Towards More Coherent and Sustainable Biomass Policy: Examining European biomass-to-energy planning

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Doctoral Dissertation

the international institute for industrial environmental economics

Lund University, Sweden

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LUND
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The cover picture was designed by Adrian Magu from photos of Yuliya Voytenko (Y), Murat Mirata (M) and the author (N). It describes a variety of biomass feedstocks that can be used for energy, but also for other purposes such as food, animal bedding and building materials. For the author there is a specific meaning of targeting towards a more sustainable future with means of better biomass policies and planning – the target is often a moving one.

Clockwise from 12 o'clock, the photos depict 1) willow fields grown for energy in Svalöv, Sweden (Y); 2) straw bales in Horreby for a large scale combined heat and power plant in Copenhagen, Denmark (Y); 3) hemp grown for energy crops in Rydaholm, Sweden (N); 4) wood logs with machinery in Güssing, Austria (Y); 5) corn harvesting in Güssing, Austria (Y); 7) biodegradable waste in Jyväskylä Finland (N); 6) wood chips in Güssing, Austria (Y) and; 8) rapeseed fields near Malmö, Sweden (M).

Doctoral thesis in industrial environmental economics
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I had a plan (well, sort of). It is said that good plans are flexible and adapt to change, while the longer term goals remain clear. Although the specific topic of this thesis was initially beyond imagination more than five years ago, I knew that I needed to aim for a Doctor's hat. The way to achieve it, however, was indeed oblique! Now that I am close to finishing, the process feels like it has been more important than the actual outcome – it has been above all an enormous learning experience.

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I wish to dedicate this book to my dear late grandmother Juulia. If it had not been for her and the Karelian *sisu* (perseverance) inherited from her, I would not be completing this feat today.

Niina Kautto

Lund, August 2011

Executive summary

Background and purpose

Biomass has a broad range of uses and users – bioenergy is one utilisation pathway. However, biomass is also utilised for food, feed, materials and chemicals, and bioenergy interacts with these areas; in many instances such interactions are synergistic, but they may also be in conflict. These other utilisation areas are each important in their own right, and have their own well established supply and utilisation chains, and their own enfolding policy and regulatory frameworks. Related to such complexities, the use of biomass for energy is also influenced by multiple, at times contradicting policy fields. This all adds to the complexity of the management of its supply and demand. All these aspects point strongly to the importance of coordination and coherence of policies directing the supply and use of biomass for different purposes.

Policy goals of the European Commission (EC) to promote renewable energy and reduce greenhouse gas (GHG) emissions are to contribute to mitigating climate change and improving energy security – while also contributing to socio-economic development in the European Union (EU). While biomass as a renewable energy source is considered to be a vital component for policy goal attainment, the EC regards that the progress towards achieving the policy goals has been slower than required. A lack of coordination and integration of biomass policies is indicated as one contributing factor. To boost bioenergy, and to pursue a more coordinated approach to biomass policy, biomass-relevant planning was first encouraged by the EU Biomass Action Plan in 2005 – yielding national biomass action plans (BAPs) – and mandated four years later within the framework of the Renewable Energy Directive. This directive required the establishment of national renewable energy action plans (NREAPs). While the call for optional BAPs spurred only around third of the EU member states to establish a formal biomass plan by the adoption of the directive (May 2009), a number of regional strategies and biomass plans have been drawn up at regional level in Europe. Each and every member state finalised the obligatory NREAPs by early 2011.

Efforts to stimulate energy related biomass use are justified on the basis of widely recognised potential for benefits over fossil fuels, such as improved security of supply, reduction of GHG emissions and creation of employment opportunities. However, the versatile and complex character of biomass energy carriers demands planning. Moreover, the field's potential to

contribute to negative impacts – in areas such as food security, biodiversity and water quality – speak for a coordinated policy approach. In this light, a number of proposals and recommendations have been made, in part due to the concerns over unsustainable biomass use, and in part to leverage biomass planning. Such proposals indicate that coordinated and integrated approaches to policy are needed on the one hand to maximise the benefits and capture the synergies of biomass, and on the other hand, to balance trade-offs and prevent or reduce the potential for negative impacts of bioenergy production.

The thesis work is framed by a multifaceted research problem. The major issue driving this research has been that *the manner in which a more coordinated and coherent approach to biomass policy can be achieved needs to be clarified*. Here, this concerns both more general lines of action, and more specific items such as the consistency of bioenergy support schemes and their instruments. Consistency is an important theme, as the interplay of policy instruments can create both positive and negative impacts on biomass use. In addition, in the areas where BAPs are intended to assist in the delivery of bioenergy development, relatively little is known about the degree to which they are successfully implemented. Related to this, the processes to develop and implement biomass plans have not been analysed in detail. There is also little research on the role of these plans – essentially policy implementation tools – as coordinators of better biomass utilisation for energy. Relevant to the issue, this work has a parallel point of departure that there is a lack of understanding especially regarding how regional biomass planning can or should contribute to national level planning and achieving the targets.

This thesis examines planning documents and processes relevant to biomass use for energy at both national and regional levels in the EU. The aim of the work is to *advance understanding of that which constitutes coherent and sustainable biomass policy interventions*. As such, the overall purpose is to support better policy-making and policy process in the fields intersecting biomass use for energy. This is to be achieved through generation of knowledge that can support the establishment and implementation of coherent and sustainable biomass plans and strategies. Two main research questions guided the examination of the research problem and achievement of the aim:

- *How can more coherent biomass policy be achieved in the EU?*
- *How can national and regional level biomass planning experiences contribute to the improvement of future biomass planning?*

Methodology

The two main fields of research shaping the work were policy research and (policy) planning. While the former is devoted to changing the world with better policies and providing 'knowledge for action', the latter can be seen as a link between knowledge and action. The research work has been multidisciplinary, seeking insights from various social science fields, such as public policy, public administration, organisational management and urban planning.

The review of literature enfolding 'sound' planning and policy contributed to the development of an analytical framework to support analysis. In addition to literature (and archival) research, the data collection was based on interviews and field observation. While the data analysis relied mainly on qualitative methods, some quantitative approaches were also utilised to support them. The analytical framework developed in this thesis was applied for the cross-jurisdictional comparative analysis of national and regional biomass planning documents. Among other things, this was used to provide measures of their relative quality. Notably this part of research focused on the design of a policy tool rather than the actual outcomes of its implementation. Work concentrating on the impacts of policy instrument interaction on biomass use also compared country 'cases' based on interviews and statistical data. The largest empirical part of the work was to analyse, to extract and interpret the meaning of the views of national and regional actors on planning processes. Table A summarises the jurisdictions participating in this thesis and the type of analysis. All work in the study was supported by the use of combination of data and methods (triangulation).

Table A: Selected jurisdictions in this study and the type of analysis

National level	**Type of analysis**
Austria	Planning process, policy interaction
Czech Republic	Planning process
Estonia	Planning document and planning process
Finland	Planning process, policy interaction
Germany	Planning document and planning process, policy interaction
Greece	Planning process
Ireland	Planning document and planning process
Netherlands	Planning document and planning process, policy interaction
Poland	Policy interaction
Spain	Planning document and planning process
Sweden	Planning process, policy interaction
United Kingdom	Planning document and planning process, policy interaction

Table A (continued): Selected jurisdictions in this study and the type of analysis

Regional level	Type of analysis
Central Finland (Finland)	Planning document
Dalarna (Sweden)	Planning process
Flanders (Belgium)	Planning process
North Karelia (Finland)	Planning document and planning process
North West England (UK)	Planning process
Pomerania (Poland)	Planning process
Scotland (UK)	Planning document
South East Region (Ireland)	Planning document and planning process
South Tyrol (Austria)	Planning process
Emilia Romagna (Italy)	Planning process
Southern Bohemia(Czech Republic)	Planning process

Key findings

The findings of the work seek to focus on the gap between the current situation in biomass planning and a more comprehensive and coherent form of planning. These points are intended to provide insights into how those accountable for (or involved in) planning activities may ameliorate existing planning difficulties. The work is also to assist those countries and regions that have not yet planned their biomass use comprehensively. In this light, the first research question: *How can more coherent biomass policy be achieved in the EU?* – is addressed with a number of key findings below.

Current biomass-to-energy plans are heterogeneous and display serious shortcomings: This study indicates that while the basic elements of a coherent approach are present in the planning documents at both national and regional level, they displayed inconsistencies, heterogeneity and other serious shortcomings. While the plans varied extensively in a number of areas, for instance in the levels of effort applied in assessing biomass resources and the specificity of targets, important shortcomings included inadequate monitoring and evaluation of plans, and poor assessment of the impacts of biomass use. Implications include that the progress towards targets will not be appropriately evaluated, and that the probability that realisation of planned items is achieved is reduced. It can be concluded that in their current form – and due to an absence of some of the abovementioned parameters – the plans at both levels are insufficient to deliver coherent, sustainable bioenergy development. Moreover, this research shows that there is scope for improvement in terms of biomass planning within NREAPs. Therefore, biomass-to-energy planning needs to

be improved both within specific biomass planning and in integrated planning efforts such as the NREAP framework.

Biomass demands a coherent strategic planning and management approach: The diverse and complex character of biomass production and utilisation has been shown to demand a combination of strategic planning and management approaches. The various jurisdictional levels of planning, the large number of uses for biomass and overlaps in such, multiple stakeholders and interests, and frequent interlinks or overlaps in policies must be coordinated in planning activities. The work indicated that in order to address and better (vertically) integrate multiple jurisdictional levels, a certain type of formal, institutionalised collaboration structure would be needed. This has potential to achieve the coordination of actions and objectives at various levels. The research also found that while stakeholder engagement is considered as vital to achieve success at both levels, there is a need to establish communication channels and platforms that can better deal with multiple stakeholder interests. The systematic analysis of impacts on other sectors needed to help account for the large number of biomass uses and overlaps in such is not yet taking place. Moreover, there are indications that targets and objectives of policy instruments and their respective policies are not often streamlined for consistency and complementarity.

Biomass planning must adopt a more structured approach: It is held that a more structured approach will contribute to a more coherent, sustainable and eventually successful use of biomass for energy and the achievement of related goals. This research indicates that a coherent biomass-to-energy planning should include the principal elements of:

- formulation of a vision;
- resource assessment based on sound methodology and data;
- the setting of SMART targets based on the awareness of the strengths, weaknesses, opportunities and threats (SWOT);
- formulation of a strategy and action plan with measures to boost biomass availability considering other biomass uses;
- adequate stakeholder engagement throughout the process;
- implementation and monitoring of the progress;
- impact assessment of taken measures founded on life cycle assessment and paying attention to all sustainability dimensions;
- evaluation of the results and feeding them back to the decision-making of a new round of planning.

Planning processes should embrace adaptation and continuous improvement: This work also found that the traditional, rational decision-making model is not applicable to real life situations found in the biomass/energy field, and does not account for the complexity inherently linked to natural world, including the biomass field. A strategic approach to policy-making suggested here includes an adoption of the ideas of continuous learning, flexibility and adaptation. This demands a forward- and outward-looking approach and inclusivity, i.e. involving stakeholders throughout the planning process. Moreover, this work outlined a strategic planning approach that includes the abovementioned elements. This requires both flexible and adaptive approaches to accommodate for uncertainty *and* formal planning with long-term shared vision due to the complexity and diversity of the biomass field.

Policy instrument interactions need to be assessed: The research highlighted the need for recognition of policy instrument interactions within the planning framework. The examination of the impacts of policy interactions on biomass use yields insights on how to improve the design of policy interventions. While interactions between different policy instruments – such as the EU-ETS and national climate/bioenergy policy instruments – are challenging to evaluate, this work finds that such assessments are required in order to create a more coherent policy mix. Such work should be performed in order to *inter alia:* identify synergies; avoid negative effects; deal with conflicting outcomes; and to improve understanding of the better design of support schemes and individual policy instruments.

Planning must look beyond just energy use: It was shown – both from the perspective of planning documents and planning processes – that biomass planning has a general tendency to look the issue from an energy viewpoint. This implies that the consideration of other uses in the plans does not match the requirement to evaluate the impact on other sectors (as required by the NREAP process); also the recognition of overall optimal use is only in its initial stages. The analysis of planning processes conducted in this work in turn demonstrated that approaches looking beyond energy use do not seem to be widely endorsed or applied in practice at either regional or national levels. A planning document (or process) specifically devoted to biomass and its better use could facilitate the adoption of such approaches. This would enable the better acknowledgement of the unique properties of biomass, optimisation of resources and recognition of interactions between different markets.

The research approached the second research question: *How can national and regional level biomass planning experiences contribute to the improvement of future biomass planning?* with exploration of views held by actors engaged in biomass planning. Important lessons were drawn from the examination of the planning processes in jurisdictions at both national and regional levels.

Work towards flexibility and continuity of process: The work showed that the jurisdictions encountered several barriers in the planning process – a number of them general barriers to policy implementation such as insufficient time and resources and rapidly shifting political focus. It was yet indicated that critical issues particularly pertinent to bioenergy planning still exist that have not been adequately addressed. These include the need to achieve a broad stakeholder consensus and coordination of actions between the levels. One of the items indicated in the work as vital to overcome barriers is a process that is flexible, continuously evaluated/updated and engages stakeholders throughout the process. Further, there are strong indications that high levels of motivation and actions that clearly display that the plan is seen as a living document are particularly important. These need to be recognised in the many levels of planning for bioenergy to meet the expectations that many actors have of it. There are also significant opportunities for best experiences and practices to be shared more widely in order to spread vital knowledge of the factors facilitating planning processes.

Acknowledging and expanding from the multifaceted roles of plans: This research demonstrated in addition to the goal achievement, a biomass plan is seen to serve a number of other roles such as information, discussion, collaboration, coordination and transformation. Nevertheless, the planning documents assessed in this study generally do not match the intended functions such as harmonisation of biomass data and planning the role and the interaction of uses. While the NREAP requirement at national level has addressed the harmonisation of data to a significant extent, there is a gap between the current and intended roles and functions concerning planning beyond energy spheres.

Clarify plan definitions: While the two main concepts (strategy and action plan) important to the function of planning documents are commonly understood to be different, their consistent application is not straightforward. There also appears to be gamut of related definitions that are used interchangeably in the bioenergy sphere. This matter is held to be of importance, as the manner in which the definition is interpreted by jurisdictional actors plays an essential role in determining that which the

planning document is expected to deliver. This work finds that a more consistent use of terminology of planning documents, and understanding of the bounds of their role, would constitute an important improvement.

Develop comprehensive, yet flexible guidelines: This work demonstrated that both planning in general, and guidelines steering the planning are largely perceived worthwhile by national and regional actors. However, it is indicated that they should be flexible, broad enough to accommodate regional and national differences. There is thus a challenge to design such guidelines that are flexible, enable comparison, and are comprehensive enough to deal with the complexity of biomass.

Coordinate planning and more explicitly recognise lower level actions: While the work showed that both top-down and bottom-up approaches are advocated by biomass planners, successful biomass-to-energy planning requires a combination of these – not an 'either' 'or' approach. It was found that collaboration between actors and coordination of plans, targets and actions are generally weak between the jurisdictional levels. In other words, there is a lack of vertical integration. Related to the issue, the flow on benefits that may be achieved by regionalisation of policy appears to be a 'lost opportunity' without effective coordination of planning between the levels. National level work needs to recognise directions of work taking place at regional levels if it is to deliver both a realistic picture of what can be achieved and a basis for planning how to achieve it. Recognition of regional stimuli and competences need to be recognised in higher level policy-making in order to help biomass policy and planning achieve its intended outcomes.

Concluding remarks

An important line of questioning in light of the common EU targets lies in what it is that ultimately helps member states to meet their goals. This work strongly suggests that coordination of (and by) planning is necessary to effect desired changes. Generalising from this study, it is proposed that this will be particularly true for the vast majority of EU states that have limited experience in modern biomass for bioenergy. The diversity and complexity of biomass field places intricate demands on its planning, and this is reflected in the plan content, process and actors involved in the process.

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Abbreviations

AEBIOM	European Biomass Association
BAP	Biomass Action Plan
BEE	Biomass Energy Europe -project
BEn	Biomass energy register for sustainable site development for European Regions -project
BIOCLUS	Biomass Clusters -project
BioMob	Biomass Mobilisation -project
BUBE	Better Use of Biomass for Energy
CHP	Combined heat and power
CO_2	Carbon dioxide
EC	European Commission
EEA	European Environment Agency
ELIN	Electronic Library Information Navigator
ETS	Emissions Trading Scheme
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GHG	Greenhouse gas
IFES	Integrated Food Energy Systems
ILUC	Indirect land use change
IPCC	Intergovernmental Panel on Climate Change
IRGC	International Risk Governance Council
JRC	Joint Research Centre
LCA	Life cycle assessment
MAKE-IT-BE	Decision Making and Implementation Tools for Delivery of Local & Regional Bio-Energy Chains -project
Mtoe	Million tons of oil equivalent
NREAP	National Renewable Energy Action Plan
NoE	Network of Excellence
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development

PESTLE	Political, economic, social, technological, legal and environmental
RE	Renewable energy
REGBIE+	Regional Initiatives Increasing the Market for Biomass Heating in Europe –project
Rok-FOR	Regions of Knowledge for Forestry -project
RQ	Research question
SD	Sustainable development
SERA	South East Regional Authority (of Ireland)
SMART	Specific, Measurable, Attainable, Realistic and Time limited
SWOT	Strengths, weaknesses, opportunities and threats
UNEP	United Nations Environment Programme
WBGU	German Advisory Council on Global Change

CHAPTER

ONE

1. Introduction

This chapter presents the background to the research and defines the research problem, questions and objectives. It also delineates the scope and limitations, presents the overarching research fields, outlines the intended audience, and the thesis structure.

1.1 Research background

1.1.1 Biomass for energy and the EU framework

Biomass serves as a fundamental raw material for the energy, food, feed, chemical and material sectors. It has a wide range of uses and users, which adds to the complexity of the management of its supply and demand. Biomass also lies at the intersection of a broad suite of political, economic, environmental and social interests; the number of stakeholders and trade-offs related to biomass use all contribute to the generation of a complex decision-making arena (IRGC, 2008). One high profile example is the food price increases held to have been contributed to by the biofuels production in 2006-2008 (OECD, 2008; Rosegrant, 2008); however less than initially thought (Baffes & Haniotis, 2010). Moreover, the use of biomass for energy is influenced by numerous, sometimes contradicting policy fields. They include forestry, agriculture, waste, trade and industry (see e.g. Bringezu et al., 2007; EUREC Agency, 2002; WBGU, 2009). All these aspects point strongly to the importance of coordination and coherence of policies directing the supply and use of biomass for different purposes.

Integrated and coherent energy policy is intended to be at the heart of the European Commission's (EC) "Climate action and renewable energy package" (European Commission, 2008a), which provides a framework and 2020 targets to promote renewable energy and energy efficiency, and reduce greenhouse gas emissions. In the context of this framework, the Renewable Energy Directive (European Commission, 2009a) (hereafter RES-Directive)

requires that each EU member state enhance its use of renewable energy so that an overall EU share of 20% by 2020 may be achieved. To facilitate overall target achievement, mandatory targets for each member state have been set. As the single largest renewable energy (RE) source in absolute terms, biomass is considered a vital component of meeting the energy and climate goals. It is forecast to contribute around two-thirds of the estimated primary energy consumption of the renewable energy share in 2020 (European Commission, 2009b). This has been estimated to equate to some 165-195 Mtoe of biomass (European Commission, 2009c). It is noteworthy that the manner in which bioenergy resources are used can have a considerable impact on the overall renewable energy strategy. As of 2009, biomass and renewable wastes contributed 6% (or 105 Mtoe/4.4 EJ) to EU-27's primary energy (or gross inland) consumption (representing a 7% increase from 2008) (Eurostat, 2011). Thus, the promotion of biomass use for energy also addresses an important share in overall terms. However, the EC renewable energy progress report (European Commission, 2009b) indicates that the development of the bioenergy sector has not been satisfactory, especially when the projections of the EU Biomass Action Plan (EU BAP) (European Commission, 2005a) – of 150 Mtoe biomass to be consumed for energy by 2010 – are considered.

One factor potentially contributing to the slow progress of bioenergy is that the existing biomass strategies are often a patchwork of various policies related to different biomass usage that lack coordination and integration (BAP Driver, 2009). This lack of coordination for the various biomass related policies – along with insufficient support systems – was already identified in 2004 (European Commission, 2004). Therefore, the EU Biomass Action Plan a year later stressed the need for a coordinated approach to biomass policy and encouraged member states to establish national Biomass Action Plans (BAPs) as one of the key measures to boost the bioenergy market (European Commission, 2005a). This coordinated approach must take account of actors on many levels (European Commission, 2004, 2005a). Related to this, biomass mobilisation measures are required not only at the EU level but also at national, regional and local levels (European Commission, 2005b).

The EC perceives that BAPs at national level play an essential role in increasing the likelihood of progress towards the EU's renewable energy 2020 targets and ensuring the long-term and sustainable supply of biomass resources for energy use (European Commission, 2009c). Along with the RES-Directive, there has been a shift of focus from optional national BAPs

to mandatory national renewable energy action plans (NREAPs). Member states were obliged to establish such plans and present how they will reach the national targets set in the RES-Directive within them. As of January 2011, all member states finalised their NREAP (Beurskens & Hekkenberg, 2011). An analysis of the NREAPs shows that biomass is estimated to dominate renewables both in the heating and cooling sector (78%) and in the transport sector (91%) while biomass-based electricity is projected to account for 19% of the total renewable electricity production in 2020 (Beurskens & Hekkenberg, 2011).

National biomass action plans and strategies – prepared by a number of countries prior to the action plan requirement – have been considered to form a vital part of NREAPs (European Commission, 2008b). This is to ensure that the RES-Directive is soundly implemented (European Commission, 2008c). The EC has also perceived that regional and local level biomass plans can feed into the NREAPs. As the work underpinning the thesis was undertaken both before and in parallel to the preparation of the NREAPs, this research has primarily focused on biomass action plans and their planning processes. Nevertheless, it has investigated, among other things, the ability of national BAPs to act as a foundation for NREAPs.

1.1.2 Status of biomass planning

Biomass strategies and action plans have been established in several parts of the world, and many countries have also identified biomass-derived energy as one of the pathways to achieve their Kyoto Protocol obligations. In addition to the EU member states (see below), different kinds and levels of specific biomass/bioenergy strategies have been made in (at least) Japan (Kuzuhara, 2005), the US state of Texas (Office of the Governor Rick Perry, 2007), British Columbia in Canada (Ministry of Energy, Mines and Petroleum Resources, 2008) and in Australia (Clean Energy Council, 2008). Further, the BEST project promotes bioenergy strategies in Africa (EUEI Partnership Dialogue Facility, n.d.).

In response to the call of the EU BAP for the national biomass action plans, around half of the EU member states had a biomass strategy or action plan under preparation or defined by May 2009, i.e. just after the RES-Directive was adopted (Table 1-1). Whilst formal biomass action plans had been prepared by nine countries, six of them submitted their plans to the EC: Estonia, Germany, Ireland, Netherlands, Spain and the United Kingdom. However, the other half of the EU countries did not yet have a biomass

plan. At the time of this research it was not clear whether the plans in preparation would be published as specific plans or as part of the NREAPs, but it seemed likely that the obligation for NREAPs would override the voluntary encouragement for national BAPs and the prepared biomass action plans would be integrated in them at least in some form.

Table 1-1: Status of the national BAPs in the EU-27 as of May 2009

Status of the national BAP	**EU member states**
BAP officially submitted to the EC	Estonia, Germany, Ireland, Netherlands, Spain, United Kingdom
Established BAP but not submitted to the EC	Cyprus, Czech Republic, Slovakia
In preparation[a]	Austria, Bulgaria, France, Latvia, Romania, Slovenia
No BAP[b]	Belgium, Denmark, Finland, Greece, Hungary, Italy, Lithuania, Luxembourg, Malta, Poland, Portugal, Sweden

Source: Developed from Kautto & Jäger-Waldau (2009)

[a] The preparatory stage can signify a plan in the public consultation process or in the process of government approval. In addition, it was considered here that the plan has been established only if it has been officially approved by the government.

[b] The table categorises countries with inadequate information on their BAP status in the 'no nBAP' category.

It should be noted that the absence of a formal plan or its preparation does not necessarily indicate the lack of other bioenergy activities or planning in the country. Finland and Sweden for example have highly advanced biomass and bioenergy industries, which have been supported by other means than action plans.[1] In addition, while biomass use related planning can take place independently (i.e. as biomass-focused plans – called 'specific plans' in this study) as indicated here, it can also occur as a part e.g. of energy, forestry and/or climate strategies and plans (called 'integrated plans'). There can also

[1] For example, the establishment of national research agendas for the forest-based sector in Finland and Sweden can be regarded as a holistic approach on forest-based research and development actions (cf. FTP, 2008).

be several regional biomass plans, strategies and initiatives being pursued despite a country lacking a BAP at national level.

In fact, a number of regional strategies and biomass plans have been drawn up at regional level in Europe. Examples of these are the plans of Central Finland, Northern Karelia (Finland), Scotland, South-East Region of Ireland and Northern Ireland (European Commission, 2009b). This does not however accurately reflect the true number of regional plans established or in development. A snapshot of such planning processes indicates that regional biomass planning – both in the form of specific and integrated plans – is taking place in more than 50 regions in 21 EU countries (see Paper III attached). The REGBIE, MAKE-IT-BE and BEn[2] are some of the projects that have guided or are currently guiding regions in how to plan their biomass use for energy. The regional level is perceived as having a central role in implementing EU and national level biomass policies (cf. Elle & Steinkraus, 2009). Strategic planning at local level, including bioenergy elements, is encompassed by items such as the Sustainable Energy Action Plans within the Covenant of Mayors commitment for tackling climate change in cities (Covenant of Mayors, 2010).

1.1.3 Planning the use of biomass – the reasoning

Global concerns over climate change, growing energy demand and security of supply have stimulated the search for renewable pathways. In addition to emitting less greenhouse gases (GHG) and creating other environmental benefits, it is desired that these contribute to social and economic development (IPCC, 2011; Johansson, Kelly, Reddy, & Williams, 1993). Planning of biomass use for energy is justified based on the widely recognised benefits of biomass over conventional energy sources – such as improved security of supply, reduction of GHG emissions[3] and creation of

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[2] REGBIE+ (Regional Initiatives Increasing the Market for Biomass Heating in Europe) was active 2007-2009, whereas MAKE-IT-BE (Decision Making and Implementation Tools for Delivery of Local & Regional Bio-Energy Chains) and BEn (Biomass energy register for sustainable site development for European Regions) both started in 2008 and will be active until October 2011. More information on the projects can be found at: http://www.regbieplus.eu, http://www.makeitbe.eu and http://www.ben-project.eu, respectively. The Regions of Knowledge initiative within the EU Seventh Framework Programme also includes a number of projects planning for biomass-to-energy.

