of the biomass chains. In each of the three subgroups, the chairperson asked the participants the typical repertory grid question: "How are two of these chains similar but different from the third?". Different combinations of chains could be made to find a broad range of constructs. Participants individually wrote down their answers (the constructs), until they indicated that they couldn't think of any more constructs. The group discussed the constructs, and all unique constructs were noted on a flip-over. The chairperson then asked: "If you take a look at this list of characteristics of the biomass chains, which of these are most important for the sustainability of the biomass chains?" [44] This resulted in a list of characteristics that, positively or negatively, influence sustainability.

A simplified argumentation model

The second tool that was used to support the articulation of divergent perspectives, and that prepared for the confrontation of divergent perspectives was a simplified argumentation model. This tool was used to exemplify claims regarding the sustainability of the biomass chains. It was applied in the first workshop of the Biomass Dialogue after application of the repertory grid technique. The tool was based on the argumentation model as developed by Toulmin (Toulmin et al., 1979; Toulmin, 2003). As explained in chapter 3, the Toulmin model structures arguments according to six elements: claim, information, warrant, backing, qualifier and rebuttal. The result of an argumentation is the *claim* (C), a statement about what is needed or desirable, e.g.: "For The Netherlands options from biomass offer on the short term most chances for the transition to sustainable mobility". The claim is based on *information* (I), e.g.: "Many good transport fuels from biomass are already on the market". The *warrant* supports the claim by explaining why the claim is valid based on the information, e.g.: "Because many good transport fuels from biomass are on the market it can be expected that biomass options offer the best chances for a transition to sustainable mobility on the short term in The Netherlands". The *backing* justifies or supports the warrant, e.g.: "Globally, there is enough space for sustainably produced biomass". The probability of the claim can be indicated with a *qualifier*, e.g., the qualifier 'probably' in the claim: "For The Netherlands, biomass-options *probably* offer the best chances for a transition to sustainable mobility in the short term". The sixth element of an argumentation is the *rebuttal*. The rebuttal states the conditions under which the claim is not true, e.g.: "..unless it appears to be impossible to have a worldwide certification system for biomass".

44 During the workshop the Repertory Grid jargon was avoided, so the chairperson spoke about 'characteristics' instead of 'constructs'.

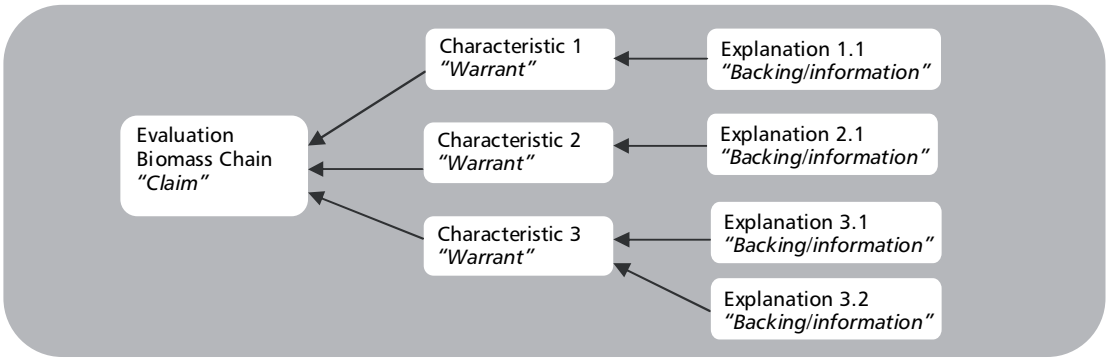


Figure 7.3: Simplified argumentation model to structure evaluation of sustainability of biomass chains in workshop 1

A simplified version of the Toulmin model was used in workshop 1 of the Biomass Dialogue. This simplified version included the claim (the evaluation of the sustainability of the biomass chain), warrant (characteristics that influence the sustainability of the chain) and a hybrid of backing and information (explanation of why and how a characteristic influences the sustainability of the chain). Figure 7.3 shows this simplified argumentation model. The structure of this figure was flexible; boxes were added or removed depending on the evaluation of the participants.

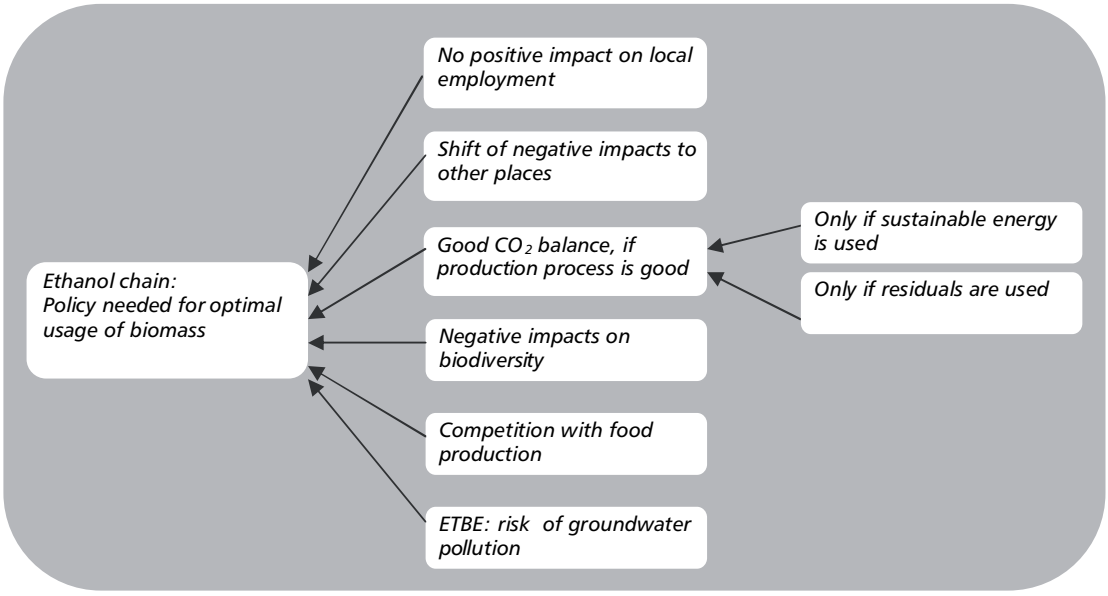


Figure 7.4 Argumentation model from one of the subgroups about the bio-ethanol chain

Figure 7.4 shows an example of an argumentation scheme from one of the subgroups about the sustainability of the bio-ethanol chain. The claim in this scheme is that policy is needed for making optimal use of biomass for ethanol production. The boxes in the middle column list six aspects of the chain that influence its sustainability. The boxes in the right column do not give backings or information, but rather rebuttals. According to these participants, there is a good CO_2 balance, only if sustainable energy is used in the process and when residuals are used to produce bio-ethanol.

7.3 Constructive Conflict Methodology step 3: Confrontation of divergent claims

Confrontation in the *Constructive Conflict Methodology* is aimed at making explicit the assumptions and beliefs that may form the basis of divergent perspectives and to stimulate participants to consider and evaluate alternative options and viewpoints. In the context of the Biomass Dialogue, this refers to assumptions and beliefs about the sustainability of biomass options. The confrontation of divergent perspectives was prepared in workshop 1 by the 'like-minded' subgroups by working out the argumentation models. For the confrontation in workshop 1 also subgroups were used, but now in such a way that each subgroup consisted of participants with *different* perspectives. These subgroups were asked to reflect on the evaluations of the 'like-minded' subgroups. The Q results were used to ensure a balanced distribution of the six perspectives over the three subgroups.[45]

In workshop 2, confrontation took place to a lesser extent. The heterogeneous subgroups were used in workshop 2 to generate the elements of a desirable future vision, based on the input provided (the results of workshop 1 and six innovative biomass chains, see section 5.3). Based on the outcomes of workshop 1, the project team had the impression that participants did not disagree as much as initially anticipated, and as much as participants would think themselves. Therefore, the project team decided to do this task in heterogeneous groups, in order to find out whether heterogeneous groups would develop one future vision or agree on the elements, or whether they would come up with more visions or contested elements. In the next round, the 'like-minded' groups reflected upon the visions developed by the heterogeneous groups. They were asked to identify conflicts and where possible, solutions to conflicts. Here, confrontation was thus less central in workshop. It only took place within the 'like-minded'-groups that

45 According to *Constructive Conflict Methodology* one might expect that this step would take place by confronting the evaluations of two 'like-minded' subgroups, rather than in new heterogeneous subgroups. This was however practically impossible, as this requires three confrontation rounds (group 1-group2; group 2-group 3; group 2-group 3) and hence much more time.

confronted and compared the different future visions. In workshop 3 the aim was to reach a synthesis; articulation and confrontation was not part of workshop 3.

A simplified argumentation model

In workshop 1, the simplified argumentation models that were produced by the 'like-minded' groups were each presented to one of the new, heterogeneous groups in order to confront the former evaluations with different evaluations. The participants in the heterogeneous groups were asked to indicate which elements in this model they did not agree on, or to add to the model the characteristics or explanations that they missed. Figure 7.5 shows how participants could, in theory, alter the model. They could disagree with the explanation of how a characteristic influences the sustainability of the biomass chain (1) and add another (2), they could disagree with a characteristic and its explanation (3), they could add a characteristic that they considered important for the sustainability of the biomass chain and an explanation of how the characteristic influences the sustainability of the biomass chain (4).

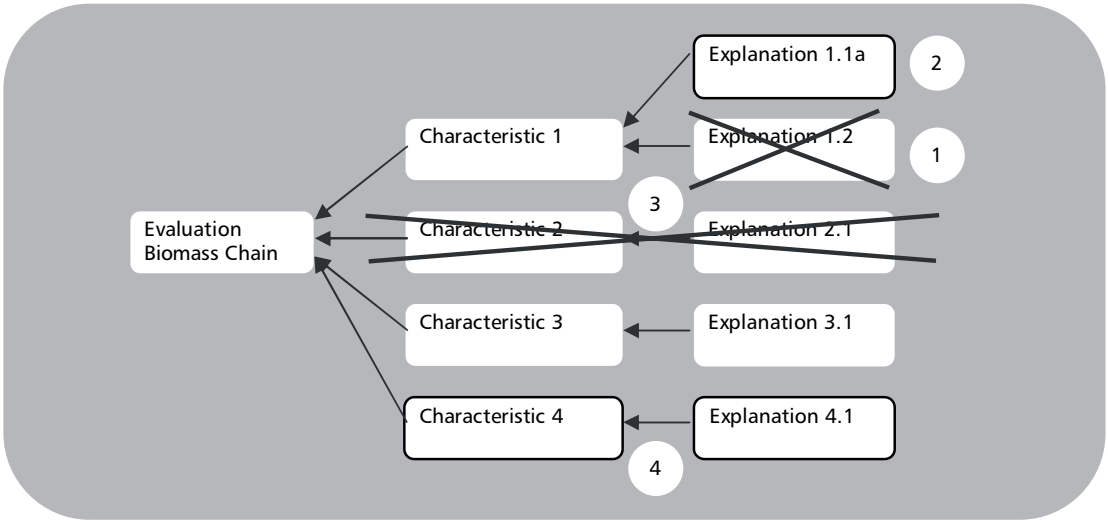


Figure 7.5 Participants in the afternoon subgroups in workshop 1 reflected upon the argumentation model that was produced by the morning subgroups and they could alter elements in, or add elements to the model

Participants made many amendments to the evaluations and argumentations of the morning subgroups. Besides specific knowledge or factual issues, for instance about specific characteristics of technologies, or about studies on CO_2-reduction of specific biomass chains, the main amendments related to the reference situation for evaluation of the biomass chain. An example is shown in Figure 7.6. One of the characteristics that,

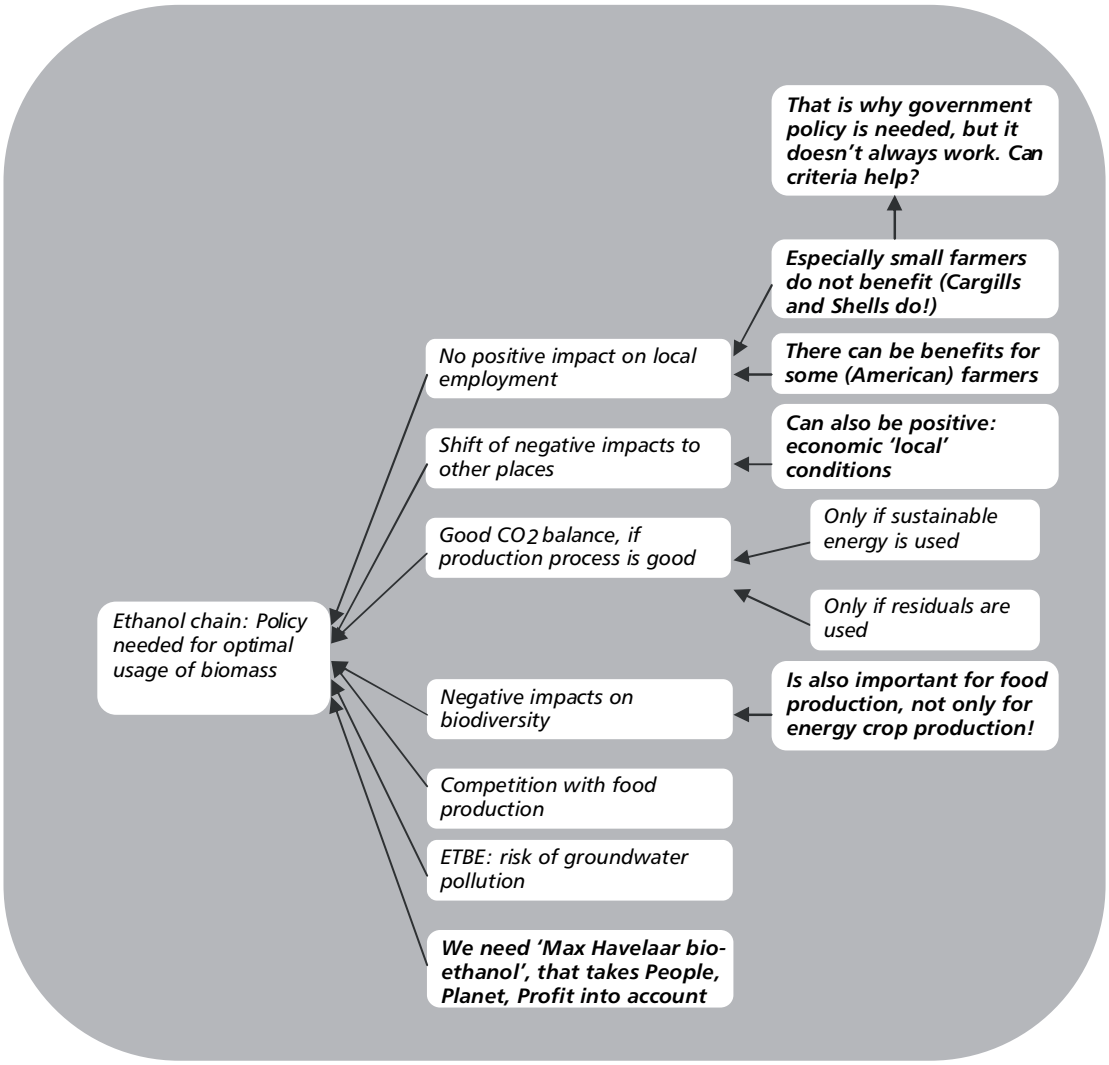


Figure 7.6 Argumentation model from one group (italic) confronted with the ideas of the other group (italic and bold)

according to the first subgroup, negatively influences the sustainability of the bioethanol chain is the negative impact on biodiversity. The second subgroup responds to this by stating that this is also the case for food production, not only for energy production. Hence, the question is with what alternative chain one prefers to compare the bioethanol chain: a food chain or an alternative energy chain.

7.4 Constructive Conflict Methodology step 4: Synthesis

As was set out in chapter 3, synthesis should be the result of the confrontation and evaluation of divergent perspectives. It is supposed to show similarities and differences in perspectives, and hence includes a final assessment of the *disparity* of perspectives. At the start of the dialogue, the project team made clear to the participants that they were not expected to agree on, or to reach a consensus on the sustainability of biomass. In fact, the project team assumed that, given the diverging opinions and controversies, participants would not be able to agree with one another. Hence, the dialogue was presented as an appraisal process that should give ample room to the diversity of opinions and ideas.

Synthesis took place on the level of workshops and on the level of the dialogue, mainly through analysis reports written by the project team. No specific tools were used to facilitate synthesis. The process of synthesis will be explained below for each of the workshops respectively and for the dialogue as a whole. In comparison to the first three steps of the *Constructive Conflict Methodology*, more attention will be paid to the process and contents of synthesis (instead of tools) and the outcomes of the workshops and the dialogue as a whole will be discussed. These outcomes give an impression of how the project team tried to synthesize the divergent perspectives, ideas and evaluations by doing justice to this diversity, but at the same time identifying overlap and similarities.

Synthesis Workshop 1

Workshop 1 was supposed to deliver a set of criteria to assess the sustainability of biomass chains. The intention was to do this in the closing plenary discussion, in which the results of the subgroups were discussed and a conclusion was to be formulated. Due to lack of time and complexity of the issue no definitive set of criteria was arrived at in the closing plenary session. The workshop delivered an enormous amount of information: characteristics of biomass chains that influence the sustainability of those chains according to the participants, argumentations for sustainability claims and other qualitative data from the discussions. The project team analyzed all data (put down as notes and minutes, and recorded on audio tapes) and synthesized it in a report after the workshop. The report was distributed as input for the second workshop. Hence, final synthesis of workshop 1 did not take place in the workshop itself, but afterwards in the form of a report written by the project team. The project team's analysis involved two things in particular: 1) the relation between perspectives and the evaluations of the chains and 2) categorization of sustainability characteristics into criteria that participants used to assess the sustainability of biomass chains.

As regards the relation between perspectives and the evaluations of the chains, some interesting observations were made. Within the 'like-minded' subgroups participants managed quite well to reach a consensus on the sustainability of the biomass chains. Between subgroups, there was no particular difference in the criteria that were used to evaluate the sustainability of biomass chains.

However, between subgroups there was a difference in the 'style' of evaluating the sustainability of biomass chains. The morning group 1 (perspectives 1,4,5) was mainly raising questions, adding nuances, formulating conditions. Participants in this group were reluctant to make a definite judgment about the sustainability of the chains. This is interesting, as perspectives 1, 4 and 5 are relatively reflective and abstract as compared to the other perspectives (see chapter 6). For instance, when discussing the sustainability of the Greenmills chain, morning group 1 did not formulate a definite answer on the sustainability of that chain, but indicated which elements and aspects of the chain are critical to understand the sustainability of the chain. One of the questions they raised was for example what alternative applications there are for the frying oil and fat, as these alternatives might suffer from subsidizing chains such as the Greenmills chain. When discussing the ethanol chain and the role of the producing companies, one of the participants for instance nuanced 'companies' and emphasized that it is important to distinguish large industrial companies from entrepreneurs, as both set up very different chains that have very different sustainability impacts.

Morning group 2 formulated several objections, conditions and requirements that the chain should live up to in order to be sustainable. Much attention was paid to socio-economic effects and the shift of (negative) effects to other places or people in the world. This reflects the critical position of perspective 2. When discussing land-use of biomass chains for instance, one of the participants in morning group 2 emphasized that land-use is a moral issue. She stated that even in the unlikely case that sufficient land is available in the Netherlands to grow all our energy crops, it becomes a global problem when tropical forests are cut down in other countries. Hence, it is important to think about alternative usages of agricultural land. Another example of this group concerns the large-scale bio-ethanol chain. A participant doubted whether biomass plants have a positive effect on employment, because working conditions on sugarcane plants or in the ethanol-plants are bad. Another example concerns the dung fermentation chain. One participant argued that this chain creates a demand for dung and that dung is a product of intensive cattle breeding, which is unsustainable practice in any case. She evaluated the dung fermentation chain negatively, because it may lead to a legitimization of the intensive cattle breeding industry.

Morning group 3 took a very practical stance for evaluating the chains and identified the elements of the chains that could be improved in terms of sustainability. Opposed to group 1, this group was not reluctant to make judgments about the sustainability of the presented chains. This group was very specific about its own criteria. This practical attitude reflects perspectives 3 and 6. The ease with which they made judgments was especially notable for the Biomass Energy Plant in Sittard, which is based on local residuals from forestry and green areas, and delivers electricity and heat to a neighboring area and an elderly home. The group agreed that this chain is not sustainable, because it makes use of inefficient technology and doesn't use its sources in the most efficient way. This group also discussed the dung fermentation chain, and proposed a number of things on the basis of which this chain could be improved. They proposed for example that the corn that is added to the dung in the fermentation process can be more efficiently processed with other techniques. They also proposed other techniques to make use of the produced gas and heat in a more efficient way.

These observations seem to suggest that there is a relation between the perspective of participants and the style of evaluating the sustainability of biomass chains. However, there also appeared to be an important similarity in the way participants evaluated the chains. It is notable that all participants used relative, rather than absolute, evaluations for judging the chains. A relative evaluation means that the evaluation of sustainability is made in relation to a specific reference situation. For different aspects of the chain, participants looked for different reference situations, such as an existing fossil alternative, a renewable alternative, an alternative usage of the biomass or a future situation. The Biomass Energy plant in Sittard was for instance compared to electricity production with natural gas in order to assess the energy loss and the use of residual heat. This is a fossil reference situation. Comparison to alternative processes or usages of the biomass took place for instance for the Greenmills chain (biodiesel from fat). People asked what used to happen to the frying fat when it was not used to produce energy, and through what other (more efficient) processes energy can be produced from the fat. There were also comparisons to non-existing chains, such as improved chains on the basis of better design of a specific aspect of the chain. This was for instance the case when participants proposed an improved dung fermentation chain, which used more of the residual heat by distributing the heat on a district level. In contrast to these relative evaluations, an absolute evaluation would have meant that a chain was judged to be (un)sustainable *per definition.* Such a fixed position would leave only limited room for discussing the sustainability of that respective chain. Although not everyone used the same reference situation, the relative evaluations implied that there was room for dialogue, i.e. room to discuss and compare.

The second task for the project team was to categorize the characteristics (elicited through repertory grid technique and applied in the Toulmin models) into criteria that participants use to judge the sustainability of biomass chains. This resulted in the following criteria:

1. Energy efficiency
2. CO_2 balance
3. Environmental impacts
4. Socio-economic impacts
5. Spatial impacts
6. Biodiversity
7. Transparency of the chain
8. Innovation potential
9. Renewability of the source

In the years before the dialogue, a Dutch committee chaired by Prof. Cramer (currently the minister of Environment) worked on the evaluation of the sustainability of biomass chains, and developed a set of criteria for sustainability judgments. The criteria above largely resemble the criteria of the Cramer Committee, which are: 1) Greenhouse gas emissions; 2) Competition with food or other local usages; 3) Biodiversity; 4) Environment; 5) Prosperity; 6) Wellbeing. Criterion 2 of the Cramer Committee relates to criteria 4 and 5 above (socio-economic impacts and spatial impacts). Criteria 5 and 6 of the Cramer Committee are covered by criteria 4 (socio-economic impacts). The bottom-up analysis on the basis of specific chains thus resulted in a similar analysis of important criteria for judging the sustainability of biomass chains as the more top-down analysis by the Cramer Committee. However, the bottom-up analysis resulted in three more criteria that are used by stakeholders to judge the sustainability of biomass chains: Transparency of the chain (7), Innovation potential (8), Renewability of the source (9). These criteria relate to (the organization of) the chain itself, rather than to its impacts. Apparently, not only impacts are taken into account when judging the sustainability of biomass chains, but also (organizational) aspects of the chain itself.

Participants in workshop 1, despite their different perspectives, seemed to agree to a fair extent on the criteria. However, the interpretation of criteria differed among participants. This difference is related to the reference situation that participants chose for evaluating a chain. Morning group 3 (based on perspectives 3 & 6) for instance was quite ambitious and compared chains to optimal, future situations. The afternoon group that reflected on the evaluation of group 3 used other reference situations, such as a fossil alternative. These diverging reference situations result in different interpretations

of (and 'scores' on) criteria and hence in different judgments about the sustainability of a chain.

The project team summarized the above analyses in a report, which was sent to the participants shortly after workshop 1. Participants were invited to comment on the report at workshop 2. No amendments were made; participants were quite positive about the report. It helped them to get more grip on the diffuse discussions in workshop 1.

Synthesis Workshop 2

For the synthesis of workshop 2 the same procedure was followed as for workshop 1. Synthesis of workshop 2 was supposed to result in one or more visions of the future about the role of biomass in a sustainable energy supply in the Netherlands. Due to lack of time, complexity of the issue and perhaps scope of the task, no full-fledged future vision was formulated in workshop 2. Workshop 2 resulted in an overview of ingredients for a future vision. These ingredients are listed in box 1.

These ingredients were synthesized by the project team in a vision of the future after the workshop. This meant that the project team combined the ingredients into a vision, and added ingredients where needed. The ingredients reflected the diversity of perspectives about sustainable biomass and hence were not all equally preferred by all participants. The project team decided therefore to divide the vision into three partial visions. The partial visions described incremental application of biomass chains. Partial vision A involved small-scale, decentralized biomass chains in the Netherlands, largely based on waste and residuals, to supply the national demand for electricity and heat. Partial vision B added to A small-scale, decentralized biomass applications in developing countries to secure energy supply in those countries. Partial vision B included no export from developing countries to Western countries. Partial vision C added to A and B global biomass chains: import of bio-based products for energy (mainly transport fuels) by Western countries. The partial visions were set up in order to reflect the different ideas about the desirability of specific types of chains among participants.[46]

46 See for the future visions the final report of the Biomass Dialogue; available online: http://www.ivm.vu.nl/en/projects/Archive/Biomassadialoog/index.asp

BOX 1: ingredients for the future vision, developed in workshop 2

Consensus aspects:

- Importance of energy demand reduction through energy saving & efficiency improvements in energy use, material use and land use.
- Importance of use of residuals: usage of residuals not only for energy production, but also to increase biomass production (as in the algae chain).
- Land-use per unit CO_2 as an extra criterion to judge sustainability of biomass chains.
- Closed nutrients cycle: keep nutrients on site of production and 'give them back to the land' rather than transporting them elsewhere.
- Transport of end or half products is preferred to transport of raw products.
- Cascading (from high to low grade use of sources, e.g. from chemicals to feed) and biorefinery as structural principles: use as many parts & elements of a crop in order to produce no residuals or waste.
- Smartsizing: adapt technique and scale of the application to local biomass sources and local context rather than the other way around.
- Flexible biomass chains: chains should be able to adapt to new developments in order to prevent lock-in effects.
- Diversity of techniques and products rather than selection of one 'best' technique and source.
- General adoption of the sustainability concept: sustainability is not only CO_2.
- Controllability: it should be possible to judge sustainability with clear criteria (however not everyone agreed on the necessity of a certification scheme).
- Importance of transparency for making chains sustainable, especially for global biomass chains.
- Importance of cooperation between actors in the Netherlands and around the world.