[3] The ability of bioenergy systems to result in GHG emission reductions depends largely on technology and resource (both land and biomass) management practices; see more e.g. from Bauen et al. (2009), IPCC (2011) and WBGU (2009).

employment opportunities (Bauen et al., 2009; IRGC, 2008). In addition, biomass is more versatile and diverse than any other RE sources in terms of feedstock sources and their use; it is also the most complex due to its numerous interlinkages (WBGU, 2009). As the background document for the bioenergy plan of Ireland (Sustainable Energy Ireland, 2004, p. III) states; "more than any other area of renewable energy, bioenergy is an inter-departmental issue, touching on many policy areas. Thus, while led by renewable energy goals, the task of promoting bioenergy both merits and requires an inter-departmental response."

Adding to this complexity is that while yielding many benefits, bioenergy production in a number of instances has been shown to contribute to negative impacts on some countries and societies (IRGC, 2008). Some examples include worsened food security, as in Sub-Saharan Africa (Rosegrant, Zhu, Msangi, & Sulser, 2008), biodiversity loss in oil palm plantations in Indonesia (Danielsen et al., 2009) and increased stress on the US water resources (Stone, Hunt, Cantrell, & Ro, 2010).[4] Also the scale of impacts is deemed important; protection of soil and water resources and biodiversity calls for special focus on local and regional level while climate change is more of a global scale issue (EEA, 2008). Noteworthy is that policies boosting biomass demand for energy can increase competition for biomass resources for other purposes (Ignaciuk, Vöhringer, Ruijs, & van Ierland, 2006; Schwarzbauer & Stern, 2010; WBGU, 2009). Plans for a transition to an economy founded on bio-based raw materials instead of fossil ones – a so called bioeconomy – further complicates the issue as it is likely to result in growing competition for biomass resources due to increased use of biomass for energy, chemicals and materials (Clever Consult BVBA, 2010; de Jong, van Ree, Sanders, & Langeveld, 2010). However, it also encompasses the idea of a more efficient and sustainable use of biomass by adding higher value to biomass through so called biorefineries (cf. de Jong et al, 2009). When the prospect of human population growing to over 8.3 billion in 2030 is added, which will require some 50% more food and fuel and 30% more water (UK GovNet, 2009), there are concerns of several kinds regarding the sustainability of biomass use for various purposes.

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[4] For more examples on opportunities and risks associated with bioenergy, see IRGC (2008), UNEP (2010a, 2010b, 2010c) and WBGU (2009).

Noting these points, it is argued here that the use of biomass for energy requires more planning effort than many of renewables. This is also supported by the fact that the NREAPs have been required to include specific biomass relevant elements (see Section 2.2.2). Certainly, it can be questioned if other RE policy fields have to account for so many areas. It also has to justify its land use more than other activities requiring land (e.g. food production). Bioenergy seems nevertheless to be rather unique due to its cross-sectoral, multi-level and multidisciplinary nature – as indicated e.g. by the German Advisory Council on Global Change (WBGU, 2009). In addition, it is only recently when we actually start to see the true interlinkedness of such areas in real time.

Consequently, planning for change[5] – or, as Food and Agriculture Organization of the United Nations (FAO, 2010a, p. 30) argues, for "foreseeable changes" – would seem essential in order to deal with the potential for negative impacts as early as possible and to balance the trade-offs between environmental, social and economic impacts. A planning framework can also serve the purpose of facilitating maximisation of the benefits of bioenergy production. It may also allow for a more swift response to unforeseen changes. Thus, planning is about dealing with uncertainty, e.g. through learning both about the past and the future (Hutter & Schanze, 2008). It can be argued that uncertainty is an unavoidable component of any planning process – however, this is especially important in the case of decision-making touching upon environmental matters due to the complex interactions pertinent to large-scale natural systems (Sigel, Klauer, & Pahl-Wostl, 2010).

At any rate, the realisation of the impacts is largely reliant on two things at the policy level; as United Nations Environment Programme (UNEP, 2010d, p. 1) puts it, "it all depends how bioenergy development is designed and implemented". As an additional support for planning, bioenergy policy benefits from better policy-making and design like any other public policy field. As an example, the "Better Use of Biomass for Energy" (BUBE) project calls for the establishment of better policy (Fritsche, Kampman, & Bergsma, 2009; Kampman et al., 2010).

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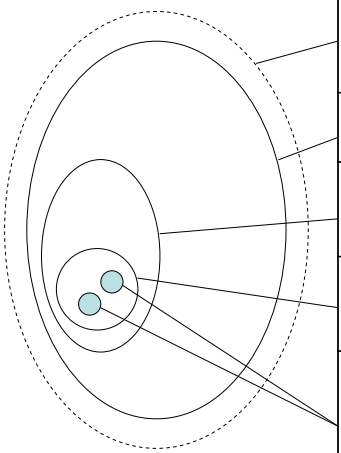
5 See Section 2.4.4 for the division of planning *of* change and planning *for* change.

1.2 Problem definition

In the context of the research background, the thesis work is framed by a multifaceted research problem (see Figure 1-1). As outlined in this section, the research problem is defined in two parts that present the rationale through which the research questions and objectives are formulated.



Context
Environmental science, renewable energy and climate policy, public policy, organisational management, urban planning, sustainable development planning, bioenergy systems etc.

Research problem area
Coherent policy-making in the EU

Boundaries of research problem
Biomass-to-energy planning content and processes, climate and bioenergy policy interaction

Research problem
A lack of coherence in biomass policy is a significant hinder to achievement of policy goals

Research questions
How can more coherent biomass policy be achieved in the EU?

How can national and regional level biomass planning experiences contribute to the improvement of future biomass planning?

Figure 1-1: Relationship between the research area, problem and questions

Source: Adapted after Perry (1995)

1.2.1 About a coherent and sustainable biomass policy intervention

Relevant to the argument on the critical components of the actualisation of bioenergy impacts (UNEP, 2010d), the design element has recently received attention in the form of guideline proposals and policy recommendations for policy-makers. Such proposals have partly been spurred by the concerns over unsustainable biomass use and in part to leverage the establishment of plans (e.g. BAP Driver, 2009; IRGC, 2008; Kampman et al., 2010; Orthen & Brückmann, 2009; WBGU, 2009). They indicate that coordinated and integrated approaches to policy are needed to maximise the benefits and capture the synergies of biomass utilisation – and to help balance the trade-offs and prevent or reduce negative impacts of bioenergy production. Such

suggestions often regard the content of planning ('what' or substantive aspects), giving less attention to the 'how' of planning, i.e. procedural aspects. These recommendations are discussed further in Chapter 3.

Notably, the majority of the abovementioned studies providing guidance appeared after the EU BAP was published in 2005. It called for a coordinated approach to biomass policy along with national BAPs, but did not elaborate any guidelines or recommendations for their content. Thus, there was no clear definition of a 'biomass action plan' early on. Wide variability of data in the national BAPs has contributed to difficulties in tracking the progress towards reaching bioenergy objectives. Consequently, a need to provide guidelines for the establishment of biomass strategies that can guarantee the comparability of the BAPs between member states has been recognised. The EC also proposed three years later a so called 'coherent and coordinated approach' detailing appropriate elements to be included in national BAPs (see Section 2.2.1 for more details).

Coherent approaches to policy are contributed to by policy coordination and integration (Jones, 2002; Mickwitz et al., 2009). Bearing in mind that the lack of coordination and integration of biomass policies has been identified as an important contributing factor to a slower than anticipated – and required[6] – progress of bioenergy towards the EU policy goals, the main research problem is formulated as: *a lack of coherence in biomass policy is a significant hinder to achievement of policy goals and thus the manner in which more coherent biomass policy can be achieved needs to be clarified.* Antikainen et al. (2007) argue that bioenergy is an example of environmental policy being integrated into other policy sectors, and that the combined effects of these various policy sectors need to be considered in decision-making. It is also highlighted that bioenergy objectives – often shared with other policies, such as job creation, mitigation of climate change, energy security and environmental quality – must be taken into account within broader policy strategies; this encompasses the idea that bioenergy policies should be coordinated with other related policies (IRGC, 2008). Consistency in bioenergy support schemes and their instruments is one related issue. For instance, the objectives of policy instruments applied in the climate and energy fields can overlap and form interactions that can be complementary or conflicting, or both (cf.

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[6] The EU BAP estimated that biomass use would be 150 Mtoe in 2010, thus it was not a requirement. However, it contributed to the targets of the White Paper on Renewable Energy Sources, which set to increase the share of RE in the energy consumption in the EU from 6% in 1997 to 12% by 2010 (European Commission, 1997).

Oikonomou & Jepma, 2008; Sorrell et al., 2003). Therefore, BAP Driver (2009) recommends that such interplay should be considered, as it can have both positive and negative effects on biomass use (see Section 2.3.2 for more details). *However, a review of relevant literature has shown that there are a limited number of research studies looking into such impacts.*

Coherence is connected to the concept of sustainable development (SD),[7] in that its advancement requires integration of economic, social and environmental objectives in decision-making (Cherp, George, & Kirkpatrick, 2004). The magnitude of the contribution that bioenergy can make to sustainable development is reflected in the statement of the WBGU (2009): bioenergy plays a "strategic role […] as a component of the global transformation of energy systems towards sustainability" (p. 1). In the view of the WBGU, the use of bioenergy should primarily be guided by its contribution to climate change mitigation and assisting in overcoming energy poverty. In fact, biomass policy in this work is likened to other cross-sectoral policies and planning in areas such as sustainable development.[8] Similar to biomass use for energy *and* other purposes, sustainable development requires a long-term view, concerns various actors and involves several sectors (Steurer, 2007). This research explores the various ways biomass policy – and actions that do or could arise from it – can contribute to a development that is environmentally, socially and economically sound. Hence, 'sustainable biomass policy' (or planning) refers to a policy (or a plan) with such aspirations. Moreover, in this work the definition of coherence is considered to encompass the idea of sustainable development (see Section 2.3.2 for a definition of biomass policy coherence).

One more item relevant to this work requiring introduction is policy success. It is not easily defined due to its multidimensionality; according to Bovens et al. (2001, as cited in McConnell, 2010): "success … means different things to different people at different times" (p. 19). Nevertheless, McConnell (2010) defines three dimensions of policy success: process, programme and political success. At the programme level, which this research is situated (see

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7 Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, Chapter 2:1).

8 For studies of planning for sustainable development, see e.g. Dalal-Clayton and Bass (2002); Meadowcroft (1997); Sharma (2009); Steurer and Martinuzzi (2005).

Section 3.1.2), the success can be determined based e.g. on whether objectives have been met or desired outcomes been produced (McConnell, 2010). Given that biomass action plans are intended to assist in the delivery of bioenergy development, relatively little is known about the degree to which they are successfully implemented. *Related to this, the actual processes undertaken to develop and implement biomass plans have not been analysed in detail.*

1.2.2 Roles and functions of biomass action plans

Pursuant to the EC's descriptions for the NREAPs, they are to act as implementation and monitoring tools for the RES-Directive (European Commission, 2008c). They are considered "necessary for any effective monitoring and evaluation of a law" (European Commission, 2008c, p. 113). Furthermore, any policies and action plans aiming to boost biomass use are urged to harmonise biomass data "to improve accuracy and better comparability of future biomass resource assessments" (European Commission, 2009c, p. 39). Another indication of the role of the BAP is given by the NREAP template that states: "national biomass strategy is crucial to plan the role and the interaction of uses between the energy end uses and interaction with non-energy sectors" (European Commission, 2009d, p. 52). Antikainen et al. (2007) suggest that a national biomass strategy could clarify the expectations and objectives directed to biomass and its production area, for example between energy use, land use, industrial raw material use and conservation and recreational use.

Further, when the EC encouraged the establishment of national BAPs in 2005, it was considered that they would help remove national bottlenecks for the increased use of biomass and would also reduce investor uncertainty. They were also seen as being suitable for inclusion in consumer information campaigns on the benefits of biomass (European Commission, 2005a).

Relevant to the discussion above, these descriptions do not adequately explain the roles of biomass action plans – specific or integrated – as coordinators of better biomass utilisation for energy. Moreover, while other types of plans – for example in organisational strategy and in policy fields addressing items such as sustainable development and urban development – can act as communication devices (Mintzberg, 2000; Talen, 1996), exhibiting political will (Steurer, 2007) and supporting public engagement (Berke & Godschalk, 2009), *the roles and functions of BAPs are not well documented.*

Another, related issue of interest to this research is the role of regional planning in ensuring national plan achievement. Clues to the role definition are given for instance by Sharma (2009, p. 39) who – in the context of SD planning – argues that local strategies can assist in "translating national plan to local level action while allowing for local level prioritisation and ownership". The BAP Driver project (BAP Driver, 2009) notes that national level policy processes – often with 'top-down' approach – are poorly communicated to the regional and local level actors. Therefore, bioenergy policies must be 'regionalised' in order to ensure effective communication between national (/political) and local (/market) players. Sub-national planning is also considered to better portray those decisions that are best taken at lower levels, e.g. those regarding suitability of energy crops – as indicated by the EU BAP. The EC considers at least some aspects of regional and local level planning as relevant for RE (and biomass) planning – evident from the items the NREAP template optionally asks. Still, it remains unclear to what extent sub-national planning should be integrated in and coordinated by national plans. *In line with the above, this work has a point of departure that there is a lack of understanding regarding how regional biomass planning can or should contribute to national level planning and achievement of targets.*

1.3 Research questions and objectives

The aim of this research is to advance understanding of that which constitutes coherent and sustainable biomass policy interventions. This work has the point of departure in a belief that enough is known about the unsustainable use of biomass for energy to justify the formulation and implementation of better policies in the field. The overall purpose is to support better policy-making and policy process in the fields intersecting with biomass use for energy. This is to be achieved through generation of knowledge that can support the establishment and implementation of coherent and sustainable biomass plans and strategies. To achieve this aim the following research questions (RQ) objectives (O) have guided the work:

RQ1: How can more coherent biomass policy be achieved in the EU?

- O1a: delineate key elements of improved biomass planning, both in terms of planning process and plan content;
- O1b: provide examples of how the interplay of energy and climate policy instruments may impact biomass use.

RQ2: How can national and regional level biomass planning experiences contribute to the improvement of future biomass planning?

- O2a: clarify the underlying factors of biomass planning processes;
- O2b: provide insights into the role and function of national and regional planning;
- O2c: delineate how policy implementation tools are comprehended and used by actors involved in the planning process.

Chapter 6 answers to these research questions and develops recommendations for further policy interventions. Findings will also be discussed in the light of the research objectives in Chapter 5.

1.4 Scope and (de)limitations

This research deals with a range of issues related to biomass-to-energy planning. Along with the features of sound policy-making, the focus is on structuring the policy planning process and deepening the understanding of policy coordination in the biomass policy context. The scope is narrowed down to seek answers to *what* biomass plans should contain in order for them to be described as 'better' plans, and *how* biomass planning should be formulated and executed for it to be more coordinated and coherent. Also of interest is *why* biomass planning is currently being done (and why it should be done).

Biomass use: In its broadest sense, biomass encompasses all material of biological origin derived from living or recently living organisms (cf. Biomass Energy Centre, n.d.). Recognising that the term biomass is used for many purposes, the term in this work pertains to energy context. The key focus of this thesis is indeed the energy use of biomass; however, as it becomes clear from the study, it is imperative to look beyond the energy use and seek for more holistic policy and planning frameworks. A major part of the research therefore examines biomass planning rather than just bioenergy planning, not least as it can be argued that the latter cannot exist without the former. Alternatively, the 'biomass-to-energy' term is used to highlight a particular context.

It should also be pointed out that although this work refers to the currently relevant issues in the bioenergy field, such as sustainability criteria and standards for biomass, and land use changes; their detailed discussion is

beyond the scope of this research. It also excludes the impact of lobbying – something that has been indicated as important to bioenergy development (cf. Langeveld, Kalf, & Elbersen, 2010) – or other stakeholder communication strategies (cf. Peck, Berndes, & Hektor, 2011).

Planning: The term 'planning' has a variety of meanings. This thesis studies public policy enfolding one renewable energy source and its implementation tools, hence the use generally applies to policy planning. While the work is relevant to the production and use of one type of (renewable) natural resource, it does not extensively discuss natural resource planning *per se*. While the thesis does not either seek to address other types of public sector planning – such as spatial planning (known also as urban or environmental planning),[9] programme planning[10] or sustainable development planning – let alone private sector planning, it does borrow concepts from and discusses theories and practices pertaining to all these spheres. This is to form a more complete picture of the useful concepts for biomass planning (see Chapter 2 for further planning definitions).

In addition, a 'biomass (action) plan' has been deemed in this work to constitute any biomass planning document formulated to boost biomass-to-energy use and relevant to the country or region at the time of the study.

Analysis approach: The examination of biomass-to-energy planning in Europe focuses on biomass action plans at national and regional levels. It can also be called 'evaluation', but it should be noted that this work does not compare the promises of the plans to their actual outcomes or impact ('outcome evaluation'). This is due to various stages of planning in the studied jurisdictions, multicausality and the different meanings of success. The research does, however, seek to determine a suite of desirable processes and outcomes for the plans to succeed in delivering sustainable bioenergy development, and explore the realities of planning practices.

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9 It may also be called landscape or physical planning. Common to all these terms is that they deal primarily with the policy dimensions of space and place rather than of natural resources.

10 "Conscious strategy developed to facilitate problem-solving in human services" (Netting, O'Connor, & Fauri, 2008, p. 265).

Based in research papers: The research is founded upon five research papers. These are appended to this thesis. Reflecting the research aim and objectives, the papers focused on specific aspects of biomass planning.

- Paper I: presentation of the research context and analysis of national biomass planning documents, particularly from the 'how' (process) angle.

- Paper II: examination of national biomass plans from the 'what' perspective (content).

- Paper III: exploration of regional biomass plans, both in the process and content contexts.

- Paper IV: mapping of the views of planning actors on the planning processes, both at national and regional levels.

- Paper V: examination of policy instrument interactions and their impact on biomass use (related to a specific stage in the planning process).

Geographical focus: The geographical scope of this thesis is limited to Europe and the EU member states. However, the analysis concerns national and regional level planning within a suite of the member states. The national level investigation – both in terms of planning document and process analysis – included Germany, Estonia, Ireland, the Netherlands, Spain and the United Kingdom (Papers I, II and IV). In addition, planning process analysis was applied to Austria, Czech Republic, Greece, Finland and Sweden (Paper IV). At regional (sub-national) level, the plan analysis work addressed items from Central Finland, North Karelia (in Finland), Scotland and South East Region of Ireland (Paper III). The examination of planning processes was conducted with actors representing Dalarna (Sweden), Emilia Romagna (Italy), Flanders (Belgium), North Karelia, North West England (UK), Pomerania (Poland), South East Region of Ireland, South Tyrol (Austria), and Southern Bohemia (Czech Republic) (Paper IV). Furthermore, experiences of the impact of policy interaction were drawn from Austria, Finland, Germany, the Netherlands, Poland, Sweden and the United Kingdom, with a special focus on Finland and Sweden.

This set of countries and regions is considered to establish an adequate basis for providing insights into the factors underlying more coherent and sustainable biomass planning. While geographical limitations may reduce the

generalisability of the work, it is held that focused critical assessment is necessary to deliver both such insights and increased understanding of the role and scope of biomass planning.

Data sources and access: The study is based mostly on a desktop research of official policy documents, but includes data sources ranging from business management papers to public policy literature. The information from informants at national and regional levels is primarily used in this work to verify or enrich data from desktop research.

Temporal bounds: The thesis work has covered a period of circa five years. The temporal scope of this work is narrowed primarily to the period before the introduction of the requirement for NREAP establishment. Therefore, the recently prepared NREAPs have not been included in this research. The work focuses on the national biomass planning documents and views on the planning processes pre-dating the NREAPs.

Sample size and heterogeneity: The work underpinning the Papers I-III included official planning documents in each jurisdiction participating in this work. While the small sample size of the plans under examination may not be representative of the whole set of planning activity in the EU, they were perceived to represent the jurisdictional bioenergy policy stance and vision, and thus important indicators of the view on biomass planning.[11] Moreover, the jurisdictions vary greatly in terms of geographical size and population.[12] Thus, the comparability varies – for example, from region to region, and due to differing plan parameters. It should also be noted that many planning documents do not fully explain procedural/process dimensions of planning (i.e. how planning has been done), but rather reflect policy outcomes of planning ("what" aspects). These limitations have been worked with. Firstly, heterogeneity is an important theme in this work; it has been studied both as an example of 'incoherence' and different approaches have been utilised in the search for 'lessons'. Secondly, many of the missing items have been addressed in the later stages of the research (i.e. in interviews). It is held that these limitations do not prevent from the generation of insights into, and

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[11] However, even if newer documents had replaced or complemented the BAP documents, they have been excluded in the analysis.

[12] Regarding regions, the administrative level (or territorial unit according to the Nomenclature of Territorial Units for Statistics, NUTS) can also differ and affect the scope and the implementation of the plan.

enhancing understanding of the biomass planning content and processes. Indeed, the limited suite of plans that were studied allowed a more thorough, in-depth analysis assisting this task.

1.5 About the overarching research fields

In general terms, the research has been framed by two major fields: *policy research*[13] and *(policy) planning*. While policy research is held to be devoted to changing the world and providing 'knowledge for action' (Etzioni, 2006; Hakim, 2000), Friedmann and Hudson (1974) indicate that planning acts as a link between knowledge and action. Both frameworks and their role in shaping the research are discussed more closely in the Chapters 2 and 3.

Policy research differs from theoretical research in that it is multidisciplinary, multidimensional and focuses on 'actionable factors' rather than theoretical constructs. Both can examine causal processes, but those related to policy research are often more complex (Hakim, 2000). The audience of policy research generally encompasses a variety of actors from policy-makers and non-governmental organisations to private sector (see the next section for the audiences of this study). As this research is targeted to actors involved in or informing planning and policy-making in the biomass field, it primarily concerns creating knowledge for action than producing understanding specifically for social science. This implies that – as Patton (2002) purports when the audience consists of policy-makers – the research results will be judged by the relevance, clarity, utility and applicability instead of the standards of basic research, i.e. research rigour and contribution to theory.

Within the realm of policy-oriented research, Rist (2003) argues that the manner in which policy research is done should be reformulated so that research can contribute to informed decision-making, i.e. the context in which to search for a linkage between knowledge and action needs to be redefined. He advocates seeing policy-making as a process – constantly evolving through cycles – instead of as a discrete event. This perspective

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[13] Also called policy-oriented research. Several researchers have made the distinction between 'theoretical' or 'basic' research and (applied) policy research (Bardach, 2005; Etzioni, 2006; Hakim, 2000; Ritchie & Spencer, 1994). Hakim (2000) explains the division – albeit unfixed – between theoretical research and policy research, in which the former has an interest in creating knowledge for understanding, normally to a specific social science community.

coincides with regarding research serving an 'enlightenment function' as opposed to an 'engineering function'.[14] While the former view suggests that researchers work with policy-makers to create a contextual understanding about an issue and build lasting linkages, it contends with the latter point of view, which assumes that adequate information can be collected to support a policy initiative. In light of these perspectives, this work is in line with the 'enlightenment function', and views the biomass policy planning as a process, and seeks to generate a contextual understanding about it.

Related to this discussion is the way in which knowledge relevant to policy research is produced. Gibbons et al. (1994) have distinguished two modes of knowledge production: Mode 1 and Mode 2. Mode 1 describes a disciplinary, homogeneous problem solving driven by a mostly specific, mostly academic community. In turn, Mode 2 knowledge is produced in the context of application, and is transdisciplinary and heterogeneous in nature. This type of inter- and transdisciplinary approach is pertinent also to this research as it relies on a number of disciplines of social sciences, e.g. public policy and administration, urban planning and organisational management.

1.6 Intended audience

This thesis is intended to be relevant to a variety of audiences. A great asset in this regard is the set of peer-reviewed research papers that have the potential to facilitate wider spreading of the research. First and foremost, this work is targeted to actors involved in or informing planning and policy-making in the biomass/bioenergy field. However, the findings are also expected to be of interest to the larger bioenergy community. A number of intended audiences are described as follows.

Policy- and decision-makers dealing with biomass use for energy are the main audience of this thesis. This group includes both politicians and administrators, particularly at the EU and national level. The findings of the research are posed so that they can contribute to the design and implementation of improved bioenergy policy and planning. Due to the

[14] According to Jenkins-Smith and Sabatier (2003, p. 138), "[w]hile policy analyses may seldom influence specific government decisions, they often serve an 'enlightenment function' by gradually altering the concepts and assumptions of policy makers over time". In turn, Bardach (2005) argues that intellectual enlightenment is an inevitable by-product, even if not a prime goal of policy research.

more holistic scope on biomass use in this thesis – urging the consideration of other uses of biomass, the results of this work are also considered pertinent to practitioners beyond energy field. In addition, the findings are intended to be relevant to the *actors responsible for regional and local level policy and planning*; these actors include, among others, energy agencies, and regional and local authorities.

This work is also relevant for *industry actors* in the biomass and bioenergy spheres. They play a key role both to the delivery of bioenergy targets, and the process of ensuring that it is done in a sustainable manner.

The work is applicable to *researchers* in the fields intersecting with biomass use as it synthesises a significant volume of knowledge published in the relevant planning areas and contributes to the body of knowledge on sound biomass policy and planning. This knowledge is intended to stimulate, for instance, further research and analysis of the success of planning and plans, and their ability to steer biomass use to a more environmentally and socially sound path.

Finally, and as indicated in the introduction, biomass planning is not limited to EU member states and regions, but also concerns many other countries in the world. This work is produced in the belief that sound planning should be widely applied. As this work shows for Europe, improvements to planning processes can help to promote more sustainable use of biomass to energy and communicate on its benefits and trade-offs, and to generally promote more informed decision-making. Such improvement can contribute to successful bioenergy policy implementation in many jurisdictions, and jurisdictional levels.

1.7 About the author

The choice of topic and scope of this research have been greatly shaped by the fact that the author was employed for the majority of the PhD period (2006-2009) by an EU institution.[15] A significant portion of the work was performed at the Joint Research Centre (JRC), Institute for Energy in Ispra, Italy. It is an organisation that is a key provider of scientific and technical

[15] The formal contract was employment but in practice it was a 3-year fully funded research grant position to examine a problem deemed to be of general interest to the Joint Research Centre.

support for EU policy-making. The work started to focus on biomass action plans increasingly since the work done for the "Renewable Energy Snapshots" report in 2007 including an analysis of the status of national BAPs (Kautto & Jäger-Waldau, 2007).