Aspects without consensus:

- Importance and share of biomass in the energy supply in 2025. According to some participants wind and solar should be the main energy sources, not biomass. Others envisioned a combined role for solar, wind and biomass.
- Import and conditions: not everyone was in favor of import of biomass, because some participants were in doubt whether it is possible to have sustainable global chains and because they considered it undesirable from an ecological perspective. Others stressed that within global chains transport of nutrients should be avoided and that production of the end products should take place in the country of origin to have local socio-economic benefits.
- Cultivation: there were many discussions on competition with food and feed production, and displacement effects.
- Scale of biomass chains: some participants preferred small-scale and decentralized chains because it is easier to keep the nutrient cycle closed, transport is minimized, and efficiency is often higher. Others also saw possibilities for large-scale chains.
- Certification scheme: some participants were cautious with regard to a scheme, because small businesses might have difficulties to comply with the scheme for financial reasons. This might undermine the positions of small, innovative businesses.

Synthesis Workshop 3

Synthesis of workshop 3 followed a similar procedure as workshops 1 and 2. Workshop 3 was supposed to result in a description of a pathway to each of the partial visions. These pathways should be clear on which actions and intervention strategies should be taken on the short and the long term in order to reach the future situation as described in the partial visions. The actions and intervention strategies were based on an identification of the biggest challenges for the pathways. Six biggest challenges were identified in workshop 3:

1. In the Netherlands and abroad, biomass chains are connected to needs, ideas and culture at the local level.
2. Networks stimulate cooperation and knowledge exchange. Attention is paid to new collaborations.
3. When organizing the bio-based economy, actors pay attention to connections between different bio-based chains.
4. When supporting biomass chains, the aim is to stimulate positive effects and prevent negative effects.
5. Investments will be made in a system that points out negative effects in an early stage.
6. At the same time, expectations should be realistic: future options may seem more attractive than present ones because negative aspects are not (yet) known. As a result, no action is taken in the present. The dialogue pleaded for 'learning-by-doing'.

At the end of the workshop, participants were asked to indicate to what extent they thought the three partial visions were desirable and feasible. Hence, the aim of workshop 3 was not to generate one or three consensus pathways, but rather to indicate the range of desirable future visions, strategies and actions among the participants, without ignoring diversity of preferences and perspectives.

Workshop 3 delivered much data, all recorded through the GroupSupportSystems software: ideas about barriers, opportunities, main challenges and ways to deal with all of these for each partial vision. These elements were combined and added upon where necessary by the project team into a description of the pathway.[47] The pathway consisted of four parts: one general part and three parts for each of the partial visions, thereby taking into account the different ideas about a sustainable future vision.

47 See the final report of the Biomass Dialogue; available online: http://www.ivm.vu.nl/en/projects/Archive/Biomassadialoog/index.asp

Overall Synthesis

The project team synthesized the findings and outcomes of the dialogue in a final report. The synthesis reports of the three workshops were input for this overall synthesis. At the end of workshop 3 participants indicated that they wished to have an extra meeting to discuss the actions and recommendations that resulted from workshop 3. The final report was input for this extra meeting. The aim of the meeting was to conclude on the findings and outcomes of the Biomass Dialogue. The final report did not just summarize earlier reports, but tried to be provocative in the sense that it was very specific about actions and interventions. This level of specificity was not employed earlier in the dialogue. This was done to stimulate participants to speak out on issues and on actions they can initiate themselves. Participants criticized the level of specificity in the final report as they felt that this was not a reflection of what was being discussed in the dialogue. Based on the comments and amendments made in the extra meeting, the final report was adjusted.

With regard to overall synthesis, participants in the extra meeting stressed that there was, in their opinion, a difference between outcomes related to the *process* and outcomes related to *contents* of the dialogue. They felt that the dialogue delivered interesting results related to the process. However, they also felt that they did not reach to well worked-out conclusions with regard to contents due to lack of time and/or complexity of the issue. With regard to the process-related outcomes, participants indicated that the six perspectives, identified with Q methodology, were helpful to get grip on the complexity of the issue. For example, one participant indicated that, according to the project team's analysis, one of her colleagues adhered to another perspective than she would have initially assumed, which made her better understand this colleague's ideas.

Furthermore, participants were surprised that, despite the diversity of perspectives, there was agreement on the criteria for judging the sustainability of biomass chains. However, as mentioned above, different reference situations were used to judge sustainability. Participants considered this an interesting observation, and underlined the importance of making explicit what kind of reference situation one uses. In relation to the criteria, participants furthermore observed another reason for diverging sustainability judgments: diverging assumptions about the system's boundaries. This became for instance clear in workshop 2 when the paper chain was discussed. This chain presented a dilemma between, on the one hand, energy and material efficiency and, on the other hand, CO_2 reduction. The dilemma arises when the system boundaries do not include the growth of trees for recycling paper, but when they do include the growth of trees for converting paper to energy after it has been used. In that case, recycling would be evaluated less positively in terms of CO_2 reduction than burning the paper for energy

purposes after its usage, despite the fact that recycling paper is more efficient in terms of material and energy use and, not unimportantly, is originally also made from trees.

As noted above, the report that was used as input for the extra meeting was very specific, and intended to be provocative in terms of actions and strategies. Whereas participants criticized the level of specificity, it did help to articulate the contents-related conclusions that participants wanted to include. A very general observation seems to be that there is a dilemma between on the one hand the need to act and on the other hand the need to be careful. However, the dialogue showed that there are ways forward with biomass. There were many examples of chains that do (or will) not compete with food production or that do (or will) not negatively impact people in producing countries, which made participants more optimistic with regard to the possibilities of biomass. These examples mainly concerned chains that make use of residuals, that apply the cascading principle (from high to low grade use of biomass) and that make use of biorefinery (refining biomass in order to use all valuable elements within the biomass). Although participants stated that they could not be very specific in terms of actions and strategies, there were a number of key issues that were central and kept recurring in the discussions.

Firstly, the concept of 'smartsizing' received much attention. Smartsizing means that scale and technology of chains are adapted to the local context. It implies that -and this was stressed by the participants in the extra meeting- one needs to be flexible in the design of chains in terms of technologies, scale, sources, organization and structure of the chain.

Secondly, learning-by-doing recurred many times in relation to strategies for developing sustainable biomass chains. Learning-by-doing was for example proposed as a way to develop new chains, but also to develop systems for certification, transparency and control.

Thirdly, the issue of certification was discussed extensively and opinions on this issue diverged widely. There were participants who stressed the importance of certification and of linking the discussions in the dialogue to ongoing activities with regard to certification[48]. There were also participants who were rather critical with regard to certification, for instance because they expected decreased trust in certification systems, or (financial) difficulties for small entrepreneurs to live up to the standards of a certification scheme.

Fourthly, participants stressed the importance of innovation. Ideas about innovations especially focused on organizational and social innovation. Issues such as knowledge

48 Such as Roundtable of Sustainable Palmoil, Forest Stewardship Council, Roundtable of Sustainable biomass

exchange, cooperation between knowledge institutes and industry, and between small and big companies or industry and connections between different bio-based chains were seen as barriers that need to be overcome in order to successfully utilize the potential of biomass.

Returning to the aim of the dialogue (develop ideas about sustainable biomass chains for the Netherlands), the dialogue did not result in plans or actions for the development of biomass chains. Rather, it resulted in a number of insights into relation between the diversity of perspectives and the evaluated sustainability of biomass chains (the 'process' outcomes described above) and in four issues that are important for the development of sustainable biomass chains (the 'contents' issues described above).

7.5 Conclusion

The six perspectives that resulted from the Q analysis were used as a starting point for the articulation of divergent perspectives in the dialogues. It appeared from the evaluations that the perspectives were helpful for participants to get grip on the complexity of the biomass issue, and to understand how people with different perspectives arrive at different conclusions about biomass chains. Supported by the use of repertory grid technique and the Toulmin model of argumentation in workshop 1, it seems that the articulation of divergent perspectives was rather successful in the Biomass Dialogue. By confronting the evaluations of the biomass chains, it became clear that people use different reference situations for judging the sustainability of a biomass chain. As such, confrontation further clarified the divergent perspectives and gave a better understanding of why people arrive at different conclusions with regard to the sustainability of biomass chains.

As regards the process of synthesis, it appeared difficult to synthesize the results of each workshop within the workshop itself. The issues for discussions were so complex and broad that time was often lacking to reach a synthesis. The project team played a critical role in synthesizing results. The synthesis reports summarized what the project team learned from the workshop. As a member of the project team this was a very interesting activity; it gave valuable insight into the discussions and the relations between perspectives, claims, and results.

The synthesis results underline the importance of the first two steps of the *Constructive Conflict Methodology* for being able to reach synthesis. In the process of synthesis, the perspectives provided value added for structuring and understanding the results. This would not have been possible without the first two steps. Also confrontation of perspec-

tives appeared critical for synthesis, especially when it showed that participants arrive at different evaluations of the sustainability of biomass chains *not* because they use different criteria for evaluating, but because they use different reference situations.

Final remarks

Two issues need further discussion. The first issue relates to the role of the researcher, and concerns learning by the researchers as a result of organizing the dialogue. The second issue concerns the extent of disagreement in the dialogue.

Learning in a stakeholder dialogue is not restricted to its participants. For the organizers of a dialogue, there is a lot to learn as well. This observation is especially salient in relation to the project's teamleader, who was involved in a number of other stakeholder dialogue projects on sustainable energy. Insights from one dialogue project can be relevant for other dialogue projects. These insights relate for instance to factual information about energy options or to the identification of relevant stakeholders. In addition, the project team leader's experience with similar projects seemed to result in overarching insights related to process issues, but also to policy measures or ways to proceed with or develop sustainable energy projects. When the project team used these insights in the Biomass Dialogue, this sometimes resulted in tensions, because participants felt that this was not a product of the dialogue (which in a sense was true of course). However, learning by the project team seemed to be critical for understanding the discussions, and for facilitating the dialogue in an effective way. This is illustrated by the synthesis reports and the important role that these reports played in structuring the dialogue.

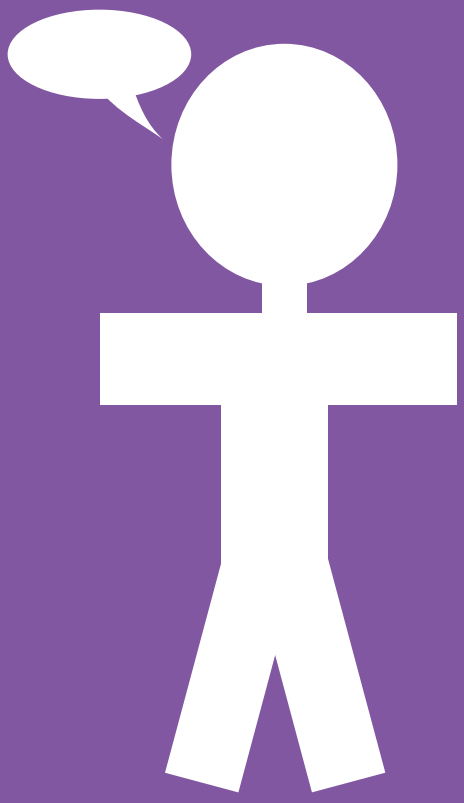
Due to the controversial character of the biomass issue in the Netherlands and globally, the project team expected a high level of dissensus in the dialogue. However, less dissensus was observed in the workshops than the project team anticipated. Even confrontation in the Biomass Dialogue did not result in heated debates, but rather in constructive discussions. The small size of the subgroups very likely contributed to the constructive atmosphere. Communication biases as discussed in chapter 2 hardly seemed in place, which is also likely due to the small size of the subgroups. Yet the project team wondered whether participants were completely open. Evaluations show that participants felt that there was sufficient opportunity to do their say. It might be that participants, for whatever reasons, did not *want* to say everything they thought. A plausible explanation is that the specific focus of discussions facilitated a constructive discussion. This made it for instance possible for chain representatives to give more specific information about biomass chains. A specific level of discussion may easily resolve conflict that arises because people, without realizing it, talk about different things, or because people lack

detailed information, as a result of which they may use their intuition, or analogies with similar applications to make judgments. Conflicts can furthermore arise through stakes. In workshop 1, it seemed that stakes did not play a very dominant role in the discussions. This may have to do with the focus of the discussions; stakes may not be very salient in discussions on the positive and negative aspects of biomass chains for sustainability. The project team wondered after workshop 1 whether stakes would become more salient in the remainder of the dialogue, especially when commitments were to be made to specific biomass options. However, there appeared to be another mechanism through which stake-related conflict remained low in the remainder of the dialogue: absence of stakeholders with high, or probably contested stakes, such as energy and oil companies. Regardless whether this was intentional or coincidental, it very likely contributed to a relatively low-conflict atmosphere. One may argue that the absence of particular stakeholders diminished the level of constructive conflict and the problem structuring effect of the dialogue. This points to an obvious limit of methods for stakeholder dialogues: even when stakeholder selection is done very thoroughly, and based on very well worked out arguments and methods, it is not in the hands of the organizers whether participants will actually show up. This was especially striking after workshop 3, when participants themselves expressed the wish to have an extra meeting to discuss the conclusions of the dialogue and the dissemination of those conclusions, but when in the end only six participants showed up at this extra meeting.

Observing the lack of conflict, the project team leader, at some moments, attempted to draw participants out and to 'force' participants to speak out on issues that are relevant for them. He furthermore enhanced confrontation by bringing in very specific ideas. Participants did not always appreciate this. From literature, it is known that an atmosphere of conflict facilitates creative problem solving (see chapter 2). However, literature also indicates that an atmosphere of conflict results in lower satisfaction with the process and lower commitment to the group and the outcomes (Schweiger et al., 1986; Jehn et al., 1999). Hence, tension may arise between on the one hand the need for conflict to stimulate creativity and learning, and on the other hand the need to keep participants committed to the process.

Chapter 8

Evaluation of Constructive Conflict Methodology in the Biomass Dialogue



Evaluation of Constructive Conflict Methodology in the Biomass Dialogue

In the previous chapters it was argued that the articulation and confrontation of divergent perspectives is needed in order to stimulate learning in stakeholder dialogues. *Constructive Conflict Methodology* was presented as an overarching approach to the design of stakeholder dialogues. The previous chapter showed how *Constructive Conflict Methodology* was applied in the Biomass Dialogue. The next question is: does it work? Hence, the question for this chapter is to what extent the application of *Constructive Conflict Methodology* in the Biomass Dialogue resulted in an *improved understanding of participants' own and other perspectives* (Figure 8.1).

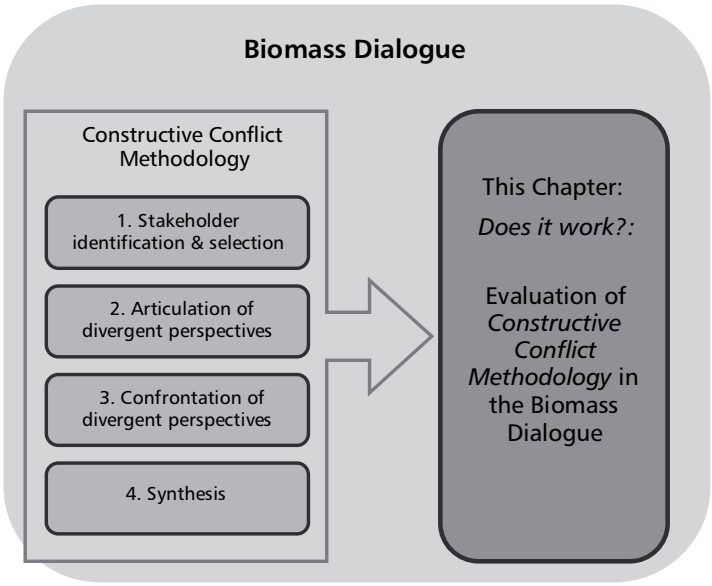


Figure 8.1 This chapter evaluates the application of Constructive Conflict Methodology in the Biomass Dialogue

Section 8.1 will first explain the research method used for the evaluation: Q methodology applied in a quasi-experimental design. Section 8.2 presents the results of the quantitative analyses of learning in the Biomass Dialogue. On the basis of the qualita-

tive data discussed in section 8.3 the results will be interpreted in section 8.4. Section 8.5 discusses the method used for the evaluation. Finally, section 8.6 will wrap up with conclusions.

8.1 Method: Repeated Q measures

Quasi-experimental design

A quasi-experimental design was used to find an answer on the question whether the use of the *Constructive Conflict Methodology* resulted in an improved understanding of perspectives for participants in the Biomass Dialogue. A *quasi*-experimental design is similar to an *experimental* design in that it includes a control group, but it lacks the key ingredient of an experimental design – random assignment of people to groups. Quasi-experimental designs are used in situations in which it does not make sense, or in which it is impossible to use randomly selected groups. Participants in the Biomass Dialogue were selected because of their salient perspectives (based on the outcomes of the Q methodology, see chapter 4). Hence, assignment of participants to the 'quasi-experimental' group was not (and could not be) random.

There are different types of quasi-experimental designs[49], mainly differing in the way the groups are composed. The design that was used here is visualized in Figure 8.2.

	Measurement 1	*Intervention*	*Measurement 2*
Dialogue Group	Q1 →	Biomass Dialogue →	Q2
Control Group	Q1	→	Q2

Figure 8.2 Quasi-experimental design

Q methodology was used as a measurement on two points in time: before (Q1) and after (Q2) the Biomass Dialogue. Only the quasi-experimental group (the dialogue group) was subjected to the intervention (participation in the dialogue); the control group was not subjected to the intervention (no participation in the dialogue). This design is most similar to a 'non-equivalent groups design', but also shares similarities with the 'regression-discontinuity design'. In a 'non-equivalent groups design' two (existing) groups are chosen that are assumed to be similar, e.g. two comparable schools to test the effect

49 See http://www.socialresearchmethods.net/kb/quasiexp.php

of a new educational program. In 'regression-discontinuity design' participants are assigned to the quasi-experimental or control group on the basis of a cut-off score on a pre-program measure, e.g. school children with low grades are assigned to the quasi-experimental group that will receive remedial training, whereas the children with higher grades are assigned to the control group.

In this study, the quasi-experimental group was composed on the basis of persons' factor loadings on Q factors, i.e. perspectives. This is similar to selecting participants based on a cut-off score as in the 'regression-discontinuity design'. However, the control group was assembled in such a way that it resembled the dialogue group as much as possible, which is similar to the 'non-equivalent groups design'. That is, the persons in the control group were matched to the persons in the dialogue group in terms of the similarity of their Q sorts.

Respondents

As explained in chapter 6, seventy-five stakeholders were involved in the Q1 interviews. Only forty of these respondents were invited to take part in the Biomass Dialogue. As regards the quasi-experimental group (the dialogue group), only the participants who attended at least two out of three workshops were invited to participate in the Q2 interviews. This concerned twelve persons. For each of the twelve persons, a matching person was identified from the remaining sixty-three persons. This was done on the basis of the Q1 sorts; a non-participant was selected whose Q1 sort correlated most strongly with this person's Q1 sort. Eleven participants ($N_{\text{dialogue group}} = 11$) and 12 non-participants ($N_{\text{control group}} = 12$) were able and willing to participate in the Q2 interviews.

Q interviews

The Q2 interviews took place in July and August 2008. Q2 interviews were conducted by telephone[50]. When an appointment was made, the interviewer sent the Q statements and the distribution that was printed on a sheet of paper to the respondent. The Q statements and distribution were equal to those in the Q1 interviews (11-points normal distribution from 'least in accordance with my opinion' to 'most in accordance with my opinion'; see chapter 6). When the respondent finished the Q2 sort, the interviewer asked him or her to explain his or her opinion with regard to the statements that were at

50 Obviously, telephone interviews are less time-intensive than normal interviews. A disadvantage of a telephone interviews is that there is no face-to-face contact, which makes it for example more difficult to anticipate, i.e. to help the respondent with the Q task. Q interviews per telephone were preferable and feasible, because all respondents participated in the first round of Q interviews, so they were already familiar with the task.

the extremes of the distribution (columns 1,2, 10, and 11). Furthermore, the interviewer compared the sort with the Q1 sort of the respondent. If there were striking differences between the Q1 and the Q2 sort, the interviewer asked the respondent to explain this.

Retrieving the six perspectives

There are different possibilities for analyzing repeated Q sorts. For the aim of this study an analysis is needed that allows for calculating how a respondent's loading on the six factors at Q2 differs from the loading on the six factors at Q1. This is why the two datasets (23 Q1 sorts and 23 Q2 sorts) could not be analyzed separately. The intervention was based on the six perspectives; the perspectives were communicated to the participants in the dialogue and the dialogue was structured accordingly. To analyze the effect of the intervention, I am interested in the change of ideas *in terms of these six perspectives*. Re-analyzing the Q1 sorts by including only the 23 Q1 sorts and leaving out the other 52 would result in different perspectives, because participants that attended at least two out of three workshops (i.e. the respondents at Q2) were not distributed equally over the six perspectives. Perspectives 4 and 6 were not represented in this group for example. Redoing the analyses would obviously change the picture, and the six perspectives would clearly not be identifiable.

Therefore, in line with the analysis method of Brown (1977) and Niemeyer (2002; 2004), the data of the Q2 sorts (N=23) are added to the data of the Q1 sorts (N=75). This results in a total dataset of 98 Q sorts (N_{total}=75+23=98). To analyze how respondents changed with regard to their loadings on the six factors (perspectives; see chapter 6), the six factors have to be retrieved from this dataset by means of a Q factor analysis.

The factor analysis was conducted with PQMETHOD 2.11 (Schmolck, 2002). The correlations between the 98 Q sorts were calculated, creating a 98 by 98 correlation matrix. The correlation matrix was factoranalyzed using the centroid analysis method (with Q sorts/respondents as variables and the statements as cases), and rotated using Varimax, which are both standard procedures in Q methodology. In addition, factors were rotated manually to maximize similarity to the initial six factors (in terms of defining sorts). This resulted in 6 'new' factors that were maximally similar to the six initial factors.

*Table 8.1 Correlations between initial Q factors (based on N=75) and 'new' Q factors (based on N=98); *p< .01*

Factors	Correlation
Factor $1_{initial}$ x Factor 1_{new}	,92*
Factor $2_{initial}$ x Factor 2_{new}	,97*
Factor $3_{initial}$ x Factor 3_{new}	,87*
Factor $4_{initial}$ x Factor 4_{new}	,94*
Factor $5_{initial}$ x Factor 5_{new}	,82*
Factor $6_{initial}$ x Factor 6_{new}	,74*

To validate the factor analysis, correlations between initial and 'new' variants of factors were calculated in SPSS. These correlations are shown in Table 8.1. In the ideal case, correlations should be significant and 1. All correlations are significant (p< .01), and high. Only for factor 6 the correlation is lower than .80. Appendix E gives an overview of defining statements for each of the 6 perspectives (and compares these to the defining statements of the initial factor analysis presented in chapter 6). The defining statements for the new perspectives are not completely equal to those for the initial perspectives. It is for example for some factors the case that a statement that was defining for the initial factor is not defining for the new factor. However, in most cases, this statement is then in the list of 'distinguishing statements' for that factor. This means that this statement is not at the extremes of the Q distribution (-5, -4 or 4, 5), but that it receives a significantly higher or lower score for this factor than for others, and as such distinguishes this factor from the others. Most differences occur for factor 6, which is also the factor with the lowest correlation with its initial variant. The differences in defining statements do however not profoundly change the interpretation of factors. The 'new' six factors are therefore interpreted as the six perspectives that were presented in chapter 6. Below the titles and keywords of the six perspectives will be repeated, see for a detailed description of the perspectives chapter 6.

1. Keep all options open
   knowledge development, broad application (sources, applications, scale), evaluation of sustainability case-specific, cascading and biorefinery
2. Hit the brakes
   skeptical, negative impacts developing countries, socio-ecological/developmental perspective, do not stimulate growth of energy crops, international biomass market

3. Support small-scale innovative initiatives
   small-scale decentralized options, the Netherlands, market introduction/implementation, critical about government & policy
4. Security of supply with global, certified, 2nd generation biomass
   large scale, import, 2nd generation, certification, security of supply, replacing fossil
5. Efficiency the aim: biomass a means?
   efficiency, limited availability of sources, residuals & cascading, technology development & market introduction to make use of potentials
6. Just do it, step by step
   pragmatic, incremental, do not wait for best solution, but act now with the knowledge there is, keep options open

8.2 Results

Two types of analyses will be presented. Firstly, the results of an analysis that was conducted to examine individual changes will be presented. Secondly, the results of an analysis focusing on the group as a whole will be presented. This analysis was done to statistically test the effect of taking part in the dialogue.

Individual level results

Each person has two loadings on each of the six perspectives: a factor loading before the dialogue (Q1) and a factor loading after the dialogue (Q2). The higher a factor loading is, the more that person agrees with the respective perspective (scores vary between –1: 'complete disagreement with perspective' to 1: 'complete agreement with perspective'). As a first step in the analysis, the Q1 and Q2 scores of the respondents on the six perspectives are compared. This gives a first impression of how, and whether, respondents' agreement with each of the six perspectives changed from Q1 to Q2.

Table 8.2 shows the factor loadings of both the dialogue and the control group before (Q1) and after the dialogue (Q2), and the differences between those scores (Q2-Q1). Each row shows the data of a pair of respondents: one respondent from the dialogue group, and the respondent from the control group that was matched to this person on the basis of their initial Q sorts. Factor loadings and differences (Q2-Q1) printed in bold are significant on the $p < .05$ level.[51] A factor loading is significant when this loading is 'high enough' and the loadings on the other perspectives are 'low enough'. A significant loading means that that person's sort is defining that factor. A factor loading indicates the level of agreement. So, a significant factor loading means that this person is in *significant agreement* with that perspective.

A first way to analyze this table is to examine whether respondents shift from one perspective to another, i.e. whether they load significantly on another factor before than after the dialogue, or whether they load significantly on a factor at one of these moments, but not on the other. For the respondents from the dialogue group five of these changes can be observed: one respondent (in row 11) loads significantly at Q2 but not at Q1, and three respondents (rows 3, 6, 8) load significantly at Q1, but not anymore at Q2. The former respondent thus changed his or her opinion in such a way that he or she is in significant agreement with perspective 1 ('Keep all options open') after the dialogue but not before, whereas the latter three respondents are not anymore in significant agreement with one of the six perspectives. The most notable change occurred for the respondent from the dialogue group in row 2. This person was in significant agreement with perspective 2 ('Hit the brakes') before the dialogue (Q1), but is in significant agreement with perspective 1 ('Keep all options open') after the dialogue (Q2). Also for respondent 6 from the dialogue group there is an interesting change. Table 8.2 shows that this person agreed significantly with perspective 2 ('Hit the brakes') before the dialogue (Q1), but that this agreement has sharply decreased after the dialogue (Q2; from .53 to .14). After the dialogue (Q2) this person is a 'mix' of perspectives, with loadings on perspective 1 ('Keep all options open'; increase from .09 to .45), perspective 4 ('Security of supply with global, certified, 2nd generation biomass'; increase from .24 to .42) and to a lesser extent on perspective 5 ('Efficiency the aim: biomass a means?'; decrease from .40 to .33). Furthermore, an interesting change can be observed for respondent 3 from the dialogue group. This person is in significant agreement with perspective 2 ('Hit the

51 The following formula was used to calculate significance of differences: $z = d/\sigma_d$, where d is the difference between the factor loading on Q1 and Q2, and $\sigma_d = \sqrt{[\sigma_1^2 + \sigma_2^2 - 2(r_{12})(\sigma_1)(\sigma_2)]}$, with $\sigma_1 = (1-f_1^2)/\sqrt{N}$ and $\sigma_2 = (1-f_2^2)/\sqrt{N}$, where σ_d is the standard error of difference between the factor loadings on Q1 (f_1) and Q2 (f_2), σ_1 the standard error of difference for f_1 and σ_2 the standard error of difference for f_2, r_{12} the correlation between the two sorts (calculated as the cross-product of the two factor loadings, as it is "not simply the correlation between the two Q sorts, but only that portion of their overall correlation which is subsumed by the factor" (Expositor, 1992)), and N the number of statements (60) (Expositor, 1992).

Table 8.2 Factor loadings before (Q1) and after (Q2) the dialogue, for the dialogue and control group; factor loadings printed in bold indicate defining sorts (significant factor loading); differences printed in bold indicate significant differences (p< .05).

		Dialogue group						Control group					
Respondents nr		**P1** Keep all options open	**P2** Hit the brakes	**P3** Support small-scale innovative initiatives	**P4** Security of supply with global, certified, 2nd generation biomass	**P5** Efficiency the aim: biomass a means?	**P6** Just do it, step by step	**P1** Keep all options open	**P2** Hit the brakes	**P3** Support small-scale innovative initiatives	**P4** Security of supply with global, certified, 2nd generation biomass	**P5** Efficiency the aim: biomass a means?	**P6** Just do it, step by step
1	Q1	0,00	0,11	0,13	0,25	**0,57**	0,08	0,25	0,06	0,32	0,40	0,52	0,13
	Q2	0,05	0,25	0,00	0,25	**0,40**	0,02	0,30	-0,07	0,52	0,42	0,30	-0,18
	Q2-Q1	0,05	0,14	-0,13	0,01	-0,17	-0,06	0,05	-0,12	0,20	0,02	**-0,23**	**-0,31**
2	Q1	0,29	**0,47**	-0,05	0,25	0,36	0,13	0,24	0,29	-0,13	0,34	0,47	0,10
	Q2	**0,55**	0,20	0,05	0,35	0,30	0,08	0,12	0,20	0,03	0,14	**0,52**	-0,14
	Q2-Q1	**0,25**	**-0,27**	0,10	0,11	-0,06	-0,05	-0,13	-0,08	0,17	**-0,20**	0,04	-0,23
3	Q1	0,09	**0,52**	-0,11	0,38	0,29	0,38	0,00	0,28	-0,08	0,41	**0,32**	0,31
	Q2	0,04	0,53	-0,01	0,21	0,53	0,34	-0,05	0,25	-0,30	0,36	0,36	0,25
	Q2-Q1	-0,05	0,01	0,10	-0,17	**0,24**	-0,05	-0,05	-0,03	-0,21	-0,04	0,04	-0,06
4	Q1	-0,13	**0,64**	-0,11	0,00	0,35	0,04	-0,17	**0,70**	-0,08	0,10	-0,07	-0,15
	Q2	0,16	**0,71**	-0,18	-0,06	0,21	0,10	-0,13	**0,77**	0,04	0,17	-0,01	-0,16
	Q2-Q1	**0,30**	0,07	-0,07	-0,06	-0,14	0,05	0,04	0,07	0,13	0,07	0,06	-0,01
5	Q1	0,18	**0,52**	0,08	0,12	0,22	0,08	0,32	0,15	0,10	0,24	0,49	0,26
	Q2	0,13	**0,60**	0,41	0,05	0,30	-0,15	0,21	-0,02	0,08	0,28	0,43	0,26
	Q2-Q1	-0,05	0,08	**0,33**	-0,07	0,08	-0,24	-0,11	-0,17	-0,02	0,04	-0,06	0,00
6	Q1	0,09	**0,53**	-0,11	0,24	0,40	-0,07	0,08	**0,56**	0,15	0,01	0,49	0,11
	Q2	0,45	0,14	0,03	0,42	0,33	0,11	0,20	0,26	0,16	0,04	0,23	0,34
	Q2-Q1	**0,36**	**-0,39**	0,14	0,18	-0,07	0,18	0,12	**-0,30**	0,01	0,03	**-0,25**	0,22

7	**Q1**	0,51	-0,03	0,28	0,13	0,19	0,40	0,50	0,14	0,44	-0,04	0,22	0,34
	Q2	0,47	-0,09	0,32	-0,05	0,07	0,49	**0,52**	0,18	0,36	-0,01	0,21	0,19
	Q2-Q1	-0,04	-0,06	0,04	-0,19	-0,12	0,09	0,02	0,04	-0,09	0,04	-0,02	-0,16
8	**Q1**	0,10	0,12	**0,49**	0,05	0,30	-0,03	0,16	-0,01	0,37	0,32	0,14	0,23
	Q2	0,14	-0,11	0,34	0,21	0,42	-0,01	0,18	0,12	0,30	-0,14	0,16	0,12
	Q2-Q1	0,04	-0,24	-0,15	0,15	0,12	0,02	0,03	0,13	-0,07	**-0,47**	0,02	-0,11
9	**Q1**	**0,69**	-0,22	0,03	0,19	0,15	0,18	**0,61**	0,03	0,22	0,20	0,03	0,24
	Q2	**0,55**	-0,03	0,21	0,28	0,30	0,13	0,48	-0,12	0,18	0,18	-0,17	0,38
	Q2-Q1	-0,14	0,19	0,18	0,09	0,15	-0,05	-0,13	-0,14	-0,03	-0,02	-0,21	0,14
10	**Q1**	0,17	-0,27	**0,56**	0,02	-0,03	0,10	0,04	-0,10	**0,60**	0,18	0,20	0,19
	Q2	0,17	-0,05	**0,61**	-0,15	0,20	0,16	-0,12	-0,12	**0,51**	-0,04	0,09	0,34
	Q2-Q1	0,00	0,22	0,04	-0,16	0,23	0,05	-0,16	-0,02	-0,09	-0,22	-0,11	0,16
11	**Q1**	0,45	-0,04	0,22	0,49	0,28	0,07	**0,56**	0,00	0,08	0,19	0,33	0,02
	Q2	**0,68**	0,06	0,24	0,46	0,09	0,00	**0,56**	0,20	0,03	0,14	0,21	-0,13
	Q2-Q1	**0,23**	0,11	0,02	-0,02	-0,19	-0,07	0,00	0,20	-0,04	-0,06	-0,11	-0,15
12	**Q1**							0,17	0,11	0,00	0,27	0,29	0,52
	Q2							0,19	0,12	0,08	0,12	0,18	**0,38**
	Q2-Q1							0,03	0,01	0,08	-0,15	-0,11	-0,14

brakes') before the dialogue (Q1), but not anymore after the dialogue (Q2). The loading on perspective 2 does not decrease much, but this loading is not any more significant because the loading on perspective 5 ('Efficiency the aim: biomass a means?') significantly increases (from .29 to .53). Hence, this person is after the dialogue (Q2) a 'mix' of perspectives 2 and 5.

Table 8.2 shows that for 6 out of 12 respondents from the control group there is a change with regard to their significant agreement with perspectives: for 3 out of 12 respondents from the control group there is a significant loading at Q2, whereas this was not the case at Q1 and for three other respondents from the control group this is the other way around. Hence, three respondents from the control group are in significant agreement with one of the perspectives after the dialogue, whereas this was not the case before the dialogue. For three other respondents from the control group this is the other way around.

A second way to look at this table is to examine whether the differences between the two factor loadings of a respondent on each of the six perspectives is significant. That is, even when the loading on a particular perspective itself is not significant, the change from Q1 to Q2 can be significant. This also tells something about the changed agreement of a respondent with that particular perspective. Significant differences (Q2-Q1) are printed in bold in Table 8.2. Table 8.2 shows that for the dialogue group there are, in addition to the changes reported above, a number of respondents who significantly change in terms of their factor loadings on a particular perspective. Table 8.3 summarizes Table 8.2 by giving an overview of the number of respondents who significantly change in terms of their factor loadings on each of the six perspectives.

Table 8.3 Number of significant changes in factor loadings (Q2-Q1) on each of the six perspectives, for the dialogue and the control group. (+) indicates that the changes concern increases, (-) indicates that the changes concern decreases from Q1 to Q2.

	Dialogue group	Control group
P1 Keep all options open	4 (+)	-
P2 Hit the brakes	2 (-)	1 (-)
P3 Support small-scale innovative initiatives	1 (+)	-
P4 Security of supply with global, certified, 2nd generation biomass	-	1 (-)
P5 Efficiency the aim: biomass a means?	1 (+)	2 (-)
P6 Just do it, step by step	-	1 (-)
Total	**8** **(of which 6(+), 2(-))**	**5** **(of which 5 (-)-)**

Table 8.3 firstly shows that the number of significant changes is higher for the dialogue group than for the control group (8 versus 5). Secondly, it shows that for participants the changes mainly concern *increased* factor loadings (6 out of 8), whereas for non-participants it only concerns *decreased* factor loadings. These results not only show that more participants than non-participants significantly changed in terms of the factor loadings on the six perspectives, but also that these changes in general concern increased agreement with the perspectives for participants, whereas they concern decreased agreement with the perspectives for non-participants. Thirdly, for the dialogue group, the significant changes with regard to perspective 2 ('Hit the brakes') concern *decreased* factor loadings, whereas the changed factor loadings on perspectives 1, 3 and 5 all concern increased factor loadings. Fourthly, Table 8.3 shows that the number of participants with an increased factor loading on perspective 1 ('Keep all options open') is relatively high (4, as compared to 2 and 1 for other perspectives), whereas there are no significant changes with regard to this perspective for the control group. The underlying data (Table 8.2) show that three out of four of these changes concern people who loaded significantly on perspective 2 before the dialogue.

These results give an impression of the changes on the level of individuals. However, it is not possible to use these results as a basis for concluding on the effect of dialogue participation on the shifts in perspectives. For that purpose, an integrated analysis that compares participants and non-participants (control group) on the level of groups is needed. This will be discussed next.

Main analysis of effect of dialogue: multivariate analysis of variance

A multivariate analysis of variance (MANOVA) on the normalized factor loadings was conducted to investigate the effect of dialogue participation. The MANOVA, conducted in SPSS, included three independent variables. The first (between subjects[52]) independent variable is the 'group' variable and has two levels: 'dialogue group' and 'control group'. The second independent (within subjects[52]) variable is the repeated Q variable and has also two levels: 'before the dialogue (Q1)' and 'after the dialogue (Q2)'. The third independent (within subjects) variable is the factor variable and has six levels: factor 1 to factor 6. The dependent variable is the factor loading on each of the six perspectives before (Q1) and after (Q2) the dialogue.

As an analysis of variance requires normally distributed data, and factor loadings are not normally distributed, the factor loadings are first transformed into Fisher's z-scores according to the following formula (Brown, 1977):

$$z_x = 1.15129 * \log \left\{ \frac{(1+f_x)}{(1-f_x)} \right\}$$

in which f_x is the factor loading on perspective x, and z_x the transformed Fisher's z-score for perspective x.

MANOVA calculates main effects of the three independent variables, and interaction effects between the variables. None of the three main effects appears to be significant.[53] Out of the four interaction effects, the interaction effect of the 'group' variable and the

52 A 'between-subjects variable' is varied *between* respondents rather than *within* respondents. That means that respondents are subjected to only one of the levels of the variable. The 'group' variable in this design is a 'between-subjects variable' because respondents belong either to the dialogue group or to the control group. This in contrast to a 'within subjects variable'. In case of a 'within subjects variable' respondents are subjected to all levels of the variable. The repeated Q variable and the factor variable are both 'within subjects variables': because each respondent has Q sort data for Q1 as well as for Q2, and for each of the six factors respectively.

53 Main effects: 'factor': $F(5,105)=1.05$, n.s.; 'repeated Q': $F(1,21)=2.38$, n.s; 'group': $F(1,21)= .71$, n.s

'repeated Q' variable is significant ($F(1,21), = 16.\ 91,\ p < .01$)[54], which indicates that there is a significant difference between the dialogue group and the control group as regards the relation between their Q1 and Q2 average factor loadings.

In order to understand this effect, Figure 8.3 shows the average Fisher's z score of the dialogue group (black line) and the control group (gray line) on Q1 and Q2. The Y-axis represents the mean normalized factor loading on the six perspectives. This value is calculated as the mean of the six normalized factor loadings, averaged on the level of groups (dialogue and control). On the X-axis are the two measurements: before (Q1) and after (Q2) the dialogue.

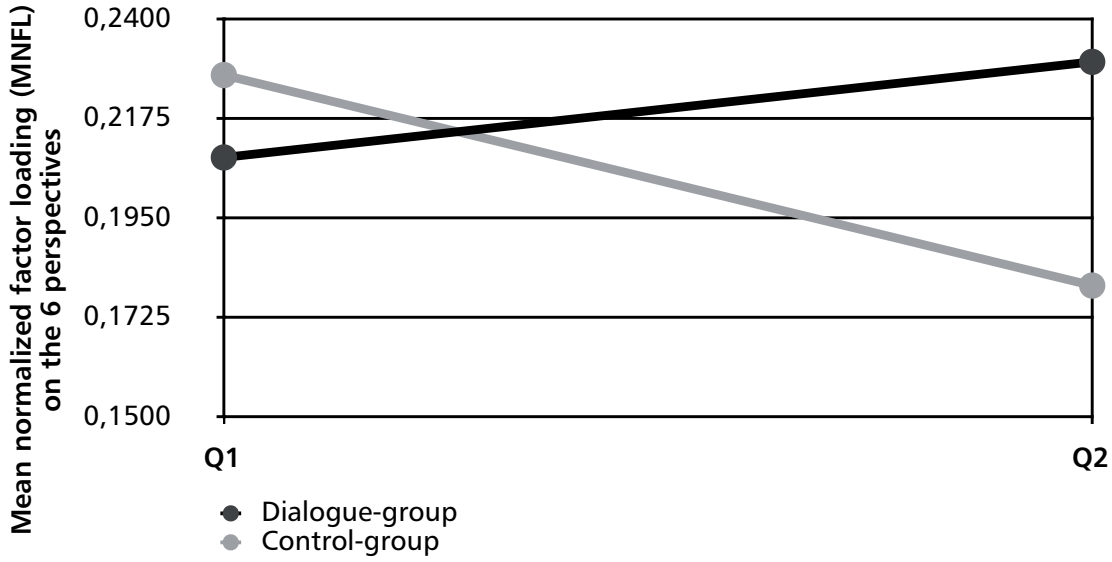


Figure 8.3 Significant interaction effect ($p < .01$): the mean normalized factor loading (Fisher's z-score) increases for the dialogue group, whereas it decreases for the control group

As noted earlier, factor loadings are a measure for agreement. That is, the higher a respondent's loading on a specific factor (perspective), the more this person's perspective is in line with that factor (perspective) and hence the more this person agrees with that perspective. The *mean* factor loading is the average agreement of respondents with the six perspectives. In order to understand what this means it is important to note that, for each respondent, the differences between the agreements with each of the six perspectives are averaged out. That is, if two persons have an equally high mean factor loading,

54 Interaction effects: 'factor' x 'group': $F(5,105)=0.15$, n.s; 'factor' x 'repeated Q': $F(5,105)=1.01$, n.s; 'factor' x 'group' x 'repeated Q': $F(5,21)=0.27$, n.s.

this does not mean that their perspectives are alike. Assume for instance that person A has a high factor loading on three out of six perspectives, but a low loading on the other three perspectives. The mean of his factor loadings can then be equal to that of someone with an intermediate loading on each of the six perspectives. Moreover, the mean factor loading on the six perspectives as displayed in Figure 8.3 averages not only over perspectives, but also over respondents.

Figure 8.3 shows a clear effect: for the dialogue group the mean normalized factor loading (MNFL) increases, whereas it decreases for the control group. Hence, on average, the agreement with the six perspectives increases for the dialogue group, whereas it decreases for the control group.

Follow-up analysis of effect of dialogue

In order to gain further insight into the effect that appeared from the multivariate analysis of variance, four additional tests were conducted in SPSS. These tests concern four simple main effects within the MANOVA design. The first simple main effect test was conducted to check whether the dialogue group and the control group were in fact comparable samples before the dialogue (Q1). That is, there should not be a difference between the two groups in terms of their MNFLs before the dialogue, as this would make the effect that resulted from the MANOVA difficult to interpret and of less value. The null hypothesis (H_0) is that the MNFLs of the dialogue and the control group are equal, and the alternative hypothesis (H_1) is that the means are not equa l:

1. *Before the dialogue:* $H_0 : (\bar{f}_{x1-x6})_{Q1,DG} = (\bar{f}_{x1-x6})_{Q1,CG}$

$H_1 : (\bar{f}_{x1-x6})_{Q1,DG} \neq (\bar{f}_{x1-x6})_{Q1,CG}$

in which ($\bar{f}_{x1-x6}$) is the MNFL for either the dialogue group (indicated by the subscript *DG*) or the control group (indicated by the subscript *CG*).

The simple main effect test shows that the null hypothesis cannot be rejected in favor of the alternative hypothesis (H_1) (p=.418)[55], which means that the MNFLs of the dialogue and the control group before the dialogue are not significantly different. Hence, before the dialogue, the average agreement with the six perspectives is similar for the dialogue and the control group, which makes them comparable samples.

The second simple main effect test was conducted to compare the MNFLs before (Q1) and after the dialogue (Q2) for the dialogue group. This test was conducted to analyze

55 F(1,21)=0.68, p=.418

whether the difference between the MNFL before (Q1) and after (Q2) the dialogue is significant. If this difference is significant, the null hypotheses (H_o) - the means before and after the dialogue are equal- can be rejected in favor of the alternative hypotheses (H_1):

2. *Dialogue group:* $H_0 : (\bar{f}_{x1-x6})_{DG,Q2} = (\bar{f}_{x1-x6})_{DG,Q1}$

$H_1 : (\bar{f}_{x1-x6})_{DG,Q2} > (\bar{f}_{x1-x6})_{DG,Q1}$

in which ($\bar{f}_{x1-x6}$) is the MNFL for the dialogue group (indicated by the subscript *DG*), before (indicated by the subscript *Q1*) or after (indicated by the subscript *Q2*) the dialogue.

The null hypothesis is rejected in favor of the alternative hypotheses. The difference between the MNFLs before and after the dialogue is significant ($p < .05$)[56], which means that the MNFL after the dialogue is significantly higher than before the dialogue. Hence, the dialogue group has, on average, a higher agreement with the six perspectives after the dialogue than before.

The third simple main effect test was conducted to test a similar hypothesis for the control group. However, the a priori hypothesis for the control group was that the MNFL would be the same for Q1 and Q2, as no intervention took place for the control group. If the difference between Q1 and Q2 is significant, the null hypotheses (H_o) - the means before and after the dialogue are equal- should be rejected in favor of the alternative hypotheses (H_1):

3. *Control group:* $H_0 : (\bar{f}_{x1-x6})_{CG,Q2} = (\bar{f}_{x1-x6})_{CG,Q1}$

$H_1 : (\bar{f}_{x1-x6})_{CG,Q2} \neq (\bar{f}_{x1-x6})_{CG,Q1}$

in which ($\bar{f}_{x1-x6}$) is the MNFL for the control group (indicated by the subscript *CG*), before (indicated by the subscript *Q1*) or after (indicated by the subscript *Q2*) the dialogue.

Also for the control group the null hypothesis is rejected in favor of the alternative hypothesis. The difference is significant ($p < .01$)[57], which means that the MNFL after the dialogue is significantly lower than before the dialogue. Hence, the control group has, on average, a lower agreement with the six perspectives after the dialogue than before. This effect appears to be stronger than the increase for the dialogue group.

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56 $F(1,21)=3.16$, $p=0.45$ (tested one-sided). A one-sided test is allowed as the alternative hypothesis states a direction (a larger than b), rather than a non-equivalence (a is not b). This means that p-values are divided by 2. The p-value for this hypothesis is the only one that is not significant (but only marginally significant) when tested two-sided ($p=0.09$).

57 $F(1,21)=16.72$, $p=.001$

The fourth simple main effect test was conducted to analyze whether the difference between the dialogue group and the control group after the dialogue (Q2) is significant. If this difference is significant, the null hypothesis (H_o) - the means for the dialogue and the control group are equal- can be rejected in favor of the alternative hypothesis (H_1):

4. *After the dialogue:* $H_0 : (\bar{f}_{x1-x6})_{Q2,DG} = (\bar{f}_{x1-x6})_{Q2,CG}$

$H_1 : (\bar{f}_{x1-x6})_{Q2,DG} > (\bar{f}_{x1-x6})_{Q2,CG}$

in which ($\bar{f}_{x1-x6}$) is the MNFL after the dialogue (indicated by the subscript *Q2*), for either the dialogue group (indicated by the subscript *DG*) or the control group (indicated by the subscript *CG*).

The null hypothesis is rejected in favor of the alternative hypothesis (H_1). The difference between the MNFLs of the dialogue and the control group after the dialogue is significant ($p < .01$)[58]. This means that the dialogue group has a significantly higher MNFL after the dialogue than the control group, and hence, on average a higher agreement with the six perspectives after the dialogue than the control group.

Summary of the results

The MANOVA showed that there is a significant difference between the dialogue group and the control group as regards the relation between their Q1 and Q2 factor loadings. Hence, on average, the agreement with the six perspectives increases for the dialogue group, whereas it decreases for the control group. Follow-up tests showed that the dialogue group and the control group were, before the dialogue, comparable in terms of their agreement with the six perspectives. However, afterwards, they differ significantly: the agreement for the dialogue group is higher than that for the control group. The increase in agreement for the dialogue group and the decrease in agreement for the control group respectively are both on itself significant, which means that the dialogue group agrees more with the six perspectives after the dialogue than before, and the control group agrees less with the six perspectives after the dialogue than before. This means that the intervention, taking part in the Biomass Dialogue, had an effect: an increased agreement with the six perspectives.

This effect is reflected by the changes on the individual level. Both for the dialogue group as well as for the control group significant individual changes were observed. The number of significant changes is higher for the dialogue group than for the control

58 $F(1,21)=7.21$, $p=.007$ (tested one-sided).

group (8 versus 5). In line with the effect found with MANOVA, for the dialogue group the changes mainly concern increased factor loadings (6 out of 8), whereas for non-participants it only concerns decreased factor loadings. There is only one perspective for which agreement of two respondents from the dialogue group significantly *decreases*, namely perspective 2 ('Hit the brakes'). It appeared furthermore that the number of respondents from the dialogue group with an increased agreement with perspective 1 ('Keep all options open') is relatively high, whereas there are no significant changes with regard to this perspective for the control group.

8.3 Qualitative data used for interpretation of the results

Learning and perspectives

Each of the three workshops of the Biomass Dialogue was evaluated by means of a short evaluation form. In these evaluation forms participants were asked to what extent they felt they have had enough opportunity to do their say, to what extent the dialogue was open, to what extent they have learned during the workshop, and what they have learned.

In general, participants indicated in the evaluation forms that the atmosphere in the three workshops was open and constructive. As one participant states it: "*of course there were hobby horses, but in general, people asked for clarifications and arguments*". This probably has to do with the size of the subgroups in which deliberation took place in the Biomass Dialogue. The small subgroups were helpful in increasing speech time and opportunities for all participants. This is underlined by the results of the evaluations, in which participants indicate that they have had sufficient opportunity to have their say. In such small groups, communication biases that hamper an open exploration of competing arguments are less likely to play a role. Furthermore, the chairpersons were instructed to pay equal attention to all input, and to avoid situations in which only few participants were active in the discussions. Moreover, each of the tasks for the subgroups started with each participant individually writing down his or her ideas. In order to make sure that no individual input was lost, all this information was first gathered on a flip-over sheet before discussions continued.

Participants indicated in the evaluation forms (and also in personal communications and the fourth workshop) that the Q perspectives were helpful for understanding the complexity of the biomass issue. When asked to indicate what they learned, participants often made referrals to other people's perspectives, ideas, and information. One par-

ticipant stated for instance after workshop 1: *I now have "a better understanding of the perspectives on the basis of which people talk about biomass".* Another participant stated: "*Even Shell thinks in a nuanced way*" and "*let's think from another perspective*". And after workshop 3 participants indicated for instance that they learned "*about the diversity of understandings*", "*about the perspective of other stakeholders, deepening and broadening of 'my' environment-perspective*", and that they learned "*to listen*".

Focus on specific chains

In addition to learning about perspectives, participants indicated that they learned about facts. After workshop 1, a participant indicated for instance that he learned "*that dung fermentation without additions is not possible*" and another participant learned "*that ashes (embers) from combustion installations cannot be returned to the land*". After workshop 2, a participant mentioned that he learned "*about techniques of sustainable biomass and energy production*". Learning about facts appeared to be especially critical in the context of the rapeseed chain, which was discussed in workshop 1. The initiator of a Dutch rapeseed chain (pure vegetable oil from rapeseed) was present at the workshop and explained the chain. Initially, there were participants who were negative about the sustainability of the chain, because it was thought to use much land to produce little energy. However, this evaluation appeared to be based on incorrect factual information about the way the chain was organized. The chain initiator explained that only one-third of the rapeseed is used to produce pure plant oil for energy and that two-third is used for feed. Hence, pure plant oil is not the only product, but it is only a small proportion of what is produced from a certain piece of land. For most participants, this was new information that actually made them change their evaluation of the sustainability of the rapeseed chain. Notably, in contrast to the rapeseed chain, the Biomass Energy Plant Sittard chain received a very negative evaluation. The representative of this chain could not be present due to illness. It was noticed afterwards by the project team, that not all available information on the chain was used by the group, and that some of their assumptions appeared to be incorrect. The project team wondered very strongly whether the chain also would have received a negative evaluation if the representative had been present and able to explain details with regard to the organization of the chain. These examples stress the importance of face-to-face exchange of first-hand information for learning in stakeholder dialogues.

The fact that the dialogue focused on the level of specific chains (rather than on abstract sustainability criteria) hence gave people the opportunity to show what their beliefs and claims are based on, and to exchange not only perspectives, but also factual information. In the evaluation form after workshop 2, participants were asked to what extent

the presented biomass chains helped them to think about desirable future scenarios (this was the aim of workshop 2). Participants were positive about the use of the chains in workshop 2. As one participants stated it: "*..the chains make you think and highlight arguments and considerations*", and another one: "*I gained new ideas. Many aspects and opinions passed by, and that always gives a sharper own image*". Some participants were critical with regard to the particular use of the chains in workshop 2: "*the chains were clear, but started from the present situation and not from the future. As such, they were less effective",* and "*I found the chains very interesting. What I missed were figures, e.g. how many MJ does an hectare of algae produce?*" The visual way of presenting the information facilitated the understanding of the chains and actually revived the discussions. This is especially notable in comparison to the visions that were used for the repertory grid exercise in the H_2 Dialogue. In discussing the repertory grid exercise in the H_2 Dialogue in chapter 4, it was noted that the visions were for some participants difficult to grasp and that this might be due to the fact that there was only text to explain the visions. It was argued then that visualizations might have improved the understanding. Based on the experiences with the visualizations in the Biomass Dialogue it appears that visualizations are indeed helpful for participants to get grip on information and to revive the discussions.