The author has also been involved in a research project Bioenergy Network of Excellence (NoE) from 2006 to 2008.[16] This project involved eight European research institutes; one of them was the IIIEE. The aim of the project was to integrate research, development and demonstration activities to establish a Virtual Bioenergy R&D Centre in Europe. In common project meetings the author was exposed to a range of new ideas and developments in the bioenergy field. The author also participated in one of the jointly executed projects within the Bioenergy NoE. At first it was called "Needs and challenges in implementing key directives – EU Emissions Trading Directive", and later, "EU-ETS[17] and Biomass". This work has contributed to Paper V. For relevant publications from the author, see Appendix A.

1.8 Thesis outline and paper contributions

This thesis has five chapters and five appended research papers. The author has been the principal contributor for the work in all of the papers. Co-author support has been provided by researchers from the IIIEE and other research organisations (see Table 1-2). The thesis structure is outlined as follows.

Chapter 1 has presented the context for the thesis work and defined the research problem, questions and objectives. It has also delineated the scope and limitations, and described the intended audience.

Chapter 2 presents the first part of the literature review underpinning the research. It begins with the discussion on the recommendations for planning the sustainable use of biomass. It then describes essential concepts for this thesis – including policy coordination and coherence and reviews the aspects enfolding strategic planning.

[16] The Bioenergy NoE was active between 2004 and 2009.

[17] EU Emissions Trading Scheme

Chapter 3 describes the conceptual background to the analytical framework of the thesis; this is the second part of the literature review. The conceptual background is elaborated from the perspective of the planning process and the plan content.

Chapter 4 explains the methodologies applied to achieve research objectives. It positions the research in terms of scientific research paradigms, and presents the research methods applied in the study. It concludes by discussing the validity and reliability of the results.

Chapter 5 provides a summary, analysis and discussion of the main findings in the light of the research questions and objectives.

Chapter 6 concludes the thesis by answering to the research questions and elaborating on the main outcomes. It develops recommendations, presents the contribution of the research work and proposes issues for further research.

Table 1-2: Research papers and contributions by the author of this thesis

Publication	Title	Contribution
Paper I	Kautto, N. & Peck, P. National biomass action plans in Europe – Looking for a coordinated approach to biomass policy. Submitted to *Energy Policy* in November 2010.	The researcher scoped and planned the majority of the underlying research work, conducted all of the research and analysis, and wrote the majority of the article.
Paper II	Kautto, N. & Peck, P. (2011). From optional BAPs to obligatory NREAPs: understanding biomass planning in the EU. *Biofuels, Bioproducts and Biorefining* 5(3): 305-316.	The researcher scoped and planned the majority of the underlying research work, conducted all of the research and analysis, and wrote the majority of the article.
Paper III	Kautto, N. & Peck, P. Regional biomass planning – Contributing to the realisation of biomass potential in the EU? Submitted to *Renewable Energy* in February 2011.	The researcher scoped and planned the majority of the underlying research work, conducted all of the research and analysis, and wrote the majority of the article.
Paper IV	Kautto N. & Peck, P. Lessons from biomass planning at national and regional level in the EU. Submitted to *Biofuels, Bioproducts and Biorefining* in August 2011.	The researcher scoped and planned the majority of the underlying research work, conducted all of the research and analysis, and wrote the majority of the article.
Paper V	Kautto, N., Arasto, A., Sijm, J. & Peck, P. (2011). Interaction of the EU-ETS and national climate policy instruments – Impact on biomass use. *Biomass and Bioenergy* (article in press).	The researcher planned major part of the underlying research work, conducted the majority of the research and analysis, and wrote the majority of the article.

CHAPTER
TWO

2. Biomass planning – context and theoretical considerations

This chapter presents the first part of the literature review underpinning the research. It discusses the recommendations for planning the sustainable use of biomass for energy and presents essential concepts for the research. These focus on policy coordination, integration and coherence, and a review of aspects of strategic planning. This chapter is intended to provide deeper background to the research and insights into more coordinated policy-making.

2.1 General recommendations for planning

Biomass planning often departs from an energy viewpoint. The EU BAP and the established biomass plans at national level follow this approach. However, some analysts indicate a need to expand that view with policies that concentrate on issues going beyond biomass for energy, such as land- and water-efficient food production, reduction of emissions from agriculture and promotion of sustainable cultivation systems (Kampman et al., 2010; WBGU, 2009). The need to look beyond biomass for energy has been fuelled by the questioning of the environmental and social sustainability of its use (cf. WBGU, 2009). As a response to such critique, several studies and initiatives have recently addressed the sustainability of biomass from various aspects and provide recommendations on what policy-making revolving around biomass use should take into account. Examples of these studies and their areas include:

- Antikainen et al. (2007): New challenges of bioenergy (in Finland) and their environmental, social and economic aspects
- Avebiom and Junta de Castilla-y-León (2009): A 'methodology proposal' for a national biomass plan

- BAP Driver (2009): Best practice guidelines based on the assessment of national biomass strategies and action plans in 12 EU countries
- Bringezu et al. (2007): Non-food use of biomass and its environmental sustainability implications
- FAO (2008, 2010a): Policy options and recommendations in terms of the opportunities and threats to forestry, policy and institutional frameworks for sustainable wood fuels
- IRGC (2008): Risk governance guidelines for bioenergy policies
- Orthen and Brückmann (2009): Operational guideline for the development of integrated bioenergy action plans
- UNEP DTIE (2010a, 2010b, 2010c, 2010d): Land use and land use change, water, invasive species and stakeholder involvement in the bioenergy context
- WBGU (2009): Recommendations for sustainable bioenergy use and components of sustainable bioenergy policy

A full examination of these many, and at times disparate, viewpoints is beyond the scope of this thesis; however, a number of the recommendations found within such work are incorporated in the discussion relevant to the development of the analytical framework in Chapter 3.

The abovementioned recommendations can also be formulated as guidelines for the countries to follow; this will be discussed in the next section in terms of EU level guidelines for BAPs and NREAPs. Of note is the perception of how such guidelines are and should be viewed. For instance, recommendations regarding items considered necessary items for sustainable development strategies are to be considered not as a blueprint or a checklist but as a set of desirable processes and outcomes that allow for local differences (Dalal-Clayton & Bass, 2002). In contrast, Berke and Godschalk (2009, p. 230) see that the criteria they propose for the assessment of the quality of city and regional plans can act as "a checklist of possible considerations", however also taking account of "variations that are pertinent to local contexts". In this work, the views on guidelines are examined (see Section 5.4.2).

2.2 EU guidelines for biomass action plans

As indicated in the introduction (Section 1.2.1), the biomass action plan concept was not well defined at the outset. However, the discussion of

national BAPs attempted to clarify the structure and the content of these plans. The two most important initiatives have been a series of expert meetings on nBAPs convened by the European Commission and the so-called 'BAP Driver project'. In addition to EC efforts (described in the next section), the BAP Driver project has assisted in developing a policy guideline to help the process develop biomass strategies that feed into the NREAPs (BAP Driver, 2009; Orthen & Brückmann, 2009). Similar to the idea of creating a common structure for a guideline for biomass plans, the template for NREAPs (European Commission, 2009d) should help the consistency and comparability of plans between member states.

2.2.1 Evolution of the scope and content of national BAPs

Since the nBAPs were first proposed by the EU BAP, there have been efforts by the EU to involve key national actors in the bioenergy field in developing the scope and content of national BAPs. In the period 2006-2008, three nBAP expert meetings involving member state and candidate country representatives and national experts were convened to exchange views and experiences about national BAPs, and to discuss how to achieve a coherent and coordinated approach on bioenergy. The EC also initiated a discussion in this forum on the common elements for national BAPs to clarify the scope and common content of these plans (European Commission, 2008b).

The meeting minutes show the development of the BAP concept. In the first nBAP expert meeting in June 2006, it was concluded that national BAPs go beyond studies of biomass potentials and summaries of support schemes. Furthermore, they are held to combine inter-sectoral (biomass use) and inter-service (ministries and stakeholders) approaches and to contain 'added-value components' that encompass "a problem-solving, market-oriented approach towards more market dynamics in the bioenergy sector" (European Commission, 2006, p. 4). In the the second meeting in March 2007 it was decided that the nBAP meetings needed to focus more on specific issues (European Commission, 2007). Based on results of the questionnaire developed by the EC, a discussion paper was developed on contents and purposes of national BAPs for the third meeting.

The last meeting in February 2008 addressed the dialogue on three topics: the proposal for common elements in nBAPs, collection and documentation of comparable data on biomass availability and biomass sustainability criteria (European Commission, 2008b). A so called 'coherent and coordinated

approach' was proposed by the EC detailing four themes as appropriate elements to be included in national BAPs. These are presented in Table 2-1.

Table 2-1: EC proposed elements for nBAPs in February 2008

Physical and economic availability of biomass	Of different kinds; including wood and wood residues, wastes and agricultural crops and residues, including by-products
Priorities for biomass use	Biomass use and setting appropriate targets for three sectors: heating, electricity and transport, including targets or objectives for resource and energy efficiency
Measures that can be taken until 2020	- Develop biomass resources - Mobilise new biomass resources (identification, cataloguing and exchange of best practices) - Create a competitive and sustainable market and supply chain, including consideration to imports of biomass vs. domestic supply
Implications	Land use, biodiversity and economy, including costs and impact on employment

Source: European Commission (2008b)

Pursuant to the rather slow development of national BAPs during those three years of discussion, it became clear that more had to be done. It was apparent that the encouragement of national BAPs did not yield the expected development of such plans. The experiences of 12 member states reported by BAP Driver (2009) explained the slow development of national BAPs and highlighted that the political priorities were often not in the area of biomass planning. For example in Germany and Poland it was reported that the process was initiated many times, but was overrun by other activities with higher priority. In Austria, the political priorities were indicated to be in food and energy, while in Finland the promotion of RES was not a top priority in general. In Greece, other technologies, such as solar and wind, were favoured over biomass. In addition, a large number of actors involved and the complexity of the issues have been observed to delay the plan establishment.

As mentioned in Section 1.1.1, the requirement of the RES-Directive for mandatory NREAPs, including various biomass-related actions, created a shift of focus from voluntary nBAPs to mandatory NREAPs. Consequently,

it is unlikely that there will be more EC level meetings concentrated specifically on national BAPs.

2.2.2 Requirement for national renewable energy action plans (NREAPs)

In contrast to the national BAPs, the content of the NREAPs is dictated by an official template complementing the RES-Directive (European Commission, 2009d). This provides guidance for the member states in the detailing of their strategies to reach the national targets. The idea of a template is that it aims to ensure completeness and comparability among the action plans, and that they are structured so as to facilitate future reporting on the implementation of the RES-Directive (EUROPA, 2009).

It was mandated that NREAPs be delivered by the end of June 2010.[18] Their progress reports should be submitted by the end of 2011 and every two years thereafter until 2020. These plans need to include targets for the shares of energy from renewable sources in transport, electricity, heating and cooling for 2020; in addition, they need to outline the trajectory that renewable energy growth is expected to follow. It is also required that they identify adequate measures to achieve these targets, including national policies to develop existing biomass resources and mobilise new biomass resources for different uses. Again as outlined in Section , national BAPs should form an integral part of the NREAPs (European Commission, 2008b). However, the NREAPs were expected to expand from the suggested 'coherent and coordinated' approach of the EC. An indication of the need to take the various biomass uses and users into account is that it was requested that the NREAPs consider the interactions between the energy end uses and interaction with other non-energy sectors (European Commission, 2009d). As the timeframe from the template development to the submission of the NREAPs was only about one year, certain issues have had to be left to be covered by the biannual progress reports. These issues include the detailed impact assessment of renewable energy policies. Section 3.2 discusses the NREAP elements more in detail.

According to Vagonyte (2010), the biomass community seems to have great faith that the NREAPs can guide the EU to the 2020 targets. Reflecting this,

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[18] As mentioned earlier, all member states had submitted their NREAPs to the EC by January 2011.

member states have been provided guidance especially concerning the biomass part of their NREAPs by biomass actors. The European Biomass Association (AEBIOM) organised a workshop on the bioenergy part of the NREAPs in March 2009 and March 2010. The 2010 event was centred upon comprehensive, specifically focused targets on small-scale heat and biogas, effective measures to support market development, and biomass supply issues, in creating 'the right strategy' for bioenergy in the NREAPs. As the NREAPs will define the framework for bioenergy support schemes and investments for the coming ten years, AEBIOM has suggested that clear guidelines should be given to those who have to formulate such plans to ensure that "all biomass resources and markets are considered properly" (AEBIOM, 2009a).

2.3 Policy coordination, integration and coherence

This section defines and applies relevant concepts to provide insights into the coordinated approach to biomass policy. These concepts are: policy coordination, integration and coherence.

2.3.1 Definitions

The concepts of *policy coordination, integration, consistency and coherence* are considered to be central for this study. In order to provide insights into biomass planning, this section shall first examine their definition. There are various definitions for all these four terms, and these are shortly discussed in this sub-section.

Coordination: In general terms, *coordination* is "the act of coordinating, making different people or things work together for a goal or effect" (Saxena, 2009, p. 31) or "harmonious combination of agents or functions towards the production of a result", following a physiological definition (OED Online, 2011a). According to Jones (2002), *policy coordination* means "getting the various institutional and managerial systems of government that formulate policy to work together" (p. 391). For this work this implies that the policy coordination is seen as ensuring that different actors and issues concerning biomass use work together for common goals and results.

Coherence and consistency: It is important to view the concept of policy coordination as only a part of achieving coherence in policy-making. Jones (2002) argues that *coherence* goes further than the concepts of policy

coordination and *consistency*, the latter focusing on "avoiding conflict among policies in reaching for broader goals" (Jones, 2002, p. 391). The reason is that coherence "involves the systematic promotion of mutually reinforcing policy action across government departments and agencies creating synergies towards achieving the defined objective". It also "stresses the cumulative value-added that is possible from efficiently interweaving the contributions made by different policy communities" (Jones, 2002, p. 392). Another way to define policy coherence is that it is about attaining a situation in which multiple and potentially conflicting goals can be made compatible (Richardson, 1997, as cited in Winship, 2006). In this vein Mickwitz et al. (2009, p. 24) (addressing climate policy coherence) indicate that "policy coherence is used to imply that the incentives and signals of different policies – climate and others – provide target groups with non-conflicting signals". Thus, policy coordination is one of the ways to achieve coherence.

Integration: Policy integration also contributes to policy coherence as it introduces means to reduce coherence problems; an example can be seen in climate policy integration between sectoral and climate policies (Mickwitz et al., 2009). In general terms, policy integration embraces the idea of inclusion of specific policy objectives into other public policies (Mickwitz & Kivimaa, 2007). Lafferty and Hovden (2003, p. 9) maintain that environmental policy integration[19] involves "the incorporation of environmental objectives into all stages of policymaking in non-environmental policy sectors, with a specific recognition of this goal as a guiding principle for the planning and execution of policy". They argue that environmental objectives cannot be balanced with the objectives of other policy sectors as they link with the protection of the carrying capacity of nature. Moreover, Mickwitz et al. (2009) see it as important that various policy aims and instruments are consistent with each other; or as Lafferty and Hovden (2003) argue, contradictions should be minimised, while prioritising environmental concerns when policies have

[19] Developed from the policy integration definition of Underdal (1980), who argues that for a policy to qualify as 'integrated', three requirements need to be met: comprehensiveness, aggregation, and consistency. While comprehensiveness signifies time, space, actors and issues, aggregation is about establishing the evaluation of policy on 'accumulated' decisions. Consistency entails harmony and accord of different components. Based on these requirements, a fully integrated policy is one where "…all significant consequences of policy decisions are recognised as decision premises, where policy options are evaluated on the basis of their effects on some aggregate measure of utility, and where the different policy elements are consistent with each other" (Underdal, 1980, p. 162).

conflicting goals. This is also considered to be the case regarding sustainable development (SD). While Cherp et al. (2004) maintain that for sustainable development to be forwarded, economic, social and environmental objectives must be balanced, the environment is considered as the limiting factor (Meadowcroft (1997). For Steurer and Martinuzzi (2005) – when they discuss the key characteristics for SD strategy processes – the advancement of SD entails integration of policies across sectors (horizontal policy integration) and between different levels of jurisdictions (vertical policy integration).[20] Institutionalised collaboration is one mechanism that is indicated to facilitate both types of integration (Steurer & Martinuzzi, 2005).

2.3.2 Application of policy coordination, integration and coherence

Pursuant to the above, policy coherence, consistency, integration and coordination can all be considered as vital elements of good policy-making. However, if the policy coherence reflects the "more positive view of how to reach those broader goals" (Jones 2002, p. 391), then it can be questioned whether it should also be the 'ultimate' aim also for biomass policies rather than the policy coordination, called for by the EU BAP. In any case, this paper seeks to take a more practical approach and fuses the above discussed definitions. Therefore, biomass policy coherence is defined as ensuring that *different stakeholders for biomass use work together for common goals or results (or react to policy stimuli in such ways) while minimising contradictions between different policy aims, balancing the economic, social and environmental objectives and capturing synergies.*

Several literature sources on sustainable biomass policy have stressed that bioenergy policies should be integrated with or linked to other related policies. As a cross-sectoral issue, it must be integrated (at least) into forestry, agriculture and land use policies (FAO, 2008; IRGC, 2008). Bringezu et al. (2007) hold that a sustainable biomass strategy must take account of the interrelations of energy, material and land use. It should also be embedded within a cross-sectoral strategy for sustainable use and management of resources. It appears logical that limited biomass resources can be used more efficiently and with a greater delivery of good to society when there is a coordinated approach on biomass use. A coordinated strategy can also assist in finding synergies between various biomass pathways. As one example, this can be enabled by the application of the

[20] For such integration in the climate policy context, see Mickwitz et al. (2009).

'cascade principle' (e.g. first using wood for material purposes, and later for energy recovery); a topic addressed in more detail in Section 3.2.1). Further, the efficiency of the conversion of biomass for energy (e.g. combined heat and power, i.e. CHP vs. biofuels) and the capability of biomass to act as an inherent energy storage – buffering fluctuating RE sources such as wind in order to allow a higher penetration of renewable energy as a whole – should not be neglected in a biomass strategy.

As indicated in Section 1.2.1, bioenergy objectives need to be coordinated with other related policies (IRGC, 2008). Thrän et al. (2006) support this view in their call for better coordination of the political frameworks in the agricultural, energy and environmental sectors. In addition, energy policy aims and support instruments applied to these sectors need to be better coordinated to avoid unfair or socio-economically damaging effects upon competing markets for use, and to better prepare for uncertainties. A 'good' example of this is the so called 'food versus fuel' debate, exacerbated by the uncoordinated policy actions; consequently, there is a demand for policies that enhance the trust in access to food (OECD/FAO, 2010). In the same vein, the FAO urges greater coherence among agriculture, food security and climate change policy-making; the promotion of Integrated Food Energy Systems (IFES) is suggested to be part of the solution (FAO, 2010b). As around half of the human population relies on traditional, and often unsustainable biomass to meet their energy needs,[21] IFES can alleviate the need for food and energy, as these integrated systems aim to produce both of them simultaneously.[22] A more coordinated take on policies and institutions directing sustainable woodfuels, highlighted by FAO (2010a), appears also to be part of the solution.

A related matter is the indirect land use change (ILUC) implications that can be linked to biofuels production. According to Croezen, Bergsma, Otten and van Valkengoed (2010), current policies need to be reformulated if we wish to avoid additional emissions associated with ILUC. Directing biofuel production to a more sustainable path needs an informed decision-making process. To support such, UNEP (2010a) suggests the creation of comprehensive land use planning and management systems. Such planning

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21 An excerpt of the World Energy Outlook on energy poverty estimates that in 2009, 40% of the human population (2.7 billion) depended on traditional biomass fuels for cooking (OECD/IEA, 2010).

22 For more detail, refer to FAO (2010b).

processes will also need to adopt a cross-sectoral, multi-level and participatory approach in order to improve coherence of all relevant policies, to collect all available data and to gain support among stakeholders (UNEP, 2010a).

The BAP Driver operational guideline (Orthen & Brückmann, 2009) aims to guide the integration of the bioenergy sector towards a well balanced political strategy. The list of items that must be addressed by national biomass strategies and NREAPs demonstrates the highly diverse and complex nature of the field of biomass use: different biomass sectors and/or links of value chains, steps of the policy process, administrative levels of the policy processes, and various policy perspectives. Just as a one example to portray the complexity, there are various jurisdictional levels at which the policies are made – international/EU, national, regional and local levels. While bioenergy policies are often determined and implemented at the national level, a diversity of sub-national or local conditions (e.g. related to differing socio-economic and agro-ecological circumstances, as indicated by WBGU, 2009) ought to be accounted for (IRGC, 2008). The International Risk Governance Council (2008) argues that this can be facilitated by developing national policies from the bottom-up and by flexibility in their local implementation. On the other hand, various related risks have implications at a global scale and demand a global perspective (IRGC, 2008). Moreover, effective multi-level governance and transboundary action is needed as bioenergy policy cannot be developed within only the national context. In short, a multi-level policy approach is required (WBGU, 2009). Consequently, the IRGC (2008) recommends that policies determining the biomass use for energy "allow for full consideration of global, regional, national and local perspectives and also reflect the different capabilities and needs of industrialised and developing countries" (p. 21).

As discussed in Section 1.2.1, another issue worthy of attention is the interplay of various policy instruments applied in the energy and climate field. It is argued that the policy environment is becoming increasingly congested, and this can cause policy targets to form interactions when they overlap (cf. Oikonomou & Jepma, 2008; Sorrell & Sijm, 2003; Sorrell et al., 2003). Oikonomou and Jepma (2008) and Sorrell et al. (2003) have shown that the multiplicity of instruments can decrease the effectiveness and success of an instrument, especially when the targets contradict. Thus, as argued by del Río González (2007) in the context of emissions trading and renewable electricity support schemes, policy coordination is required to avoid conflicts and make use of synergies. Also, compatibility of different

support systems is considered as crucial for policy design (Oikonomou & Jepma, 2008). Consistency in support bioenergy support instruments are further discussed in Section 3.1.3.

2.4 Strategic planning: concepts, theories and applications

This section presents a selection of theory enfolding the concept of strategic planning. This is intended to provide understanding of the point of departure, role and scope of national biomass planning documents and process.

A linkage between coherence and sound policy-making is provided by Bullock, Mountford and Stanley (2001, p. 15) with the words: "modern public policy needs to be soundly based, enduring and coherent" – in this instance equating modern policy to better policy. Better policy is held to contribute to better performance, and is described as "policy [that] is informed by a full understanding of the practicalities of delivery, rigorously assessed for its realism, designed with a capacity for continuous improvement, and understood by everyone with a role to play in putting it into practice" (Mulgan & Lee, 2001, p. 10).

2.4.1 Key concepts

According to a survey among civil servants with the UK government, there is an increasing awareness among policy-makers about the need to adopt a strategic approach to policy-making (Bullock et al. 2001). It is argued that this approach would embody the idea of policy-makers being more forward- and outward-looking, i.e. the first including the ideas of taking a long-term view and clearly defining the outcomes that the policy is designed to achieve, and the latter being about considering influencing factors and drawing on experience of other countries (Bullock et al., 2001). According to Dalal-Clayton and Bass (2002), the advancement of sustainable development also requires a strategic approach; it entails long-term vision and integration of different development processes.

This approach essentially matches the concept of strategic planning, as shall be outlined in this and the next chapter. Understanding its importance starts with understanding the various interpretations of the term *strategy*. There are a multitude of definitions to strategy and not all of them are applicable to

the public sector.[23] In this discussion, it has not been chosen to adopt any specific strategy definition, but to seek examples that may be applicable to biomass policy and planning. For instance, it can be considered as "a direction and scope of the organisation over the long-term, which achieves advantage in a changing environment through its configuration of resources and competences with the aim of fulfilling stakeholder expectations" (Johnson, Scholes, & Whittington, 2005, p. 9). While this corporate world definition contrasts with the general aspirations of public policy in that the latter does not explicitly pursue advantage over competitors, it includes a number of relevant aspects to biomass planning. These will be discussed in the next sections. Management theorist Henry Mintzberg argues that strategy is definable by five Ps: plan, pattern, position, perspective and ploy (Mintzberg, 2000). Mintzberg points out that while strategy as a plan looks into the future, strategy as a pattern describes a consistency in behaviour over time (i.e. looking into the past). These two concepts are called *intended* and *realised* strategies, respectively (Figure 2-1). He further argues that a third type of a strategy is however needed to be defined, an *emergent* strategy, in which a realised pattern was not particularly intended. *Deliberate* strategies are those which intentions are fully realised (Mintzberg, 2000; Mintzberg, Ahlstrand, & Lampel, 1998).

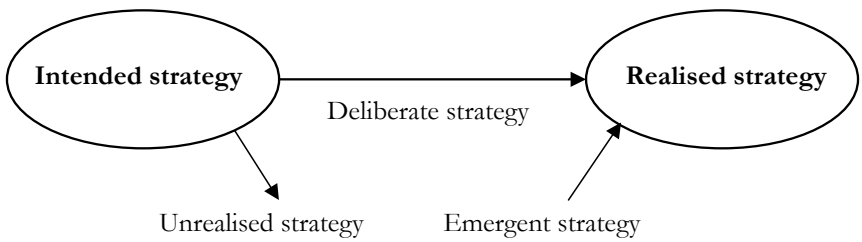

Figure 2-1: From intended strategy to realised strategy

Source: Mintzberg & Waters (1985)

The public sector strategy definition of Bryson (2004) – a pattern of purposes, policies and actions; varying by level, function and time frame – is intentionally broad. He aims to draw attention to the need to seek consistency across four components: "rhetoric (what people say), choices

[23] Such as that of Porter (1996), who argues that strategy is about a unique position, which is attained by choosing among a variety of activities those ones that are different from competitors.

(what people decide on and are willing to pay for), actions (what people do), and the consequences of those actions" (p. 46). It is held here that the definition for sustainable development strategies can further assist in the quest of comprehending better the roles and function of biomass strategies and plans. They are described as: "[a] coordinated set of participatory and continuously improving processes of analysis, debate, capacity-strengthening, planning and investment, which integrates the economic, social and environmental objectives of society, seeking trade-offs where this is not possible (Dalal-Clayton & Bass, 2002, p. 31).

When it comes to *planning*, there is a myriad of definitions and applications – and an in-depth review is beyond the scope of this work. Nevertheless, some of the most relevant items to the research are discussed here so as to provide a more integrated view on planning. As presented earlier (Section 1.5), planning is considered to concern an activity located at the connection between knowledge and action (Friedmann & Hudson, 1974). According to Friedmann and Hudson (1974), planning and its theory are pertinent to fields from organisational development and national economic planning to urban planning.[24] In the business world, planning has been held to be the manner in which managers develop and change their goals and ensure that these goals are achieved (Smith, 1996). For Ackoff (1970), it is "the design of a desired future and of effective ways of bringing it about" (p. 2). According to Mintzberg (2000), planning is "a formalised procedure to produce an articulated result, in the form of an integrated system of decisions" (p. 12). He also argues that the key to understanding planning is formalisation, i.e. to decompose, articulate and rationalise the processes by which decisions[25] are made and integrated into organisations.