New encounters

It is interesting to note that the dialogue entailed a meeting between persons from different perspectives, who, in their daily practice, do not encounter one another. This also appeared from the evaluation forms in which participants were asked whether they met new people in the dialogue. In the first workshop this was the case for all participants. The encounter of stakeholders from perspectives 2 and 3 is especially interesting, as the two perspectives have a completely different focus, for example regarding the types of biomass chains. Whereas, according to perspective 2, all biomass initiatives should be halted because sustainability cannot be guaranteed, perspective 3 claims that sustainable biomass chains are possible. As opposed to perspective 2, perspective 3 does not focus on large-scale, or global chains, but mainly on small-scale, decentralized chains, many of which make use of residuals. For this type of chains, the negative impacts of large-scale, centralized chains on developing countries may not be so likely. Interestingly, participants concluded in the synthesis of the dialogue that there are ways forward with biomass. This might have to do with the fact that entrepreneurs from perspective 3 had the opportunity to present local, small-scale, decentralized biomass chains that do not negatively impact developing countries.

Perspectives and synthesis

The concept 'biorefinery' (refining biomass in order to use all valuable elements within the biomass) figured as one of the central concepts in the synthesis of the dialogue. This concept was strongly advocated by participants from perspective 1 ('Keep all options open'). In that sense, it is interesting to note that perspective 1 was, in addition to perspectives 2 and 3, relatively well represented in the dialogue in terms of number of participants. Two other concepts that reflect the line of thinking of perspective 1 are also strongly present in the synthesis of the dialogue, i.e. 'smartsizing' (scale and technology of chains are adapted to the local context) and flexibility. Participants concluded that specific contexts ask for specific technologies, scales, etcetera, which means that there is no "one-size-fits-all" solution. This reflects the claim of perspective 1 that it is not possible to judge the sustainability of biomass options on a generic level. According to perspective 1, sustainability judgments should be made on a case-specific basis, because within a certain context a specific chain is more (or less) sustainable than in another.

Perspective 5 ('Efficiency the goal: biomass a means?') was especially present through participation of one specific stakeholder, who frequently stressed the importance of the energy and material efficiency of chains. This stakeholder presented the paper chain in workshop 2 (see chapter 6) to highlight the dilemma between CO_2 reduction and energy and material efficiency. This issue was taken on by some of the participants and kept recurring in the discussions, and was also taken on in the synthesis of the dialogue.

Stakeholders from perspective 4 ('Security of supply with large-scale certified 2nd generation biomass") were largely absent during the dialogue. Whether this is coincidental or not is hard to say. It is notable that security of supply, the central concept in perspective 4, was not central in the discussions. This may be related to the absence of stakeholders with perspective 4. Certification, also a central concept in perspective 4, was an extensively discussed topic on which no clear conclusion or synthesis was achieved. Notably, the stakeholders who actually want (and need) a certification scheme were largely absent throughout the dialogue.

Finally, not all invited respondents from perspective 6 attended the Biomass Dialogue. There were two participants who adhered to perspective 6, of whom one was a mix between perspective 6 and perspective 1. Strikingly, the central role that emerged for 'learning-by-doing' in the synthesis with regard to future activities strongly reflects perspective 6 ('Just do it, step by step'). This is interesting, as perspective 6 can be interpreted as a marginal perspective in the general biomass discourse in the Netherlands in the sense that it is not part of the mainstream debate about biomass (it was also the

smallest perspective in terms of the number of respondents who adhered to the perspective in the Q analysis).

8.4 Interpretation of results

Effect of dialogue

The significant interaction effect from the MANOVA shows that participants were able to use the six perspectives to get grip on the complexity of the issue. In fact, participants used the perspectives to impose structure upon the sixty Q statements. This in contrast to the control group. It indicates that the general acknowledgement of the six perspectives has increased due to their taking part in the dialogue. This is in line with the qualitative finding from the evaluation of the Biomass Dialogue that participants found the perspectives helpful in getting grip on the complexity of the issue.

It is plausible that the way the Biomass Dialogue built on the identified perspectives (through stakeholder selection and subgroup formation) resulted in a better understanding of the diversity of perspectives than mere 'exposure to' the perspectives would have done, e.g. through a presentation. Persons from the control group were presented with the perspectives through a report that was sent to them after the first round of Q interviews. Participants however were presented with the perspectives not only through a report, but they took part in a dialogue in which the perspectives played a central and structuring role. They were repeatedly, and in different ways confronted and working with the perspectives: through a presentation and discussion of the perspectives in the first workshop, through the structure of the first two workshops (subgroups based on perspectives) and through the synthesis reports in which analyses were made in relation to the perspectives. In this way, they could make themselves familiar with the perspectives and consequently use them in their thinking about the complex biomass issue.

An important question with regard to the interaction effect displayed in Figure 8.3 is why the control group *decreased* in their average loading on the perspectives. After all, if nothing had changed for them, the line would have been horizontal. My hypothesis is that this has to do with the media-attention to the biomass issue. In the year between the two Q interviews much negative news appeared, mainly in relation to the food cri-

sis.[59] At the same time, attention to climate change and security of supply has increased. As a result of this, the ideas may have become more diffuse. In contrast to the dialogue group, the control group could not use the six perspectives to make sense of the biomass issue. The diffuse image may have been translated into a decreased agreement with the six perspectives.

The intervention – taking part in the Biomass Dialogue- thus actually made a difference: it helped people to see structure and to prevent diffusion of ideas. Hence, the results indicate that the Biomass Dialogue was in fact a problem structuring process: a learning process brought about through the articulation and confrontation of divergent perspectives. In the light of the results, problem structuring in the Biomass Dialogue can be understood as a process of convergence to the six perspectives. Rather than reaching a consensus on a particular perspective, there is consensus on the fact that a diversity of perspectives exists.

Importantly, these results give us a better understanding of what learning in stakeholder dialogues actually entails. For the Biomass Dialogue, learning does not mean that participants drastically change their perspective. Rather, learning means that participants better understand and acknowledge the diversity of perspectives, which enables them to use the perspectives as a structure to understand the complexity of the issue.

Changed perspectives

A radical change of perspective, in the sense that people have significant factor loadings on *another* perspective after than before the dialogue, took place only for one participant (participant 2 in Table 8.2, shift from perspective 2 to 1). Less radical, but still notable changes occurred for two participants who both loaded significantly on perspective 2 ('Hit the brakes') before the dialogue, but not anymore significantly after the dialogue. One of the two does not anymore load strongly on perspective 2 after the dialogue, but is then a 'mix' of perspectives 1 ('Keep all options open'), 4 ('Security of supply with global, certified, 2nd generation biomass'), and 5 ('Efficiency the aim: biomass a means?'). The other persons still loads on perspective 2 ('Hit the brakes'), but also on perspective 5. It is difficult to say whether this is a result of dialogue participation.

59 Three students from the Master program Environment and Resource Management at VU University Amsterdam conducted an analysis of the number of articles in Dutch newspapers in which two combinations of search terms appeared in the period 2005-2009: "biofuel" and "food", and "biofuel" and "sustainability". It appears from their analysis that for both combinations of search terms there is a peak in the number of articles in the period between the two Q interviews. Especially for the combination "biofuel" and "food" there is a steep increase in the number of articles: from just above 50 in June 2008 to about 380 in June 2008 (Baboeram, Braat & Mufti, 2009).

Interestingly, these three persons all adhered to the critical perspective 2 ('Hit the brakes') before the dialogue (but not anymore after the dialogue). The results from the analysis of the number of significant changes in factor loadings on each of the six perspectives show a similar pattern. For participants, there are only significant *increases* on the perspectives (in particular on perspectives 1, 3, 5), *except* for perspective 2, for which there are two significant decreases (see Table 8.2).

The results from the analysis of the number of significant changes in factor loadings on each of the six perspectives (see Table 8.3) show that there are a relatively large number of significant changes (4) for perspective 1 ('Keep all options open'). One participant (respondent 3, see Table 8.2) is even in significant agreement with perspective 1 after the dialogue (as indicated by the significant factor loading), whereas she was in significant agreement with perspective 2 before the dialogue. The other three participants are not in significant agreement with perspective 1 after the dialogue, but the difference between their factor loadings before and after the dialogue is significant, meaning that they agree more with perspective 1 after the dialogue. The increased agreement with perspective 1 is reflected by the increased attention for some of the central ideas in perspective 1 that has been observed in the course the dialogue: biorefinery (refining biomass in order to use all valuable elements within the biomass), flexibility, and related to this the concept of 'smartsizing' (scale and technology of chains are adapted to the local context).

In that sense, the encounter of participants from three perspectives in particular seems important for the learning process in the Biomass Dialogue: perspectives 1 ('Keep all options open'), 2 ('Hit the brakes), and 3 ('Support innovative initiatives'). Participants from perspective 2 were initially very critical with regard to the possibilities of sustainable biomass, by warning of the negative impacts for developing countries. The participants from perspective 3 were very eager to show that there are many possibilities for biomass chains that do not negatively impact developing countries, mainly by focusing on small-scale, decentralized chains in the Netherlands. The dialogue's focus on specific chains gave these participants an opportunity to do this, by making use of very specific terms, facts and figures. The example of the rapeseed chain is still very striking in this regard. By simply explaining what goes on in the chain, i.e. explaining how much of the rapeseed is used for energy and how much for food, certain initial beliefs were corrected and eyes were opened. In the synthesis phase of the dialogue, participants concluded that there are ways forward with biomass and that options should be kept open. The idea that options should be kept open reflects perspective 1, which is underlined by the relatively large number of significant changes for perspective 1. Three out of four of these significant changes took place for participants who initially adhered to perspective 2. Hence,

these participants shifted from a perspective that aims to exclude options to a perspective that aims to keep options open (perspective 1). This shift seems to be triggered by the specific examples discussed in the dialogue, and further specified by concepts such as biorefinery and smartsizing.

The above interpretations reflect a clear relation between the results from the quantitative analyses and the qualitative data from the dialogue. However, there is also an incompatibility between the synthesis of the dialogue and the quantitative results discussed in this chapter. In the synthesis of the dialogue, 'learning-by-doing' was considered an important strategy for dealing with future biomass activities. 'Learning-by-doing' is a strategy that on the one hand acknowledges the urgency to act, and on the other hand acknowledges that we still need to learn a lot and are not yet prepared at this moment to set up biomass chains that will appear most sustainable in the future. As opposed to strategies advocating more knowledge development before setting-up more biomass chains, learning-by-doing claims that the most useful knowledge is developed by actually setting-up (pilot) biomass chains. This strategy lies at the heart of perspective 6 ('Just do it, step by step'), which claims that we cannot know now what will appear to be the most sustainable option in the future. According to perspective 6, this means that we should act now with the knowledge that we have, instead of postponing actions. In line with perspective 1, perspective 6 argues that all options should be kept open and that there should be a broad range of applications in order to be flexible in the future. Based on the important role for learning-by doing in the synthesis of the dialogue, I would have expected to see significant changes with regard to perspective 6 in the quantitative analyses. However, the analysis of the number of significant changes in factor loadings on each of the six perspectives (see Table 8.3) reports no significant changes on perspective 6.

8.5 Discussion of the use of repeated Q measures for evaluating learning

Q methodology proved a useful method to evaluate how participants changed with regard to the six perspectives identified before the dialogue. Used in the quasi-experimental design, it allowed for a statistically sound analysis that enabled drawing a conclusion about the effect of dialogue. Interpreted on the basis of the qualitative data from the dialogue, it enabled an in-depth understanding of learning in the Biomass Dialogue.

A small number of studies are available that make use of repeated Q measures to evaluate the effect of a specific intervention. It has for instance been applied to study the ef-

fect of deliberative discussion on environmental preferences (Walton, 2008), the effect of an experiential learning approach on perceptions of authority relations (Rodenbaugh, 2002), the effect of deliberation on environmental policy preferences (Niemeyer, 2004; Niemeyer, 2002) and on viewpoints on policy for the local food system (Pelletier, Kraak, McCullum, Uusitalo, & Rich, 1999). Steven Brown used it already in 1977 to investigate the impact of reading political literature on individuals' political response.

To my knowledge, there are four studies in which repeated Q measures are used to investigate the effect of a participatory process (Niemeyer, 2002; see also 2004; Walton, 2008; Pelletier et al., 1999; Raadgever, 2009). Niemeyer's study (2002) is quite similar to the present study in that its emphasis is both on the methodical design of the dialogue (a citizen's jury deliberating policy options for the Bloomfield Track, a controversial road within a World Heritage listed rainforest) as well as on its effect in terms of changes of perspectives. Niemeyer concludes that there was a significant change in the participants' perspectives as a consequence of their participation in the citizens' jury. His study did not include a control group. As a consequence, this conclusion should strictly speaking be made with some caution. The intervention, the citizens' jury, covered a four-day period, in which (also) external events may have contributed to changes in perspectives. Also the study by Pelletier et al. (1999) has an emphasis on design of the dialogue (a 'search conference', which seems similar to participatory scenario or backcasting workshops, on scenario development for the local food system) but does not include a control group. As there were several weeks in between administration of the ex ante Q interviews and the dialogue, and again several weeks in between the dialogue and administration of the ex post Q interviews, there may have been all kinds of external factors in place. Both Walton's (2008) and Raadgever's (2009) studies evaluate the effect of dialogue, without emphasis on the methodical design of the dialogue, but with inclusion of a control group. Walton's study (2008) was set up as an experimental design, in which the intervention entailed watching a video about the different viewpoints on policy for a coastal plain in Alaska (oil reserves or designate it a wilderness area) and participating in a follow-up group discussion. The purpose of including a control group in Walton's study was different than in this study. Walton used the control group to test whether the ex ante Q sort had an effect on the ex post Q sort. The control group did not participate in the ex ante Q interviews, but only in the ex post interviews. As Walton found that the ex ante Q interviews did not influence the ex post Q interviews, and hence a test-effect could be excluded, the analysis of changes was based solely on the Q interview data of the dialogue group. Changes for the dialogue group were not (could not be) compared to changes for the control group. Raadgever's study (2009) focuses on analyzing changes in individual Q sorts as a result of two dialogue projects (one on future flood management in the Lower Rhine basin and one on groundwater management in Delft,

the Netherlands). His study included a control group, which conducted both ex ante and ex post Q interviews. Raadgever's level of analysis is different from the one in this study, as he focused on individual Q sorts rather than factor loadings on all factors (perspectives). He calculated correlations between individual ex ante and ex post Q interviews to analyze the number of significant changes of individual Q sorts, both for the dialogue and the control group. His analysis does either include measurement of significance of differences between the changes for the dialogue and control group, nor analysis of the question whether the dialogue and the control group were comparable samples at the time of the ex ante Q interviews. Hence, although a control group was included, his statistical analysis strictly speaking does not allow for drawing conclusions about the effect of the intervention, i.e. participating in the dialogue.

In conclusion, this repeated Q measures study contributes to the work that has been done so far through the combination of four characteristics. Firstly, this study was set up to evaluate a methodical approach to stakeholder dialogue. Hence, emphasis was both on the methodical design of the dialogue as well as on the evaluation of the methodical design. Secondly, the repeated Q analysis was applied in a quasi-experimental fashion that included a control group to check whether changes in perspectives for participants did not take place for non-participants. Importantly, effort was put into composing a control group that was comparable to the dialogue group in terms of ex ante Q sorts, which is necessary in order to exclude the possibility that external factors caused observed changes. Thirdly, the statistical analysis involved an analysis of significance of the effect of dialogue. The multivariate analysis of variance made it possible to statistically check whether the dialogue and the control group were comparable samples in terms of their perspectives before the dialogue and whether changes in perspectives for the dialogue group were significantly different from the changes for the control group. Only when these two things have statistically been affirmed can found changes be attributed to the intervention, i.e. participation in the dialogue. Fourthly, the repeated Q analysis was triangulated with qualitative data from the dialogue, i.e. evaluation forms and observations from the project team. This triangulation enabled analyzing which elements within the dialogue design were critical and contributed to the identified effects.

Limitation of the repeated Q measures analysis

The repeated Q measures were used to evaluate the effect of the intervention, i.e. participation in the dialogue. As the intervention was based on the six perspectives identified before the dialogue, I was predominantly interested in the question how participants changed with regard to the six perspectives. Of course, it would be interesting to see if *new* perspectives were to be identified after the dialogue. This would require a different

analysis, which includes only the 23 Q1 sorts of respondents that were also involved in the Q2 sorts (and leaves out the other 52). As noted earlier, such an analysis would without doubt result in different perspectives, because participants that attended at least two out of three workshops (i.e. the respondents for this analysis) were not distributed equally over the six perspectives, and perspectives 4 and 6 were not represented at all. Therefore, the outcomes would have been difficult to interpret in terms of the intervention. In addition, it would have been difficult to communicate them to the participants.

Related to this, one might argue that as a consequence of learning in the dialogue new ideas or perspectives might have come up, and that it should therefore be possible to add new statements to the second Q sample. Also, in one-year time -the period between the two Q sorts- new issues may have come up, which necessitates adding new statements to the sample. This was partly solved by asking respondents whether they missed statements in the Q sample. Of the few times that respondents wanted to add a statement, it concerned mostly a repetition or a refinement of an existing statement that they strongly (dis)agreed with. The identification of new perspectives through including new statements in the Q sample originating from the dialogue was not possible within the specific design of this study. The quasi-experimental design requires that the Q statements before and after the dialogue are equivalent. If not, the quantitative analyses presented in this chapter would not have been possible.

In conclusion, although it was not possible to identify new perspectives, Q methodology appeared a very useful method to identify changes in perspectives, in referral to the six perspectives identified before the dialogue. This actually gave meaning to the identified changes, as these could be linked to the perspectives that were already known, and to specific people and occurrences in the dialogue. Related to this, it furthermore provided a good starting point for triangulation of the evaluation methods: the quantitative, statistical analysis triangulated with the qualitative data (participants' evaluations, observations).

8.6 Conclusion

The question for this chapter was to what extent *Constructive Conflict Methodology* resulted in an improved understanding of a participant's own and others' perspectives. The analyses showed that the dialogue had a problem structuring effect, in the sense that participants learned about the diversity of perspectives. Hisschemöller (2005) defines problem structuring as "the articulation, confrontation, comparison and, where possible, integration of as many contradictory arguments as possible". This definition

stipulates the process of problem structuring, rather than the outcome. Taking on this definition for the process of problem structuring, the analyses presented here also give insight into the outcome of problem structuring. That is, it gives deeper insight into the question what learning in stakeholder dialogues actually entails. For the Biomass Dialogue, learning means that participants show in general more agreement with the beforehand-identified perspectives after the dialogue than before. Hence, learning does not imply that people drastically change their perspective, but rather that they better understand and acknowledge the diversity of perspectives.

The evaluation of learning in the Biomass Dialogue highlights four methodological conclusions with regard to learning in a stakeholder dialogue. First, the articulation of divergent perspectives offers people a structure that helps them to get grip on the complexity of the issue. It facilitates a problem structuring process by enhancing the understanding and acknowledgement of the diversity of perspectives. It furthermore creates a more balanced, or fair if you like, dialogue, in that all perspectives can have their role in the dialogue. This is necessary, because, in their daily life, stakeholders do not necessarily meet stakeholders with different perspectives.

This brings us to the second issue. The evaluation underlines the importance of the understanding of a dialogue as an encounter of stakeholders that, in their daily practice, do not encounter one another. In the Biomass Dialogue, this was especially the case for people from perspective 2 ('Hit the brakes') and perspective 3 '(Support innovative initiatives'). In general, stakeholders from these perspectives operate in separate working fields, and do not meet, let alone cooperate. Although to some it may sound trivial to understand a dialogue as a mere encounter of people who are unfamiliar with each other, this is often not what actually happens in practice.

Thirdly, and related to the second issue, the importance of the inclusion of marginal perspectives for learning is underlined. This is shown by the important role for the entrepreneurs of perspective 3 ('Support innovative initiatives') in showing participants from perspective 2 ('Hit the brakes') that there are examples of biomass chains that do not negatively impact developing countries. Although not shown by the quantitative analysis, this is also illustrated by the central role for 'learning-by-doing' in the synthesis of the dialogue, which was initially only predominant for stakeholders representing the marginal perspective 6 ('Just do it, step by step'). Marginality refers to the *newness* of perspectives for stakeholders: a marginal perspective is a perspective that is not often heard in the dominant.

The fourth issue concerns the object of discussions. The results of the evaluation point to the role of the biomass chains that were discussed in the Biomass Dialogue. These chains

facilitated the articulation of viewpoints, because participants could be very explicit about their assumptions, arguments and information. In addition, the face-to-face exchange of first-hand information (through chain representatives or initiators) appeared very important. This resulted in a constructive dialogue, in which points of view were confronted and clarified for participants in the dialogue. The focus on a very specific level –specific biomass chains- rather than on an abstract level (e.g. a discussion on the question: "what is sustainability"?) has facilitated an open dialogue. It has thereby contributed to the problem structuring process that resulted in an improved understanding and acknowledgement of the diversity of perspectives.

Chapter 9

Conclusion and discussion

Conclusion and discussion

This study presented *Constructive Conflict Methodology* as an overarching approach for problem structuring in stakeholder dialogues. The aim of *Constructive Conflict Methodology* is firstly to incorporate specific social science methods that can be used to identify and select stakeholders in such a way that a diversity of perspectives is reflected in the dialogue. Secondly, it aims to incorporate methods to facilitate problem structuring through 1) the articulation of diversity in terms of divergent perspectives and, 2) confrontation of claims that results from these divergent perspectives. Thirdly, *Constructive Conflict Methodology* should be assessable, so that its application can be evaluated in a methodical manner. The evaluation of *Constructive Conflict Methodology* concerns the question whether *Constructive Conflict Methodology* enhances learning in stakeholder dialogue, i.e. whether it supports participants' understanding of the diversity of perspectives.

This chapter highlights and reflects on the main conclusions from this study. The structure of this chapter is as follows. Section 9.1 starts with summarizing the conclusions from the previous chapters, which form the answers to the four research questions that were guiding this study. The next four sections discuss a number of issues that follow from the main conclusions from this study. Section 9.2 discusses the importance of the preparation phase of a dialogue in order to identify and select stakeholders. Section 9.3 concludes on the relevance of constructive conflict for learning on unstructured problems, and emphasizes two issues: the importance of providing insight into the perspectives before discussing specific options, and the importance of situated learning, i.e. discuss specific options within specific situations. Section 9.4 raises the question how to manage constructive conflict in stakeholder dialogues. This question is discussed in relation to cognitive and affective conflict, the role of power relations, and the role of the researcher. Section 9.5 discusses the relevance of this study for policy. First, it discusses the value of learning in stakeholder dialogues for policy. Second, it discusses the implications of the conclusions of this study for sustainability planning and policy. The chapter wraps up in section 9.6 with three suggestions and recommendations for future research.

9.1 Conclusions with regard to the research questions

The following four research questions were guiding this study:

1. Which characteristics should *Constructive Conflict Methodology* have in order to enhance learning about perspectives?

2. Which methods can be used to identify divergent perspectives and how can these be applied to select participants for a stakeholder dialogue?

3. Which methods can be used to articulate and confront divergent claims, and how can these be applied in a stakeholder dialogue?

4. To what extent does a stakeholder dialogue designed according to *Constructive Conflict Methodology* result in participants gaining an improved understanding of the diversity of perspectives?

As regards the first research question, first a theoretical argument was developed about how learning in stakeholder dialogues can be enhanced. Stakeholder dialogues should facilitate learning about the diversity of perspectives. Chapter 2 introduced the concept 'constructive conflict' as a design objective for stakeholder dialogues aimed at problem structuring. Constructive conflict requires an open dialogue, in the sense that the broad range of ideas, knowledge and values are put on the table. However, various mechanisms can hamper an open dialogue. In chapter 2, four communication biases were discussed that can obstruct an open dialogue: the bias of shared information, the bias of source, the bias of phrasing and the bias of attitude. Given these barriers to an open dialogue, the claim of this study was that methods are needed that facilitate the articulation and confrontation of divergent perspectives. In order to enhance learning about perspectives, conflict should be authentic rather than artificial and issue-related rather than personal. Chapter 2 also highlighted the implications of learning as the aim of stakeholder dialogue for stakeholder selection. Stakeholder selection should be based on a balanced inclusion of the variety of perspectives. This means that the identification and selection of relevant stakeholders should be based on an empirical analysis of the diversity of perspectives rather than on (implicit) assumptions on who owns relevant expertise, as is the case when stakeholders are selected on the basis of actor types or socio-demographic variables.

Based on the theoretical insights, chapter 3 introduced *Constructive Conflict Methodology* as a four-step-approach for stakeholder dialogue: 1) stakeholder identification and selection, 2) articulation of divergent perspectives, 3) confrontation and evaluation of

divergent claims, 4) synthesis. Chapter 3 identified a number of social science methods that can be used to support specific steps of the methodology. As regards research question 2, it was argued in chapter 2 that methods to select stakeholders should be congruent and replicable and based on a bottom-up identification of perspectives. Examples of such methods are Repertory grid technique and Q methodology. As regards research question 3, it was argued in chapter 2 that methods to articulate and confront divergent claims should be able to elicit, in a bottom-up fashion, implicit elements of perspectives, such as assumptions or underlying theories. Examples discussed in chapter 3 are Policy Delphi, Value-focused thinking, Cognitive mapping, Policy capturing, Toulmin model of argument, Policy capturing and Dialectical methodology.

Two methods were empirically explored in more detail: Repertory grid technique and Q methodology. Chapter 4 showed an empirical application of Repertory grid technique. Repertory grid technique was used in the H_2 Dialogue for two purposes: 1) to identify the variety of constructs that stakeholders use to understand and distinguish future hydrogen visions, and 2) to analyze disparity of future hydrogen visions in order to identify three most disparate visions. The results of the analysis were used to structure the dialogue and to assign participants to subgroups that were formed around the three visions. As regards the first purpose, repertory grid technique enabled the identification of the variety of constructs that participants used to understand, compare and distinguish the visions. As regards the second purpose, the statistical HOMALS analysis ('homogeneity analysis of alternating least squares') appeared useful. Repertory grid technique enabled a selection of three disparate (most different) future visions that could be further explored in the dialogue and that could be used to form three subgroups accordingly. As such, chapter 4 showed how Repertory grid technique was applied in a stakeholder dialogue to articulate and confront divergent claims (research question 3).

Chapter 5 introduced the Biomass Dialogue, a stakeholder dialogue on energy options from biomass in the Netherlands. This dialogue served as the main empirical case in this study. It was designed according to *Constructive Conflict Methodology*. Chapter 6 discussed how Q methodology was used to identify the diversity of perspectives on energy options from biomass in the Netherlands. Q methodology proved a useful method for stakeholder selection that enabled a selection on the basis of a bottom-up analysis of stakeholders' perspectives (research question 2). Based on the perspectives identified with Q methodology, the dialogue was structured in such a way as to articulate and confront divergent claims and presumptions with regard to the sustainability of specific biomass chains. Chapter 7 discussed how each of the steps of *Constructive Conflict Methodology* was taken in the Biomass Dialogue. In addition to Q methodology for the identification of perspectives and stakeholder selection, three other methods were

used within *Constructive Conflict Methodology* (research question 3): Repertory grid technique applied in subgroups of 'like-minded' people (formed on the basis of the Q perspectives) for further articulation of perspectives, a simplified Toulmin argumentation model to support articulation and confrontation of perspectives, and synthesis reporting to feed workshop results into the next workshop and to summarize observations and conclusions of the dialogue.

Research question 4 was answered in chapter 8, which presented a triangulated evaluation of learning in the Biomass Dialogue. It was emphasized in chapter 1 that methodical rigor is needed as regards the evaluation of stakeholder dialogues. In a field largely dominated by qualitative evaluation methods, this study provided a quantitative analysis of learning. Q methodology was used in the Biomass Dialogue to measure changes in the understanding of perspectives. In order to determine whether observed changes could be attributed to the dialogue, a quasi-experimental design was followed. Participants, all of whom conducted a Q sort before the dialogue, conducted a second Q sort after the dialogue. A control group was formed that consisted of a group of stakeholders who also conducted a Q sort before the dialogue, but who did not participate in the dialogue. The control group also conducted a second Q sort. The quasi-experimental design enabled a statistical analysis of the extent to which participants' agreement with the six perspectives identified before the dialogue changed as a consequence of taking part in the dialogue. It appeared that the dialogue had a significant effect: on average, the agreement with the six perspectives increased due to taking part in the dialogue. This was interpreted as an improved understanding and acknowledgement of the diversity of perspectives. Problem structuring in the Biomass Dialogue can be understood as a process of convergence to the six perspectives. Rather than reaching a consensus on a particular perspective, there seems to be consensus on the fact that a diversity of perspectives exists.

9.2 Good dialogue requires good preparation

Stakeholder selection can make or break a problem structuring process. A better understanding of the problem and its potential solutions can only be achieved when different problem perceptions are included and evaluated. Of course, when a limited number of stakeholders with similar problem perceptions are included it is very well possible that they will reach an agreement on a specific problem. This can be satisfying for participants, and maybe also for organizers, as there is a very concrete outcome of the dialogue that all participants can agree with. However, the risk of type III errors, i.e. solving the wrong problem, is real. One might also argue that the outcomes of the dialogue are

not truly legitimate as not the full range of perspectives was involved in the dialogue. As a result, implementation of the outcomes may be hampered. The importance of stakeholder selection was illustrated in chapter 2 with an example of a stakeholder dialogue on water management in Tholen/ St.Philipsland. The national nature organizations and local farmers negotiated a solution in the dialogue that was criticized later on by actors who were not involved in the dialogue. This dialogue apparently included only limited perspectives on the problem, and as such, the problem was unjustly treated as a badly structured rather than an unstructured problem (see Figure 1.1; Hisschemöller, 1993).

The examples from the H_2 Dialogue and the Biomass Dialogue in this study show the value of an extensive preparation process. This preparation process is needed in order for the researcher to gain insight into the different perspectives on the issue at hand. The identification of marginal perspectives is especially relevant in this stage, as these may easily be overlooked but are essential for a problem structuring process. The use of (social science) methods in this stage is critical. Repertory grid technique and Q methodology both proved to be useful methods for understanding the elements of a problem and their relation. Based on the results from Repertory grid technique and Q methodology, the H_2 Dialogue and the Biomass Dialogue respectively could be structured in such a way as to provide equal opportunity for all perspectives to contribute to the dialogue.

An extensive preparation phase has important implications in terms of planning a project. To take the Biomass Dialogue as an example, the preparation phase (including stakeholder identification, Q interviews, Q analysis, stakeholder selection) lasted seven months, whereas the actual dialogue phase lasted five months. An extensive preparation may be problematic when only limited budget is available for the project, and the client needs to be convinced of the importance of the preparation phase. However, the preparation phase is decisive for the outcome, and as such indispensable for a problem structuring process.

9.3 Constructive conflict enhances learning

A process of constructive conflict, in which stakeholders jointly explore and evaluate competing options and knowledge claims, helps them to better understand the diversity of perspectives on the problem under consideration. Two issues appear to be of particular importance when enhancing learning through constructive conflict. First, as a basis for discussing specific options, people need to be informed about the diversity of perspectives and the position of other stakeholders in relation to the perspectives. Second,

the importance of situated learning is highlighted: discussions should focus on specific options in specific situations.

Provide insight into perspectives before discussing specific options

The Biomass Dialogue showed that the Q perspectives played an important role for learning in the dialogue. Participants indicated that the explicit analysis of participants' positions with regard to the identified perspectives helped them to better understand their own, but more importantly, others' positions. Although the abstract level of perspectives is not the level on which conflicts can be resolved (and this should be stressed to participants!), it is at this level that people better understand why other people pay attention to specific elements of the problem. It provides an understanding of underlying values and worldview. This proved a good basis for discussing specific options and competing knowledge claims. As such, the perspectives can serve as anchor points in a dialogue that focuses on concrete objects of discussion.

Making participants' perspectives explicit before discussing specific options may be a way to address some of the communication biases that can hamper learning in stakeholder dialogues. In chapter 3 it was noted already that making perspectives explicit in the dialogue can reduce the bias of shared information as it puts people in an expert-role with regard to their perspective. It appears from literature that this increases the exchange of unique information (Stasser and Titus, 1985).

The conclusion that learning is enhanced by making perspectives explicit disfavors the use of methods in which participants provide their input anonymously, such as policy Delphi and (some instances of) Electronic Boardroom. This type of methods involves anonymous input in order to create equal opportunities for all participants to contribute to the dialogue. Yet, if learning requires that perspectives can be explicitly linked to people in the dialogue, this means that this type of methods should be used with some caution. If anonymous input is being used, it should only be done at some moments in the dialogue and in such a way that it is still possible to explicitly link participants and their input to perspectives at other moments.

Discuss specific options in a specific situation: situated learning

Intrinsic to problem structuring is the articulation and confrontation of competing knowledge claims. As such, the focus on specific objects for discussion logically follows from the objective of problem structuring. The importance of concrete objects of discussion is underlined by the evaluation of the Biomass Dialogue. In the Biomass Dialogue

specific biomass chains were the objects of discussion in workshops 1 and 2. Rather than discussing the sustainability of biomass in general, the biomass chains served as vehicles to derive general criteria for the sustainability of biomass.

In addition, the specific options should be discussed within a specific situation. That is, a discussion on a decentralized energy system, in which e.g. heat pumps, micro CHP and solar panels are used to provide electricity and heat on the level of a district, has much more informational richness when these specific options are discussed for a particular district. In a new housing development plan for instance the situation is completely different than in an existing housing area that is to be renovated. Also the proximity to other infrastructure can make a completely different picture, for instance when there are possibilities to use heat from nearby greenhouses.

In the Biomass Dialogue, informational richness was enlarged through the face-to-face exchange of detailed information by stakeholders who initiated the biomass chain. An example concerns the Pure Vegetable Oil (rapeseed) chain discussed in workshop 1. There were many negative ideas about this chain among participants. The initiator of the chain explained what actually goes on in the chain. He explained for instance that one-third of the rapeseed is used for energy and the rest for animal feed. Some of participants' negative ideas about the chain were based on the assumption that two-third of the rapeseed was waste. When it appeared that this assumption was incorrect, and hence that the efficiency of the chain was higher than assumed, some participants changed their evaluation of the chain. Hence, by providing information on a detailed level from a specific context, participants gained a better understanding of the chain and some of them actually changed their evaluation of the chain as a result of this new information.

This conclusion pleads in favor of situated learning to enlarge informational richness (see also Schön & Rein, 1994). Situated learning means that people learn about a specific option within a specific context. It means asking the trivial, yet often unasked, question: What is actually happening in the situation in which this option is applied? Dialogues should as such entail a process of joint fact-finding on specific options in specific situations, in which stakeholders 'go out and see for themselves' in order to gather as much information as possible. Site-visits may as such be very useful. In a stakeholder dialogue that was organized on Curacao, site visits played an important role for getting a good grasp of the energy situation on the island.[60] One group of stakeholders on the island

60 It concerned the project "An all island energy policy for Curacao", organized by Clingendael International Energy Programme (CIEP) and the Institute for Environmental Studies, Vrije Universiteit Amsterdam. See: Hisschemöller, M. et al. (2009). Een energiebeleid voor Curaçao: Beleidsvisie, doelstellingen en maatregelen. IVM report: W09/007.

were for instance supermarket owners, who paid high energy bills due to the freezers, fridges and air-conditioning in their stores. By simply going to the supermarkets and discussing with the owners of those stores, stakeholders achieved a good understanding of the problem and possible energy solutions that would fit that specific situation.

9.4 How to manage constructive conflict in stakeholder dialogues?

Cognitive conflict can turn into affective conflict when conflict is too big

Constructive conflict is conflict on the cognitive rather than the affective level (Jehn, 1997). For this reason, *Constructive Conflict Methodology* involves the confrontation of competing knowledge claims rather than the confrontation of perspectives. However, even when conflict is on a cognitive level, it is not always constructive. Conflict is not always enjoyed; there may be people who have difficulties being confronted with conflicting visions. As a result, cognitive conflict can shift to affective conflict.

This is illustrated by an example from the H_2 Dialogue. Stakeholders from a research institute with vested interests in the energy field (Energy Research Centre of the Netherlands) were confronted with conflicting information from other stakeholders (without vested interests). The former stakeholders were not willing to evaluate the conflicting information; they regarded it as untrue. Their reaction was to distance themselves from the dialogue. It was suggested in chapter 2 that there is an optimum relation between the 'newness' and 'familiarity' of information. This has been referred to as 'optimal cognitive distance' (Nooteboom et al., 2007). The cognitive distance may have been too large in this example; the stakeholders from the research institute were confronted with *too* new and *too* unfamiliar information. As such, conflict was too big in order still to be constructive. The conflicting information was seen as nonsense, and as a result the stakeholders from the research institute felt they were not being taken seriously. Cognitive conflict then turned into affective conflict, including affective reactions such as annoyance and animosity. The fact that the research institute had vested interests probably played an important role. These stakeholders were not used to being confronted with other information; they are the most important suppliers of knowledge in the energy field. The risk that cognitive conflict turns into affective conflict may be especially high for stakeholders with vested interests who may not be willing to give up their position. For stakeholders who are not used to being confronted with conflicting information, it may be difficult to realize that different people have different problem perceptions and that, as a result, there are different versions of 'true' knowledge.

There seems to be no clear-cut recipe for preventing that cognitive conflict turns into affective conflict. In chapter 2 it was suggested to deal with the 'optimal cognitive distance' problem by including people who can bridge disparate perspectives. For instance, a dialogue can involve chairpersons, who are selected because they are seen as independent, knowledgeable and authoritative. In the above-mentioned stakeholder dialogue on Curacao this worked well. Also in the COOL dialogue, a stakeholder dialogue on climate change policy in the Netherlands, this was seen as an important element in the design of the dialogue (Van de Kerkhof, 2004). However, in the above example of the H_2 Dialogue it did not work. Although the chairpersons tried to translate, mediate and bridge divergent viewpoints, they could not prevent or solve the affective, i.e. detrimental conflict.

Power relations can hamper constructive conflict

Problem structuring can only take place when participants are willing to share their knowledge and explore divergent ideas and claims. The willingness to engage in an open exchange of information is influenced by existing power relations and interests. As such, power relations and interests can hamper constructive conflict. This was illustrated by the example of the H_2 Dialogue discussed above. Not only stakeholders with vested interests may have difficulties engaging in an open dialogue. There are also examples thinkable in which existing power relations between industries and small entrepreneurs make entrepreneurs reluctant to share particular information. As small entrepreneurs have in general less access to funds to finance innovative ideas, they may be afraid that their idea will be 'stolen' by people with more access to funding.

A way to stimulate an atmosphere in which people are more willing to engage in a dialogue may be by establishing rules-of-the-game. A rules-of-the-game document lists the tasks, responsibilities and mutual expectations with respect to participants and the project team. It includes rules about the confidentiality of the information discussed within the dialogue and the obligation for participants to share relevant knowledge.

The role of the researcher?

From the above discussions it appears that methods are only to a limited extent capable of managing conflict. After all, there is no fixed recipe that can be applied to each case and that will always result in the same type of process and outcomes. Designing and organizing stakeholder dialogues requires that the researcher or organizer uses existing knowledge, specific methods and tools, but also his or her experience and intuition. The researcher is thus not only observing the process, but he or she is co-shaping the

process through the choice for specific methods, questions to be answered and issues to be studied.[61] Managing conflict in such a way that it remains constructive may be one of the things that relies on experience and intuition of the researcher rather than on methods and tools to structure the dialogue.

9.5 Relevance for policy

The stakeholder dialogues as described in this study primarily served a methodological aim: they were set up as scientific exercises to apply and evaluate *Constructive Conflict Methodology*. The Biomass Dialogue in particular was set up as a quasi-experiment to apply *Constructive Conflict Methodology* and to evaluate to what extent participants learned as a result of taking part in the dialogue.

Value of learning in stakeholder dialogue

Stakeholder dialogues on unstructured problems are about learning. As such, stakeholder dialogues have an 'enlightenment' function. This is different from participatory processes that are set up in order to find an acceptable solution to a specific problem, such as negotiation processes, which have an instrumental function. It was demonstrated that participants in the Biomass Dialogue gained a better understanding of the diversity of perspectives and got a better grasp of the complexity of the biomass issue. Furthermore, it was demonstrated that the Biomass Dialogue brought together stakeholders from different networks that were not familiar with each other's ideas and work. As such, a dialogue provides a forum for creating new knowledge networks and for knowledge distribution. Learning by the researchers organizing a dialogue is also an important part of the enlightenment value of dialogue. Practical experience with organizing dialogues benefits from academic knowledge construction and vice versa. The insights gained while working on these dialogues are used within academic teaching programs and for policy advisory projects.

Insights for sustainability planning and policy

Two findings from this study are in particular relevant for sustainability planning and policy. Firstly, this concerns the finding that problem structuring should take place as

61 In this understanding, the social scientific researcher is not a participant in the process. There are however pleas to involve more social scientific knowledge in public participation processes. This was a topic for discussion at a workshop in Zurich called Ironists, Reformers or Rebels? The role of the Social Sciences in Participatory Policy Making (26-27 Juni 2008). See also a report touching upon this issue edited by Kevin Burchell and Kerry Holden (2009).

situated learning on the basis of underlying perspectives. Secondly, this concerns the finding that if 'cognitive distance' is too large this has adverse effects on learning about a problem and its potential solutions. These findings may have an important implication for current approaches to sustainability planning and policy.

In the prevalent way of thinking about sustainability planning and policy, at least in the Netherlands, an important role is assigned to future visions for strategy and policy development. Transition management has found its way from science to policy, and is adopted in Dutch policy on innovation and sustainability. Visions are developed to guide strategic thinking. Based on a sustainable future vision, transition programs and experiments are set up that can contribute to a sustainable future situation. These visions in general focus on systems at a high level of abstraction and with a large number or interrelated elements, such as a vision on the future mobility system in the Netherlands.

Backcasting is a method to help stakeholders think about how to get from a desirable future vision to actions and strategies in the present. Applications of backcasting however repeatedly show that people have difficulties to detach themselves from the present. This was the case in the H_2 Dialogue and the Biomass Dialogue, as well as in the COOL Dialogue (Van de Kerkhof, 2004). A hypothesis is that this relates to the concept 'optimal cognitive distance'. Two types of cognitive distance may be challenged in this regard: time and scale. The cognitive distance between activities in the present situation and an abstract future system, 50 years from now, may be too large for people who are not used to think in large-scale or abstract systems and who generally focus on the short-term.[62] In fact, the focus on future system visions can be interpreted as the expression of a particular perspective on sustainability transitions: that of people who are accustomed to abstract systems thinking with a focus on the long-term.

Although this particular perspective is relevant and indispensable for sustainability planning and policy, it may leave insufficient room for the multiple perspectives on the problem. Although the intention of visioning exercises is to stimulate learning by out-of-the-box thinking, it may only do so for a limited group of people. As such, a focus on future system visions may unintentionally decrease the degrees of freedom of a dialogue, and consequently miss out relevant knowledge and expertise. If this hypothesis is true, this implies that the role of future visions in sustainability planning and policy should be reconsidered. Learning may benefit more from the cognitive distance between divergent perspectives that are used to evaluate specific options in specific situations (i.e. situated

62 A solution to deal with the cognitive distance related to scale might be to backcast a particular option in a future vision rather than to backcast an entire vision. This approach was followed (however not for reasons of optimizing cognitive distance) in the COOL Dialogue (Van de Kerkhof, 2004).

learning), than from the cognitive distance between the present and an abstract guiding vision. This latter distance may simply be too large.

Application areas of Constructive Conflict Methodology

Constructive Conflict Methodology is a relevant approach for dealing with unstructured problems. As such, it may be of value for organizations that have to deal with problems of that type, be it governmental organizations, companies or other types of organizations. *Constructive Conflict Methodology* can be applied within organizations, as well as between organizations. It may for instance be applied in think tanks or taskforces that are set up to inform policymaking on societal issues that require cooperation between governmental departments. The Dutch government for example recently formed twenty taskforces to develop ideas for large cutbacks on twenty themes, such as climate and energy, housing, healthcare, government, and family allowance. These interdepartmental working groups have the task to come up with new ideas and solutions by means of creative and out-of-the-box thinking. *Constructive Conflict Methodology* may be a useful approach for facilitating the problem structuring process that these taskforces have to carry out. Also, *Constructive Conflict Methodology* may be a useful approach for problem structuring in governance arrangements set up to identify and implement strategies for dealing with specific societal issues and challenges. Either organized by government or by actors themselves, such governance arrangements involve a group of stakeholders working together on issues such as sustainability transitions, regional restructuring or adaptive ecosystem management. Furthermore, *Constructive Conflict Methodology* may be a relevant approach for learning about emerging technologies, which are usually characterized by uncertainties as regards their societal use and (perceived and real) risks. As such, *Constructive Conflict Methodology* may add to the work that has been done on interactive (Grin & Van de Graaf, 1996b) or constructive technology assessment (Schot & Rip, 1997). This type of technology assessment recognizes the importance of problem structuring for dealing with emerging technologies. It argues for stakeholder dialogue to enhance the quality of innovation processes and the societal embedment of technologies. *Constructive Conflict Methodology* may provide such assessments with a structured approach to learning about stakeholder perspectives on emergent technologies.

9.6 How to move forward?

First, further research is needed that gives more insight into the concept ‘optimal cognitive distance’ in relation to constructive conflict in stakeholder dialogues. A better understanding of what this concept means in terms of competing policy options or con-

flicting knowledge claims will help to optimize constructive conflict in stakeholder dialogues. Related to this, more insight into the conditions under which cognitive conflict turns into affective conflict is necessary. To this end, a study can be set up to evaluate and compare a set of methods that provoke different levels of cognitive conflict in terms of their learning effect. This may imply reconsidering the (substantiated) choice made in this study to leave out methods that are based on artificial conflict, such as Devil's Advocate. A better understanding of how constructive conflict remains constructive will enable fine-tuning of methods for stakeholder dialogues.

A second line of thinking regarding the question how to optimize constructive conflict in stakeholder dialogues refers to the biases discussed in chapter 2. These biases hamper an open exploration of information and viewpoints. The theory that formed the basis for the understanding of the role of biases in chapter 2 is largely based on experimental research. In these experimental studies, the biases are measured in a laboratory setting. An independent variable is manipulated across a number of experimental conditions, while controlling for all other variables. Obviously, such a laboratory setting is completely different from a real stakeholder dialogue. Operationalizations of biases used in experimental studies cannot one-on-one be translated to the context of stakeholder dialogues. Further work is needed on the question how to measure the biases in real dialogues. When biases can be made measurable, this provides an important contribution to the evaluation of participatory methods and stakeholder dialogues. It will give a better understanding of the mechanisms and conditions through which biases can be reduced and hence how an open dialogue can be stimulated.

A third issue for future research that can run parallel to the above two issues concerns further application, fine-tuning and evaluation of *Constructive Conflict Methodology*. This study presented a thorough, triangulated evaluation of *Constructive Conflict Methodology* in the Biomass Dialogue. It would however be good to have multiple case studies, in which *Constructive Conflict Methodology* can be applied and evaluated in order to learn about the specificities of the methodology and to improve its robustness. Given that there is no fixed methodological recipe for participatory processes, repeated application and evaluation will not result in the one silver bullet solution, but rather in a robust methodology that is flexible in its application. Evaluation should encompass several stakeholder dialogues that vary with regard to specific variables, for instance political culture, link with policymaking practice, 'newness' of the issue, extent of conflict on the issue, etcetera. In addition to the question to what extent application of *Constructive Conflict Methodology* improves the understanding of the diversity of perspectives, evaluation should include the follow-up process of the stakeholder dialogue. An empirical investigation of the question how problem structuring affects actual problem

solving, e.g. whether a dialogue resulted in new policies, stakeholder initiatives or joint programs, may give more insight into the conditions and specificities of *Constructive Conflict Methodology*. In that way, evaluation can be used to further analyze what the effect of specific elements within the methodology is and under which circumstances it works or not. Hence, the evaluative question should not be whether *Constructive Conflict Methodology* always has a particular effect, but the question should be how it works, for whom and in which circumstances (Pawson & Tilley, 1997).

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Appendix A: Q statements

1 If the complete lifecycle is taken into account in the analysis, biofuels do not reduce as much greenhouse-gas emissions as was hoped for.

2 If biofuels are being stimulated in the EU, this will definitively result in negative impacts on environment, socio-economic conditions, violation of human rights and food shortages in developing countries.

3 If there are no entrepreneurs who want to experiment with biofuel applications, nothing will happen.

4 If we want, we can drive clean and fly clean now with biofuels.

5 Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously.

6 Bio-ethanol is more promising the bio-diesel, because there are more possibilities for improving the process and the efficiency with ethanol.

7 Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.

8 Algae are the biomass source of the future.

9 Biomass should be used only for electricity production and heat supply, not for transport fuels.

10 Bio-refinery offers huge opportunities for small-scale and regional sustainable developments.

11 Criteria will not prevent that in the future there will be a number of large agro-companies, that supply biomass without taking social and environmental interests sufficiently into account.

12 Tax on fossil fuels should be increased.

13 The most important obstacle for biofuels is not the conversion, but the uncertainty in the future supply of biomass.

14 The availability of private capital is at the moment not a limiting factor for the development of a large-scale bio-based energy-supply.

15 The competition between food, feed, and fuel will have a negative financial impact on people

16 The European blending-targets, such as 5,75% in 2010 and 10% in 2020, require significant import volumes from countries outside the EU.

17 The Dutch government mainly has an eye for large companies; there is not enough attention and support for small, innovative players.

18 The Dutch government should enact tax exemption for biofuels.

19 The potential of degraded and marginal grounds is so large that it can have an economic impact in rural areas.

20 The issue of unsustainable land-use, for example in South America, Africa and South-east Asia also exist without biomass production.

21 The production of biomass is only sustainable if it contributes to the socio-economic development of the local community.

22 The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment.

23 The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.

24 The cultivation of energy crops contributes to a colorful landscape and to the bee-population.

25 The time of large-scale is over; we need flexible, decentralized energy systems.

26 Every form of subsidy on imported biomass should be stopped.

27 Cultivation of energy crops is not favorable because manure and irrigation are needed.

28 Cultivation of energy crops for the 2nd generation biofuels will cause much less problems in developing countries than for the 1st generation crops.

29 There is a need for generic policy aimed at all clean and efficient vehicles, instead of a policy that is aimed specifically at biofuels.

30 If the European fuel has to meet higher standards than the American, this results in unfair competition.

31 Too much money goes to research, and too little to implementation in the market.

32 Biomass delivers an important contribution to the security of supply, namely less dependence on geopolitically sensitive areas, and a higher degree of self-support for the EU.

33 Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.

34 The distinction between 1st and 2nd generation is not as black-and-white as is often posed.

35 There is no use to develop niche-markets; in the end we need large-scale biomass applications, and that niche won't help to reach that.

36 Stimulating biofuels has more to do with agricultural policy than with environmental policy.

37 The precarious Dutch energy policy has resulted in stagnation of the market development concerning biomass.

38 Biofuels can only succeed if the government subsidizes until the end of times.

39 Import of end- or half products is preferable to import raw biomass.

40 In the formulation of criteria for certification of biomass also stakeholders from the South should be involved.

41 In the Netherlands, biofuels are discriminated compared to fossil fuels when it concerns the calculation of CO2-emissions.

42 Small-scale energy production with biomass can have a huge impact on security of supply in developing countries.

43 The Netherlands can supply an important part of the houses with sustainable energy by means of local residuals.

44 The Netherlands is strong in knowledge development in the area of biomass technology.

45 Dutch farmers will not benefit from a growing use of biomass.

46 Political pressure, at minimum on the EU level, is needed to make sustainability criteria function.

47 Because stakeholders did not succeed in forming a successful lobby, there is insufficient support for the development of biomass technologies.

48 Because the CO2-reduction potential of 1st generation biofuels is limited, we should not invest in 1st generation, but in 2nd generation.

49 Being a small country with limited means, we are forced to make choices; therefore the government should support only the most favorable trajectories.

50 Entrepreneurs are not only competitors: cooperation is required to learn from, and support each other.

51 In the long run, biofuels will compete on the world market with fossil fuels.

52 Over the whole biomass chain, there should be a positive score as regards economic profit, energy- and CO2-balance.

53 First, try to make high-quality products from a biomass source, and make energy from what is left.

54 Public resistance is an obstacle for local biomass applications.

55 Technology development is the key to large-scale use of biomass, not an active subsidy policy.

56 2nd generation biofuels profit from stimulating the 1st generation (E85 and diesel-variant E95) now.

57 2nd generation biofuels are for the time being not ready for large-scale application.