Strategic planning fuses planning and decision-making (Bryson, 1988). According to Bryson (2004) it can be defined as "a disciplined effort to produce fundamental decisions and actions that shape and guide what an organization (or other entity) is, what it does, and why it does it" (p. 6).[26]

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[24] A planning theory, however, has not an endogenous body of theory but consists of a broad suite of theories and practices from different disciplines (Allmendinger, 2009).

[25] Planning has been used as a synonym for decision-making in the public sector (Mintzberg, 2000). According to Smith (1996), if a decision includes a commitment to future action, every decision must thus constitute a plan or a part of a plan.

[26] Mintzberg (1994, 2000) is of the opinion that strategy cannot be planned as planning is about analysis and strategy is about synthesis. Thus, he suggests that instead of strategic

The product of strategic planning process (i.e. strategy formation) is often called a strategic plan (see for definitions Section 2.5.1). It should be noted that strategic planning and *strategic management* are not synonymous; the first is encompassed by the latter, which pertains to "the central integrative process that gives organisation a sense of direction and ensures a concerted effort to achieve strategic goals and objectives" (Poister & Streib, 1999, p. 323).[27] Therefore, the abovementioned sustainable development definition actually can be seen to fit within the description of strategic management.

2.4.2 From business world to public sector

Strategic planning has its roots in the private sector and has inspired public and non-profit sector planning (cf. Kaufman & Jacobs, 1987; Porter, 1996; Rondinelli, 1976). While strategic planning in the business world arose in the 1960s, the concept is reported to have permeated the public sector twenty years later, in the 1980s (Kaufman & Jacobs, 1987; Pindur, 1992).[28] The corporate strategic planning approach was introduced to public sector to improve its effectiveness, as it was regarded to focus more on action and results, promoting wider participation in the planning process and stressing the assessment of strengths and weaknesses in the context of opportunities and threats (Kaufman and Jacobs 1987).[29] Other benefits of strategic planning entailed clarification of direction and assistance in decision-making (Berry & Wechsler, 1995; Bryson & Roering, 1988).[30] In addition, the reasons behind the introduction of this concept to the public sector included the argument that due to dramatic changes in the environments of public

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planning, the term 'strategic programming' should be used. This research, however, continues to use the term strategic planning as it is the mainstream term.

27 Strategic management in the public sector can also be called strategic public management (Steurer, 2007; Steurer & Martinuzzi, 2005).

28 Before the 1980s, public sector strategic planning had mostly been taken place in the military sector (Bryson, 2004). While the application of strategy to business (and strategic management) is held to be dating back to the time of the Greeks (3000 B.C), its application in the latter half of the last decade was spurred by faster changing business environment after World War II (Bracker, 1980).

29 However, Kaufman and Jacobs (1987) found that corporate strategic planning was not fundamentally different from good comprehensive planning in the public sector; the emphasis was different, but they were the same 'kind'.

30 See Poister et al. (2010) for more detail, and Kemp (1990) for comparison of traditional versus strategic planning.

and non-profit organisations – such as significant demographic shifts and quick technological changes[31] (Kemp, 1990) – they needed to adopt the strategic planning approach in order to successfully meet the various challenges ahead (Bryson, 1988; Kemp, 1990).

While the application of private sector approaches have largely been seen as positive, some critical views include the notion that entrepreneurial values cannot directly be applied to the public sector due to different purposes, tasks and conditions[32] (cf. Smith, 1996; Stewart & Walsh, 1992). However, despite that and even arguments that there has been an overall failure of planning in both business and public realms – put forth e.g. by Mintzberg (1994, 2000) and Voß, Smith and Grin (2009), respectively – strategic, long-term planning in the public sector seems to have regained its position (Voß et al., 2009). Poister et al. (2010) indicate that the role of strategic management in the public sector yet remains insufficiently researched.

2.4.3 Strategic planning examples in public policy

Looking back to the statement of Mulgan and Lee (2001) on better policy contributing to better performance, studies such as (Boyne & Gould-Williams, 2003) have indicated along the line that there is a notion among policy-makers that better planning leads to better organisational performance.[33] The benefits of applying strategic planning to policy-making contain, among others, the idea that it supports the definition of policies creating public value (Moore, 1995); and provides guidance on how to address community needs and explains how policies should be put into practice (Mazzara, Sangiorgi, & Siboni, 2010). Further, it is argued that policy implementation demands strategic planning in order to utilise proper

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31 This context is relevant to bioenergy and biofuels.

32 For example, typical of the public sector is that it is required to provide 'public goods', in other words "a commodity or service provided, without profit, to all members of a society" (OED Online, 2011b). This is usually contrary to the private sector purposes.

33 However, for instance Boyne and Gould-Williams (2003) and Bryson & Roering (1988) point out that there has been little research especially on the impact of planning on the performance in the public sector in particular. The research of Boyne and Gould-Williams (2003) indicates that the production of action plans has an insignificant impact on the performance of public organisations but acknowledges it is the first empirical study of its kind. Poister and Streib (2005), however, arrive to a more positive conclusion in that the development of action plans is positively associated with the perceived impacts at the city level strategic planning.

timing and provide an atmosphere for action (Rondinelli, 1976). Examples of where strategic management ideas have been applied to various policy fields include sustainable development planning (Mazzara et al., 2010; Steurer, 2007; Williams, 2002), forest sector (Gane, 2007), tourism sector (Edgell, DelMastro Allen, Smith, & Swanson, 2008) and the military (U.S. Air Force in Barzelay & Campbell, 2003). Strategic planning at different policy-making levels is acknowledged by Bullock et al. (2001) and Wechsler & Backoff (1986) at national level; Kasza (2009) at regional level; and Williams (2002) and Mazzara et al. (2010) at local/community level. Supporting the linkage between the business management models and bioenergy policy-making, the BAP Driver project has created a model for an integrated bioenergy policy approach that is based on processes drawn from strategic management theory (Orthen & Brückmann, 2009).[34]

2.4.4 Rational and incremental models of planning

To close the 'circle', starting from searching the origin of strategic planning in the private sector and continuing to public sector applications, it is important to examine the linkage between strategic management concepts and policy-making from a wider perspective. This discussion will examine the controversy surrounding planning, which also explains the decline in planning described above. As planning is essentially linked to the way policy decisions should be or are made, it is affected by two main decision-making theories: *rational* and *incremental* models. This discussion is also of relevance to this research due to the pursuit of sustainable development with bioenergy systems and the extent to which governments can intervene and deliberately change the course of development according to this overarching objective.[35]

According to the rational model, decision-making is about selecting those alternatives that maximise outcomes – essentially based on decision-makers' values, the choice achieved through comprehensive analysis of all alternatives and their consequences (Simon, 1957, as cited in Hill, 2005; cf. Howlett & Ramesh, 2003). Thus, it is called also a rational-comprehensive

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[34] The bioenergy policy guideline is adapted from the model of Hill and Jones (2010) (R. Brückmann, personal communication, October 20, 2009).

[35] Meadowcroft (1997) has exactly this intention in his paper on seeking insights from political science literature to contribute to the debates about the manner in which sustainable development should be forwarded.

model (cf. Lindblom, 1959). One of the principal criticisms of this model indicates that decision-making in practice usually is not so purposive or logical; in addition, decision-makers are rarely able to consider all possible alternatives during the process (Hill, 2005). Consequently, Herbert Simon – probably the best known critic of the rational model – developed the idea of '*bounded rationality*' to better portray the real life decision-making. Instead of maximising their values, decision-makers choose an alternative, which is satisfactory or good enough (Simon, 1957, as cited in Hill, 2005).

Those criticising the rational theory focus on the point that decision-making is a complex and collective process in practice. Rather than being achieved through one-off rational analysis, decision-making proceeds by *successive limited comparisons* with earlier, familiar decisions (Braybrooke and Lindblom, 1963, as cited in Hill, 2005). According to one of the leading advocates of incrementalism Charles Lindblom (1959, p. 81), developing policies is actually closer to "continually building out from the current situation, step-by-step and by small degrees". He also called this way of formulating policies as *muddling through* (or *disjointed incrementalism*), in which policies are formed/changed incrementally from the status quo (cf. Hill, 2005; Howlett and Ramesh, 2003).[36] When compared to the rational theory, it has also been argued that the incremental way of making policies is a less technical and more political activity, and that is largely determined by bargaining and negotiations between key decision-makers rather than a comprehensive analysis (Howlett and Ramesh, 2003). Benefits offered by this approach include that serious mistakes are avoided through incremental changes (Lindblom, 1959) and by dealing with selective issues as they arise (ad hoc), new evidence can be picked up and utilised rapidly (Overseas Development Institute, 2009). Nevertheless, this model is not without criticism; Howlett and Ramesh (2003) for example hold that it lacks goal orientation and is conservative.[37]

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[36] Kay (2010) interprets Lindblom's term as 'obliquity' as "a process of experiment and discovery". It entails that "[s]uccesses and failures and the expansion of knowledge lead to reassessment of our objectives and goals and the actions that result" (p. 62). For this reason, he establishes that good decision-making is necessarily oblique (instead of rational/direct) in complex systems and an uncertain environment.

[37] For more criticism refer e.g. to Boyne & Gould-Williams (2003); Weiss and Woodhouse (1992); for discussion on alternative perspectives, refer to Hill (2005), Howlett and Ramesh (2003) and Kay (2010).

These aspects are held to be valid for policy argumentation in this thesis because sustainable development is considered to need forward-oriented thinking and purposive action by governments instead of leaving it to be spontaneously achieved; this entails some sort of public planning (Meadowcroft, 1997). Nevertheless, as highlighted by Meadowcroft (1997), public sector planning experiences have been considered as ambiguous – or even fiascos. Reasons for this become clearer through examining the debate between different strategy schools of thought. This in turn assists in understanding the ways in which policy planning could go forward to be more successful in bringing about the desired changes.

The dichotomy between the two theories of decision-making has been the source of debate since the 1960s. Parallel to this discussion is the dispute between the two models of planning as methods for policy formulation, taking place among strategists in two different schools, i.e. planning and learning schools (Brews & Hunt, 1999; Steurer, 2007).[38] As Brews and Hunt (1999) describe the confrontation between the two schools, strategic planning models range from the formalised processes (conforming to the planning school) to incremental processes (learning school). According to the planning school, strategic planning is seen as a rational, linear and formal process (Chaffee, 1985). Furthermore, typical for the planning school, strategies must be formed through a controlled, conscious process of formal planning and the result of this process is an entirely ready product to be implemented via detailed attention to objectives, budgets, programmes and operational plans (Mintzberg, 2000; Mintzberg, et al., 1998).

The traditional, rational model of policy-making explained above is in line with the planning school theses. According to Parsons (1995), such approach "is imbued with ideas that implementation is about getting people to do what they are told, and keeping control over a sequence of stages in a system" (p. 466). However, this type of planning – peaking in the 1970s and 1980s in the private sector (Mintzberg et al., 1998), but dominant in a number of policy fields still in the 1990s (Steurer & Martinuzzi, 2005) – was seen to not match with the complexity and non-linearity of reality, and

[38] As Mintzberg et al. (1998) and Chaffee (1985) argue, strategy has not one single definition even if there is some kind of consensus of its nature. It has been suggested that this is because strategy is both multidimensional and situational (Hambrick, 1983). Thus, its formation process can also take several forms depending on the perspective or 'school of thought'; Mintzberg (2000) and Mintzberg et al. (1998) have defined ten of these schools.

therefore lost ground (Steurer & Martinuzzi, 2005, cf. Mintzberg, 2000; Mintzberg et al., 1998; Wildavsky, 1973).[39] Noteworthy is that the majority of decision-making and planning approaches are claimed still to be grounded in rational models (Heazle, 2010; Netting et al., 2008).

In contrast, from the learning school's point of view, strategies are not formed through rational analysis but through adaptive, dynamic, non-linear, incremental and emergent learning process (cf. Brews & Hunt, 1999; Quinn & Voyer, 1996). Even if Lindblom's disjointed incrementalism was not considered as a suitable theory for strategy formation, he has been said to point the way toward this school of thought (Mintzberg et al., 1998). James Brian Quinn expanded the concept and arrived to a conclusion that strategy can be formed incrementally, but instead of 'muddling', the process is about *logical incrementalism* (Quinn & Voyer, 1996). According to this approach – argued to better match real life – broad ideas lead to specific commitments in a flexible and experimental manner. Making those specifics concrete as late as possible allows the organisation to decrease the uncertainty and utilise the best available information (Quinn & Voyer, 1996). According to Quinn (1980, as cited in Mintzberg et al., 1998), it is essential to promote strategic visions that are changing and improving; however Mintzberg (2000) points out that formulation of a document is not necessary.

In direct contrast to the rational school of thought, Netting et al. (2008) present non-rational planning. Non-rational planners adopt circular thinking which leads them to understand the world at the level of subjective experience.[40] The dichotomy of these two planning approaches is well portrayed by the analogy of a line vs. circle; while the line represents 'surety' or certainty – the circle symbolises tentativeness – of never knowing for sure (Netting et al. 2008). Related to this is the distinction that Hogwood and

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[39] Mintzberg (2000) offers an explanation about the failure of strategic planning through his explicit criticism of three 'fundamental fallacies' against the planning school. These fallacies are: 1) strategic planning assumes predictability and stability during strategy-making while ignoring that the process is actually dynamic and uncertain; 2) planners and implementers of the plan are disconnected from strategy-making process; essentially, thinking is detached from acting and formulation is disconnected from implementation; 3) it is assumed that strategy formation process, including manager's intuition and creativity, can be formalised.

[40] As Netting et al. (2008) point out, the non-rational thinking does not equate irrationality; while it involves rational and logical thought, it yields different results from rational thinking.

Gunn (1984) make between 'planning *of* change' and 'planning *for* change'. The public policy field has mostly to do with planning for change rather than being able to control the change – the latter usually concerning an organisation, in which implementation is seen as a technical/managerial problem. In contrast, the change in the 'real world' is difficult to predict and control. Reflecting this view, Hogwood and Gunn (1984) advocate a need for an adaptive approach and treating policy-making more of an iterative process than linear.[41]

The current action planning (e.g. NREAPs) at the EC level, in principal, seems to follow the theses of the planning school, such as comprehensive analysis of alternatives, relatively tight control of the process with steps and timetables and the idea that decisions are made in order to drive behaviour, i.e. as an intended/deliberate strategy. In the sustainable development planning context, Meadowcroft (1997) regards the points of the learning school potentially significant as it, among others, suggests the adaptation of policy when facing uncertainty; argued to be of particular relevance in the field such as sustainable development. In fact, both of the planning schools include aspects that can be utilised when devising a better approach to planning. This is discussed in Section 2.4.6.

2.4.5 Coordination by planning

Furthermore, revisiting the earlier discussed concepts, coordination by planning is not a new idea. In fact, that is one of the planning school's reasoning for planning (formally), i.e. organisations need to engage in planning in order to coordinate their activities, especially because its capacity to enhance communication, building mutual confidence and knitting disparate activities together (Mintzberg, 2000). Wildavsky (1973), who criticised several ideas connected with planning, argued that planners are intended to coordinate. This implies the achievement of efficiency and guaranteeing the performance by allowing redundancy while ensuring plan compliance and seeking consent of others. These contradictory ideas of coordination are not easily reconciled, as Meadowcroft (1997) points out. However, coordination can also happen informally (Mintzberg, 2000), and "on the ground" (Meadowcroft, 1997, p. 435). Such forms of informal communication, 'mutual adjustment', were described by Lindblom (1979, explained in Hill, 2005). This entails coordination between people in the

[41] See Section 3.1.2 for further discussion on such model of policy-making.

absence of a central coordinator, through the mixture of conflict and conformity. Both of these 'lines of thought' are held to be relevant to coordination of sustainable development, as central governments usually assume a coordinating role while the planning centres can reconcile their efforts via negotiation (Meadowcroft, 1997).

Already in 1976, Rondinelli stressed the dynamic conditions of public policy-making and proposed new approaches to planning to develop strategies and policies designed to achieve social acceptance. These approaches entail adopting various planning styles, one of which is coordinative planning. Rondinelli (1976, p. 81) argues that "planning for policy enactment and implementation requires co-ordination and integration of the decisions of the multitude of participants involved in policy-making". This type of planning aims to reconcile differences among decision-makers. He further purports that "[c]o-ordination, to be successful, must have an explicit objective." The views of Rondinelli provide additional justification for seeking coordination with the means of planning in the case of biomass use.

2.4.6 Hybrid concept of planning

Continuing the discussion on the sustainable development context and the form of policy planning, Steurer (2007) has argued that both planning schools show significant weaknesses when it comes to cross-sectoral policies such as sustainable development policies. Steurer asserts that SD policies need, to some extent, a deliberate, formal strategy that – quoting Dalal-Clayton and Bass (2002) – matches its sophistication with complex challenges. Instead of SD strategies following strictly either planning models at the extreme ends of perspectives, he proposes that these strategies represent a hybrid strategic approach. Steurer justifies this, and the overall existence of SD strategies, largely by the nature of the concept of sustainable development; it requires a long-term view, concerns various actors and involves several sectors. In addition, the reality of the challenges posed by the rapidly accruing loss of environmental quality (implying, among other things, an escalating sense of urgency among many social stakeholders; cf. Dasgupta, Levin, & Lubchenco, 2000), and complexity in policy-making in general is much more difficult than the ideal planning models suggest. Therefore, Steurer argues that neither a rigid and rational planning model with a top-down approach, nor purely incremental planning lacking shared vision, is suitable for guiding strategic management of sustainable development.

These accounts of sustainable development strategy-making mark the path for understanding biomass policy planning in this work. Similar to SD policies, it can be argued that policies touching upon biomass use similarly require sophisticated, formal planning with long-term shared vision due to the complexity and diversity of the biomass field.

2.5 The role and function of planning documents

Relevant to this discussion, and additionally assisting in understanding the role and function of biomass strategies and action plans, are the definition and level of decision-making and the assigned roles for planning documents.

2.5.1 Definition and decision-making level

Sharma (2009) and Bryson (2004) suggest that an action plan is an implementation tool that identifies implementation options and supports an effective implementation process. An action plan is defined (in the context of SD planning) as "a framework of actions for achieving a strategy objectives and targets" (Dalal-Clayton & Bass, 2002, p. 255). This supports that which was presented in the introductory chapter (Section 1.2.2) of the functions of NREAPs; they act as implementation and monitoring tools of EC law. As the planning document terms seem to often be used interchangeably in today's policy-making, it is not always that clear what exactly they are supposed to achieve. In addition to strategy and action plan, they can be called e.g. roadmaps,[42] programmes[43] and implementation plans. Looking into the decision-making level of the documents may assist in understanding their function, and what they are expected to deliver.

Harrington and Ottenbacher (2009) have distinguished three levels of organisational decisions and processes, namely strategic, tactical and operational levels. Such divisions have also been applied by Gane (2007), specifying them to concern long-, medium- and short-term, day-to-day

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[42] A roadmap has been defined as "a means of bringing about or reaching something" and nowadays is often used to signify "a plan or a strategy intended to achieve a particular (political) goal" (OED Online, 2011c). Sawyer has held the roadmap as a strategic plan "with a fixed and well-defined target, as well as the steps to reach that target" (1989, as cited in Mintzberg, 2000, p. 228).

[43] See Section 3.1.2 for definitions.

matters, respectively.[44] This is reflected, even if in somewhat varied forms, in the policy development process of Government of South Australia (2007), which argues that it is composed of three connected levels of policy-making, i.e. directional, strategic and operational. Similar to these levels, Wilson (2006, p. 153) indicates that policy-making involves different levels; day-to-day operations might not be policy, but "inextricably linked" with higher level policy-making. Strategic decisions are complex in nature, are characterised by uncertainty about the future and demand an integrated approach to managing an organisation (Johnson et al., 2005, pp. 10-11); they are also likely to affect operational decisions. Gane (2007) however, is of the opinion that the uncertainty related to the strategy process is linked with the tactical and operational level issues, such as programme funding (in the context of forest sector).

Reflecting the main levels of decision-making, two types of (business) plans are depicted by Smith (1996). *Strategic plans* are complex and correspond to the decisions made about future activities and long-term goals, whereas *operational plans* contain clear communication about who is going to do what, by when, with what resources and to what standard (Smith, 1996). Planning can also be used to reduce or remove uncertainty from strategic and operational planning by attempting to answer to 'what if' questions about the issues that can affect the achievement of long-term success; these are known as *contingency plans* (Smith, 1996; cf. Mintzberg, 2000).

This discussion relates to the positioning of biomass action plans in the policy process. As Wilson (2006) stresses, operational level decisions are linked with high level policy-making. Public policy – among many definitions – is distinguishable from a 'decision' (e.g. considered larger than a specific decision) but less readily to be distinguished from 'administration' (Hogwood & Gunn, 1984).[45] As Parsons (1995) indicates, policy-making does not finish at a policy being established, but continues to be carried out while the policy is being put into effect, i.e. implemented (or administered). This issue is further discussed in the next chapter.

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[44] The three decision-making levels can also be defined in terms of the scope of responsibilities: strategic (national), tactics (sub-national, control of projects) and operational level (day-to-day management) (Gane, 2007).

[45] According to Healey (1997), policy signifies an "explicit statement of a governance objective" that "frames subsequent action" (p. 214). Governance in turn she defines as "the management of collective affairs", usually identified with government activity (Healey, 1997, p. 211). See Section 3.1.2 for another definition.

2.5.2 Roles of planning documents

As presented in the introductory chapter (Section 1.2.2), the planning documents (i.e. formal plans) can have various roles. For instance, Mintzberg suggest the roles of formal plans – coinciding with the reasons for planning – are two-fold: media for communication and devices of control (Mintzberg, 2000). Planning, and its products, can also act as symbolic demonstrators of political will to interest groups (Steurer, 2007).

Poister and Streib (2005) see the development of action plans as a tool for implementing strategic initiatives in the city level strategic planning. Mintzberg (2000) states that organisations, especially the effective ones, engage in formal planning in order to elaborate and operationalise the consequences of their strategies formally. He purports that formal planning is not done to create strategies *but to programme already existing strategies*. For example in the context of Polish regional development policy, Kasza (2009) argues that operational programming needs to accompany strategic planning. Similarly, Boyne and Gould-Williams (2003) indicate that planning (in private organisations) has often been equated with the production of planning documents, and argue that this disregards the conceptualisation of planning as a process. As the formal plan, itself an essential part of the planning cycle, does not constitute the whole cycle and may not tell about the other parts of planning process (which may not result in a written plan), it is necessary to measure different elements of planning (Boyne & Gould-Williams, 2003). Johnson et al. (2005) agree that strategy is not the same as 'the plan', i.e. a written document, but a long-term direction that the organisation is following. Mintzberg (2000) further clarifies that "strategy is not the consequence of planning but the opposite: its starting point. Planning helps to translate intended strategies into realized ones, by taking the first step that can lead to effective implementation" (p. 333).

Mintzberg's notion regarding the formal plans is also held to be useful as he indicates that the action plans are essentially 'formalised articulation' of the intended strategies of countries. Steurer (2007) further clarifies the issue by noting that formal plans are strategic devices, which should not be rejected when outdated. He touches upon the idea of flexibility and learning in the strategy process – a topic that shall be further discussed in Chapter 3.

CHAPTER

THREE

3. Conceptual background for the sound policy and planning framework

Pursuant to the discussion of a number of key concepts for the research presented in the previous chapter, this chapter presents the conceptual background to the analytical framework developed in this thesis. This framework – applied in this work for the analysis of the national and regional biomass planning documents – is not presented in this chapter, but in Section 4.4 and in the appended papers (Papers I-III).[46] The following discussion lays the foundation for the framework from the perspectives of the planning processes and plan content. It is intended that this material will improve understanding of how policy planning can and ought to be improved.

3.1 Features of sound biomass policy and planning – process

The analytical framework for this study is built from a range of elements held to represent features of sound biomass policy and planning. This section is intended to elaborate on the 'how' aspect of sound policy-making. The next section (see Section 3.2) is to address the 'what' aspect, i.e. what it is suggested that biomass plans should include.

This research adopts the view that policy success assumes good policy (cf. McConnell, 2010).[47] In the extent public policy literature, the terms for the building blocks of 'good' policy have been used in several ways and are often open to many interpretations. Among other things, they are

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[46] The analytical framework has been utilised in three different variations in this thesis.

[47] McConnell (2010) presents that "[success] certainly contains strong assumptions of what constitutes 'good' policy" (p. 24), even if the word 'success' is seldom utilised within public policy literature.

considered to consist of, among others, realistic and meaningful targets reflecting the desired policy outcomes (Mulgan & Lee, 2001). Other key elements listed as the essential components for good, or better, policies include fairness, transparency, forward-[48] and outward-looking, innovation and the use of evidence, analysis and evaluation (Bullock et al., 2001; Government of South Australia, 2007).[49] The sound policy and planning features relevant to this research are summarised in Table 3-1. This structures sound policy features mainly according to the terminology of Bullock et al. (2001) in order to maintain a degree of comparability between this research and earlier work by others. It also includes the policy coherence definition as formulated in Section 2.3.2.

3.1.1 Continuous learning and improvement

Both public policy-making and strategic management in general are considered as continuous processes (Poister & Streib, 1999; Rondinelli, 1976). Reflecting this, and supporting the understanding of the characteristics of sound policy, is the idea of continuous learning, adaptation and improvement in the policy process (Mulgan & Lee, 2001). Freeman (2006) sees public policy-making as a continuous process of iteration and reiteration, as previous policy is likely to be the most important parameter shaping current decisions. Policy evaluation is considered to generate great benefits for policy learning (Howlett & Ramesh 2003). Mulgan and Lee (2001, p. 18) support this view by saying "every new initiative needs a built-in capacity to learn from monitoring and evaluation". In addition, it is suggested that also the implementation stage of the policy process can be considered a process of learning and mutual adaptation (Freeman, 2006).[50] According to Mintzberg (2000), formulation may precede implementation, but "there has to be "implementation as evolution" […] because prior thought can never specify all subsequent action" (p. 289).

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[48] According to OECD Public Management Agency (n.d., quoted in Jones 2002) forward vision signifies government being "able to anticipate future problems and issues based on current data and trends and develop policies that take into account future costs and anticipated changes (e.g. demographic, economic, environmental, etc.)" (p. 391).

[49] See Lindblom (1959) for comparison of 'good policy' both from the rational and incremental decision-making perspectives.