58 Consumers and end-users are increasingly interested in biofuels.

59 We can never compete on price with biofuel that are made in developing countries.

60 We should concentrate on the use of residuals for biofuel production.

Appendix B: Q Factor loadings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Respondent						
1	0.1467	-0.1500	0.4096	0.1608	0.3613	0.3611
2	0.5391X	-0.2616	0.2272	-0.0563	0.2176	-0.0077
3	0.3518	0.1695	0.0595	0.4068	0.0578	0.4908
4	0.3278	0.2132	-0.0572	0.2227	0.4539	0.2652
5	-0.0291	0.2869	0.3332	-0.0196	0.4142	-0.0648
6	0.0999	0.1052	0.1822	0.1010	0.3409	0.4336X
7	0.4525	0.2700	0.2185	0.1702	0.3909	0.1201
8	0.1487	0.1434	0.1761	0.2628	0.4331X	-0.0068
9	0.4590	0.1828	0.4092	0.2208	0.1230	0.1158
10	-0.1299	0.6709X	-0.0275	-0.0724	-0.0710	-0.2441
11	0.3919	-0.0463	0.1476	0.3646	0.1430	0.1202
12	0.2746	0.0901	0.4310	0.1185	0.3275	0.1488
13	0.2467	0.5376X	0.0415	0.3020	0.2094	0.1137
14	0.1792	0.3672	0.3461	0.3014	0.1328	-0.0853
15	0.1467	0.0638	0.3408	0.3606	0.0869	0.2333
16	0.4841	0.0419	-0.0286	-0.0485	0.2798	0.5028
17	0.0658	0.2253	0.0076	0.6016X	-0.0693	0.0148
18	0.2715	0.6125X	0.0264	0.1658	0.3347	0.0376
19	0.2540	0.3589	-0.0769	0.3343	0.4382	0.0417
20	0.2099	0.7868X	0.2398	-0.0819	0.0286	0.0741
21	0.4881X	0.0704	0.1035	0.2350	0.2200	0.2354
22	-0.1531	0.6708X	-0.0441	-0.0280	0.3170	0.0150
23	0.2593	0.5706X	0.1285	0.0595	0.0786	0.0335
24	0.1611	-0.1928	0.5347	0.3862	0.3214	-0.0101
25	0.0394	0.6257X	-0.0230	0.2854	0.2636	-0.0222
26	0.3823	-0.0048	0.3504	0.2163	0.2268	0.4216
27	0.0352	0.1057	0.5362X	0.1004	0.1339	0.0308
28	0.4760X	0.2048	0.0761	0.0843	0.2940	0.2237
29	0.6812X	-0.1732	0.0802	0.2331	0.0347	0.2309
30	0.1032	-0.1285	0.3186	-0.0325	-0.0707	0.4598X
31	0.3311	0.0448	0.4478	0.0358	0.2834	0.1595
32	0.2975	0.1104	-0.0461	0.5120X	0.2305	0.2114
33	0.2242	0.1292	0.0164	0.1338	0.1558	0.4538X

34	0.3135	-0.1892	0.2512	0.1025	0.1877	0.5785X
35	0.0857	-0.1270	0.6028X	0.1640	0.1776	0.1153
36	0.0869	0.4592X	0.0154	0.2353	0.0522	-0.2110
37	0.0569	0.2332	0.2447	0.0570	0.4982X	0.2652
38	0.3542	0.1108	0.5091	0.0512	0.1573	0.4452
39	0.0531	0.3537	0.0042	0.2766	0.4695X	0.1221
40	0.6249X	0.0529	0.1445	0.1971	0.1711	0.0019
41	0.2931	0.1087	0.3054	-0.0401	-0.0448	0.1050
42	-0.0286	0.5056	0.3924	0.3494	0.1451	0.1371
43	0.3238	-0.0226	0.3188	0.2952	0.3247	0.2052
44	0.3020	0.0063	0.3607	0.3143	0.4526	0.0348
45	0.5666X	0.2184	0.0486	0.2316	0.0529	0.0987
46	0.1998	0.2342	0.6324X	-0.0249	0.0514	0.1211
47	0.0045	0.3917X	-0.2363	0.2747	-0.0103	0.0595
48	0.2489	0.2000	0.0930	0.1241	0.4384X	0.2475
49	-0.0189	0.6047X	-0.1947	-0.1686	-0.0885	-0.0286
50	0.2395	-0.2329	0.1551	0.4674X	0.1040	0.0039
51	0.4968	-0.2235	-0.0289	0.0918	0.1810	0.5807
52	0.0265	-0.3441	0.4684	0.1926	-0.1277	0.3684
53	0.4415	0.0930	0.1553	0.3005	0.5535	-0.0638
54	0.1571	0.0734	0.0939	0.5903X	0.2596	-0.1264
55	0.1676	0.3103	0.3785	0.3377	0.1618	0.1033
56	0.5073	0.0075	0.3149	0.4541	0.1744	-0.0203
57	0.4390	0.1066	0.3241	0.1859	0.4601	-0.0240
58	0.1996	-0.0826	0.2385	-0.0727	0.5132X	0.1612
59	0.1080	0.1217	-0.0837	0.2254	0.0528	-0.4089X
60	0.5769X	0.0432	0.2796	0.1386	0.0182	0.2379
61	0.1937	0.0860	0.1878	0.4048X	0.0588	0.1443
62	-0.0741	0.6204X	0.1865	0.1001	0.0975	-0.1328
63	0.1019	0.2474	0.2086	0.5511X	0.2076	-0.0143
64	-0.0608	0.2036	-0.0286	0.3578	0.4330X	0.0328
65	0.4408	0.0921	0.1582	0.3113	0.5300	0.0219
66	0.1244	0.0812	0.3491	0.6105X	0.4114	0.2254
67	0.1955	0.0402	0.2865	0.1168	0.5063X	0.3218
68	0.0146	0.7959X	0.0133	0.0024	-0.1169	0.1477
69	0.1219	-0.0773	0.0817	0.4516	0.2279	0.3531
70	-0.2136	0.5615X	0.0258	0.1790	0.1208	-0.1877
71	0.4757	-0.0308	0.3443	0.1728	0.2299	0.3367
72	0.1262	0.6143X	0.2400	0.0387	0.2520	0.0314
73	0.2095	0.1179	0.2692	0.0729	0.2695	-0.0657
74	0.3654	0.4077	0.0378	0.2169	0.2091	0.1950
75	0.2759	0.2245	0.0798	0.3913	0.0393	-0.2543

Factor Matrix with an X Indicating a Defining Sort

Appendix C: Synthesis workshop 2 Biomass Dialogue: Future visions

Translated from "Resultaat Workshop 2 Biomassadialoog: De rol van biomassa in de Nederlandse energievoorziening in 2025"

Introduction

The aim of workshop 2 of the Biomass Dialogue was to develop one (or more) desirable future vision(s) describing the role of biomass in the Dutch energy supply. This document reports the result of this workshop. After the workshop, participants felt that they did not succeed in developing *one* vision that was clear to everyone and that everyone agreed with. However, the participants came up with many ingredients. These ingredients were synthesized by the project team into a vision of the future. The vision consists of three parts: partial visions A, B and C. Partial vision A describes local, small-scale biomass chains in the Netherlands. Partial visions B and C describe international biomass chains. Partial vision B focuses on local, small-scale biomass applications in developing countries, whereas partial vision C focuses on middle- and large-scale global biomass chains. The partial visions imply an increasing use of biomass (from A to C). The partial visions are not exclusive, but rather can be combined. Every partial vision concerns applications for the stationary sector (electricity and heat), applications for the mobile sector (transport fuels) and applications for other sectors, such as chemicals and food. We assume however that large-scale import will dominantly be used for the Dutch demand for transport fuels. So whereas partial vision A concerns local energy supply, partial vision C concerns covering the demand from the transport sector. Partial vision B covers the local demand in developing countries, but if it is true that 'many a little make a mickle' this can also be a basis for import.

The integrated future vision (ABC) assumes an increasing use of biomass. This is perhaps not the most desirable situation for all participants; some would for instance prefer partial vision A without B and C. However, we have tried to describe a future situation that on the one hand reflects the diversity of ideas and preferences of the participants, but that can on the other hand serve as a starting point for the backcasting exercise in workshop 3. In workshop 3 participants will reason 'backwards' from the future vision to the present situation. This will result in a description of the trajectory to the future vision. The three partial visions will be respectively presented in this document, preceded by a general picture of the situation in 2025.

General situation in 2025

In 2025 the Netherlands will use considerably less energy than in 2008. This is mainly due to efficiency improvements and the development and implementation of the concept of *biorefinery* [63]. This means that first the most high-grade elements of the biomass are extracted and used (e.g. minerals and proteins) and only then the biomass is used to produce energy. The raw materials are applied in an economically high-grade fashion.

Energy is supplied by sun, wind and biomass. There is still some fossil energy, but its share is getting smaller and smaller. In 2025 there will be a diversity of types of biomass chains and actors involved. Biomass is converted into several products: electricity, heat, transport fuels, and (bulk) chemicals. As regards the scale of biomass chains, *smartsizing* is applied to optimize the scale of an application in its specific context, mainly regarding energy- and CO_2 balance. For the Dutch biomass chains, there is a closed nutrient cycle. For chains outside the Netherlands, the ambition is also to have closed nutrient cycles, but the cycles are still not completely closed. For some biomass chains, the competition between different application is still alive (e.g. competition between feed and energy), but to a lesser extent than in 2008, as we succeed better in producing more end products from the biomass. In line with changed practice, the term 'residuals' is not anymore prevalent. After all, production systems have been developed and integrated in such a way that raw materials are converted into different *end* products. The aim is to have no, (or hardly any) residuals (waste). The former distinction between 'first' and 'second' generation fuels is not anymore in use in 2025. The distinction is not clear, as former first generation fuels have already benefited from a number of innovations as well.

Nine criteria are used to evaluate the sustainability of a biomass chain: 1) Energy efficiency, 2) CO_2-balance, 3) Environmental impacts, 4) Socio-economic impacts, 5) Spatial impacts, 6) Biodiversity, 7) Transparency of the chain, 8) Innovation potential, 9) Renewability of the sources. As a result of the discussions on the land-use of biomass cultivation, there is a new indicator for the criterion 'spatial impacts', namely the amount of space per unit CO_2 reduced. The criterion 'transparency' has gained importance. After all, to judge the sustainability it is important that all elements and components of the chain are comprehensible.

The transparency of the chains is warranted through an international control system. This system was developed as a reaction to the proliferation of certification schemes for sustainable biomass in the years after the turn of the century. Each certification scheme appeared to be surrounded with limitations, lack of clarity, and susceptible to fraud, which resulted in a diminished trust of consumers in certification schemes and eventually in the abolishment of the schemes. The new control system is based on a broad consensus amongst stakeholders on the desirability of transparency. Compared to a certification scheme, the new system is focused less on performance measurement, and more on the idea of a social contract. The surplus value of the system is also that the feasibility of the system is higher than that of a global sustainability certification scheme. Full transparency means that all parties involved in the biomass chain (producers of the biomass, transporters, buy-

63 Biorefinery means that specific components can be extracted from the biomass by means of extraction technologies, so these components can then be used for other applications. This allows for efficient use of the functionality of the raw materials.

ers, producers of end- or half-products, et cetera) are co-responsible for the transparency and hence for delivering information. In practice it would for instance work as follows. Actors within a specific biomass chain can make a 'forum' on a specific website. In addition to information about profits, producers and processing companies make information available about the production process in relation to the nine criteria. The forum enables others to respond to this information, and this is amply used. The local population of the locations where biomass is produced shares their experiences via the forum. Also NGOs that investigated the displacement effects of a chain, and research institutes that investigated the environmental impacts on the soil, publish their findings on the forum. Some forums use a web cam that enables people to directly follow the production process.

Partial Vision A: Small scale applications in the Netherlands

Many small-scale decentralized biomass applications exist in the Netherlands, mainly based on (what we know in 2008 as) waste or residuals. Residuals from for instance the Dutch nature conservation and all kinds of organic waste (from households, but also dung and agricultural waste) are being used. The biomass is used at the spot, so that no (or hardly any) transport of biomass and minerals takes place. The use of residuals in the Netherlands is responsible for a CO_2-reduction of about 15%[64].

Particularly in the built environment, biomass applications based on residuals are responsible for a considerable CO_2-reduction. All organic waste in and around houses is used in biomass chains. Several chains play a role in this regard. An example is the 'Zonneterp' ("Sun mound") [65], which embodies a link between greenhouses and houses. Heat that is produced by the greenhouses is used to heat the houses. Organic waste from the houses is fermented by means of a high-pressure fermenting device. The advantage of the high-pressure fermenting device is that the pressure that is built up during fermentation is used to pump the biomass flows, so that no extra energy is required for this. The CO_2 that is produced goes to the greenhouse and serves as nutrient for the plants in the greenhouse. The produced biogas is used to produce electricity and heat (via CHP) for the houses. In some areas the biogas is reprocessed to the quality of natural gas, and is fed into the gas grid or used as fuel for cars. Lochem was the first town that realized a climate-neutral district on the basis of these applications. In this climate-neutral district, the gases from industry are used to produce algae. The algae are used with the organic waste of the area to cover the energy demand of the district. In the built environment biomass is part of a broad range of decentralized sustainable energy options, which amount in total to a CO_2-reduction of 32%. Biomass applications are responsible for one-third of this reduction, which is about 10%, which equals about 7 Mton. [66]

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64 Based on "Groenboek Energietransitie, Platform Groene Grondstoffen, (2007)" and "Hisschemöller et al. (2007). Trajecten voor verduurzaming van de Nederlandse energievoorziening, met een accent op de bijdrage van waterstof. Rapportage uit de H_2 Dialoog.Amsterdam: VU/IVM".

65 See www.zonneterp.nl

66 Based on: "Hisschemöller et al. (2007). Trajecten voor verduurzaming van de Nederlandse energievoorziening, met een accent op de bijdrage van waterstof. Rapportage uit de H_2 Dialoog.Amsterdam: VU/IVM". The percentage of 32% is based on CO_2-reduction contributions of 'Greenhouse as energy source ('Kas als energiebron'), 'Zonneterp' (zie www.zonneterp.nl), PV on roofs, PV foil on roofs, and the concept of 'Stoere Houtman' (incl. H_2 buffer) (see www.destoerehoutman.nl).

In addition, there are a number of applications based on residuals that do not take place in residential areas. This concerns chains based on dung, and agricultural and forest waste. Also at sewage treatment plants there are connections to biomass chains. Fermenting devices produce biogas that is reprocessed to the quality of natural gas. This 'green gas' is fed into the gas grid, or used as a transport fuel. There are also algae ponds near to some sewage treatment plants. Nitrogen is transported from the treatment plant to the pond to enhance the growth of algae, and the oxygen produced by the algae is transported to the treatment plant. The algae are pressed, and the oil is used to produce biodiesel. Hence this is one of the only applications in which transport fuels are being produced and which does not only use residuals (but residuals are used to produce more biomass (algae) and hence to produce more energy). One hectare of algae delivers about 15-20 tons of oil per year; in terms of energy this is a larger production than cultivation on land (e.g. rapeseed). CO_2-credits are granted for algae pond. One hectare of algae consumes about 100 tons of CO_2 [67].

Cultivation of biomass takes place only on a small scale. Particularly in the northern part of the Netherlands ligneous crops are grown on a small scale (miscanthus and willows). In the past years, the concept of biorefinery has resulted in a different understanding of the cultivation of biomass for energy. There is no cultivation of biomass solely for energy. All cultivated biomass is used to produce different products, for instance feed, chemicals and energy that are all used for high-value purposes. The sugar beet chain, which uses less energy to produce less sugar, but more ethanol from the beet (chain in workshop 2), is an example of a biorefinery process taking place in 2025. This innovative chain results in a production-profit of 10,35 PJ (petajoule) as compared to the conventional beet chain, because more bioethanol (7,9 PJ versus 1,75 PJ), more biogas (4,0 PJ versus 0 PJ), more feed (4,1 PJ versus 1,6 PJ) and more nutrients (1,4 PJ versus 1,2 PJ) are being produced than in the conventional chain (but 1,5 PJ less sugar).

There is also some small-scale rapeseed cultivation, which is used to produce Pure Plant Oil (PPO). Innovations with regard to enzymatic treatment of PPO made the formerly required adjustments to diesel engines superfluous, which makes it possible for every diesel car to drive on PPO. There are a number of gas stations that sell PPO in the Netherlands. The pressed cake that remains after PPO production is used for several purposes, in line with the concept of biorefinery.

Partial vision B: Small-scale applications in developing countries

The production of sustainable energy from biomass in the Netherlands (see partial vision A) cannot fully cover the demand for sustainable energy in the Netherlands. For this reason, there is import of biomass from other countries under specific conditions.

At relatively low costs, efficient, small-scale and decentralized biomass applications have been developed in developing countries. Economically efficient use of the biomass is the aim. Many applications are based on local residuals, such as agricultural waste, but there is also small-scale cultivation. It is not the case that more residuals are being used than in 2008 (because then there was already little left), but the residuals are used in a more efficient way. Local initiators can choose on the one hand to produce for their own energy need, which saves costs on buying and transport-

67 These figures and facts are derived from the algae chain discussed in workshop 2.

ing energy from other places. On the other hand they can choose to sell the energy (oil, gas) on the national, or even world market. After all, prices for bio-energy on the world market are good.

These developments have resulted in an intensification of the socio-economic position of the local communities, particularly because of an increase in employment, profit from energy-sale, an increased degree of self-support (decreased dependence on energy import) and CO_2-credits. CO_2-credits are acquired by means of small-scale pyrolysis of biomass (all kinds of organic waste; see 4P+ chain workshop 2). The carbon that remains after pyrolysis is put under the ground, which is a form of carbon-storage. This process qualifies for CO_2-credits[68]. In addition to the CO_2-credits, this way of storing carbon resonates the idea of *terra preta*. Terra preta is very fertile soil that was originally found in the basin of the Amazon. The soil is so fertile, because the original population, between 5050 BC and 1450, cultivated this soil by adding (amongst others) carbon. The original terra preta areas are self-regenerating with a pace of 1 centimeter per year (at a depth of 2 m.)[69]. This biomass application hence has, besides the CO_2-effect, also a positive impact on the fertility of the soil, as a result of which new agricultural activities can be developed. The small scale of the chains makes a closed nutrient cycle in general possible.

Countries that cannot provide for their own energy need, such as the Netherlands, are willing to import energy from biomass. The Netherlands imports only biomass products for the domestic energy supply if these are produced within transparent chains. For reasons of efficiency and closing nutrient cycle, no raw biomass is imported, but always half- or end-products (e.g. (pyrolysis) oil). Together with the innovative, transparent chains, new collaborations have been developed between Dutch importers/processing industries and local parties in developing countries.

Partial vision C: Global flows, import for transport

Internationally, the large-scale biomass cultivation for energy has sharply increased. However, in the Netherlands the polarized discussions on the sustainability of biomass in the years around 2008 have had a discouraging effect on large-scale producers of energy and transport fuels from biomass. Yet there is some large-scale activity. In addition, the Netherlands plays an important role as regards the import, processing and export of biomass.

Biorefinery plays an important role for the large-scale global biomass chains. Biomass is not only cultivated for energy purposes, but there are always connections to other biobased industries, such as oils for the food industry and for the chemical industry (e.g. paint, cosmetics, pharmacy)[70]. The aim is to first realize high-grade applications (e.g. pharmacy and food), then bulk products, such as fibers, and only then energy. No raw biomass is imported to the Netherlands, but only half- or end-products, such as *biocrude,* pyrolysis-oil, Neofuel (PPO minus unsaturated fats), wood pellets, bioethanol, biodiesel or PPO. Partial processing at the place of origin helps to keep the mineral-balance intact and it reduces the volume of the import flow.

68 Based on: start report workshop 2, 4P+ chain

69 www.wikipedia.org

70 Boosten, G., J. de Wilt (2007). Bioport: Nederland als mainport voor biomassa. InnovatieNetwerk, Utrecht.

The Netherlands imports only half- and end-products from transparent biomass chains for the mobile sector. The largest share is imported as end-product, e.g. biodiesel and ethanol (both on the basis of ligno-cellulose). A small part is processed in the Netherlands. In Rotterdam there is a plant where bioethanol is produced from ligno-cellulose. In the ports of Rotterdam and Terneuzen there are plants where biodiesel and bioethanol (from corn) are produced. The produced heat and CO_2 are transported to greenhouses in the area. There are also some biomass gasification plants in the Netherlands. These are being used flexibly: they can produce car gas, gas for the grid, or electricity. Domestic cultivation for transport fuels also takes place. In the vicinity of Delfzijl there is for instance algae production, where the gases (CO_2) from several industrial processes are being used to stimulate the growth of the algae.

Biomass for transport fuels is mainly imported from Europe and Ukraine. The large-scale biomass cultivation in those areas concerns for instance rapeseed, corn and beets for the production of biodiesel, PPO and bioethanol. There is a sharp increase in the amount of chains that are based on ligneous crops, which can grow on marginal land and require less nutrients and water. The innovative technologies for processing ligneous crops resulted in a higher energy-output per hectare.[71] The rising prices of CO_2-credits render these technologies with high CO_2-reduction potentials attractive. They do however require large-scale implementation, and hence a guaranteed supply of biomass.

The Netherlands imports and processes biofuels to supply the domestic demand for transport fuels. In addition to that, the Netherlands has remained important as a transit port. The Dutch qualities regarding agriculture and greenery, chemistry and logistics are increasingly combined in purchase, processing, trade and transit of biomass products.[72] The aim is explicitly to tune and optimize agricultural, chemical and energy chains.

Decentralized and small-scale initiatives from partial visions A and B can be linked to partial vision C. The sugar beet chain for example (workshop 2, partial vision A) has a link with the ethanol producers in Rotterdam. Import of for example pyrolysis-oil (partial vision B) is also one of the possibilities. This oil is the product of a chain that is decentralized and small-scale in the first steps, but further on in the chain not anymore.

71 Londo, H. M., Lensink, S. M., Wakker, A., Fischer, G., Prieler, S., Van Velthuizen, H. et al. (2008). Eyes on the track, Mind on the horizon, From inconvenient rapeseed to clean wood: A European roadmap for biofuels. Refuel.

72 Boosten, G., J. de Wilt (2007). Bioport: Nederland als mainport voor biomassa. Utrecht: InnovatieNetwerk, Grensverleggend in Agro en Groen

Appendix D: Synthesis workshop 3 Biomass Dialogue: Pathways

Translated from: "Verslag workshop 3 Biomassadialoog"

Pathway for the full vision

Certification and Transparency control system

As a consequence of the increasingly critical questions about the sustainability of biomass, from 2009 onwards several certification systems and transparency control systems are developed. The United Nations (UN) launched a certification protocol in 2009 with minimal environmental criteria for biomass routes. Many countries signed the protocol, which made them a new market for UN-certified biomass. The trade in emission rights is part of this market.

In 2012, the European Union signs the UN protocol as one party. In the three years in between opening and signing the protocol, the EU developed a far-reaching certification package. This package is implemented simultaneously with the signing of the protocol. The package consists of two pillars. On the one hand, stricter criteria are used than in the UN protocol, based on the Cramer criteria that involve not only environmental impacts, but also social, political and economic effects. On the other hand, the newly developed transparency control system should ensure a good control of the sustainability of biomass. In order to qualify for a certificate, parties within the chain should deliver information themselves that proves that the biomass lives up to the criteria. This occurs according to a fixed format and the information is published on the internet. In addition, in countries where large biomass flows are produced there are around 2010-2012 already strong societal networks with sufficient knowledge and resources to highlight and advocate the positive and negative aspects of biomass chains. These networks also provide knowledge and information for the transparency control system.

Because biomass chains often involve countries outside Europe, this control system also stimulates a sustainable development in other parts of the world. More and more countries join the European system, and around 2025 there are hardly any countries that are not part of it yet.

Not everyone agrees with the importance of transparency. A negative effect of the system is that there is a shift of problems to the countries that are not involved. Around 2020, it appears that companies that want to back out of the transparency system became active in these countries.

Socially responsible production and consumption

Besides the certification systems initiated by the EU and the UN, a number of sustainability certificates have been developed on a voluntary basis by the market. These came into development from 2010 onwards, because of an increased demand and supply of sustainable biomass. Companies make more and more use of the principle of socially responsible production and sustainable entrepreneurship. Moreover, the Dutch government increasingly steers towards internalizing sustainability for individual action. A tax revision in 2010 made sustainable products cheaper than unsustainable products for instance. Also the government is setting an example by purchasing sustainable products and services. Comparable measures in other countries, together with a generally increasing sustainability-awareness, have caused an increase in the worldwide demand for sustainable biomass.

Formation of networks and knowledge exchange

For a better global adjustment of supply and demand for (sustainable) biomass for energy, food, feed and chemistry, from 2008 onwards structures for stakeholder meetings are set up. The transparency system of the EU plays a facilitating role. Activities for developing an international knowledge system about positive and negative aspects are strengthened. A global network of diverse stakeholder (also NGOs) is taking shape in the years after 2008, partly on the basis of existing networks. Knowledge exchange between multinationals, pioneers, entrepreneurs, societal organizations, knowledge institutes and governments is increasing and is focused on identifying sustainability-opportunities.

Expectations and the public debate

High expectations can stimulate innovations, but non-realized expectations can result in disappointments and a halted development of biomass. Before 2008 there was a tendency to flee in future technological promises when the current applications appeared to have negative aspects. In the years thereafter, the unrealistic expectations of (sustainable) energy applications have been tempered.

The strongly polarized discussions in 2008 paved the way for the understanding that no one energy option is perfect, and that learning processes are required to achieve applications that are as sustainable as possible. Entrepreneurs and involved parties in the North and the South have forced the right on *learning-by-doing*: if something is not going as was hoped it would, this is not a reason to reject a biomass application, but rather a reason to search for improvement. Hence, there is more attention to the innovation potential of chains, in which chains with a high innovation potential are preferred.

There are also large improvements as regards the communication about the pros and cons of specific options to society and stakeholders. This is a positive effect from inter alia the transparency system that offers the opportunity for open communication from the media, science, trade and industry and the government.

Pathway A: Small-scale applications in the Netherlands

Market development small-scale biomass applications

The situation of 2008, in which central and large-scale initiatives dominated in the Netherlands, has in the years thereafter made room for several niches and small-scale activities. After 2010 it is getting more clear that large-scale initiatives do not necessarily have the best (competing) position. The increasing prices of raw materials and energy stimulate small-scale chains. Local efficiency advantages have become more important, such as lower transport costs, the limited necessity to build infrastructure to bring the products to producers and customers, the possibility of using heat and closing the nutrient cycle. Moreover, local and small-scale initiatives require only limited financial investments, as a result of which newcomers can get on easily and projects are profitable relatively quickly.

Cooperation as innovation

The biggest challenge for vision A is not so much the technique, but the organization, network formation and building mutual trust. Several technological innovations are not sufficiently available for entrepreneurs around 2010. This is the result of laborious knowledge exchange, as it takes a long time before entrepreneurs understand what is possible with new technologies but also what the possibilities are for getting financial support. To the extent that entrepreneurs and knowledge institutes cooperate, there is often a missing link with policy makers and governments, who, consequently, do not sufficiently support the activities. Especially after 2013 cooperation between entrepreneurs, knowledge institutes and governments is much better. One has started to realize that cooperation cannot be decoupled from the success of innovations. Entrepreneurs, regional and local governments, environmental organizations and knowledge institutes cooperate better as a result of which innovations can get quicker off the ground.

Cascading and adjustment

The cascading principle –use local residuals and raw materials as efficiently as possible and thereby create positive environmental effects as well as profit, is applied more and more. To the extent that there is cultivation, it has taken a while before farmers got used to woody crops such as willow and miscanthus, which require another treatment, but result in less negative environmental effects that conventional crops.

Residuals are used more and more to increase biomass production, such as the exchange of oxygen and nitrogen between the wastewater treatment and algae ponds. Local use of residual heat has also become standard practice.

Not only knowledge exchange, but also cooperation on a more practical level remains a challenge for long. Initially the biomass suppliers (governments, farmers, nature conservation, water boards) did not supply sufficient biomass flows, as a result of which entrepreneurs were uncertain with regard to the regular supply of biomass. It took years before the involved actors developed a working method for this. An important problem remains related to questions such as: what to do when the biomass supply is cut off? Who is responsible if, as a consequence, a plant stops working? Although for some flows the supply is guaranteed (such as the sewer), other flows have decreased in volume, as production and consumption are more and more efficient.

Successful biomass chains

Several learning processes lead to sustainable, practically applicable, spatially applicable and financially feasible projects. After 2015 a number of these processes can be up-scaled (several projects/locations/flows). Many regions are self-sufficient already around 2025 as regards the energy supply on the level of households. Considering that local biomass projects supply against lower costs, these projects compete with conventional options (which have become more expensive). The confrontation with small-scale biomass chains in the neighborhood raises the awareness for consumers. This does not result in radical behavioral changes, but it increases the local public acceptance of energy projects.