[50] See Pressman and Wildavsky (1984) and Schofield (2004) for more detail.

This idea of continuous and adaptive learning is also reflected in the works of authors such as Bagheri and Hjorth (2007) and Steurer (2007). Referring to the hybrid strategic concept of Steurer (see Section 2.4.6), its characteristics include among others the idea that strategy formation is seen as an open, circular process (Mintzberg, 2000), which is also flexible concerning varying circumstances and objectives. Steurer – supporting the work of Mintzberg – stresses that the outcome (realised strategy) is dependent both on intended and emergent strategies (see Section 2.4.1 for definitions). The product, a formal plan, should be a living document (Plant, 2009), and the process itself should "allow for unexpected events by providing flexibility so that the strategy process becomes responsive to change and allows readjustment as it continues" (Gane, 2007, p. 3). Further, Bagheri and Hjorth (2007) speak for 'process-based' approaches instead of 'fixed goal' approaches on sustainable development strategies as they consider sustainability as a moving, continuously evolving target. This emphasis is largely based on the notion of social learning resulting from stakeholder engagement. They hold that this process "results in adaptive responses to uncertainties" and evolution of values (Bagheri & Hjorth, 2007, p. 86). Kay (2010), whose message can also be applied to policy-making, argues that good outcomes are indeed the result of continual – however often unsuccessful – adaptation to ever changing circumstances rather than through a conscious process of maximisation.

Table 3-1: Sound policy features

Sound policy features	*Description*
Forward-looking	Clearly defines policy outcomes and adopts a "long-term view based on statistical trends and informed predictions of social, political, economic and cultural trends" (Bullock et al., 2001, p. 14; cf. Jones, 2002).
Outward-looking	Considers influencing factors in the national, European and international spheres and how policy will be communicated with the public; draws on experience in other countries (Bullock et al., 2001). Analyses external factors: the industry (or sector/market) environment, the national environment and the wider socioeconomic environment (PESTLE)[51];

[51] PESTLE denotes the analysis of political, economic, social, technological, legal and environmental factors; see Analysis of internal and external factors in this section.

Outward-looking (continued)	Examines internal factors: organisation's resources, capabilities and competencies (Hill & Jones, 2010). Sets realistic objectives that are aware of the strengths, weaknesses, opportunities and threats both internally and externally (Smith, 1996).
Joined-up	Links to the other policy documents in the field; adopts a holistic view and looks "beyond institutional boundaries to the strategic objectives and seeks to establish the ethical, moral and legal base for policy" (Bullock et al., 2001, p. 14). Facilitates different modes of governance and the activation of various actors (Steurer & Martinuzzi, 2005).
Inclusive	Considers the impact on and/or meets the needs of all people directly or indirectly affected by the policy; involves key stakeholders directly (Bullock et al., 2001). Establishes communication channels among stakeholders as a first step to successful planning (Sharma, 2009). Ideally includes both top-down and bottom-up processes (Smith, 1996).
Continuous learning and improvement	Passes knowledge through feedback loops between the final and the first stage; this becomes an input for the next planning round (Hill and Jones, 2010). Continuously learns, adapts and improves in the policy process (Mulgan and Lee, 2001).
Policy coherence (incl. coordination and integration)	Ensures that different stakeholders for biomass use work together for common goals or results (or react to policy stimuli in such ways) while minimises contradictions between different policy aims, balances the economic, social and environmental objectives and captures synergies.

3.1.2 From policy cycle to strategic planning cycle

Mulgan and Lee (2001) argue that policy delivery is better depicted by a circular process than a linear one. This corresponds to a 'staged' model of the policy process, also called the 'policy cycle'. Originally developed in late 1950s by Harold Lasswell, this model breaks down the policy process into distinct stages in order to simplify the complexity of public policy-making. It was further developed by Gary Brewer, who recognised the policy process as an ongoing cycle; instead of policies terminating at the final stage of the policy cycle, they are likely to reappear in a modified form (Howlett &

Ramesh 2003, cf. Rist, 2003). This supports Freeman's (2006) notion of previous policies forming an essential part of new policies.

One example that subsumes the approaches of many models of policy stages is the three main stages of the policy cycle: policy formulation, implementation and accountability (Rist, 2003) (or evaluation; see Section 3.1.3 for elaboration). [52] It is not an easy task to distinguish between these stages in this research, and thus it can be considered that it focuses on topics that touch upon all these stages. However, as with so many other models, the policy cycle has also been criticised for being far from reality; one critique being the absence of an explicit recognition of the overlapping and interaction between the stages (Hill, 2005), and ignoring that the stages can be skipped, compressed or change order (Howlett & Ramesh, 2003).[53]

As discussed earlier, action plans are seen to act as policy tools assisting the implementation of a certain policy. It can be argued that they fit within the programme level of the policy model of Alexander (1985), see Figure 3-1 for simplified version. This is also because programmes – considered to put policy into practice (McConnell, 2010) – are generally expressed in legislation, plans and projects (Alexander, 1987).[54]

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[52] Another, more detailed public policy process model is the nine-step model of Hogwood and Gunn (1984): 1) Deciding to decide (issue search or agenda-setting), 2) Deciding how to decide (or issue filtration), 3) Issue definition, 4) Forecasting, 5) Setting objectives and priorities, 6) Options analysis, 7) Policy implementation, monitoring and control, 8) Evaluation and review, 9) Policy maintenance, succession, or termination.

[53] See Howard (2005) for more criticism.

[54] According to Alexander (1985), programmes are "elaborated specifications of policy" while policy is a "more general response to broader issues and goals"; however, the definitions are considered relative (p. 413). Hogwood and Gunn (1984) support the view that policy can be also viewed as a programme. Moreover, Alexander (1985) argues that implementation can come about even without a formalised policy or plan.

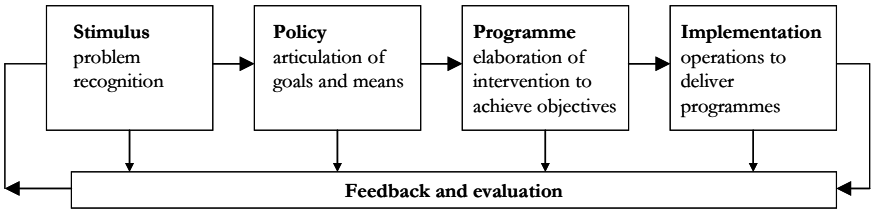

Figure 3-1: Policy-programme implementation process

Source: Adapted from Alexander (1985)

As for cyclical planning models, it is unclear to what extent private sector practices have influenced public policy. According to Parsons (1995), the public sector has adopted corporate management planning cycles as an approach to implementation.[55] For example Gane (2007) – in the context of forest sector strategic management – recognises that the strategy process is cyclical and consists of three basic steps (analysis, aims and action).[56] In any case, similarities are discernible in terms of stages and the idea of continuous improvement. For instance, the congruence of implementation and evaluation stages is evident between public policy and business strategy-making models. Thus, approaches from both models are utilised in this paper especially in terms of these stages to assist in understanding the strategic planning of biomass use.

In addition to public policy models, a planning cycle from the business sector is thought to be suitable to guide the analysis of biomass action planning as the already established biomass action plans seem to have qualities of both strategic and operational plans; see results in Chapter 5). The integrated bioenergy strategy model of the BAP Driver project (Orthen & Brückmann, 2009) is one example of applying such a model to bioenergy planning. Smith (1996) presents one of the planning cycles typical of the

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55 Another example of planning cycles is the Planning-Programming-Budgeting System (PPBS) – a rational policy analysis technique applied in the 1960s (Parsons, 1995). Circular planning approaches can be seen to have similarities with the Plan-Do-Check-Act cycle, also known as Deming or Stewhart cycle, which is central to business process improvement and quality control. While its evaluation stage is represented by the 'check' stage, the starting of the new cycle can be seen to take place at the 'act' stage (cf. Figure 3-2).

56 Also Boyne and Gould-Williams (2003) mention the planning cycle in their study of public organisations.

business sector[57] and calls it as a 'control loop'. This control loop – in the form of a circle – is essential to any kind of effective planning with four distinct stages: drawing up the plan, implementation, monitoring and evaluation of the plan. These are incorporated in the cycle of (formal) planning process with more specific stages: developing a vision; setting goals and objectives; planning how to achieve objectives; implementation and monitoring; and the evaluation of results (Smith, 1996), see Figure 3-2.

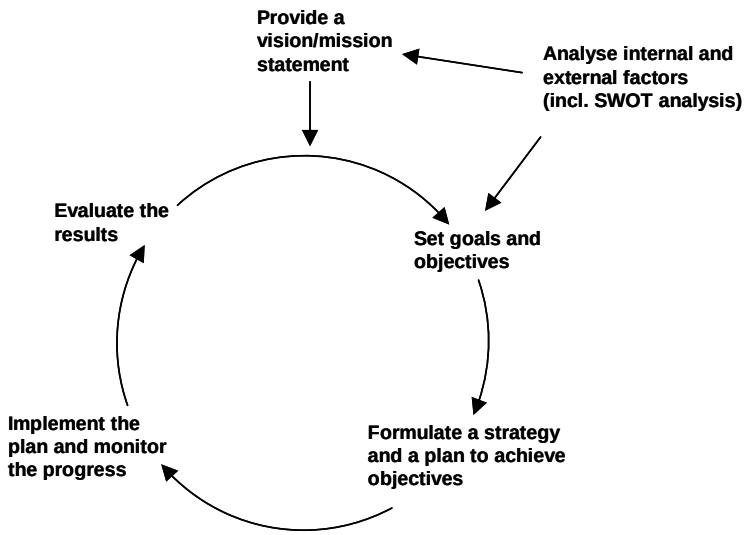

Figure 3-2: Strategic planning cycle

Source: Adapted from Smith (1996)

The planning cycle stages are summarised in Table 3-2 and further discussed in the following section (3.1.3). While acknowledging that private sector models are not directly transferable to public policy, this business sector model has been utilised in this thesis as a basis for examining the various stages of biomass policy planning. It is considered here to act as a more precise pattern of planning than the policy cycle model, which depicts policy-making in general.

[57] For other, more elaborated private sector models see e.g. Bryson (2004) and Hill and Jones (2010). They both combine linear and circular features in the sense that even if the planning process is described as linear, the feedback loops indicate the idea of continuity.

Table 3-2: Strategic planning stages

Planning cycle stages	*Description or comment*
Vision/mission statement	Bridging the present with the future and creating the energy the energy needed to provide an organisation with its overriding purpose and direction (Smith, 1996). Setting the desired future state and stating the key values (Hill & Jones, 2010).
Goals and objectives	Goals are general statements of aims or purposes, whereas objectives or targets specify the results and outcomes to be achieved (Smith, 1996). Goals and objectives are formulated on one hand to diminish the threats and weaknesses, and on the other hand to build on the strengths and opportunities (Pindur, 1992).
Formulation of strategy and plan to achieve objectives (measures)	Establishment of a strategic plan, often resulting in a formal planning document (e.g. Bryson, 2004). Necessary conditions for adequate public participation include time, operational sensitivity and credibility (Steurer & Martinuzzi, 2005). Measures and actions are designed to solve problems, reduce difficulties or utilise the opportunities (Avebiom & Junta de Castilla-y-León, 2009). National bioenergy policy framework and support schemes should be consistent, without forgetting the interplay of single measures (BAP Driver, 2009).
Implementation	Implementation of the policy should be considered at the policy formulation stage (Slade, Panoutsou, & Bauen, 2009) and part of the policy-making process (Bullock et al. 2001). Good policy anticipates the challenges of implementation and is capable of adapting to the changing realities of the operational environment (Government of South-Australia, 2007).
Evaluation	Formative (or process) evaluation monitors and documents the process of implementation ('along the way'); summative (or outcome) evaluation focuses on the outcome or impact of the policy (Fischer, 1995; Netting et al., 2008). Continuous review of policy is to ensure that it deals with the right issues; systematic evaluation of the effectiveness is built in to the policy-making process (Bullock et al., 2001).

3.1.3 From vision to evaluation

This section discusses the strategic planning process both in general terms and in the bioenergy context. Public policy cycle stages are mainly given emphasis in the case of implementation and evaluation, as explained above. It also examines to which extent the strategic planning model of Hill and Jones (2010) has been applied in the 'integrated bioenergy strategy approach' of the BAP Driver project (Orthen & Brückmann, 2009).

Vision and mission statement

Often the first step, preceding the formal planning process, is to develop a vision, which bridges the present with the future and which helps stimulate the energy needed for an organisation to define its overriding purpose and direction (Smith, 1996). Hill and Jones (2010) hold that a mission statement is made up of: a mission – a statement of the reason for its existence (raison d'être); the vision – setting the desired future state, and the statement of the key values and major goals.[58] According to Pindur (1992), the mission statement also guides the public sector strategic planning process. As Smith (1996) argues, "the results achieved by any organisation depend to a great extent on the quality of the mission, vision and values and the processes by which they are defined" (p. 76). Moreover, Smith purports that the vision is a way to communicate the organisation's purpose to the employees in the private sector, while regarding the scope of this work, the vision of the plan is a tool to communicate the biomass sector's purpose to the stakeholders. It should be noted that the strategy model of Orthen and Brückmann (2009) lacks a vision/mission statement stage altogether.[59]

Analysis of internal and external factors

It can be considered that the real starting point for planning is the analysis of the factors influencing the vision and objective setting. According to Smith (1996), setting realistic objectives depends on the awareness of strengths and opportunities both in the external and internal environment. Hill and Jones (2010) suggest that the external analysis should include the examination of three interrelated environments: the industry (or sector/market) environment, the national environment and macroenvironment, i.e. wider socioeconomic environment (cf. Johnson et al., 2005). The external factors

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[58] However, the last component is discussed later in this Section.

[59] The reason for this may be that the authors consider the vision to be included in the goal setting (see Goals and objectives in this section).

(or forces or trends) in the macroenvironment can be divided into six main areas that influence the development of an organisation: political, economic, social, technological, legal and environmental areas (also known by an acronym PESTLE or PESTEL) (Johnson et al., 2005; Smith, 1996). The internal analysis, in contrast, is focused upon identifying the organisation's resources, capabilities and competencies (Hill & Jones, 2010; also referred to as strategic capability by Johnson et al., 2005).

It is often difficult to draw the line between the internal and external factors, especially in the public policy context. This is apparent in the strategy approach of Orthen and Brückmann (2009), which applies the analysis of internal and external factors to bioenergy sector. Orthen and Brückmann (2009) divide the factors enabling or constraining national biomass use for energy into three linked areas: different bioenergy sectors (electricity, heat and transport fuels), different renewable energy technologies and non-energy use of biomass (such as food and materials). As the organisation under consideration in this case is made up of a cluster of biomass using sectors at national level, external factors include factors such as EU targets and legislation whereas the internal factors entail the assessment of domestic biomass resources. Those factors that the strategy approach of Orthen and Brückmann have categorised as internal factors, such as competition with other renewable energy technologies could also be considered as external factors. Further, at this stage it is of importance to take account of the conflicts with the non-energy use of biomass.

Strategic choice and SWOT analysis

Comparison of the strengths, weaknesses, opportunities and threats both internally and externally – also called a SWOT analysis[60] – is intended to yield a range of strategic alternatives or choices. Based on these alternatives, those strategies may be identified that best match the resources and capabilities to the environment (Hill & Jones, 2010). Bryson (2004) calls this stage as the identification of strategic issues;[61] these issues being central policy issues or crucial challenges impacting the organisation. He points out that at this stage the organisation might find that their mission needs to be

[60] Bryson (2004) uses the term SWOC, replacing 'threats' with 'challenges'.

[61] For another example on issue selection and identification, see Pindur (1992).

reformulated because of the new understanding acquired through the external and internal analysis.[62]

In the context of bioenergy planning, Orthen and Brückmann (2009, p. 15) argue that this analysis should yield a sound assessment of the biomass potential. This analysis necessitates that availability of biomass is assessed by means of sustainability criteria. This is related to much more than just endogenous resources and their availability – here member states must decide on to what extent biomass resources outside the EU should be exploited (Bringezu et al., 2007) (for more discussion on sustainability criteria, see Section 3.2.1).

Goals and objectives

Goals and objectives are formulated to both diminish the threats and weaknesses, and, on the other hand, to build on the strengths and opportunities (Pindur, 1992). The terms are often used interchangeably, but this work follows with the approach of Smith (1996) who maintains that goals are general statements of aims or purposes (here qualitative objectives), whereas objectives or targets specify the results and outcomes to be achieved.[63] Thus, the objectives could also be regarded as measurable (or quantitative) goals. In the business world, objectives are often aligned with the SMART principle, which contains the idea of sound objectives being **s**pecific, **m**easurable, **a**ttainable, **r**ealistic, and **t**ime limited (Smith, 1996). As Pindur (1992) stresses, objectives are focused on what and when rather than how and why. Concerning the number of goals or objectives, an 'economic approach' entailing setting only few primary goals per initiative (in the policy context) is suggested by Mulgan and Lee (2001). This is supported by the finding of Boyne and Gould-Williams (2003) that a higher number of targets is linked to poorer performance in the context of planning in public organisations.[64]

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62 See Bryson (2004, pp. 153-182) for further approaches on strategic issue identification.

63 For instance, Hill and Jones (2010) do not seem to make this difference, but consider goals as precise and measurable; cf. Johnson et al., (2005) and Pindur (1992).

64 Boyne and Gould-Williams (2003, p. 128) explain this in part by the confusion created "in the minds of managers about what they are supposed to achieve". Furthermore, their analysis concerns a number of precise quantitative targets (not making a distinction between their number and precision) associated with the perception of performance (G. Boyne, personal communication, November 1, 2010; J. Gould-Williams, personal communication, December 15, 2010).

Concerning the goals and objectives of biomass action plans, the qualitative objectives (i.e. goals according to the terminology above) can be described as governing principles and priorities creating coherence (Avebiom & Junta de Castilla-y-León, 2009). The quantitative objectives are normally known as precise targets, e.g. a certain percentage of bioenergy production at a given year. Avebiom and Junta de Castilla-y-León (2009) propose that the formulation of targets takes account of bioenergy market scenarios or forecasts. In addition, the bioenergy targets should also be aligned with the national renewable energy targets (Orthen & Brückmann 2009). Moreover, it is urged by IRGC (2008) that bioenergy policies should be established with a clear focus and have a transparent and deliberate objective in order to avoid negative outcomes due to attempt to achieve too many (possibly conflicting) goals at the same time. For instance, Berndes and Hansson (2007) note the possibility of conflicting objectives between employment creation and greenhouse gas reductions when promoting bioenergy. They indicate that policy-makers need to consider the related tradeoffs. Further, it is argued, that the issue of equity should be included in the bioenergy policy goals. Governments are recommended to build social and economic 'safety-nets' for short- and long-term losers, namely for those nations and societies who are negatively affected by bioenergy development (IRGC, 2008). These include the countries suffering from high food prices connected in part to biofuel advancement (cf. WBGU, 2009).

Formulation of strategy and plan to achieve objectives

The stage in which strategies are formulated follows the clarification of the mission and setting of objectives based on the identification of strategic issues. As discussed earlier, this is the stage of the strategic planning process in which a strategic plan is made, often resulting in a formal planning document, such as an action plan or a roadmap (cf. Bryson, 2004). A variety of strategy formulation approaches include a so called five-step process and mapping of action-to-outcome relationships (Bryson, 2004).[65] Referring to the broad strategy definition of Bryson (2004) (see Section 2.4.1) strategies are – as distinct from strategic choices – actions. Along these lines, strategies at this stage are regarded as "types of action that are required to achieve the objectives" and tactics as sub-strategies, that is "the individual actions and tasks that will be required to implement the strategies" (Smith 1996, p. 26).

[65] Refer to Mintzberg et al. (1998) and Bryson and Anderson (2000) for other approaches.

What it comes to bioenergy plans, these strategies (as actions) are usually referred to measures. Like in the case of setting objectives, it is suggested that they are based on the identification of threats and opportunities (Avebiom & Junta de Castilla-y-León, 2009; Orthen & Brückmann, 2009). Measures and actions are thus designed to solve problems, reduce difficulties or leverage opportunities (Avebiom & Junta de Castilla-y-León, 2009).

In examining the consistency of national bioenergy policy frameworks and support schemes, the BAP Driver (2009) concluded that a sustainable, long-term commitment of a government to a strategy can be more relevant than the description of the individual support schemes. As indicated in Section 1.2.1, the consistency of single support instruments ought to be considered. Stability of the policies over a long time period also counts as it helps avoid the problems of "stop and go" policies (BAP Driver, 2009, p. 114). In broader terms, if the management of the risks related to bioenergy is considered as a set of measures, these risks can be managed by measures such as the establishment of proper land use policies, which seek to balance all competing demands including food, fibre, fuel, biodiversity conservation, ecosystem management and GHG emissions reduction, and ensure mutually supportive land uses (IRGC, 2008).

The bioenergy strategy approach of Orthen and Brückmann (2009) relates this stage to combining the roadmap and setting of political measures in a single document, which is to be included in the NREAP. They also argue that the measures should be accompanied by the description of the bioenergy policy and regulatory framework. In the model of Hill and Jones (2010), strategy formulation actually comprises all the abovementioned (mission, internal and external analysis, SWOT analysis and the selection of best strategies to meet the goals). Thus, the bioenergy strategy model deviates in this sense from the model of Hill and Jones as it has created a specific step for strategy formulation (like in the 'strategy change cycle' of Bryson, 2004).

Implementation

As highlighted earlier, the implementation of strategies is assisted by implementation vehicles or tools, such as action or implementation plans. Poister and Streib (1999) posit that organisations do not reach the desired future state with plans, but by decisions and actions; therefore, the plan needs to be implemented in a purposeful manner. In the public policy context, implementation can be described as "what happens between policy

expectations and (perceived) policy results" (Ferman, 1990, as cited in Hill & Hupe, 2009, p. 2). As mentioned earlier, Parsons (1995) considers that policy-making continues to be carried out while the policy is being put into effect, thus it does not stop at the policy establishment. Seeing implementation as an evolutionary process or as a 'policy-action continuum' in the manner of Barrett and Fudge (1981, as cited in Parsons, 1995) fits with the idea of policy learning mentioned earlier.

According to the internal policy-making guide of the South Australian government (2007), good policy anticipates the challenges of implementation and is capable of adapting to the changing realities of the operational environment. Thus, implementation of the policy should be considered at the policy formulation stage; an idea that is supported by Bryson (2004) and Mintzberg (2000), and in the bioenergy policy context by Slade et al. (2009). Mintzberg (2000) claims that "every failure of implementation is, by definition, also a failure of formulation" (p. 25). FAO (2010a) is of the opinion that transparency and accountability of those implementing the policy are the factors required for a policy to succeed and to improve. Perfect implementation is regarded as virtually unattainable due to the difficulties in achieving all prerequisites such as: adequate time and resources; a foundation in valid theory of cause and effect; successful communication and coordination; and fully understood and agreed objectives (Hogwood & Gunn, 1984). Also dynamic problems, interactions of policies and strategies in the problem area, and a shifting political environment contribute to the challenges of implementation (Bryson, 2004).

The BAP Driver strategy model (Orthen & Brückmann, 2009) considers this stage as managing policies in practice. Points to take account of include: efficient support scheme management, streamlining administrative processes of bioenergy projects, strengthening energy sector infrastructure and implementation of technical regulations and quality standards. Involvement of stakeholders is also seen as important (discussed later in this section). Adapting the message of Hill and Jones (2010), all these issues aim to improve the design of the system to put the chosen bioenergy strategy into action.

Process and outcome evaluation

There are a number of evaluation-related terms that often overlap and seem to be understood as similar concepts. However, a distinction can be made between assessment 'along the road' (*formative assessment*) and *summative*

assessment (e.g. when the policy timeframe is at its end). According to Netting et al. (2008), formative evaluation monitors and documents the process of implementation, thus running parallel to implementation instead of caring only about the outcome or impact of the policy. Fischer (1995) calls this type of evaluation 'process' evaluation that focuses both on policy formulation and implementation processes. Summative evaluation "judges overall merit or worth based on whether goals were achieved" (Netting et al. 2008, p. 160). Both types of evaluation appear to be necessary;[66] advocates of this idea include Hogwood and Gunn (1984) and Smith (1996). However, as Hogwood and Gunn point out, there are a number of factors that make it very challenging to carry out evaluation. These include unexpected events, possible interactions with other governmental interventions and difficulties in isolating the effect of a single programme. They go on to recommend that the means of evaluation must in fact be considered already at early policy-making stages i.e. options selection and design stages. In the context of this work, this signifies the stages of strategic choice, goal setting and formulation.

Regarding process evaluation, a term 'monitoring' is often used. It is here understood to denote formative evaluation that includes both collecting data *and* reflecting and analysing on the collected data as an ongoing process. This is supported by Hogwood and Gunn (1984) that highlight that monitoring is not only a process of information collection but also requires decisions regarding which actions are going to be taken if performance is not as expected. On the basis of the monitoring results, the decision is urged to be made between three actions: to continue as-is, to correct the performance in some way or to revise the plan (Smith, 1996). Mulgan and Lee (2001) emphasise this type of evaluation by stating that "effective measurement of performance, in as close to real time as possible, and in as widely accessible a form as possible" (p.10) is a prerequisite for better policy.[67] Moreover, effective 'review' as Bullock et al. (2001) call it, requires a continuous and systematic check and record of the progress towards set objectives. This entails the collection of information appropriate for monitoring purposes (Hogwood & Gunn, 1984). The idea of the constant

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[66] See Netting et al. (2008, Chapters 4 and 5) for the relative importance of the evaluation type depending on the planning approach.

[67] Nonetheless, as e.g. Boyne and Gould-Williams (2003) argue in the case of the measurement of organisational performance, it is surrounded by theoretical and empirical problems.

review is to ensure that the policy is really dealing with the problems it was designed to solve, considering related effects (Bullock et al., 2001). Thus, monitoring serves as a control mechanism that is a fundamental part of effective planning (Smith, 1996).

For the information gathered through both types of evaluation to have an impact, it needs to be fed back to the decision-makers. Smith (1996) purports that evaluation provides a basis for future decision-making when it is used as a part of a continuous improvement process; thus, evaluation is both the final stage and starting point of the planning. Information and knowledge should be passed through feedback loops between the final and the first stage, and become an input for the next planning round (Hill & Jones, 2010). As mentioned before (Section 3.1.1), there are valuable lessons to be learnt from policy evaluation[68]; learning from the experience is also seen as one of the nine features of modern policy-making (Bullock et al., 2001). Moreover, Mulgan and Lee (2001) advocate a built-in capacity to learn from monitoring and evaluation; this is understood as institutional learning.

The integrated strategy approach model of Orthen and Brückmann (2009) suggests monitoring to assess policy impacts. This is understood here as both two evaluation types. As the increased biomass production is broadly recognised to have a range of implications (both positive and negative as mentioned in Section 1.1.3), in areas such as on land use, biodiversity, international trade and the economy, then this appears to be particularly important. However, the feedback loops shown in the integrated bioenergy strategy model (Orthen & Brückmann, 2009) are not elaborated in the operational guidelines for biomass action plans. Thus, there is a danger that when following these guidelines, the knowledge derived from evaluation of a bioenergy strategy or a plan will not be fully utilised.

FAO (2008) suggests that wood energy policies at national level should be monitored regularly and systematically to avoid negative impacts on environment and rural communities.[69] In addition, the monitoring and evaluation of bioenergy policies are recommended to be based on sound statistical information on market and industry progress (Orthen &

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[68] For further information refer e.g. to Howlett and Ramesh (2003, pp. 220-222).

[69] FAO (2008) also argues that a national bioenergy strategy should consider cost effectiveness and environmental performance.

Brückmann, 2009, p. 16). However, due to the lack of this data, policy performance monitoring is challenging. Contributing to this fact is that a comprehensive approach to market and industry monitoring is largely missing at the national level, as BAP Driver (2009) reports.

As for the manner in which to measure progress, effective policy performance measurement is held by BAP Driver (2009) to include items such as clear indicators to evaluate policy performance, sound data and statistics and articulation of how the results of the evaluation are fed back to the policy-making process. Another biomass plan model of a Spanish region (Avebiom & Junta de Castilla-y-León, 2009) suggests the establishment of a system of evaluation indicators,[70] setting control and BAP revision procedures with responsible actors and performance criteria to evaluate the connection between the targets and results achieved, and the measures implemented. In addition, Avebiom and Junta de Castilla-y-León (2009) advocate a periodic assessment of markets and stakeholder consultations, which enables the improvement of measures, modification of support schemes and setting of new quantitative objectives. Thus, the assessment of the progress acts as 'lessons learnt' stage, which benefits the future objective setting and implementation. Based on the experiences of national biodiversity strategies and action plans,[71] Sharma (2009) points out that the indicators should focus on periodic assessment of shorter term goals as the broader, longer term goals do not adequately indicate the progress during the implementation.

To summarise: while formulating goals, the plan makers must determine how the assessment – both process and outcome evaluation – of goal achievement and the overall success of the planning exercise will be performed. Furthermore, this assessment offers an opportunity to learn from the planning process.

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[70] Target setting should consider the evaluation of achievement of specific targets by selecting indicators for the evaluation (type of quantity/unit) (Avebiom & Junta de Castilla-y-León, 2009).

[71] Such plans are called for by the UN Convention on Biological Diversity, UNCBD (cf. Sharma, 2009).

3.1.4 Stakeholder involvement – inclusive approach

In addition to previously mentioned features, effective (strategic) planning requires that organisations map various stakeholders' expectations and understand where they might conflict (Smith, 1996). Smith highlights that planning or decision-making should ideally include both top-down and bottom-up processes, as in general stakeholders will not be committed to a plan or decision which affects them but has excluded them. Indeed, one of the important features of better policy is an inclusive approach, i.e. a process that considers "the impact on and/or meets the needs of all people directly or indirectly affected by the policy; and involves key stakeholders directly"[72] (Bullock et al., 2001, p. 14). An effective sustainable development strategy is purported to demand a people-centred approach (Dalal-Clayton & Bass, 2002). Moreover, Bass, Dalal-Clayton and Pretty (1995, as cited in Dalal-Clayton, 1996) note that "successful past [SD] strategies appear to have been participatory in nature and, conversely, those that appear to be going nowhere – even though the documentation may look good – frequently have been characterised by a lack of participation" (p. 29).

What does this inclusive approach then entail? For the IRGC (2008) it is an essential part of risk governance, including key actors – such as industry, civil society and NGOs – in decision-making.[73] This approach "would not only ensure the ongoing input of scientific knowledge, but also enable the negotiation and implementation of the sustainability targets and criteria" (IRGC, 2008, p. 44). UNEP (2010d) refers to this as a multi-stakeholder and -sectoral approach, which not only listens to the concerns of those impacted by policy decisions, but also balances the different facets of sustainable development and the diverse interests through dialogue and debate. The ultimate aim of the consultation of stakeholders is to make appropriate decisions through "meaningful, participatory and informed processes that ensure that all stakeholders are aware of the considerations behind the final decisions" (IRGC, 2008, p. 49). The involvement of stakeholders should take place from the start of a bioenergy project and continue throughout the process; from feasibility phase to evaluation (UNEP DTIE, 2010d).

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[72] Also related to one of the other nine features of modern policy-making of Bullock et al. (2001), i.e. evidence-based: "all key stakeholders are involved at an early stage and throughout the policy's development" (p. 14).

[73] See UNEP DTIE (2010d) for more information about stakeholder mapping, i.e. identification of stakeholders and their interests, and e.g. Buchholz, Rametsteiner, Volk, & Luzadis (2009) for Multi Criteria Analysis of bioenergy system stakeholders.

Effective stakeholder engagement can have several roles and functions. According to the FAO (2008), it is of great importance to involve all stakeholders in the development of bioenergy strategies as it offers a chance to balance the earlier mentioned trade-offs between economic, social and environmental impacts and benefits (see Section 1.1.3). Furthermore, while stakeholder involvement at the policy development level provides assistance for governments with compliance and ensuring social accountability as well as education about foreign investment constraints and opportunities, on the project level it aids optimisation of the local benefits and keeping an eye on less apparent negative impacts (UNEP DTIE, 2010d). Integration of policies across sectors (horizontal integration) – indicated in Section 2.3.1 as supporting sustainable development – is also considered to be facilitated through integrating stakeholders in decision-making and reconciling their various interests (Steurer, 2010). Further, stakeholder involvement is seen as essential for policy improvement and to build public support (FAO, 2010a), and considered to connect with improved outcomes (Poister & Streib, 2005).[74]

From the standpoint of national biodiversity strategies and action plans, bringing the stakeholders together to agree on common policy may pose a great challenge (Sharma, 2009). However, the ownership of the national plan is likely to be stronger if there is broader involvement of key actors. In this light, Sharma proposes that the first step to successful planning is often to build communication channels among stakeholders. Similarly, BAP Driver (2009) is of the opinion that key stakeholders should be engaged, for instance, by means of communication platforms. Other related proposals include the creation of multi-stakeholder task teams and stakeholder forums (UNEP DTIE, 2010d).

The character of biomass supply and utilisation contributes to a large network of actors in various stages of the bioenergy supply chain. This reinforces the need for involving "critical" stakeholder groups (such as agricultural associations and farmers) in the planning and implementation of policies; sharing of good quality information is considered as vital (BAP Driver, 2009). The key players ought also to cooperate, as in the case of the development and application of worldwide sustainability criteria for biofuels;

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[74] Involvement of external stakeholders was indicated as one of the success factors in the context of U.S. municipal governments and their strategic planning results (Poister & Streib, 2005).

according to Solomon (2010), the Roundtable on Sustainable Biofuels exemplifies such an initiative.

Based on the analysis of bioenergy strategies and action plans in twelve EU countries, BAP Driver (2009) argues that integration of relevant stakeholders in policy-making processes is generally insufficient at the national level, as these 'top-down processes' coordinated by national/federal ministries are poorly communicated to the regional and local level administration, industry and final users. It also highlights that for bioenergy policies to be successful, they need to have a strong element of regionalisation to ensure the effective communication between national/political and local/market players. As touched upon in Section 1.1.1, the EC indicates that it takes this into account by asking information on the involvement of local and regional authorities in preparing NREAPs (European Commission, 2009d).

3.2 Features of sound biomass policy and planning – content

Following the presentation of the process (i.e. the 'how') aspect of biomass policy and planning, this section discusses some of the various recommendations on sustainable biomass-to-energy strategies and action plans highlighted in the recent literature. In other words, it explains the 'what' perspective of planning and the analytical framework. It is structured similarly to the 'coherent and coordinated approach' of the EC (see Section 2.2.1), and includes NREAP elements related to biomass (based on European Commission, 2009d).

3.2.1 Assessment of resources and capacity

Assessment of biomass resources seems to be an essential building block for any biomass strategy. Consideration of competing biomass uses and environmental constraints is a crucial element of an appropriate resource assessment (JRC-SETIS Work Group, 2009). In addition, there are various aspects to be taken into account in order to achieve a comprehensive assessment with comparable and consistent data. As Siemons et al. (2004) point out, the assessment of biomass resources in general is touched upon by two related problems: the definition of available resources and the

reliability of data.[75] According to Rettenmaier et al. (2010), harmonisation of biomass resource assessments will improve the consistency, accuracy and reliability of the resource assessments.

Categorisation and quantification of biomass resources

The point of departure for harmonising biomass resource assessments is agreeing upon the definition of biomass. Vesterinen et al. (2010) indicate that the term "biomass" has different meanings and that many EU member states have their own definitions – complicating the comparison, However, they also indicate that one of the most popular definitions is the one in the EU directives (European Commission, 2001, 2009a), i.e. "the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste" (Article 2).

In its NREAP template, the EC considers important that member states assess the domestically available bioenergy supplies from three main sources: forestry, agriculture including fisheries and waste. These resources can further be divided into sub-categories in the NREAPs, when the information is available, such as forestry biomass into fellings and landscape management residues. The aim is to compile data that is directly comparable and consistent with other member states and Eurostat requirements. Temporal aspects are also important in terms of comparability as the biomass resources must be reported for 2006 (as a baseline) and with estimates for 2015 and 2020.

The BAP Driver project stresses the importance of sound methodology and comprehensive, reliable statistical data for assessing biomass resources. It has developed detailed performance criteria for the assessment of biomass resources with practical recommendations. This also includes consideration of cross-border effects (such as consideration of the use of foreign biomass resources for the national bioenergy strategy) (BAP Driver, 2009).

Concerning other relevant recommendations for biomass resource assessment, IRGC (2008) emphasises the importance of estimating the quantity of domestic, industrial and agricultural waste that can be used in bioenergy feedstock production. It further suggests that the resource assessment should be done both at a national level and comprise a sub-

[75] Especially when all biomass types for relatively large geographical areas are concerned.

national breakdown. A regional BAP establishment model in Spain (Avebiom & Junta de Castilla-y-León, 2009), proposes that biomass supply analysis should consider all possible biomass resource types, and that they should be defined and categorised.[76] Another relevant issue is the origin of the biomass resources. For instance, AEBIOM (2009b) considers the statistics showing the origin of biomass as necessary. NREAPs are mandated to include data on domestic resources and express the role of imported and exported biomass. Bringezu et al. (2007) purport that resource assessment should consider the extent which biomass resources outside the EU may and should be exploited.

Availability and potentials

Closely connected to a resource assessment is availability of the resources, which usually relates to some potential. Authors such as Rettenmaier et al. (2010), Siemons et al. (2004) and Thrän et al. (2006) indicate a selection of different potentials, varying from theoretical and technical potential to economic, environmental and implementation potential. Rettenmaier et al. (2010) also distinguish a so called sustainable implementation potential that is the result of the application of sustainability criteria. This variety in different assumptions behind the potentials contributes to a huge range of estimates such as those shown by Peck et al. (2011) in the case of global biomass resource potentials. Therefore, there are considerable differences and challenges for the analyst in this light, and it is recommended that to facilitate the comparison between different resource figures, it is important to define the type of the biomass potential (cf. Vesterinen et al., 2010).

For example, the European Environment Agency (EEA, 2006) estimated the technical potential of the EU-25 bioenergy production, taking into account environmental constraints. The results of the BEE project (Biomass Energy Europe) show that biomass resource assessments are in essence impossible to compare as they are based on a wide range of scenario assumptions and parameters. Based on this project work, Rettenmaier et al. (2010) conclude that technical potential is least affected by political

[76] This analysis is recommended to be made in terms of related actors (companies, consumers, land owners and institutions), resource quantification (actual situation, total potential and available potential), evaluation of costs, and competing uses and markets (Avebiom & Junta de Castilla-y-León, 2009).

frameworks.[77] Technical biomass potential is defined as the theoretical biomass potential limited by the demand of land for other purposes (e.g. food, feed and fibre production, including conservation areas) and based on an assumed level of technology (Rettenmaier et al., 2010).

However, availability is typically seen in a context of combined technical and economic boundaries (Siemons et al., 2004). Siemons et al. (2004) further argue that we should talk about the economy of bioenergy technologies that limits the employment of biomass as a sustainable energy resource rather than the available quantities of biomass. Sustainable management and delivery of energy to the place of demand can also considered to be more crucial issues than availability of biomass resources (World Energy Council, 2004). In fact, the NREAP template places biomass availability (supply) in the context of the measures for biomass resource mobilisation.

In addition to the AEBIOM recommendation that biomass availability should take limiting factors into account such as technical, economic and environmental aspects, it should take account of the other uses and users of biomass (AEBIOM, 2009b). This supports a more holistic approach with a view that biomass use for energy purposes is only one of the non-food uses of biomass resources. The EEA (2006) study highlighted that considerable biomass potentials exist within the EU without damaging the environment. However, Bringezu et al. (2007) indicate that study did not take account of the competition between biomass use for energy and food production for domestic food supply. The aim should be optimisation of the different types of use and their benefits (Bringezu et al., 2007), which is in turn connected with the strategic management of the use of biomass as an industrial feedstock (WBGU, 2009).

Also relevant to such discussion is the efficient use of biomass resources. Bringezu et al. (2007; 2009) hold that limited biomass resources can be used more efficiently through cascading systems (mentioned in Section 2.3.2).[78] The NREAP template (European Commission, 2009d) addresses the issue by asking member states to report on their conversion efficiency – the

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[77] Similar to technical potential, theoretical potential is not affected by the policy frameworks but it is considered irrelevant in decision-making (Rettenmaier et al., 2010).

[78] This principle pertains to the concept of exergy, i.e. mass and energy flows; see more for exergy analysis (Peck, 2003). For further information, refer to Haberl and Geissler (2000); Sathre and Gustavsson (2006).

efficiency that available resources are converted into primary energy carriers (as an example, the conversion of wood from cubic meters to tons of oil equivalent).

In addition, availability of biomass needs to be assessed by means of sustainability criteria (Bringezu et al., 2007). Indeed, one way to manage bioenergy related risks is to apply sustainability criteria and certification schemes (IRGC, 2008). The NREAPs are required to explain the strategy regarding the fulfilment of the sustainability criteria of biofuels and bioliquids and on the verification of compliance with the scheme (EC, 2009d). For example, WBGU (2009) recommends the combination of a minimum demanding standard and additional criteria should be set as precondition for any kind of bioenergy promotion. [79]

Capacity assessment

In addition to the resource availability, IRGC (2008) suggests that initial elements of bioenergy policy guidelines should include the determination of potential use of waste and land availability for growing bioenergy feedstock while also taking into consideration the alternative uses of the same land, such as for food and other uses (for identification of suitable land for bioenergy cf. UNEP, 2010a). In addition, this assessment should take into account water availability, soil quality, and variability in the future based on climate change models. All these items form part of the assessment of domestic capacity for bioenergy production, feeding into the overall assessment of bioenergy related risks with the overall aim to understand both the potential and the limitations of domestic bioenergy production (IRGC, 2008).

Another part of the capacity assessment is the evaluation of technology capacity. IRGC (2008) recommends that every country should consider the level of available technology and its capacity for developing and installing appropriate future technologies. Two other elements of the domestic capacity assessment are the promotion of research and development and technology transfer as well as mobilisation of capital investment (IRGC, 2008); these are connected to the support measures and costs of the implementation, and will be discussed further in the following sections.

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[79] For more information on sustainability criteria and certification see e.g. Peck et al. (2010), WBGU (2009) and Vis, Vos and van den Berg (2008).

Work force is also one type of capacity. Its adequacy has been indicated as a critical factor for bioenergy development for instance in Central Finland (Määttä & Paananen, 2005). This is related to institutional capacity and know-how (knowledge and skills) – advocated as necessary to advance bioenergy systems (McCormick & Kåberger, 2007).

3.2.2 Bioenergy use and production, including demand analysis

There is a need to know how much biomass is required to meet the targets. Therefore, the current use of biomass needs to be shown in a comparable and systematic way (AEBIOM, 2009b). The NREAP template (European Commission, 2009d) asks member states to fill in tables for primary energy production for 2006, 2015 and 2020, as well as, to estimate final energy consumption from 2010 forward until 2020 in three sectors (2005 as a base year), namely in electricity, heating and cooling, and transport. As part of the bioenergy risk assessment, IRGC (2008) suggests that each country should assess its own energy needs with long-term scenarios on the evolution of the energy demand with the development of the supply.

Energy from bioenergy carriers is transformed into electricity, heating or cooling and transport fuels with a certain conversion efficiency, i.e. the transformation of the biomass resource into the final output such as unit of base material or final energy (Bringezu et al., 2007). One of the indicators for 'better' use of biomass for energy is improving the efficiency in the use of sustainable biomass resources (Kampman et al., 2010). However, the member states are not required to explain in their NREAPs the energy efficiency of the biomass use from primary energy to final energy (from joules of stored chemical energy in the biomass energy carrier to units of delivered energy).

3.2.3 Bioenergy targets

It is recommended that bioenergy objectives be regarded within broader policy strategies (IRGC, 2008). This call is supported by Antikainen et al. (2007); an important element of the promotion of sustainable biomass use is to treat bioenergy as a part of the energy system and not separately. In other words, bioenergy can advance sustainability only as a part of a sustainable energy system.

The EC mandates the setting of sectoral renewable energy targets, and it has argued that the these sectoral targets should be realistic, feasible, and in line with the overall national renewable energy strategy of the member state given the EU's target of 20% renewables and the national targets to be realised under the RES-Directive (European Commission, 2008b). These sectoral targets can be met with any renewable energy source, depending on the resources of each member state. The NREAP template (European Commission, 2009d) does however ask the member states to estimate the contribution of each renewable energy technology to achieve sectoral targets. Thus, the contribution of biomass should be forecast in terms of each energy sector and bioenergy technology (solid, gaseous and liquid biomass) yearly until 2020. This is called a trajectory, acting as a possible future scenario, instead of setting any specific technology target.

As discussed in Section 3.1.3, it is recommended that objectives follow the SMART-principle, i.e. setting targets that are **s**pecific, **m**easurable, **a**ttainable, **r**ealistic and **t**ime limited (Smith, 1996). According to IRGC (2008), bioenergy policies need to be clearly focused and have transparent and purposeful objectives to avoid negative outcomes due to attempt to achieve too many (conflicting) goals concurrently.[80] As one of the BAP Driver's (2009) performance criteria, setting of targets and priorities for biomass use include determining the level of the achievement of national targets for renewable energies and biomass, level of ambition of the targets and 'translation' of EU targets to each bioenergy sector. Targets should be set both to the supply side (primary production of biomass) and for demand (consumption of bioenergy) (Avebiom & Junta de Castilla-y-León, 2009).

3.2.4 Measures

Apart from general support measures for renewable energy, the RES-Directive calls upon member states to set specific measures on the promotion of the use of energy from biomass. These consist of measures to mobilise new biomass resources, i.e. to increase biomass availability, and they should take into account other biomass users. In the NREAP template, a set of open questions address the measures boosting biomass availability

[80] According to IRGC (2008), the primary policy objective for industrialised nations should be to reduce GHG emissions, whereas developing countries and nations with economies in transition should develop bioenergy with the principal objective of providing affordable energy and support to rural development.

(European Commission, 2009d). These concern land use, unused resources, biogas production and improvement in forest management techniques. The variety of mobilisation measures in the forest sector is articulated by Standing Forestry Committee (2008). Significant new biomass flows for energy purposes are indicated to be attained through strategies stimulating agricultural intensification and efficiency as well as via multi-functional land uses (Peck et al., 2011). From a slightly different perspective, i.e. enhancement of efficiency of biomass production, Bringezu et al. (2009) argue that improved yields may be realised, for instance, through adjustment of cultivation methods to local conditions, restoring formerly degraded land and genetic manipulation; however uncertain risks delimit the last option.

Recent recommendations concerning bioenergy policies include various suggestions for policy measures (see Section 3.1.3 for more details on the 'how' aspect of measures). For example, EEA (EEA, 2008) stresses that bioenergy benefits can only take place in the case of policy and economic incentives steering the production in the beneficial direction, including decrease in soil erosion and water pollution risks and providing biodiversity benefits. One example is to create market mechanisms that encourage sustainable water use and diminish harmful effluents (UNEP, 2010b). WBGU (2009) in turn highlights that, principally, only those pathways that contribute to climate change mitigation in a particularly sustainable way,[81] should be promoted. The targets and measures are connected; if the GHG emission is the main goal, it also determines the type of measures to be employed. In this light, the WBGU analysts indicate that biomass production for energy purposes should only be promoted if the land use contributes to nature or soil conservation. Furthermore, support of liquid biofuels for transport is not regarded as justified from the sustainability perspective (WBGU, 2009); however, it can be argued that this depends on the context as liquid biofuels can have a strong sustainability case when reducing the dependence on foreign fuels. Also FAO (2008) suggests considering potential carbon efficiencies of forest- and agriculture-based energy in the bioenergy strategies at national level. Furthermore, sustainability standards and certification can be considered as measures.

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[81] WBGU (2008) defines pathways that meet its proposed minimum bioenergy standard (incl. avoidance of indirect land use change and preserving protected areas) and that reduces GHG emissions by at least 60 t CO_2 equivalent per terajoules of raw biomass used.

3.2.5 Assessment of impacts

Increased biomass production is largely recognised to have a range of both positive and negative implications, for example on land use, biodiversity, water quantity and quality, and the economy (EEA, 2008; IRGC, 2008; UNEP DTIE, 2010a, 2010b; WBGU, 2009); see also Section 1.1.3). There are also risks associated with the invasiveness of species used for biofuel production (UNEP DTIE, 2010c). The RES-Directive demands that member states assess the impact of increasing biomass availability on other sectors using biomass, namely agriculture and forestry-based sectors. As an optional element, the NREAP template asks to report on costs and benefits linked with renewable energy support measures; this entails estimating renewable energy use, cost associated with this use, GHG reductions and job creation per measure (European Commission, 2009d).

As mentioned Section 2.2.2, the detailed impact assessment is left to NREAP progress reports. It is in the context of these reports that the RES-Directive requires reporting on items such as commodity price and land use changes within the member state that are associated with its planned increased use of biomass and other forms of renewable energy (Article 22 of the RES-Directive). In addition, the Directive demands reporting on the estimated impact of biofuel production on biodiversity, water resources, water quality and soil quality. As such, Article 22 draws the main issues to be addressed as the NREAPs prepare information for the national reports (AEBIOM, 2009b).

Even before the call for NREAPs, the EC considered that national biomass action plans should take into account the impacts of the increased production of biomass to ensure the sustainability of bioenergy (European Commission, 2008b). According to Antikainen et al. (2007), the discussion on sustainability of bioenergy is often dominated by environmental aspects. However, the concept of sustainability or sustainable development consists of three dimensions: environment, economy and social. Promoting sustainable development is linked to a holistic approach, in which these three dimensions are connected. Thus, assessment of sustainability should take into account these three dimensions of bioenergy systems (Antikainen et al., 2007).

Antikainen et al. (2007) also argue that the assessment of the environmental dimension, namely environmental impacts of bioenergy production and use should be based on life-cycle thinking. In the same vein, the IRGC (2008) stresses that comprehensive life cycle assessments (LCA) should be used to

determine the full environmental impacts throughout the life cycle of the various forms of bioenergy. Bringezu et al. (2007) propose that various biomass pathways need to be made comparable in order to know how to use biomass best. For this purpose, they also adopt a life cycle assessment perspective. UNEP (2010b) concurs with this regarding finding the most water efficient forms of bioenergy production.

Nevertheless, Antikainen et al. (2007) also highlight that in addition to the life-cycle environmental impacts of bioenergy production; there are other issues to consider. For example, economic sustainability is affected by societal costs and benefits and their allocation. Social sustainability is more context-specific; it is based on the ability to adapt to changes and to create pathways generating favourable opportunities to act. Thus, it can be concluded that the impacts should be assessed regarding all three sustainability dimensions.

As biomass is used for a great number of purposes in addition to energy, direct competition can follow between different uses of the same type of biomass, or there may be competition for land on which to grow biomass, or with other uses of land (e.g. for nature protection) (EEA, 2008). Considering the fact that biomass production strongly interacts with the environment, it is thus of utmost importance to assess its impacts. EEA (2008) further argues that before global sustainability standards and related control mechanisms are in place, it is preferred from the environmental perspective that EU bases its bioenergy on domestic resources. The competition between different uses of the same type of biomass or for land is connected both to impact and resource assessment, and thus should be considered at these both stages of planning.

CHAPTER

FOUR

4. Methodology

As stated in the introductory chapter, the aim of this thesis is to enhance understanding of the elements of coherent and sustainable biomass policy interventions. A contribution has been sought on two levels. At a general level, a review of relevant literature contributing to the conceptual background of the analytical framework discussed in the previous chapter can assist in comprehending the manner in which policy planning should be improved for it to contribute to coherent policy interventions. On a more specific level, the insights gained from the analysis of national and regional biomass planning documents and processes are intended to support improved future planning that is coherent and sustainable.

While Chapter 1 described the motivation for pursuing the research questions and objectives guiding this work, this chapter explains the methodological approach applied to achieve the research objectives. The discussion first positions the research in terms of scientific research paradigms, and then proceeds to present research design and methods relevant to this study. It concludes by discussing the validity and reliability of the results. The research methodology was framed by the two overarching fields presented in Section 1.5: policy research and policy planning.

4.1 Scientific research paradigm

Each researcher's orientation to their subject is defined by his/her research paradigms. According to Denzin and Lincoln (2005), paradigms "represent belief systems that attach users to particular worldviews". They also represent interpretive frameworks, which are shaped by the researcher's ontological, epistemological and methodological premises (Denzin & Lincoln, 2005).

In short, *ontology* can be defined as the 'reality' that is being investigated; involving questions on the nature of reality and being. In turn, *epistemology* pertains to the nature of the relationship between the researcher and that

reality, and *methodology* denotes the ways the researcher investigates the reality to gain knowledge of it (Denzin & Lincoln, 2005; Healy & Perry, 2000). These are the elements to be found in each research paradigm: 1) positivism; 2) post-positivism (or realism); 3) critical theory and 4) constructivism (interpretivism)[82] (Guba & Lincoln, 2005; Healy & Perry, 2000). What follows is the scientific positioning of the research according to these set of terms and classification. This is intended to provide insight into the philosophical foundations and their practical implications of the two fields framing the research methodology.