Government policy

In the governmental policy after 2008, security of investments on the long term plays a central role. The policy supports several technological innovations in such a way that they can go through learning curves. Furthermore, the use of residual heat is compulsory in 2012 (this cannot be dumped anymore) and the government invests in heat infrastructure and biogas infrastructure.

The impact of energy crops on the landscape has become an important issue for entrepreneurs and local governments. Around 2012 they started interactive planning trajectories to involve several stakeholders, such as nature and landscape conservation organizations, in spatial planning.

Pathway B: Small-scale applications in developing countries

Development of decentralized, small-scale initiatives

In the years after 2008, local communities in developing countries, farmers and entrepreneurs seize the opportunity to supply new incomes on the basis of small-scale biomass projects. This is more difficult (and less fortunate) in areas where large companies and landowners are active in the economy for raw materials than in areas where this is not the case. However, in many instances

the competitive position of small entrepreneurs has improved, which is partly due to the European transparency system. These small-scale decentralized chains qualify more easily for a EU-certificate, because these chains are more transparent and better to control that large-scale global chains. Between 2008 and 2015 many new global biomass chains with a EU-certificate are set up that connect small-scale activities in the North and the South.

Global networks and improving the position of local communities

In the years 2008-2015 new networks are formed between entrepreneurs from the North and from the South. The southern partners will not always be happy to hear the ideas of their Dutch/ European colleagues, who sometimes do not take sufficient notice of the specific (political, cultural) context and the available knowledge. However, mostly the cooperation works well after a while, also because it is clear that is in both parties' interest (economic and as regards the environment) to cooperate.

Global relationships with entrepreneurs and knowledge institutes in the North are strengthened. Joint consultation results in formulating joint interests, "rules of the game" for long-term cooperation as regards knowledge exchange, investments and infrastructure. Because of these networks, small entrepreneurs can compete better with the power of multinationals and global markets. These developments contribute to strengthening the existing networks for local production, in connection to, and building on existing networks.

Bundling and marketing of biomass increasingly takes place through cooperative contexts. Cooperations are also used for shared use of mobile harvest- and production installations. Moreover, several private labeling initiatives are developed. This increases the position of small entrepreneurs in Southern countries, although as in pathway A also the continuity of biomass supply remains a point of attention.

To prevent land expropriation and exploitation, systems are set up for land property structures. This helps to beat elimination of small farmers. It is however clear that there need to be collective efforts from local communities in the South as well as Northern partners to secure projects from vision B.

To make possible the relatively high start-up investments, several initiatives have been set-up to support local entrepreneurs for funding. Because of the increased prices of raw materials and energy, they can recover the investments in a short period. Trade of CO_2 credits has stimulated small-scale CO_2 efficient biomass conversion. Because the CO_2 saving and efficiency through cascading and use of residuals has often appeared larger than for large-scale production, the small-scale chains have gained advantage.

Not all problems solved

The socio-economic position of local communities has improved. The other side of the coin is that the increasing prosperity in developing countries also results in increasing energy use and related new problems (environment, scarcity, prices). It appeared also that some national governments did

not like local emancipation and empowerment that resulted from biomass projects. This resulted in conflicts. But this was absolutely not everywhere the case.

The negative impacts of biomass that are observed in developing countries in 2008 have not completely disappeared, but they decreased. There are some shifts of unsustainable practices to areas where control is lacking and in those countries the situation for local communities has worsened. Moreover, the strong competition of global large-scale chains remains there, regardless of small-scale successes. The economic motor for other products than half- or end products for energy (*cash crops* or export of raw biomass) is strong and it is difficult to resist this on the local level.

Pathway C: Global flows, import for transport

Increased market for biomass

The volume of the world trade of biomass has increased. The same goes for the demand for biofuels and bioenergy. The market for biofuels is no longer financially supported by government policy in 2025. The government has a facilitating role as regards stimulating the exchange, learning processes and maintaining the control system.

Also efficiency improvements in large-scale applications

Large players on the energy market have not been standing still since 2008. They too were looking for opportunities to increase the efficiency of large-scale applications, not least in order to remain competitive in a market where small-scale applications gain importance. In Eastern Europe for instance, multinationals support after 2008 the large-scale cultivation of bioenergy crops. Technological breakthroughs regarding biorefinery lead to a more and more efficient large-scale production of biomass in the years from 2010-2020. Several biomass chains, that concern food, feed, chemistry and energy, are getting better integrated, also because of the improved cooperation amongst industries and between industries and knowledge institutes. Where possible, production of biomass takes place in the country of origin in order to save transport costs. Large-scale chains are increasingly open to cooperation with small farmers.

Sustainability under public attention

Reporting on unsustainable biomass results in increased public attention to sustainable biomass. Due to the transparency control system, it became common to address companies with regard to transparency and sustainability of product flows. Also because of this, international consultation and adjustment structures have been developed for large-scale biomass chains with stakeholders in producing and consuming countries. Knowledge exchange has resulted among other thins in improved conservation of natural resources.

Although land-use has become more efficient, conflicts regarding space and land-use increase in the years between 2008 and 2025. The increasing demand for biomass from different quarters has

boosted the price of biomass. As from 2015 several innovative techniques are put on the market that are linked to these problems, such as Aqua-Agri CSP: via mirror collectors solar energy is produced, while at the same time sweet water can be produced from salt (sea) water which can be used for irrigation of agricultural land. This kind of installations has been installed at different coastlines in dry areas.

Appendix E: Defining & distinguishing statements repeated Q analysis

This appendix lists the statements that received the highest positive (agree score +5 and +4) and highest negative scores (disagree score -5 and -4) for each perspective in the repeated Q analysis (see chapter 8). The most distinguishing statements are printed in italics. Statements that appeared under the highest positive or negative scores in the first Q analysis (chapter 6), but not in the second (chapter 8), are indicated by 'Q1'.

Factor 1

+5

34. The distinction between 1st and 2nd generation is not as black-and-white as is often posed.
53. First, try to make high-quality products from a biomass source, and make energy from what is left.
Q1: 60. We should concentrate on the use of residuals for biofuel production. (Q2: rank 3)

+4

10. Biorefinery offers huge opportunities for small-scale and regional sustainable developments.
20. The issue of unsustainable land-use, for example in South America, Africa and South-east Asia also exist without biomass production.
46. Political pressure, at minimum on the EU level, is needed to make sustainability criteria function.
Q1: 53. First, try to make high-quality products from a biomass source, and make energy from what is left. (Q2: rank 5)
Q1: 44. The Netherlands are strong in knowledge development in the area of biomass technology. (Q2: rank 3)

Other distinguishing statements (in agreement):
44. The Netherlands are strong in knowledge development in the area of biomass technology.
56. 2nd generation biofuels benefit from stimulating the 1st generation (E85 and diesel variant E95) now.
55. Technology development is the key to large-scale use of biomass, not an active subsidy policy.
21. The production of biomass is only sustainable if it contributes to the socio-economic development of the local community.

-5

2. If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.
7. Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.

-4

22. The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment.
23. The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
27. Cultivation of energy crops is not favourable because manure and irrigation are needed.

Other distinguishing statements (in disagreement):

31. In the Netherlands, too much money goes to research, and too little to implementation in the market.
18. The Dutch government should enact a tax exemption for biofuels.

Factor 2

+5

2. If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.
40. In the formulation of criteria for certification of biomass also stakeholders from the South should be involved.

+4

1. If the complete lifecycle is taken into account in the analysis, biofuels do not reduce as much greenhouse gas emissions as was hoped for.
21. The production of biomass is only sustainable if it contributes to the socio-economic development of the local community.
29. There is a need for generic policy aimed at all clean and efficient vehicles, instead of a policy that is aimed specifically at biofuels.

Other distinguishing statements (in agreement):

7. Biomass is a temporary solution; in the end, solar and wind should be the main energy sources.
52. Over the whole biomass chain, there should be a positive score as regards economic benefit, energy- and CO2-balance.
11. Criteria will not prevent that in the future there will be a number of large agro-companies, that supply biomass without taking social and environmental interests sufficiently into account.
25. The time of large-scale is over; we need flexible, decentral energy systems.
26. Every form of subsidy on imported biomass should be stopped.
27. Cultivation of energy crops is not favourable because manure and irrigation are needed.
22. The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment.

9. Biomass should be used only for electricity production and heat supply, not for transport fuels.

Other distinguishing statements (neutral (0)):
48. Because the CO2-reduction potential of 1st generation biofuels is limited, we should not invest in 1st generation, but in 2nd generation.

-5
4. If we want, we can drive clean and fly clean now with biofuels.
18. The Dutch government should enact a tax exemption for biofuels.
Q1: 5. Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously. (Q2: rank -4)

-4
5. Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously.
19. The potential of degraded and marginal grounds is so large that it can have an economic impact in rural areas.
35. There is no use to develop niche markets; in the end we need large-scale biomass applications, and niches won't help to reach that.
Q1: 18. The Dutch government should enact a tax exemption for biofuels. (Q2: rank -50
Q1: 24. The cultivation of energy crops contributes to a colorful landscape and to the bee-population. (Q2: rank-3)

Other distinguishing statements (in disagreement):
33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
37. The precarious Dutch energy policy has resulted in stagnation of the market development concerning biomass.
31. In the Netherlands, too much money goes to research, and too little to implementation in the market.
51. In the long run, biofuels will compete on the world market with fossil fuels.
32. Biomass delivers an important contribution to the security of supply, namely less dependence on geopolitically sensitive areas, and a higher degree of self-support for the EU.
24. The cultivation of energy crops contributes to a colorful landscape and to the bee-population.

Factor 3

+5
17. The Dutch government mainly has an eye for large companies; there is not enough attention and support for small, innovative players.
18. The Dutch government should enact a tax exemption for biofuels.
Q1: 31. In the Netherlands, too much money goes to research, and too little to implementation in the market. (Q2: rank 4)

+4

25. The time of large-scale is over; we need flexible, decentral energy systems.
31. In the Netherlands, too much money goes to research, and too little to implementation in the market.
37. The precarious Dutch energy policy has resulted in stagnation of the market development concerning biomass.
Q1: 18. The Dutch government should enact a tax exemption for biofuels. (Q2: rank 5)
Q1: 42. Small-scale energy production with biomass can have a huge impact on security of supply in developing countries. (Q2: rank 3)
Q1: 60. We should concentrate on the use of residuals for biofuel production. (Q2: rank 1)

Other distinguishing statements (in agreement):
42. Small-scale energyproduction with biomass can give a huge impuls to security of supply in developing countries.
5. Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously.
24. The cultivation of energy crops contributes to a colorful landscape and to the bee-population.
4. If we want, we can drive clean and fly clean now with biofuels.

Other distinguishing statements (neutral (0)):
41. In the Netherlands, biofuels are discriminated compared to fossil fuels when it concerns the calculation of CO2-emissions.

-5

23. The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
35. There is no use to develop niche markets; in the end we need large-scale biomass applications, and niches won't help to reach that.
Q1: 33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport. (Q2: rank –4)

-4

27. Cultivation of energy crops is not favourable because manure and irrigation are needed.
33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
49. Because, as a small country with limited means, we are forced to make choices, the government should support only the most favourable trajectories.
Q1: 23. The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell. (Q2: rank –5)
Q1: 55. Technology development is the key to large-scale use of biomass, not an active subsidy policy. (Q2: rank -3)

Other distinguishing statements (in disagreement):
34. The distinction between 1st and 2nd generation is not as black-and-white as is often posed.
55. Technology development is the key to large scale use of biomass, not an active subsidy policy.

1. If the complete lifecycle is taken into account in the analysis, biofuels do not reduce as much greenhouse gas emissions as was hoped for.

Factor 4

+5

32. Biomass delivers an important contribution to the security of supply, namely less dependence on geopolitically sensitive areas, and a higher degree of self-support for the EU.
52. Over the whole biomass chain, there should be a positive score as regards economic benefit, energy- and CO2-balance.

+4

15. The competition between food, feed, and fuel will have a negative financial impact on people
21. The production of biomass is only sustainable if it contributes to the socio-economic development of the local community.
46. Political pressure, at minimum on the EU level, is needed to make sustainability criteria function.
Q1: 51. In the long run, biofuels will compete on the world market with fossil fuels. (Q2: rank 1)

Other distinguishing statements (in agreement):

28. Cultivation of energy crops for the 2nd generation biofuels will cause much less problems in developing countries than for the 1st generation crops.
35. There is no use to develop niche markets; in the end we need large-scale biomass applications, and niches won't help to reach that.

-5

18. The Dutch government should enact a tax exemption for biofuels.
38. Biofuels can only succeed if the government subsidizes until the end of times.
Q1: 33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport. (Q2: rank –4)

-4

26. Every form of subsidy on imported biomass should be stopped.
33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
45. Dutch farmers will not benefit from a growing use of biomass.
Q1: 5. Within the Netherlands and the EU, the production of rapeseed oil should be taken seriously. (Q2: rank –2)
Q1: 18. The Dutch government should enact a tax exemption for biofuels. (Q2: rank –5)

Factor 5

+5

52. Over the whole biomass chain, there should be a positive score as regards economic benefit, energy- and CO2-balance.
53. First, try to make high-quality products from a biomass source, and make energy from what is left.
Q1: 7. Biomass is a temporary solution; in the end, solar and wind should be the main energy sources. (Q2: rank 2)

+4

15. The competition between food, feed, and fuel will have a negative financial impact on people.
16. The European blending-targets, such as 5,75% in 2010 and 10% in 2020, require significant import volumes from countries outside the EU.
60. We should concentrate on the use of residuals for biofuel production.
Q1: 37. The precarious Dutch energy policy has resulted in stagnation of the market development concerning biomass. (Q2: rank 1)
Q1: 51. In the long run, biofuels will compete on the world market with fossil fuels. (Q2: rank 3)

Other distinguishing statements (in agreement):

44. The Netherlands are strong in knowledge development in the area of biomass technology.
30. If the European fuel has to meet higher standards than the American, this results in unfair competition.

Other distinguishing statements (neutral (0)):

25. The time of large-scale is over; we need flexible, decentral energy systems.

-5

22. The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment.
45. Dutch farmers will not benefit from a growing use of biomass.
Q1: 9. Biomass should be used only for electricity production and heat supply, not for transport fuels. (Q2: rank –3)
Q1: 54. Public resistance is an obstacle for local biomass applications. (Q2: rank –4)

-4

4. If we want, we can drive clean and fly clean now with biofuels.
38. Biofuels can only succeed if the government subsidizes until the end of times.
54. Public resistance is an obstacle for local biomass applications
Q1: 23. The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell. (Q2: rank-2)
Q1: 33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport. (Q2: rank-3)
Q1: 45. Dutch farmers will not benefit from a growing use of biomass. (Q2: rank –5)

Other distinguishing statements (in disagreement):
36. Stimulating biofuels has more to do with agricultural policy than with environmental policy.

Factor 6

+5
3. If there are no entrepreneurs who want to experiment with biofuel applications, nothing will happen.
57. 2nd generation biofuels are for the time being not ready for large-scale application.

+4
34. The distinction between 1st and 2nd generation is not as black-and-white as is often posed.
55. Technology development is the key to large scale use of biomass, not an active subsidy policy.
56. 2nd generation biofuels benefit from stimulating the 1st generation (E85 and diesel variant E95) now.
Q1: 41. In the Netherlands, biofuels are discriminated compared to fossil fuels when it concerns the calculation of CO2-emissions. (Q2: rank 3)
Q1: 51. In the long run, biofuels will compete on the world market with fossil fuels. (Q2: rank 1)

Other distinguishing statements (in agreement):
41. In the Netherlands, biofuels are discriminated compared to fossil fuels when it concerns the calculation of CO2-emissions.

-5
23. The cultivation of energy crops in the Netherlands will make the landscape monotonous, attract harmful insects and spread a dirty smell.
48. Because the CO2-reduction potential of 1st generation biofuels is limited, we should not invest in 1st generation, but in 2nd generation.
Q1: 22. The production of biomass should be restricted to within the EU to be able to control sustainable preconditions with regard to society, economy and the environment. (Q2: rank –2)

-4
2. If biofuels are being stimulated in the EU, this will definitively have negative impacts on environment, socio-economic impacts, human rights and food shortages in developing countries.
33. Given the pace of the development towards more efficient cars, maybe we don't need biofuels for transport.
38. Biofuels can only succeed if the government subsidizes until the end of times.
Q1: 35. There is no use to develop niche markets; in the end we need large-scale biomass applications, and niches won't help to reach that. (Q2: rank –2)
Q1: 9. Biomass should be used only for electricity production and heat supply, not for transport fuels. (Q2: rank –3)

Other distinguishing statements (in disagreement):
46. Political pressure, at minimum on the EU level, is needed to make sustainability criteria function.

52. Over the whole biomass chain, there should be a positive score as regards economic benefit, energy- and CO2-balance.
42. Small-scale energy production with biomass can have a huge impact on security of supply in developing countries.

Summary

Participation of stakeholders, or to be more precise, interaction between different stakeholders to exchange knowledge, ideas and opinions has frequently been proposed as a way to deal with unstructured societal problems. This study is about methods to facilitate such stakeholder dialogues on unstructured problems.

Examples of unstructured issues are how to deal with climate change, biodiversity, water management and energy supply. The unstructured problem that is central in some of the empirical parts of this study is energy from biomass. For some stakeholders, the goal of policy for energy from biomass should be security of energy supply, whereas for others it should be CO_2 reduction or positive impacts for developing countries. These different problem perceptions imply different strategies and solutions, which may very well conflict. Unstructured policy problems are characterized by uncertainty with regard to the knowledge that is needed to solve the problem, as well as with regard to the values that are at stake. This means that actors have different perceptions of what the goal of policy should be, as well as what the relevant means are for attaining that goal (e.g. which policy measures). It is therefore in such cases unclear who the relevant experts are, as well as what their positions are.

Unstructured problems require policy as learning. In order to get a better understanding of the problem and its potential solutions a problem structuring process is needed, i.e. an open exploration and examination of divergent knowledge claims and viewpoints. Such an approach requires a high degree of stakeholder participation. Participation for unstructured problems takes a different form than for problems that are more structured. In a negotiation process for example, it is clear who the stakeholders are and what their positions and preferences are. Participation takes place to negotiate a solution that is acceptable to the involved parties. In case of an unstructured problem however, it is not clear who owns relevant expertise, and hence, who is a stakeholder and why. As a consequence, preference negotiation cannot take place.

Stakeholder dialogue is a transdisciplinary research method that can contribute to a political learning process. 'Transdisciplinary' means that this method not only integrates

different scientific disciplines -as an interdisciplinary method does- but also knowledge, values and interests of stakeholders outside the scientific domain. A stakeholder dialogue is defined as an organized meeting of stakeholders with different perspectives, knowledge and backgrounds, who would otherwise not meet (or not all together), structured to a greater or lesser extent by means of specific methods, tools or techniques. A stakeholder is someone involved in, affected by, knowledgeable of, or having relevant expertise or experience on the issue at stake. This definition encompasses different types of actors, such as scientists, citizens, actors from large companies, small entrepreneurs, policy makers, NGOs et cetera. The affiliation of a stakeholder is however not of primary importance for stakeholder selection; it is the perspective of a stakeholder that makes him or her relevant.

The aim of a stakeholder dialogue is to enhance learning through problem structuring. Learning in stakeholder dialogues thus means that participants gain an improved understanding of the diversity of perspectives on the problem and its potential solutions. A perspective is defined as the integrated whole of beliefs, values and presumptions that a person, or group of persons, uses to make sense of a particular problem. A perspective shapes people's perceptions and determines how someone perceives a particular problem and its solution.

Learning in stakeholder dialogue requires an atmosphere of constructive conflict. Participants are not required to reach consensus or agreement. Constructive conflict means that participants confront claims with other claims, unravel argumentations, and make (implicit) assumptions explicit in order to jointly develop new ideas that are more robust. Conflict is not in any form beneficial for stakeholder dialogues. Three issues appear to be important in order for conflict to be constructive. Firstly, conflict is more constructive when it is authentic rather than artificial, such as in role-playing techniques or devil's advocate approaches. Secondly, conflict needs to be issue-related (or cognitive) rather than personal (or affective). Personal conflict can have a detrimental effect on learning in stakeholder dialogues. Thirdly, conflict needs to be manageable. People should not feel overwhelmed by it. This may imply that differences in opinion or perspective can be too big, or that very divergent opinions need to be bridged by intermediaries.

An open exploration of divergent ideas is not something that happens 'automatically' when people are put together. There are all kinds of mechanisms that hamper learning in stakeholder dialogues. These hampering mechanisms exist because of an intrinsic characteristic of stakeholder dialogues: the interaction between people with different perspectives, interests, background, expertise and status. So, ironically, the very reason why stakeholder dialogues are thought to be valuable is also a reason why an open dia-

logue is difficult to achieve. Four hampering mechanisms, or biases, are discussed in this study. Firstly the 'bias of attitude'. People tend to take up information that underlines their initial ideas and that is in line with their own perspective and opinion, rather than information that conflicts their initial ideas. Secondly, the 'bias of phrasing' refers to those instances in which particular input has a higher (or lower) probability of playing a role in the dialogue because of the way it is phrased. The use of jargon may for instance lead to situations in which some people fully understand what is meant and others not. Thirdly, the bias of source refers to the influence that characteristics of the person who brings in specific information in the dialogue may have on the probability that this information enters or plays a role in the dialogue. The bias of source for instance plays a role when certain input is more likely to be discussed in the dialogue because the stakeholder is very powerful, or less likely to be discussed because the respective stakeholder has a marginal position. Fourthly, groups tend to discuss information they share rather than information that is unique, i.e. owned by only one or a few persons in the group. This has been referred to as the bias of shared information. These four biases each disturb in a different way the open exploration of divergent perspectives and claims and can as such hamper problem structuring in stakeholder dialogues.

In order to facilitate problem structuring in stakeholder dialogues, methods are needed to stimulate an open exploration of divergent perspectives. A participatory methodology for problem structuring should firstly incorporate methods to select stakeholders who reflect the diversity of perspectives on the issue under consideration. Secondly, these perspectives should all have an equal opportunity to play a role in the dialogue. As the hampering mechanisms may prevent specific perspectives from being articulated, a participatory methodology should thus incorporate methods that can help to put a broad range of relevant points of view, knowledge and values on the table and that can make sure that these are being clarified for, and evaluated by participants in the dialogue.

Although many participatory methodologies exist, none of these include techniques or procedures to in order to live up to these two requirements. This study therefore aims to develop an overarching participatory methodology for problem structuring in stakeholder dialogues: *Constructive Conflict Methodology*. Firstly, *Constructive Conflict Methodology* incorporates specific methods that can be used to identify and select stakeholders who reflect a diversity of perspectives on the issue under consideration. Secondly, it incorporates methods to facilitate problem structuring through 1) the articulation of diversity in terms of divergent perspectives and, 2) confrontation of claims that result from these divergent perspectives. Thirdly, *Constructive Conflict Methodology* should be assessable, so that its application can be evaluated. The evaluation of *Constructive Conflict Methodology* concerns the question whether *Constructive Conflict Methodol-*

ogy enhances learning in stakeholder dialogue, i.e. whether it supports participants' understanding of the diversity of perspectives on the issue.

Constructive Conflict Methodology comprises four steps: 1) stakeholder identification & selection, 2) articulation of the diversity of perspectives, 3) confrontation of presumptions and knowledge claims of stakeholders with divergent perspectives, 4) synthesis. *Constructive Conflict Methodology* relies on the use of specific social science methods to support each of the steps within the methodology. Methods discussed in this study are for example Repertory Grid Technique, Q methodology, Policy Delphi, Cognitive mapping, Dialectical methodology and Toulmin model of argument.

In the first and second step of *Constructive Conflict Methodology*, the aim is to identify the diversity of perspectives in a bottom-up fashion. This means that diversity is not assumed through some kind of classification (such as actor type, demographic variables, or predefined value orientations), but rather the outcome of an empirical analysis. There is no fundamental reason to assume that representation of different actor types results in representation of diverse perspectives. In fact, this study shows that this assumption is incorrect. In order to stimulate constructive conflict, three properties of diversity should be addressed through stakeholder selection. Firstly, a variety of perspectives should be included in the dialogue. This induces more divergent thinking, consideration of multiple perspectives, and consideration of higher proportions of unshared information. Secondly, constructive conflict is stimulated by including disparate perspectives in a dialogue. The more different an idea is, the larger is its potential learning effect. As such, the inclusion of marginal perspectives is critical for learning. Thirdly, the various perspectives should be balanced, in order to increase the probability that unique information is discussed and to reduce groupthink. This means that each perspective should be represented by an equal number of participants in the dialogue, regardless how dominant or marginal the perspective is.

As regards the second step, methods should be able to uncover the implicit or taken-for-granted elements of perspectives. People are for instance often not well aware of the assumptions that lie at the basis of other people's, but also their own, ideas or claims. Articulation of perspectives means that these assumptions are made explicit and clarified in order to stimulate learning. The third step in *Constructive Conflict Methodology*, confrontation of knowledge claims and presumptions, aims to enhance constructive conflict by confrontation on a specific level. This means that the discussion revolves around specific technological or policy options and that confrontation takes place on the level of knowledge claims rather than perspectives.

The first empirical part in this study concerns the H_2 Dialogue. The H_2 Dialogue was set up in order to explore the possibilities of a hydrogen economy for the Netherlands (in an international context), and to explore what kind of strategies and interventions can be developed to stimulate the transition towards a hydrogen economy in the Netherlands. The H_2 Dialogue ran from 2004-2008. The dialogue consisted of an extensive preparation phase and a series of six workshops. This study reports on how Repertory Grid Technique was used in the H_2 Dialogue for step 2 of *Constructive Conflict Methodology*: articulation of perspectives. Repertory grid technique originates from construct psychology and has mainly been used in clinical settings to increase the psychologist's understanding of how an individual (a patient) views the world. The basic idea of the method is that the minds of people are composed of 'construct systems', which reflect their constant efforts to make sense of the world. The repertory grid procedure is best characterized as a structured interview in which the respondent is confronted with a triad of elements from a larger set of elements and is then asked to specify some important way in which two of the elements are similar and different from the third. This characteristic that describes similarity and difference is referred to as a construct. In the case of the H_2 Dialogue, the elements are ten different hydrogen visions that were derived from the interviews in the preparation phase, and the constructs are the qualities that stakeholders use to distinguish between the hydrogen visions, for instance 'sustainable' versus 'not sustainable'. The bipolar construct is then presented on a scale (e.g. a five-point scale, with one pole of the construct at score 1 and the other pole at score 5). The respondent is asked to rate the elements, in this case the hydrogen visions, on this scale and to indicate which pole of the construct he or she prefers. After this, the interviewer moves on to a next triad of elements. Typically, these steps are repeated until the respondent mentions no new constructs anymore. Repertory grid technique was used in the kick-off workshop to articulate diversity of perspectives, by 1) identifying the *variety* of concepts that stakeholders use in order to frame future hydrogen visions, and 2) by identifying three *disparate* (most different) future hydrogen visions out of the ten visions that were derived from the interviews in the preparation phase. These three visions were used to form subgroups within the dialogue that each worked out one of the three visions in the course of the dialogue. The dialogue also involved a confrontation between these three groups.