4.1.1 Ontology

Regarding the researcher's own interpretive framework and ontological position, it is believed that there exists a 'real' physical world independent of the researcher's knowledge of it, but we can only partially apprehend and approximate that world. This research moves away from the extreme positivist (or foundationalist position),[83] which assumes the existence of an apprehendable reality guided by laws of nature and straightforward relationship between cause and effect. It also distances itself from the radical interpretivist (or anti-foundationalist)[84] philosophy that adopts the perspective of socially constructed realities of different stakeholders. Therefore, the beliefs of the middle ground – that is, post-positivism (or realism) are shared by the researcher.

The study approach is in accordance with the researcher's ontological position. For instance, the manner that the work addresses policy evaluation adheres to the post-positivist approach that accepts that a cause-effect relationship depends on the context and theory (cf. Guba & Lincoln, 1998). Previously discussed points also reflect the nature and core assumptions of

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[82] The opposite philosophical tradition to positivism is also called interpretivism (Marsh & Furlong, 2002). In addition to these two positions, political science spheres tend to simplify the 'middle ground' ontological position as post-positivism (or realism) (cf. (Marsh & Furlong, 2002; McConnell, 2010).

[83] According to Guba and Lincoln (2005), foundationalists tend to argue that "real phenomena necessarily imply certain final ultimate criteria for testing them as truthful" (p. 203), whereas anti-foundationalists refuse "to adopt any permanent, unvarying (or foundational) standards by which truth can be universally known" (Guba & Lincoln, 2005, p. 204). For the usage in political science, see previous footnote.

[84] Ibid.

the research in that policy (or plan) success – such as effectiveness in achieving the objectives – is neither a fact (foundationalist position), nor a matter of interpretation (anti-foundationalist) alone. Instead, it is seen as a combination of both (realism): achievement of the plan's objectives can be regarded as a success or a failure depending on the interpreter (cf. McConnell, 2010).

The researcher is of the opinion that understanding is important to provide knowledge for action, concurring with the premises of policy-oriented research. Linked to the earlier discussion in Section 1.5, this research aims to generate contextual understanding about biomass policy planning.

4.1.2 Epistemology

The epistemological position of this research is perhaps best explained through the second decisive framework for the research: planning – and especially strategic planning. This research, among others, suggests that policy coordination and coherence is advanced by applying a strategic planning approach to biomass policy. The traditional planning model usually represents rational thinking that is congruent with the positivist position. However, as discussed in Chapter 2 (Section 2.4), while the research leans towards an objectivist approach to social world (cf. Morgan & Smircich, 1980) – concurring with the idea that we can, to an extent, prepare for the future by planning, it also agrees with more adaptive, less linear type of approaches to policy-making and planning.

As established in Section 1.1.3, uncertainty is particularly pertinent to decision-making on complex environmental matters (Sigel et al., 2010). Biomass policy is one such field that is characterised by complexity and diversity. A post-positive approach is advocated as necessary in treating uncertainty in policy-making; this also means making values more explicit (Heazle, 2010) – as opposed to positivist tradition and separating facts from values.[85] The neutrality of research is related to this. Opposed to the positivist take on the issue, the researcher accepts the view that value-neutral inquiry is not possible as the social world is shaped by personal values,

[85] A concurring approach called 'post-normal science' stresses the limitations of rational decision-making in dealing with complex problems, evident especially in environmental policy ("where facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowicz & Ravetz, 1993, p. 744). It integrates values and facts to cope with uncertainty in policy-making, e.g. by means of public participation.

preferences, knowledge and experiences.[86] Instead of the investigator and subjects of inquiry being detached from each other (as pertinent to positivism), the findings in this study have been created through the interaction of researcher and the phenomenon; thus the results are value mediated.

4.1.3 Methodology

The methodological stance of this research reflects the ontological and epistemological positions described above. Due to the multifaceted nature of policy-making, there are also multiple approaches to policy research. According to Coleman (1972, as cited in Rist, 2003) "[t]here is no body of methods; no comprehensive methodology for the study of the impact of public policy as an aid to future policy" (p.619). This appears to have been valid until now (cf. Hakim, 2000). Therefore, it is suggested that a combination of a variety of research methods should be applied in line with Majchrzak (1984) and Mickwitz (2006).[87]

While this research has utilised several methods to collect and analyse data, it relies primarily on qualitative data collection and analysis methods. However, as described in the next section, quantitative methods have taken a small, but still important role in both data collection and analysis. The inclusion of quantitative methods within qualitative research can be considered to assist in choosing between different research aims, i.e. explaining and predicting (objectivist approach), and describing and understanding (subjectivist approach) (cf. Borch & Arthur, 1995).

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[86] Cf. for instance Fischer (1995), Heazle (2010) and McConnell (2010).

[87] Policy research is also argued to demand a totally different methodology compared to theoretical research due to reasons discussed above (Etzioni, 2006). For those reasons, Etzioni advocates, an essential part of knowledge on which policy research relies is founded upon "distilled practice" rather than basic research; for policy-makers, other type and structure of information is more often more useful (Etzioni, 2006, p. 834). Similarly, according to Bardach (2005), policy analysis is closer to art than science, as it relies on intuition in addition to method. In addition, it could be seen that Mitzberg's finding in a study of organisations (Mintzberg, 1979) concurs with these thoughts; while systematic data (or 'hard' data) forms the foundation of theory building, it is the anecdotal (or 'soft' data) that provides explanation for uncovering various relationships in the data.

In order to add strength to the research and find inconsistencies in results from various empirical and secondary sources, multiple sources of evidence were sought. This is called *triangulation*, and signifies combining different types of methods and data through the use of both quantitative and qualitative approaches (Patton, 2002).[88] It can be argued that triangulation can serve to deliver mutual validation of results and to obtain a more complete understanding of the studied problem (cf. Kelle, 2001).[89]

This research applied both methodological and data triangulation; that is it approached a research problem with a mix of methods and collected data from various data sources (see Sections 4.3 and 4.4). While it relies heavily on the combination of qualitative methods for data collection and analysis, it also includes some quantitative aspects at the data analysis stage. The use of qualitative methods is particularly relevant for this research as there is a need to understand particular contexts and processes within which actions and events take place – argued by Maxwell (1996) to be pertinent to qualitative research in general.

4.2 Research design

The design of this research depends on various methodological decisions. They consist mainly of the methods of reasoning, the degree of involvement of the researcher and the unit of analysis. Reflecting a need to describe methodological choices similar to that called for by Ritchie and Spencer (1994),[90] the manner in which the findings have been obtained are described more in detail as follows.

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[88] Denzin (1978, as cited in Hakim, 2000; Patton, 2002) has defined four types of triangulation: 1) the use of a diverse set of data sources (data triangulation), 2) the utilisation of multiple researchers (investigator triangulation), 3) the use of many perspectives to interpret a data set (theoretical triangulation) and 4) the utilisation of multiple methods to research a problem (methodological triangulation).

[89] For validity and multiple methods cf. Alasuutari (2010) and Bloor (1997).

[90] "If decisions or actions are to be based on qualitative research, then policy-makers and practitioners need to know how the findings of the research have been obtained" (Ritchie & Spencer, 1994, p. 175).

4.2.1 Methods and choices of reasoning

Firstly, reflecting the methodological position of the work, the research approach has chiefly been *inductive* instead of a *deductive* approach. While policy research in general is characterised by an inductive approach (Majchrzak, 1984), this work explored the study subject with a flexible approach "to respond to emergent insights" (Maxwell, 1996, p. 63) and limited prestructuring of the research. As mentioned, one of the objectives has been to understand the underlying factors of biomass planning taking place at national and regional level. This has involved, among others, following various leads on what are the relevant items to enquire from the informants; these clues have been indicated by the literature and people met at a number of meetings and conferences. Thus, this research has been characterised by discovery and exploration. It would be appropriate to say, along the words of Mintzberg, that the work has mainly been 'detective work' to track down patterns and has included a 'creative leap' – necessary to generalise beyond one's data (Mintzberg, 1979).

Secondly, while the conceptual frameworks shaping this research are congruent with a prescriptive problem solving ('what' and 'how' the planning should be), the work has also included elements of description ('what' and 'how' the planning currently is).

Degree of involvement of the researcher: On the one hand, the researcher assumed an independent position in the research process (i.e. a passive or non-participatory role). This was dictated by the fact that she was employed by the EC Joint Research Centre for the majority of the data collection phase of this work (see Section 1.7). It is also reflected in the research methods in the sense that e.g. the data collection was based on literature review as well as on meetings and research interactions with national experts in which the researcher adopted an observer's role (this work has contributed to Papers I-IV). In terms of project work within Bioenergy NoE, the role of the researcher was also independent (this work contributed to Paper V; for details on project involvement, see Section 1.7).

On the other hand, the interviews on a number of occasions evolved into 'two-way' communication in the sense that these actors – namely at regional level – asked comments and views upon their biomass planning work. In this regard, the researcher adopted a more participatory role. However, all in all, the researcher's role has been that of the 'dispassionate scientist', i.e. informing decision- and policy-makers who independently use the information generated by this study rather than actively engaging in the

studied subject to reconstruct it (cf. Guba & Lincoln, 1998). Seeking insights through the attendance in project meetings and talking to actors in the field assisted in forming a better 'real life' picture of the phenomenon. In fact, in terms of qualitative research in general, the researcher can be regarded as the instrument of research, and that she is "inextricably part of the phenomena studied" – also called *reflexivity* (Maxwell, 1996, p. 67) (see also Section 4.3.3).

4.2.2 Type of study and unit of analysis

Jurisdictional (and geographical) scale was of key importance as major foci of the research were to examine biomass planning both at national and regional level, and impacts of policy interaction on biomass use at national level. Thus, certain member states and regions were brought under scrutiny (see Section 1.4). This choice of unit of analysis is supported by Hakim (2000) in that while there are three key units of analysis – social unit, space and time, in policy research the unit of analysis is often determined by policy-related considerations and the implementation level of the legislation. Thus, instead of choosing one unit of analysis, policy research commonly demands multi-level analysis (Hakim, 2000). While the subject under investigation was considered timely due to recent changes in the EU legislation to promote renewable energy and biomass use for energy, the temporal aspect was not the main variable in this research.

Pursuing the aim of this research to improve understanding of better biomass policy-making and implementation in the EU, various national and regional 'cases' were compared, both within and between the levels. Thus, cross-national and -regional comparison is at the heart of this work. This is attempted to provide "valuable opportunities for policy learning and exposure to new ideas and perspectives", as Hopkin (2002, p. 249) describes the benefits of observing the manner in which political problems are dealt with in various contexts. It should be noted that cross-national studies are not treated here as a separate type of study or design (cf. Hakim, 2000);[91] rather, they are based on secondary analysis of existing data and in-depth interviews. All five papers (see Table 1-2) utilise comparison of a small number of cases; for the discussion of the validity and reliability of this approach, see Section 4.5.

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[91] Comparative studies may also be regarded as a particular form of case study research (Hakim, 2000).

4.3 Methods for data collection

Regarding data collection methods, important considerations include the triangulation of methods and the connection between research questions and methods of data collection (Maxwell, 1996). To ensure both *data* and *methodology triangulation* – and consequently credibility and validity of the findings as well as to "secure in-depth understanding of the phenomenon in question (Denzin & Lincoln, 2005, p. 5), several data sources and research methods were applied. They consisted most importantly of literature review and archival research, interviews and field observations. Thus, the research has a mixture of both 'manufactured' (secondary) data and 'found-in-the-field' (primary) data (cf. Silverman, 2007). These are explained in the next subsections. Figure 4-1 summarises the data collection and analysis methods.

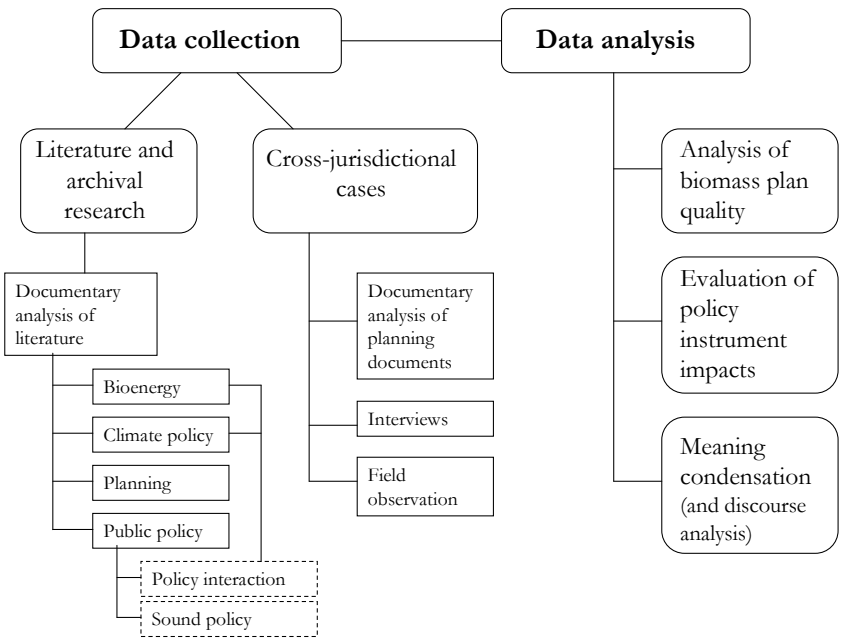

Figure 4-1: Diagrammatic view of linkages in data collection and analysis

4.3.1 Literature review and archival research

A review of literature provides the basis of the research, and was ongoing throughout the research period. Literature sources included academic papers and journals (most of them peer-reviewed), books and various grey literature (such as research and project reports, newsletters, conference and seminar

presentations etc.). An important information source consisted of European Commission documents (e.g. directives, policy statements, meeting minutes – partly internal and not published) as well as official and unofficial national and regional biomass and climate policy documents and related studies.[92] Most of the academic literature was accessed through the bibliographic databases of Science Direct and SciVerse Scopus as well as the Lund University search tool ELIN (Electronic Library Information Navigator; with an access to providers such as ABI/Inform, Elsevier, Emerald, Jstor, Science Direct, Springer and Wiley). Furthermore, the literature review work documented here, can be considered to also cover statistical review, which primarily included the Eurostat database and related statistical publications.

Literature review and archival research served two main purposes. Firstly, it informed the conceptual background for the research. Second, it created a foundation for each of the research articles, and included an update of the current literature in the field.

4.3.2 Interviews

Interviews are propelled by an interest in understanding real life experiences and their meanings (Seidman, 2006). Indeed, interviews play an essential role in policy research (Hakim, 2000) and within public policy spheres to learn about our environments to change them (Forester, 2006). In this work, the interviews were used to enable examination of motivations and other connections between (f)actors (cf. Hakim, 2000). In particular, this entailed probing issues not present in the planning documents and related literature.

The interviews conducted were *in-depth interviews* (see Appendices B and C – for the interview details and protocol). Those addressed in Papers I and IV were semi-structured and based on interview protocols.[93] Paper V interviews were conducted with a loose interview guide rather than a structured protocol. Extensive literature research and attendance in project meetings

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[92] As the research describes processes that have partly been followed from inside the EU system – particularly in terms of the EU guidelines for biomass action plans, some of the sources cited are internal.

[93] Yin (2009) distinguishes two types of interviews – in-depth interviews and *focused* interviews; the interviews conducted in this study have characteristics of both of those two types (e.g. interviewees were considered as informants instead of respondents and the interviews were utilised to corroborate specific facts).

shaped the formulation of interview questions. The questions focused on details and views on biomass planning substance and process (Papers I and IV), and themes around the impacts of the EU-ETS and national policy instruments on biomass use (Paper V). The interviews were carried out face-to-face, telephone and/or by email and the researcher conducted the majority of the interviews (31 out of 36).[94] The interviews for Paper IV were digitally recorded[95] and transcribed verbatim. All interviews were primarily one-off events with one informant, but sometimes included two interviewees at a time. In addition, a small number of informal enquiries were conducted to fill information gaps and verify certain issues (especially for Paper III).

The choice of the informants in Paper V was defined in part by the researcher's project involvement in the Bioenergy NoE (i.e. informants coming from the partner countries). A number of interviewees were selected based on existing relationships with NoE project partners; the remainder were selected on the basis of the informants' participation in report or study authorship. However, while the relatively small community of experts consulted for this paper largely prevented the triangulation of the accuracy of 'national expert opinions', it was held that the interviewee pool served its purpose as a sample of stakeholder perceptions in the study area. For paper IV, the informants were selected based on their project involvement (BAP Driver, REGBIE+), involvement in the establishment of a national or regional BAP, involvement in the national BAP expert meetings and/or due to recommendations regarding the informants' specific knowledge of the topic in their jurisdictional context. The interviewees were considered to represent an appropriate mix of relevant actors as they were, or had been involved or informing planning in their jurisdictions.

4.3.3 Field observation

A third type of data collection method utilised in this work can be considered to be *field observation*. Its definition in this study differs e.g. from the definition of Yin (2009) in that it did not seek to observe the behaviour of individuals. Rather, this method supported the other two main methods in that it observed group participation in a process – with data being gathered in BAP meetings, conferences and workshops. Field observation in

[94] Paper V: 10/15 and Paper IV/I: 21; altogether 31 interviews.

[95] The preparation for Paper IV included around 11 hours of recorded interviews.

this research was utilised seeking to obtain that which Marshall and Rossman (2006) describe as a "holistic description of events and behaviour" (p. 98). This type of data collection also assisted in capturing the context – that is indispensable to gain a holistic perspective, and enables an inductive, exploratory approach (Patton, 2002).

The field observation in this work included both passive and active elements. In the first case, the researcher's role was chiefly that of an observer. This type of observation is mainly pertinent to conference and workshop participation. Since the beginning of the PhD work in 2006, the researcher participated in 10 larger conferences and seminars in Europe covering topics on energy, bioenergy, environment and climate change policy (see Appendix D listing conference and workshop attendance). Bioenergy conferences also often included field visits to bioenergy plants, machinery and feedstock plantations – with presentations delivered by practitioners. While conference presentations acted as an up-to-date information source, these events offered an important scene to explore the diversity of the field and helped form an understanding of the complex policy interlinkages. In addition, the researcher attended a number of research workshops and meetings. Observation of expert meetings on national biomass action plans (EC level meetings on national BAPs and BAP Driver project meetings, see Appendix D) contributed to knowledge and comprehension of the role of bioenergy and its promotion by means of policy. Participation in a conference event on regional BAPs yielded insight into the lower level planning practices. Bioenergy NoE researchers meetings held yearly were attended four times, and – as mentioned already in Section 1.7 – they acted as an arena to learn both about technical and policy developments in the bioenergy field. On the whole, the researcher's role was in this instance chiefly that of an observer.

A second type of observation, including more active elements, is also relevant to this work. Above mentioned conferences and seminars and meetings also enabled informal discussion with various types of actors in the field. In addition to presentations given by the researcher in such occasions, PhD workshops functioned as an arena to test new ideas and discuss preliminary findings. Furthermore, the researcher participated altogether in five working meetings within the Bioenergy NoE project between 2006 and 2008 (see Appendix D). All these interactions assisted in redefining research focus and helping 'detective work'. Lastly, field observation was strengthened by working for three years in an organisation that is a key provider of scientific and technical support for EU policy-making. From

informal talks with colleagues and unit meetings including more formal information exchange to internal EC policy consultations, the working environment played a vital role in forming background knowledge on the EU policy-making process, shaping the research direction and detection of the most important contributions.

4.4 Methods for data analysis

According to Patton (2002), "qualitative analysis transforms data into findings" (p. 432); however, there is no formula or a recipe for that transformation. Similar to the ontological and epistemological position of the research, principally qualitative data analysis methods were applied to interpret the data. This was done bearing in mind the abovementioned recommendation to apply triangulation also in terms of data analysis (theoretical triangulation).

As mentioned before, the research work touches upon the three policy process stages: policy formulation, implementation and evaluation (see Section 3.1.2 for related discussion). Qualitative methods (or approaches to analysis) are distinguished as the analysis of biomass plan quality (Papers I-III) and the evaluation of policy instrument impacts (Paper V). One of the papers applied an application of the interview analysis technique 'meaning condensation' (Paper IV). A quantitative approach was utilised to support qualitative analysis and consisted of a simple statistical analysis (Papers II-III).

The analysis of biomass plan quality: The first three papers included a systematic, comparative analysis of biomass plans with a prime aim being to evaluate the quality of the planning documents. An analytical framework consisting of 'sound' policy and planning features – synthesised based on policy and planning literature and discussed in Chapter 3 – was developed for this purpose. One component of the framework represented the 'how' approach to planning. Table 4-1 shows the assessment criteria utilised in Paper I. Another type of analysis criteria developed was founded upon so called key elements for biomass plans ('what' approach to biomass planning), that was influenced by EC national BAP and NREAP documents, BAP project work (most importantly BAP Driver) and literature providing a number of suggestions what biomass policies should consider (Table 4-2). Some of the elements (or indicators) in the criteria in all three papers emerged from the

planning documents themselves. The analysis in Paper III included a combination of these criteria.

Table 4-1: Tailored criteria for analysis in planning process (Paper I)

Analysis criteria – planning process
Planning cycle
Vision and general goals
Objectives and targets
SMART
Aligning with other related goals
Clear definition of outcomes
Long-term view
Scenarios/trajectory to meet the targets
Formulation
Measures and implementation
Measures facilitating implementation
Accountable body
Timetable for implementation
Cost estimations
Evaluation
Monitoring group (NREAP)
Timetable for monitoring (NREAP)
Evaluation indicators (NREAP)
Outward-looking
Barrier or SWOT analysis
Analysis of influencing factors (PESTLE)
International context
National/international agreements
Impact of bioenergy to other sectors (NREAP)
Consideration of other uses of biomass
Joined-up
EU regulations and standards
EU BAP
Other relevant national policies
Regional policies/strategies
Inclusive
Ministerial/governmental actors (NREAP)
Other stakeholders involved (NREAP)
Regional actors involved (NREAP)

Table 4-2: Tailored criteria for analysis in plan content (Paper II)

Analysis criteria – plan content
Assessment of biomass resources and capacity
Quantification of currently available resources (NREAP)
Categorisation of biomass types (NREAP)
Definition for biomass/bioenergy
Current land use (NREAP)[a]
Future resource (NREAP) and land availability[b]
Energy production potentials (current/future) (NREAP)[c]
Conversion factor (from available resource to primary energy) (NREAP)
Technology capacity (current/future)
Origin of biomass (NREAP)[d]
Bioenergy production/use and targets
Current bioenergy production (NREAP)/consumption[e]
Biomass use in the regions
Past development of consumption/production
Energy conversion efficiency
Bioenergy targets (NREAP)[f]
Connection to national targets (NREAP)
Measures to reach the targets
Overview of measures (NREAP)
Type of measures (NREAP)[g]
Mobilisation of new sources (NREAP)
Sustainability criteria for biofuels and other bioliquids (NREAP)
Linking single measures and GHG reduction (NREAP) or other environmental benefits
Assessment of impacts
Expected GHG emissions reduction (NREAP)
Other environmental impacts
Expected job creation (NREAP)
Expected costs (NREAP)
Social impacts

a Includes potentials for land use.
b Includes future potentials and requirements for biomass resources and land area.
c Considered as NREAP element of expected primary energy production in 2015 and 2020.
d Imports and source of biomass.
e Focus was on primary energy production rather than final energy consumption and sectoral contribution.
f Quantitative targets; judgment of their nature (indicative/binding) was not made.
g Majority of BAP measures; ranging from 'regulatory', 'financial', 'soft' measures to 'other measures'.

The quality of the planning process in Paper I was determined through the assessment of following 'grading indicators': '-' not clearly present or fulfilled; '+' if present or fulfilled in any way; '++' present or fulfilled in a clear, systematic and/or comprehensive manner. The determination of the most important elements was linked to both the relative completeness of the document in terms of the listed grading indicators, as well as to the overall number of countries addressing a certain element.

Descriptive statistics were utilised in two papers (II and III) to assist the evaluation of the plan quality and included standard deviation, minimum and maximum values for 'performance' of plan indicators and their mean value. In addition, the margin of error was calculated. Each indicator was evaluated based on a score signifying the level of presence of that indicator in the plans. Depth and breadth were determined for each indicator as follows:

Depth: $[\sum I_i / (X N_i)] \times 100$

Breadth: $(N_i / N_t) \times 100$

Where I_i is the indicator i receiving scores; X factor depending on the maximum value of the indicator; N_i is the number of plans addressing the indicator i; and N_t is the total number of plans.

Evaluation of policy instrument impacts: Paper V analysed the interaction of the EU-ETS and national climate policy instruments and its impact on biomass use. This involved an analysis of statistical development that compared gross inland consumption and electricity production from biomass and fossil fuels before and after the introduction of the EU-ETS. The data from statistics, literature and interviews was structured along main categories (/themes) based partly on *a priori* issues founded upon initial literature review and partly on elements emerging from the data, and compared between the selected countries. A two-stage analysis was carried out based on 1) theoretical considerations and content of national policy frameworks, and 2) estimated and observed effects of the policies and their instruments.

Meaning condensation: Paper IV employed an analysis to extract and interpret the meaning of the interviews of national and regional actors (i.e. primarily

focusing on meaning instead of language, cf. Kvale & Brinkmann, 2009).[96] A simple analytical framework – based loosely on a combination of the approaches of Kvale and Brinkmann (2009), Marshall and Rossman (2006) and Ritchie and Spencer (1994) – was utilised to structure the analysis. This consisted of five stages: 1) familiarisation and organisation; 2) identification of a thematic framework; 3) indexing (i.e. coding); 4) charting; 5) interpretation.

In the beginning of the analysis, an overview of the interview material (transcriptions and notes) was gained, and the material was organised (no interview data was excluded). At the second stage, a thematic framework was set up, which was assisted by the predefined main themes in the interview protocol. Then, the thematic framework (or index) was systematically applied to the data, diminishing the amount of text and refining the 'meaning units'. Fourthly, the data was extracted from its original context and rearranged according to suitable thematic reference; this can also be referred to as 'charting'. Lastly, the key points of the data were tied together and interpreted.

4.5 Research validity and reliability

Verification of integrity and accuracy are key issues for all research, and judged often based on *validity* and *reliability*. During the course of the research, it was sought to ensure this through a number of strategic choices. The validity strategies of Creswell, (2003), Marshall and Rossman (2006) and Maxwell (1996) guided the 'validity check'.

Validity – that is synonymous to 'authenticity' and 'credibility' – is considered to be a key issue for research design (Creswell, 2003; Maxwell, 1996). Several steps were taken to rule out the threats to *internal validity* (i.e. correctness of causal inference; also: whether a method examines what is intended to be examined.[97] Firstly, the accuracy and completeness of data were confirmed at the data collection stage for instance by extensive note taking in meetings as well as taping and transcribing most of the interviews – resulting in 'rich' data. The findings supporting all appended papers

[96] However, elements of a discourse analysis (analysis of language) were adopted when examining the roles and functions of the biomass planning documents (see Section 5.3).