The major part of the empirical work in this study is based on the Biomass Dialogue, a stakeholder dialogue on energy options from biomass in the Netherlands. The Biomass Dialogue took place in 2007-2008, and consisted of three workshops in which about 30 stakeholders participated. *Constructive Conflict Methodology* was used for the overall design of the dialogue. Q methodology was used to identify the diversity of perspectives on energy from biomass in the Netherlands and to select participants. Q methodology can uncover, in a bottom-up fashion, patterns of perspectives that exist within a particu-

lar (policy) field. Q methodology involves a sorting task, in which respondents have to rank-order a broad range of (subjective) statements on a particular issue (in this case energy options from biomass in the Netherlands). Data are factor-analyzed, which results in a number of factors that can be interpreted as perspectives.

In the preparation phase of the Biomass Dialogue, seventy-five Dutch stakeholders were interviewed with Q methodology. This resulted in six perspectives on energy-options from biomass and an overview of stakeholders' positions with regard to those perspectives. Forty respondents, who reflected the six perspectives in a balanced way, were invited to take part in the dialogue. As such, Q methodology was a useful and tractable approach for stakeholder selection.

The six perspectives and the analysis of participants' positions with regard to the perspectives were presented at the first workshop of the Biomass Dialogue. The perspectives were furthermore used to form subgroups of 'like-minded' people for specific tasks and exercises in the dialogue, e.g. to elaborate upon argumentations for the sustainability of specific biomass chains. Also in the workshop reports, the project team linked the findings of the dialogue to the perspectives, for example by indicating that stakeholders with different perspectives use different reference situations for evaluating the sustainability of specific biomass chains. Hence, diversity of perspectives was emphasized throughout the dialogue, as a consequence of which participants felt that they were 'allowed' to disagree. Participants indicated in the evaluation after the workshops that the way the perspectives were used throughout the dialogue contributed to a constructive and open dialogue and that it helped them to better understand other people's viewpoints.

Apart from its use as a method to facilitate the dialogue, Q methodology was used to evaluate the learning effect of *Constructive Conflict Methodology* in the Biomass Dialogue, i.e. to what extent participants gained an improved understanding of the diversity of perspectives as a result of participating in the Biomass Dialogue. The analysis was based on a quasi-experimental design. Eleven participants conducted a second Q sort after the dialogue. In addition, a control group was formed. This control group consisted of twelve stakeholders who also conducted a Q sort before and after the dialogue, but who did not participate in the dialogue. The quasi-experimental design enabled a statistical analysis of the extent to which participants' agreement with the six perspectives changed as a consequence of taking part in the dialogue. The analysis showed that the dialogue had a significant effect: on average, the agreement with the six perspectives increased due to taking part in the dialogue. This was interpreted as an increased understanding and acknowledgement of the six perspectives. The results of the analysis in-

dicate that the Biomass Dialogue was a problem structuring process: a learning process brought about through the articulation and confrontation of divergent perspectives. Problem structuring in the Biomass Dialogue can be understood as a process of convergence to the six perspectives. Rather than reaching a consensus on a particular perspective, there seems to be consensus on the fact that a diversity of perspectives exists.

Summarizing, this study shows the importance of using methods that enable a stakeholder selection based on perspectives, rather than for example actor type. It is emphasized that stakeholder identification and selection is a critical step in the design of a stakeholder dialogue. Furthermore, the use of methods that facilitate the identification of perspectives in a bottom-up way, and that can make the taken-for-granted elements of perspectives (e.g. implicit assumptions) explicit is emphasized. Results from the Biomass Dialogue show the importance of using concrete objects for discussion in the dialogue; it is only at the concrete level that participants with different perspectives can agree on something without necessarily sharing the underlying motivations, such as values or interests. Although the abstract level of perspectives is not the level on which conflicts can be resolved, it is at this level that people better understand why other people pay attention to specific elements of the problem. Clarification of perspectives provides an understanding of underlying values and worldview. This proved a good basis for discussing specific options and competing knowledge claims. As such, the perspectives can serve as anchor points in a dialogue that focuses on concrete objects of discussion. In addition, the specific options should be discussed within a specific context, i.e. 'situated learning', as this enlarges informational richness. Situated learning means that people learn about a specific option within a specific context. It means asking the trivial, yet often unasked, question: What is actually happening in the situation in which this option is applied? Dialogues should as such entail a process of joint fact-finding on specific options in specific situations. Finally, this study shows, on the basis of a combined quantitative and qualitative evaluation, that participants better understand and acknowledge the diversity of perspectives on biomass as a result of taking part in the Biomass Dialogue. This enabled them to better grasp the complexity of the biomass issue.

This study underlines the importance of a methodological approach to the facilitation and evaluation of stakeholder dialogue. It shows how specific social scientific methods can be used to enhance learning in a stakeholder dialogue. This study and the *Constructive Conflict Methodology* it presented, is thereby relevant for researchers and practitioners working in the field of participatory assessment, participatory policymaking and sustainability planning and policy.

Samenvatting

Participatie van stakeholders, of om preciezer te zijn, interactie tussen verschillende stakeholders om kennis, ideeën en opvattingen uit te wisselen, wordt regelmatig voorgesteld als manier om ongestructureerde maatschappelijke problemen aan te pakken. Dit onderzoek gaat over methoden die ingezet kunnen worden om dit soort stakeholderdialogen over ongestructureerde problemen te faciliteren.

Voorbeelden van ongestructureerde problemen zijn hoe om te gaan met klimaatverandering, biodiversiteit, water management en energievoorziening. Het ongestructureerd probleem dat centraal staat in enkele van de empirische delen in dit onderzoek is energie uit biomassa. Voor sommige stakeholders zou het doel van beleid rondom energie uit biomassa voorzieningszekerheid moeten zijn, terwijl anderen vinden dat CO_2-reductie of positieve impacts voor ontwikkelingslanden het doel van beleid zou moeten zijn. Deze verschillende probleempercepties impliceren verschillende strategieën en oplossingen, die mogelijkerwijs met elkaar in conflict zijn. Ongestructureerde beleidsproblemen worden gekenmerkt door onzekerheid met betrekking tot de kennis die nodig is om het probleem op te lossen en onzekerheid met betrekking tot de waarden die in het geding zijn. Dit betekent dat actoren verschillende opvattingen hebben over het doel van beleid en de relevante middelen om dat doel te bereiken (bijv. welke beleidsmaatregelen). Het is daarom in dit soort gevallen onduidelijk wie de relevante experts zijn en wat hun posities zijn.

Ongestructureerde problemen vereisen beleid als leren. Om een beter begrip van het probleem en de mogelijke oplossingen te krijgen is een probleemstructureringsproces vereist: een open verkenning en toetsing van divergente kennisclaims en opvattingen. Een dergelijke aanpak vereist een hoge mate van participatie van stakeholders. Participatie neemt in geval van een ongestructureerd probleem een andere vorm aan dan in geval van een beter gestructureerd probleem. In een onderhandelingsproces is het bijvoorbeeld duidelijk wie de stakeholders zijn en wat hun posities en voorkeuren zijn. Participatie vindt dan plaats om te onderhandelen over een oplossing die acceptabel is voor de betrokken partijen. In geval van een ongestructureerd probleem is het echter

niet duidelijk wie relevante expertise bezit en dus wie een relevante stakeholder is en waarom. Dat betekent dat er geen uitruil of onderhandeling van voorkeuren mogelijk is.

Stakeholderdialoog is een transdisciplinaire onderzoeksmethode die bij kan dragen aan een politiek leerproces. 'Transdisciplinair' betekent dat deze methode niet alleen verschillende wetenschappelijke disciplines integreert – zoals een interdisciplinaire methode doet- maar ook kennis, waarden en belangen van stakeholders die zich buiten het wetenschappelijke domein bevinden. Een stakeholderdialoog is gedefinieerd als een georganiseerde bijeenkomst van stakeholders met verschillende perspectieven, kennis en achtergronden, die elkaar anders niet zouden ontmoeten (of niet allen tezamen) en die in meer of mindere mate gestructureerd is aan de hand van specifieke methoden, instrumenten of technieken. Een stakeholder is iemand die betrokken is bij, gevolgen ondervindt van, of kennis, expertise of ervaring heeft met betrekking tot het betreffende onderwerp. Deze definitie omvat verschillende typen actoren, zoals wetenschappers, burgers, bedrijven, kleine ondernemers, beleidsmakers, NGOs, enzovoort. De affiliatie van een stakeholder is echter niet van primair belang bij het selecteren van deelnemers aan een dialoog; het gaat om het perspectief dat een stakeholder heeft.

Het doel van een stakeholderdialoog is om leren te bevorderen door probleemstructurering. Leren in een stakeholderdialoog betekent dus dat deelnemers een beter begrip krijgen van de diversiteit aan perspectieven op het probleem en de potentiële oplossingen. Een perspectief is gedefinieerd als het geïntegreerde geheel aan opvattingen, waarden en veronderstellingen dat een persoon, of groep personen, gebruikt om vat te krijgen op een probleem en haar oplossingen. Een perspectief geeft vorm aan percepties en bepaalt hoe een persoon een bepaald probleem en haar oplossingen ziet.

Leren in een stakeholderdialoog vereist een sfeer van constructief conflict. Van deelnemers wordt niet geëist dat zij een consensus of overeenstemming bereiken. Constructief conflict betekent dat deelnemers opvattingen confronteren met andere opvattingen, argumenten ontrafelen en (impliciete) aannames expliciet maken om zo samen nieuwe ideeën te ontwikkelen die robuuster zijn. Conflict is niet in iedere vorm gunstig voor stakeholderdialogen. Drie dingen blijken in het bijzonder van belang te zijn voor constructief conflict. Ten eerste is conflict constructiever wanneer het authentiek is in plaats van kunstmatig, zoals bij rollenspeltechnieken of advocaat-van-de-duivel benaderingen het geval is. Ten tweede dient conflict gerelateerd te zijn aan het onderwerp (cognitief) en niet persoonlijk (affectief). Persoonlijk conflict heeft een nadelig effect op leren in stakeholderdialogen. Ten derde dient conflict beheersbaar te zijn. Mensen moeten zich niet overweldigd voelen door conflict. Dit kan betekenen dat de verschillen in opvattingen

ook te groot kunnen zijn, of dat zeer uiteenlopende opvattingen overbrugd dienen te worden door bemiddelende opvattingen.

Een open verkenning van divergente ideeën is niet iets dat 'automatisch' gebeurt wanneer mensen bij elkaar worden gezet. Er zijn allerlei mechanismen die leren in stakeholderdialogen belemmeren. Deze belemmerende mechanismen bestaan als gevolg van een intrinsieke eigenschap van stakeholderdialogen: de interactie tussen mensen met verschillende perspectieven, belangen, achtergronden, expertise en status. Het is ironisch dat de reden dat stakeholderdialogen verondersteld worden waardevol te zijn tegelijkertijd een reden is waarom een open dialoog zo moeilijk te bereiken is. In dit onderzoek worden vier belemmerende mechanismen ("biases") behandeld. Ten eerste de 'bias of attitude'. Mensen zijn eerder geneigd informatie op te nemen wanneer deze hun bestaande ideeën onderschrijft en in lijn is met hun perspectief en mening dan wanneer deze informatie strijdig is met hun ideeën. De tweede bias is de 'bias of phrasing'. Deze bias verwijst naar die gevallen waarin bepaalde input een grotere (of kleinere) kans heeft om een rol te spelen in de dialoog afhankelijk van hoe de input wordt verwoord. Het gebruik van jargon kan er bijvoorbeeld voor zorgen dat sommige mensen goed begrijpen wat er bedoeld wordt, terwijl dat voor anderen niet het geval is. De derde bias is de 'bias of source'. De 'bias of source' verwijst naar de invloed van kenmerken van de persoon die informatie inbrengt in een dialoog op de kans dat deze informatie een rol speelt in de dialoog. De 'bias of source' speelt bijvoorbeeld een rol wanneer het meer waarschijnlijk is dat de input van een machtige stakeholder besproken wordt in de dialoog dan de input van een stakeholder met een marginale positie. Ten vierde zijn groepen eerder geneigd informatie te bespreken die door hen gedeeld wordt dan informatie die uniek is omdat deze informatie slechts voor een of een aantal personen in de groep bekend is. Dit wordt de 'bias of shared information' genoemd. Deze vier 'biases' verhinderen ieder op een andere wijze een open verkenning van divergente perspectieven en opvattingen en kunnen zo een belemmering vormen voor probleemstructurering in stakeholderdialogen.

Om probleemstructurering in stakeholderdialogen te faciliteren zijn methoden nodig die een open verkenning van divergente perspectieven kunnen stimuleren. Een participatieve methodologie voor probleemstructurering dient ten eerste methoden te omvatten om stakeholders te selecteren die de diversiteit aan perspectieven rond het probleem weerspiegelen. Ten tweede dienen de diverse perspectieven allemaal een gelijke kans te hebben om een rol te spelen in de dialoog. Omdat de belemmerende mechanismen kunnen voorkomen dat bepaalde perspectieven gearticuleerd worden, dient een participatieve methodologie dus methoden te omvatten die helpen om een breed scala aan

relevante opvattingen, kennis en waarden ter tafel te brengen en te verzekeren dat deze verhelderd worden voor en geëvalueerd worden door deelnemers aan de dialoog.

Hoewel er veel participatieve methodologieën bestaan, bevat geen enkele van deze methodologieën technieken of procedures om aan deze twee vereisten te voldoen. Dit onderzoek heeft daarom als doel om een overkoepelende participatieve methodologie voor probleemstructurering in stakeholderdialogen te ontwikkelen: *Constructive Conflict Methodology*. Ten eerste omvat *Constructive Conflict Methodology* specifieke methoden om stakeholders te identificeren en te selecteren die de diversiteit aan perspectieven rond het probleem weerspiegelen. Ten tweede omvat *Constructive Conflict Methodology* methoden om probleemstructurering te faciliteren door 1) de articulatie van diversiteit in termen van divergente perspectieven en 2) confrontatie van opvattingen die volgen uit deze divergente perspectieven. Ten derde moet *Constructive Conflict Methodology* toetsbaar zijn, zodat haar toepassing kan worden geëvalueerd. De evaluatie van *Constructive Conflict Methodology* betreft de vraag of *Constructive Conflict Methodology* leren in stakeholderdialoog bevordert, met andere woorden, of het deelnemers helpt bij het begrijpen van de diversiteit aan perspectieven op het betreffende vraagstuk.

Constructive Conflict Methodology bestaat uit vier stappen: 1) stakeholder identificatie & -selectie, 2) articulatie van de diversiteit aan perspectieven, 3) confrontatie van veronderstellingen en kennisclaims van stakeholders met divergente perspectieven, 4) synthese. *Constructive Conflict Methodology* maakt gebruik van specifieke sociaalwetenschappelijke methoden om elk van de vier stappen te ondersteunen. Methoden die in dit onderzoek bijvoorbeeld behandeld worden zijn 'Repertory Grid Techniek', 'Q Methode', 'Policy Delphi', 'Cognitive mapping', 'Dialectische methode' en 'Toulmin argumentatiemodel'.

In de eerste en tweede stap van *Constructive Conflict Methodology* is het doel om de diversiteit aan perspectieven op een 'bottom-up' wijze te identificeren. Dat betekent dat diversiteit niet wordt aangenomen door een of andere classificatie (zoals actortype, demografische variabelen, of vooraf bepaalde waardeoriëntaties), maar dat deze de uitkomst is van een empirische analyse. Er is geen fundamentele reden om aan te nemen dat vertegenwoordiging van verschillende actortypen resulteert in vertegenwoordiging van diverse perspectieven. Dit onderzoek toont bovendien aan dat deze aanname onjuist is. Drie eigenschappen van diversiteit dienen geadresseerd te worden door stakeholderselectie om constructief conflict te stimuleren. Allereerst dient een groot aantal verschillende perspectieven in de dialoog aanwezig te zijn. Dit leidt tot meer afwijkende gedachten, het overwegen van meerdere perspectieven en van meer unieke informatie. Ten tweede wordt constructief conflict gestimuleerd door afwijkende perspectieven in

de dialoog te betrekken. Hoe meer afwijkend een idee, hoe groter het leereffect van dat idee in potentie is. Om die reden is het betrekken van marginale perspectieven van cruciaal belang voor leren. Ten derde dienen de verschillende perspectieven gebalanceerd te zijn, zodat unieke informatie eerder wordt gedeeld en groepsdenken wordt voorkomen. Dit betekent dat ieder perspectief door een gelijk aantal deelnemers in de dialoog vertegenwoordigd dient te worden, ongeacht hoe dominant of marginaal dat perspectief is.

Wat betreft de tweede stap moeten methoden in staat zijn om de impliciete of de als vanzelfsprekend aangenomen elementen van perspectieven bloot te leggen. Mensen zijn zich bijvoorbeeld vaak niet bewust van de aannames en veronderstellingen die anderen, maar ook zijzelf, hanteren bij het vormen van opvattingen of claims. Articulatie van perspectieven betekent dat dit soort aannames en veronderstellingen worden verhelderd om leren te stimuleren. De derde stap in *Constructive Conflict Methodology*, confrontatie van kennisclaims en veronderstellingen, beoogt constructief conflict te bevorderen door confrontatie op een concreet niveau te laten plaatsvinden. Dit betekent dat de discussies verlopen aan de hand van specifieke technologische of beleidsopties en dat confrontatie plaatsvindt op het niveau van kennisclaims in plaats van perspectieven.

Het eerste empirische deel van dit onderzoek betreft de H_2 Dialoog. De H_2 Dialoog is opgezet om zowel de mogelijkheden van een waterstofeconomie voor Nederland (in een internationale context) als strategieën en interventies om de transitie te stimuleren te verkennen. De H_2 Dialoog vond plaats van 2004 tot 2008. De dialoog bestond uit een uitgebreide voorbereidingsfase en een serie van zes workshops. Dit onderzoek rapporteert over het gebruik van 'Repertory Grid Techniek' in de H_2 Dialoog voor stap 2 van *Constructive Conflict Methodology*: articulatie van perspectieven. 'Repertory Grid Techniek' vindt haar oorsprong in constructpsychologie en is voornamelijk gebruikt in klinische toepassingen om de psycholoog meer inzicht te geven in hoe een individu (de patiënt) de wereld ziet. Het basisidee van de methode is dat de geest van mensen is opgebouwd uit 'constructsystemen' die hun continue inspanningen om zin te geven aan de wereld reflecteren. De repertory grid procedure bestaat uit een gestructureerd interview, waarin een respondent drie elementen uit een grotere verzameling krijgt voorgelegd en waarin hij gevraagd wordt op welke kenmerk twee elementen overeenkomen maar verschillen van de derde. Het genoemde kenmerk wordt een construct genoemd. In het geval van de H_2 Dialoog waren de elementen tien verschillende waterstof toekomstbeelden die werden gebaseerd op de interviews in de voorbereidingsfase en de constructen waren kenmerken die stakeholders gebruikten om onderscheid te maken tussen de toekomstbeelden, bijvoorbeeld 'duurzaam versus onduurzaam'. Het bipolaire construct wordt dan weergegeven op een schaal (bijvoorbeeld een 5-puntsschaal, met één pool van het construct, bijvoorbeeld 'duurzaam', op score 1 en de andere pool

van het construct, bijvoorbeeld 'onduurzaam', op score 5). De respondent wordt dan gevraagd om de elementen, in dit geval de toekomstbeelden, te rangschikken op deze schaal en aan te geven welke van de twee polen van het construct zijn of haar voorkeur heeft. Hierna gaat de interviewer door naar een volgende set van drie elementen. Deze stappen worden herhaald totdat de respondent geen nieuwe constructen meer noemt. 'Repertory Grid Techniek' was gebruikt in de openingsworkshop om de diversiteit aan perspectieven te articuleren door 1) de variëteit aan concepten te identificeren die stakeholders gebruiken bij het nadenken over waterstof toekomstbeelden en 2) de drie meest ongelijksoortige (meest verschillende) waterstof toekomstbeelden te kiezen uit de set van tien toekomstbeelden. Deze drie toekomstbeelden zijn gebruikt om subgroepen te vormen binnen de dialoog die vervolgens ieder een van de drie toekomstbeelden uitwerkten. De dialoog behelsde ook een confrontatie tussen deze subgroepen.

Het grootste deel van het empirische werk in dit onderzoek is gebaseerd op de Biomassadialoog, een stakeholderdialoog over energieopties uit biomassa voor Nederland. De Biomassadialoog vond plaats in 2007-2008 en bestond uit drie workshop waaraan ongeveer 30 stakeholders deelnamen. *Constructive Conflict Methodology* werd gebruikt om de dialoog te ontwerpen. 'Q methode' werd gebruikt om de diversiteit aan perspectieven op energie uit biomassa in Nederland te identificeren en om deelnemers te selecteren. 'Q methode' legt, op een 'bottom-up' wijze, patronen van perspectieven in een bepaald (beleids)veld bloot. 'Q methode' bestaat uit een sorteertaak, waarbij respondenten een brede set van stellingen over een bepaald onderwerp (in dit geval energie uit biomassa voor Nederland) moeten rangschikken. De verkregen data worden verwerkt door middel van een factoranalyse. Dit resulteert in een aantal factoren dat als perspectieven kan worden geïnterpreteerd.

In de voorbereidingsfase van de Biomassadialoog zijn vijfenzeventig Nederlandse stakeholders geïnterviewd met 'Q methode'. Dit resulteerde in zes perspectieven op energie uit biomassa en een overzicht van de posities van de vijfenzeventig respondenten ten aanzien van deze perspectieven. Veertig respondenten, die de zes perspectieven op een gebalanceerde manier reflecteerden, werden uitgenodigd deel te nemen aan de dialoog. Op deze manier is 'Q methode' een relevante en nuttige aanpak voor stakeholderselectie.

Tijdens de eerste workshop van de Biomassadialoog werden de zes perspectieven en de analyse van de posities van deelnemers ten aanzien van de perspectieven gepresenteerd. De perspectieven werden daarnaast gebruikt om subgroepen van 'gelijkgezinden' te vormen voor specifieke taken en opdrachten in de dialoog, bijvoorbeeld om argumentaties voor de duurzaamheid van specifieke biomassaketens uit te werken. Ook in de verslagen

van de workshop werden de bevindingen van de dialoog gekoppeld aan de perspectieven, bijvoorbeeld door aan te geven dat stakeholders met verschillende perspectieven verschillende referentiesituaties gebruikten voor het evalueren van de duurzaamheid van specifieke biomassaketens. De diversiteit aan perspectieven werd dus benadrukt tijdens de gehele dialoog, met als gevolg dat deelnemers het gevoel hadden dat ze het oneens 'mochten' zijn. Deelnemers gaven in de evaluatie na de workshops aan dat de manier waarop de perspectieven door de dialoog heen gebruikt werden bijdroeg aan een constructieve en open dialoog en dat het ze hielp om de ideeën van anderen beter te begrijpen.

Behalve als methode om de dialoog te faciliteren is 'Q methode' ook gebruikt om het leereffect van *Constructive Conflict Methodology* in de Biomassadialoog te evalueren, dat wil zeggen, om te bepalen in hoeverre deelnemers een beter begrip van de diversiteit aan perspectieven hebben gekregen als gevolg van hun deelname aan de Biomassadialoog. De analyse was gebaseerd op een quasi-experimenteel ontwerp. Elf deelnemers deden een tweede Q sortering na de dialoog. Daarnaast werd er een controlegroep gevormd. Deze controlegroep bestond uit twaalf stakeholders die een Q sortering hadden gedaan voor de dialoog, maar die niet deelnamen aan de dialoog. Het quasi-experimenteel ontwerp maakte een statistische analyse mogelijk van de mate waarin de overeenstemming van de deelnemers met de zes perspectieven veranderde als gevolg van deelname aan de dialoog. De analyse liet zien dat de dialoog een significant effect had: gemiddeld gezien nam de overeenstemming met de zes perspectieven toe als gevolg van deelname aan de dialoog. Dit is geïnterpreteerd als een toegenomen begrip en erkenning van de zes perspectieven. De resultaten van de analyse laten zien dat de Biomassadialoog in feite een probleemstructureringsproces was: een leerproces dat tot stand werd gebracht door de articulatie en confrontatie van divergente perspectieven. Probleemstructurering in de Biomassadialoog kan opgevat worden als een proces van convergentie naar de zes perspectieven. In plaats van een consensus te bereiken over één bepaald perspectief lijkt er een consensus te zijn bereikt over het feit dat er een diversiteit aan perspectieven bestaat.

Samenvattend laat dit onderzoek zien dat het van belang is methoden te gebruiken die een stakeholderselectie op basis van perspectieven in plaats van bijvoorbeeld actortypen mogelijk maakt. De cruciale rol van stakeholderidentificatie en –selectie in het ontwerp van een stakeholderdialoog wordt hier benadrukt. Daarnaast is het van belang dat methoden worden gebruikt die helpen om op een 'bottom-up' wijze perspectieven te identificeren en die de impliciete, of, als vanzelfsprekend aangenomen elementen van perspectieven kunnen verduidelijken. De bevindingen van de Biomassadialoog laten het belang van concrete discussieonderwerpen voor de dialoog zien; alleen op een con-

creet niveau kunnen deelnemers met verschillende perspectieven het eens worden over iets zonder noodzakelijkerwijs de onderliggende motivaties te delen, zoals waarden of belangen. Hoewel het abstracte niveau van perspectieven niet het niveau is waarop conflicten kunnen worden opgelost, is dit wel het niveau waarop mensen begrijpen waarom anderen aandacht schenken aan bepaalde elementen van een probleem. Het verhelderen van perspectieven geeft begrip van onderliggende waarden en wereldbeelden. Dit bleek een goede basis voor het bespreken van specifieke opties en concurrerende kennisclaims. Daarnaast dienen de specifieke opties besproken te worden binnen een specifieke context: gesitueerd leren. Het betekent het stellen van de triviale, maar vaak ongestelde vraag: wat gebeurt er nu eigenlijk precies in de situatie waarin deze optie wordt toegepast? Dialogen zijn als zodanig een proces van gezamenlijke feitenverzameling over specifieke opties in specifieke situaties. Als laatste laat dit onderzoek zien, op basis van een gecombineerde kwalitatieve en kwantitatieve evaluatie, dat deelnemers de diversiteit aan perspectieven over biomassa beter begrijpen en meer erkennen als gevolg van hun deelname aan de Biomassadialoog. Dit stelde hen in staat meer houvast krijgen op het complexe biomassavraagstuk.

Dit onderzoek onderstreept het belang van een methodologische aanpak voor het faciliteren en evalueren van stakeholderdialogen die bijdragen aan leerprocessen rond ongestructureerde problemen. Het laat verder zien hoe specifieke sociaalwetenschappelijke methoden hieraan bijdragen. Dit onderzoek en de daarin ontwikkelde *Constructive Conflict Methodology* is daarmee relevant voor iedereen die zich vanuit onderzoek en/of praktijk bezig houdt met participatieve analyse en participatieve beleidvorming rondom ongestructureerde problemen, in het bijzonder duurzaamheidvraagstukken.

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Eefje Cuppen received her master's degree in Innovation Sciences from Eindhoven University of Technology in August 2004. She started working at the Institute for Environmental Studies (VU University Amsterdam) in October 2004, first as junior researcher and later on her doctoral thesis. Since October 2009 Eefje works as assistant professor at the faculty of Technology, Policy and Management of Delft University of Technology. Her expertise includes methods for participatory policy making and stakeholder assessment, mainly in the fields of climate change, sustainability and innovation.