[97] Cf. Kvale and Brinkmann (2009)

originally included detailed descriptions of interview accounts; however they had to be considerably shortened to comply with academic paper length. Secondly, feedback was solicited via the presentation of findings in international conferences and research workshops, in which external experts provided valuable comments. Colleagues both from the EC JRC and Lund University served as another type of validity check. In addition, the findings were cross-checked by the informants ('member check') to rule out possibilities for misinterpretations. Thirdly, the comparative nature of the research can be seen as an additional source of validation.[98] Fourthly, the credibility of findings was ascertained due to the peer-review process of the scholarly journals (to which the appended papers were submitted). In other words, anonymous referees, that are likely to be experts in bioenergy/biomass policy, critically reviewed the results. Fifthly, the employment of 'quasi-statistics' (i.e. the use of simple numerical results easily derived from the data) supported internal validity of research results with regards to the biomass action plan analysis. Lastly, triangulation of data and methods was considered to corroborate the validity of findings.

To enhance *external validity* (i.e. generalisability of findings to settings beyond the setting or field studied),[99] the work acknowledges the concepts and parameters by which the research is guided. In addition, by developing a framework for better plans, this research can, at least to certain extent, be of use to planning the use of other renewable energies or natural resources. It was also recognised that the limited number of biomass plans studied in this work may not necessarily well represent all such plans in the EU; similarly, the views of the limited number of informants might not be representative of all stakeholders' perceptions or national/ organisational opinion on the issue under investigation. However, as Kvale and Brinkmann (2009) point out, the question is rather "whether the knowledge produced in a specific interview situation may be transferred to other relevant situations" (p. 262). Also, resembling the argument for the generalisability of case studies by Flyvbjerg (2006), it is argued here that the selected plans represent 'strategic/critical cases', which can serve as permitting logical deductions of "(not) valid for one case, then it applies to all (/no) cases" (Kvale and Brinkmann, 2009, pp. 264).

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[98] Hopkin (2002, referring to the work of King et al., 1994) argues that one reason for comparison is that "it is necessary to assess the validity of our interpretations of specific or even unique political phenomena" (p. 252).

[99] Cf. Marshall and Rossman (2006) and Maxwell (1996).

Efforts were made in the work to reduce *researcher bias* and *reactivity*, which pose specific threats to validity (cf. Maxwell, 1996). In terms of bias in data collection and selection, it is acknowledged that the impact of the researcher's values, preconceptions and theories cannot be excluded. This is one aspect of reflexivity, discussed briefly earlier in this chapter. To display the understanding of how these values influence the conduct and conclusions of the work, potential biases have been attempted to be explained in most of the appended papers (e.g. bias of judging biomass plan quality based on experience and choices made by the authors). Reactivity relates to the influence of the researcher on the phenomena studied, and was acknowledged to potentially affect the findings especially in terms of interviews.[100] This was pursued to be overcome e.g. by avoiding leading questions, and keeping the formulation of the wording of questions as consistent as possible.

The issue of leading questions relates to *reliability* (i.e. consistency; comparable with *dependability*) of the research conclusions.[101] Reliability is also about whether the findings can be replicated by other researchers at other times. In part also concerning this research – and as often is the case of social/qualitative, context-specific studies – it is not easy to provide a recipe for repeating the work and arriving to similar conclusions. Thus, it is suggested that reliability is demonstrated through an 'audit trail' for others to examine the data gathered in the course of the research (Tobin & Begley, 2004). For this purpose, all the material generated by this PhD work – such as the appended journal papers, other publications by the author as well as interview protocols and transcripts, and observation notes – act as the auditable documentation of the research.

[100] The researcher agrees with Kvale & Brinkmann (2009) in that the interviewer and the interviewee together co-author and co-construct knowledge.

[101] Cf. Marshall & Rossman (2006), Kvale & Brinkmann (2009) and Tobin & Begley (2004).

CHAPTER

FIVE

5. Analysis and discussion of findings

This chapter provides a summary, analysis and discussion of the main findings; these provide the basis for addressing the research questions posed at the outset of this work:

- How can more coherent biomass policy be achieved in the EU?

- How can national and regional level biomass planning experiences contribute to the improvement of future biomass planning?

This chapter commences with delineation of key elements required to improve biomass planning, both in terms of planning process and plan content. It then presents examples of the impacts of policy interaction in the context of national and international climate policy instruments and biomass use. To address the first research question, Section 5.1 compiles the results of Papers I-III and V. The review of literature in Chapter 2 and 3 are used as points of reference in this discussion.

The findings that underpin a response to the second research question are mainly discussed through Paper IV results. Sections of this chapter explore three sub-questions.

- What are the underlying factors of biomass planning processes? (Section 5.2)
- What are the key insights into the role and function of biomass planning? (Section 5.3)
- How are policy implementation tools comprehended and used by actors involved in the planning process? (Section 5.4)

5.1 Key elements of a coherent approach to biomass policy

Seeking pathways to a coordinated approach to biomass policy, Paper I developed and applied criteria addressing sound policy-making and planning (Sections 3.1. and 3.2 present the development of this analytical framework). This paper evaluates the planning process described by six national BAPs. In Paper II, the analysis of the same six plans was utilised to contribute to understanding of the biomass-to-energy portion in the NREAPs, and biomass planning in general. The comparative analysis was based on a set of criteria addressing the plan content rather than the process. Paper III also applied this framework – including elements of both process and content – to regional biomass action plans. For these three papers, the selected BAPs were regarded as representative of respective national and regional bioenergy policy positions and were thus treated as important indicators of the view on biomass planning at both levels in the EU. Section 5.1.1 presents and discusses the compilation of the results of Papers I and III, while the findings of Papers II and III are dealt within Section 5.1.2.

Paper V differs from Papers I-III in that it focused on examination of the interactions between policy instruments and the impact of these interactions on biomass use in seven EU countries. These results are discussed in Section 5.1.3.

5.1.1 Sound biomass policy intervention: process

Biomass planning processes – as described by the BAPs – were examined in six countries and four regions. National level investigation included Germany, Estonia, Ireland, the Netherlands, Spain and the United Kingdom, whereas regional level analysis was applied to the plans of Central Finland, North Karelia (in Finland), Scotland and the South-East Region of Ireland.[102] The regional analysis was not as detailed as the national level examination, and hence these are not discussed under all sub-sections below. The process by which the selected BAP documents approached various key features of biomass policy and planning (see Table 3-1 and Table 3-2) was used to provide insights into those features. The manner in which jurisdictions/plans fared better and the areas where improvement is needed

[102] Often referred to as South East Ireland in this work.

were investigated (see Table 4-1 for the analysis criteria and the Papers I and III for the results of the analysis).[103]

Planning cycle

The literature review presented in Chapter 3 shows that a biomass plan needs to include certain elements in order to increase the probability for successful delivery of sustainable bioenergy development. The analysis of national BAPs in Paper I suggested that the earlier stages of the planning cycle (Figure 3-2) – from vision to measures – were generally given more emphasis than the implementation and evaluation work. Paper III provided additional insight into the 'how' of planning via the relative comparison of regional and national plans. It was shown that while the overall planning process was covered at moderate depth for both levels, the regional plans appeared to handle it somewhat better. The regional visions and descriptions of preparation appeared to have been treated better than at national level, whereas implementation details were weaker in regional BAP.[104] Items related to evaluation were covered by all regional plans, but the depth of such coverage was greater at national level. When putting this into the context of Paper I, it can be concluded that the later stages of the planning cycle are generally weak at both levels.

One of the implications from this is increased risk that the plans will not to be monitored for their progress – and hence that their achievement of targets will not be properly evaluated. Moreover, without an evaluation framework inside the plan with clearly expressed accountable bodies, timetables and budget for implementation, it is unclear how the delivery of expected outcomes can be ascertained. Estonia and Spain appeared to have a more complete formula for work to deliver progress towards goals than other countries. In addition, the analysis shows that details of the preparation process can provide valuable insights into other factors, for example into whether the planning process has been legitimate, is likely to be well reviewed and if it has key actors on board. Nonetheless, as the countries provided limited evidence or documentation of this process, there is no opportunity for others to learn from them, repeat their successes, and avoid their failures.

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[103] See Table 3 in Paper I and Table 3 in Paper III.

[104] This is supported by a regional biomass project leader according to whom regions tend to be strong in formulating targets and analyse their resources but are weak in implementation (B. Callanan, personal communication, April 11, 2011).

Sound policy features

The analysis framework also guided the determination of the level of overarching sound policy features. In other words, the plans were checked to see whether they were forward- and outward-looking, joined-up and inclusive, and if they showed indications of continuous improvement. Interlacing within the planning cycle stage of goals and objectives, *forward-looking* was taken to include clearly defining policy outcomes and taking a long-term view based informed predictions of various trends. While more often than not a long-term view was provided at both levels (i.e. to at least 2020), only one-third of the national plans (Spain and the UK) provided clearly defined outcomes in terms of greenhouse gas emissions and/or job creation. Connection of individual targets to the overall renewable energy targets was not straightforward at either level, albeit somewhat clearer in regional plans.

In terms of being *outward-looking* – i.e. taking account of influencing factors (internal and external) and basing the objectives and measures on a some type of SWOT or barrier analysis – it appeared that the countries had paid more attention to SWOT/barrier analysis and linking their plan to national and international agreements and analysed other influencing factors relatively well. At regional level, the analysis of barriers (or SWOT) was also a strong feature, suggesting that critical issues are recognised and objectives and measures are realistically set.

In the contrast to the above, the extent of work to assess the impact of bioenergy to other sectors and the consideration of other uses of biomass were less well addressed in plans. Albeit, the national level again treated it relatively better than regional plans.[105] Four of six countries explicitly recognised the likelihood of increasing competition for biomass between energy and non-energy sectors, while the issue was addressed to some extent by all regional plans. While the national BAPs recognised and even proposed actions impacting non-energy uses of biomass, a systematic evaluation of these impacts is still to be developed. This supports the notion that biomass action planning generally stems from the energy viewpoint. As none of the national plans detailed evaluation of the impact of energy use of biomass on

[105] However, current projects such as BIOCLUS and Rok-FOR within the Regions of Knowledge Programme are examples of regional level aims to address biomass use from a more holistic perspective and take account of other uses (T. Hokkanen, personal communication, February 24, 2011; K. Knuuttila, personal communication, April 20, 2011). For more information see http://www.rokfor.eu/ and http://www.bioclus.eu/.

other sectors – an item that is asked for within national NREAPs – there is a danger that limited biomass resources will not be sustainably exploited. Despite the fact that the sustainability issues are increasingly important, with conflicts between competing uses of biomass as one emerging example, the approaches mentioned or demanded for assessment of the impacts are not systematic. The chronological development of plans also apparently mirrored the rising importance of the sustainability concerns in broader society; the two earlier plans – of the Netherlands and Spain – do not address the issue to same extent as the later publications.

Joined-up describes the need for a holistic view and examination of other relevant policies touching upon biomass use. In this light, the national plans do show their support for the EU level efforts by referring to EU regulations, and to some extent also link to other related policy areas at national level. However, regional initiatives in the countries are generally poorly acknowledged. Similarly to the national level, it appears to be necessary to link the regional plan to other relevant policies and plans, however, more so at the regional level. These points provide insight into the complementary role of the BAPs to the other policy documents and how different policy areas overlapping with biomass use may be taken into account in the future. Based on the material available in the BAPs, it remains difficult to assess whether the consideration of the policies in other areas will be sufficient to ensure the holistic view in line with the definition for 'joined-up'.

An *inclusive* approach essentially denotes a process that involves key stakeholders directly and considers the concerns of those impacted by policy decisions. The national BAPs provided some insights into how interdepartmental the plan establishment has been and how the opinions of various stakeholders are taken into account. However, when viewed as a whole, the analysis indicated that stakeholder engagement may have been minimal or poorly defined, or both. Moreover, it seemed that the policy-making process thus far has been predominantly top-down, and it is not clear how, or even if, the process is communicated to the actors that are to be the implementers of the plan. At the regional level, the details of stakeholder engagement were abundant; each of the four regions seemed to have engaged a variety of actors from at least two levels (of local, regional and national), and the strengthening of cooperation with biomass stakeholders was regarded as a necessity.

When checking whether the idea of a *continuous learning and improvement* was visible in the plans, indications of it were given by Estonia and Spain. They both expressed intentions to amend their plans based on monitoring. Further, the results of those national BAPs that were embedded in the existing policy process (e.g. Spain and the UK) were thought to be easier to be fed back in the process. However, explicit statements on national BAP results being fed back into the policy process were not made in the selected plans.

Concerning the intent to seek *policy coherence,* the research found that the desire or intention to apply a coordinated, holistic and integrated approach on biomass policy was visible in the planning documents at both levels, but that these intentions are yet to be implemented. The national plans indicated attempts to coordinate the various biomass-related activities; for example, embodied in the will to engage various stakeholders, in the consideration of the impact of bioenergy in other sectors and in terms of inter-ministerial collaboration. However, it was also shown that the material and optimal use considerations were still at an initial stage of development, and that the inclusion of sub-national actors in the planning process is unclear. Regional level observations suggest the need for coherent objectives across all sectors (such as in South-East Ireland), and integration of these objectives into other related plans (such as argued for within the BAP of Central Finland). The applied definition of a coherent approach to biomass policy (see Section 2.3.2) can lead the way for how a coordinated biomass policy can be achieved. To restate it, it is about ensuring that *different stakeholders for biomass use work together for common goals or results (or react to policy stimuli in such ways) while minimising contradictions between different policy aims, balancing the economic, social and environmental objectives and capturing synergies*. The idea of encouraging different actors to work together highlights the importance of stakeholder involvement throughout the BAP process.

As a conclusion, while this work has demonstrated that both national and regional plans were heterogeneous – resulting in difficulties when seeking to compare the plans, they did share a similar structure, even without common guidelines. The 'sound policy and planning framework' developed in this work proved useful by providing a lens through which the plan process could be dissected. It also assisted in identifying areas where coherence may take place to advance successful biomass planning. Such areas – that in turn help delineate a form for a sound biomass policy intervention – are provided below with examples drawn from some of the BAPs.

- *Visions, goals and objectives*: The Spanish BAP provides an example of setting SMART targets and clearly defined outcomes that are aligned with other related goals. South-East Ireland's BAP links relatively well to national targets. An articulated vision, such as in the Central Finland's and Estonian BAPs – the latter including the idea of ensuring efficient and sustainable use of biomass and land resources – can be an effective tool for stakeholder communication, and a long-term view contributes to policy stability for investment – this being one of the rationales for the EU BAP to encourage nBAPs in the first place.
- *Implementation*: To increase the likelihood of goal achievement, delineation of how policy will be enacted is needed. The Estonian and the Spanish BAPs provided details of the tasks, a timeframe with trajectory, the parties accountable for implementation and measures overcoming barriers.
- *Evaluation and continuous improvement*: Of the six national BAP countries, Spain most clearly appeared to have established a mechanism to learn from the planning process. A continuous review and systematic evaluation with clear indicators or success criteria to evaluate policy performance of goal achievement is necessary. Articulation of feedback mechanisms between the evaluation and start of the new planning cycle promotes continuous learning and adaptation.
- *Factors influencing biomass use for energy*: Knowledge of these factors is of importance to set realistic targets and appropriate measures to navigate towards more sustainable biomass use. Along with the BAPs of Estonia and Spain, the Dutch plan bases its actions on bottleneck or barrier analysis, whereas Germany bases its strategy on the principles of sustainable biomass exploitation.
- *Policy coherence and linkage to related policies*: Taking a more holistic view on the policy process to deliver cross-sectoral targets by looking beyond institutional boundaries needs to be pursued if policy-makers wish to achieve policy coordination and integration. It is likely that this will require more clearly defined joint working arrangements with other departments. Linkage to both lower level (local and regional) and international level biomass policies must be acknowledged and strengthened to support multi-level policy approach. The UK BAP is the only national document establishing clear linkages to regional biomass strategies.
- *Inclusive approach*: Stakeholder involvement well beyond the governmental policy-making sphere is required at an early stage and across the development of the policy – from the definition of the

strategy to its implementation – if stakeholder ownership of the plan is to be established and then reinforced. Communication between the jurisdictional levels needs to be improved; communication channels and platforms should form the basis of the planning process. Additionally, the cooperation and exchange of information at national level must not engage only international actors but also regional and local level players. For instance, a diverse stakeholder group, such as the one involved in the preparation of the Estonian or North Karelian BAPs, provides a better starting point for successful bioenergy planning.

5.1.2 Sound biomass policy intervention: content

In the search for understanding of biomass planning plan content and of improved approaches to coherent biomass policy, Paper II utilised the same biomass action plans for analysis as Paper I. It also investigated the extent to which the NREAP template – defining the framework for biomass planning within NREAPs – included necessary items for a coordinated and coherent approach. However, the evaluation framework was different; for this paper it was divided in elements based on the NREAP template, and non-NREAP elements (see Section 3.2 and Paper II). Due to the adoption of a quantitative approach to assist qualitative analysis, the plan quality was determined also in terms of breadth and depth (see Section 4.4). Table 5-1 presents the results of the BAP analysis (for details see Table 4-2 and Paper II). The regional BAP analysis from the plan content point of view (Paper III) is also discussed in this section.[106]

The analysis indicated that on average the BAPs met a little more than one-third of the criteria elements (37% of the total possible score). None of the BAPs fully fulfilled the criteria. In essence, there was very little variation between the best and worst covered theme (described below), but it was found that the selected plans covered the non-NREAP elements better than the NREAP items (50% versus 35% of the total possible score).

[106] Note that the regional BAPs in Paper III were not analysed against the NREAP criteria, and for the purposes of clarity, the plan quality figures in the paper are not presented in this section.

Table 5-1: Results of the relative comparison of the six national BAPs in Paper II

	Depth (%)	Breadth (%)
Assessment of biomass resources and capacity		
Categorisation of biomass types (NREAP)	47	83
Definition for biomass/bioenergy	80	83
Quantification of currently available resources (NREAP)	47	83
Current land use (NREAP) and potentials	50	67
Future resource (NREAP) and land availability (incl. requirements)	50	67
Energy production potentials (current/future) (NREAP)	47	83
Technology capacity (now/future)	58	100
Origin of biomass (domestic vs. imported) (NREAP)	40	83
Conversion factor (from available resource to primary energy) (NREAP)	33	17
Bioenergy production/use and targets		
Current bioenergy production (NREAP)/consumption	50	100
Biomass use in the regions	100	17
Past development of consumption/production	75	33
Bioenergy targets (NREAP)	47	83
Connection to national targets (NREAP)	39	100
Energy conversion efficiency	50	67
Measures to reach the targets		
Overview of measures (NREAP)	67	100
Type of measures (NREAP)		
Mobilisation of new sources (NREAP)	40	83
Sustainability criteria for biofuels and other bioliquids (NREAP)	33	50
Linking single measures and GHG reduction (NREAP) or other environmental benefits	44	50
Assessment of the impacts		
Expected GHG emissions reduction (NREAP)	44	100
Other environmental impacts	67	100
Expected job creation (NREAP)	67	17
Expected costs (NREAP)	50	67
Social impacts	63	67

Assessment of resources and capacity

As highlighted in Section 3.2.1, the assessment of biomass resources is a fundamental component of the foundation for biomass planning. This was supported by evidence collected in the study; the results indicated that all the national BAP countries had indeed invested considerable effort in assessing

their biomass resources. The majority of the plans addressed most of the elements (breadth mainly 67-100%), however, the *level* of effort applied in generating studies clearly differed (depth 33-80%). The regional level resource assessment follows a similar tendency. Such heterogeneity provides very little scope for comparison of resources between countries or across the regions (e.g. due to differing units, data presented in non-standardised ways with differing reference or target years, etc.). Within this theme, the national plans provided a working definition for biomass and/or bioenergy, delineated current and future resource and land availability, and described technology capacity relatively better than other elements (both breadth and depth ≥ 50%). However, when the national level plans were compared with regional documents – for instance in the area of regional reporting on technology capacity – such items appear to be more detailed than at the national level. In addition, the regional significance of certain biomass types is often reflected in detailed biomass/bioenergy definitions in regional plans.

The weakest point of the national plans was the clarification of the efficiency of the conversion of available resources to primary energy (breadth 17%, depth 33%). This is a significant omission considering that conversion efficiency is crucial to several parameters of goal achievement (e.g. share of renewable energy and GHG emission reductions). Limiting factors for biomass availability are acknowledged by the majority of the BAPs as shown in Paper I; this relates to the need to articulate different biomass resource potentials, discussed in Section 3.2.1.

Bioenergy use/production and targets

Pursuant to the need for the state of biomass use be shown in order to determine the quantity of biomass needed to reach the targets, the countries provided figures on their bioenergy use and/or consumption. However, similarly to the resource assessment, a variety of different biomass use figures were used and they were seldom directly comparable (breadth 100%, depth 50%). The same trend was observed in the regional level plans. Efficient use of biomass resource and energy conversion is not given particular emphasis at either level.

In general, the Spanish BAP provided the best example of alignment with the NREAP requirements – this is due to its structured approach to detail current use and provision of anticipated future biomass use trajectory. Although reporting of means being pursued for efficient bioenergy conversion is not

demanded for the NREAPs,[107] four of six plans do touch upon the subject (depth 50%). As for the targets, bioenergy specific targets were detailed by all but one national plan. At regional level, three of four plans set biomass specific targets; those were highly specific in the case of the two Finnish regions.

Measures to reach the targets

The NREAP template called for specific measures to mobilise more biomass to energy. All national BAPs portrayed a range of measures (breadth 100%, depth 67%), which is interpreted as demonstration of strong motivation to bridge the present with desired future. Mobilisation of biomass resources was also addressed by most of the national plans (breadth 83%), albeit to varying degrees (depth 40%). The regional coverage of this issue in the form of mobilisation measures were often more detailed and numerous.

International sustainability criteria and standards appeared to be recognised by half of the nBAPs, even if the plans do not explain their domestic schemes. Regional plans address the issue to a similar extent, while there is no reference to concrete definition or application of sustainability criteria. Moreover, whereas distinct national measures are not directly linked to outcomes such as GHG savings or other environmental benefits, GHG benefits for using biomass in heating, electricity and CHP applications were clearly recognised by Germany and the UK.

Assessment of impacts

It is broadly recognised that increased use of biomass for energy will have both positive and negative impacts. In Paper II, the parameters evaluated consisted of GHG emission reductions, other environmental impacts, expected job creation, expected costs and social impacts. Most of the plans assessed these impacts, and displayed an awareness of benefits and trade-offs. While all three sustainability dimensions – environmental, economic and social – were assessed only by two plans (Germany and Estonia), the national BAPs go beyond the NREAP requirements especially in their determination of environmental and social implications of intensified

[107] It contributes to the understanding how much more useful energy service can be obtained from a unit of biomass, and thus in turn how much biomass is actually needed to meet the targets when replacement of inefficient technologies is considered.

biomass use for energy. This implies that while the member states are still rather far from systematic assessment of impacts, they do provide early indications of treating the sustainability impacts of biomass holistically. The fact that sustainability issues have grown in importance for many influential stakeholders in recent years is also reflected by the national BAPs.

When Paper III compared regional impact assessment to the national level work, it was observed that the assessment of impacts is limited at both levels. Where applied, it mainly examined domestic and environmental impacts. While the regional plans appeared to examine these impacts in more depth than their national counterparts, the coverage greatly varied.

The work concludes that biomass planning within BAPs and NREAPs must be advanced if coordinated and coherent biomass policy is to be achieved. Some of the items that can assist such planning to move beyond its current form – and help future biomass planning and reporting of biomass related activities that contribute meaningfully to the achievement of bioenergy related goals, include:

- assess biomass resources more accurately and present the data appropriately to enable reliable comparison of data and eventually tracking of progress towards targets – e.g. by adopting a methodology that takes into account variations in the characteristics of biomass resource and land productivity, provides sub-national breakdowns, and delineates bioenergy potential types;
- assess domestic technology capacity and development pathways to enable harnessing of the available resources;
- show development trends and energy conversion efficiencies to provide a basis for future projections and contribute to the understanding of the amount of biomass required to achieve the targets;
- clarify support measure types to sufficiently reflect the diversity of bioenergy support measures and connect each measure clearly with outcomes to assist monitoring the progress;
- assess the impacts considering all sustainability dimensions and apply life cycle assessment.

5.1.3 Identifying policy instrument interaction

The absence of coordination of biomass related policies stressed at the outset of this thesis (Section 1.2.1) was believed to concern also policy

instruments affecting bioenergy utilisation. The need for consistency of the national bioenergy framework and the support schemes – urged by the BAP Driver project – fits within the planning cycle stage of planning that is to address how the objectives will be achieved. Paper V focused on one type of policy interaction, that is, between international and national energy and climate policy. In other words, its objective was to examine interactions of the EU Emissions Trading System (EU-ETS) with the main national climate policy instruments and to identify the influence of these on biomass use. The absence of coordination of biomass related policies stressed at the outset of this thesis (Section 1.2.1) was believed to concern also policy instruments affecting bioenergy utilisation. The study drew experiences from seven EU countries: Austria, Finland, Germany, the Netherlands, Poland, Sweden and the United Kingdom; all but Poland had recently adopted an integrated energy and/or climate strategy in their country. Appendix A lists the informant details.

The study showed that the range of policy instruments employed to assist in meeting the climate and energy strategy objectives appeared to both overlap and link to each other – often renewable energy (and bioenergy) support instruments are targeted to reduce greenhouse gas emissions. Inconsistencies were shown in the case of biomass support schemes in the UK. In line with the findings of Paper II, the individual support measures or instruments did not explicitly appear to be linked to carbon reductions – however, such links to the set of measures were found for Germany and the UK (Paper II), and support scheme evaluations in Austria and the Netherlands.

The work found that rather than being able to attribute observed effects to the EU-ETS or other individual policy instruments, it was more likely that EU-ETS served to reinforce or amplify a mix of existing instruments. The combined effect of policy instruments was indicated to have a tangible impact on biomass use. These impacts included increased competition for biomass resources, changes in fuel mixes and a contribution to upward pressure on wood prices. For instance, the investigation of statistical development indicated that during the period when the EU-ETS was introduced (2004-2007) the consumption of biomass[108] generally increased in the examined countries (total average percent change 35%). Wood and wood wastes (within the biomass and wastes) also grew by 15%. At the same

[108] According to the Eurostat categorisation, this also includes wastes.

time, the use of fossil fuels decreased by 3%. In contrast, biomass and wood were consumed in the period before the EU-ETS introduction (2000-2003) at slightly slower rates (16% and 13%, respectively) compared to 2004-2007. In turn, fossil fuel use increased by 2%. The electricity production followed a similar trend, as the increase of biomass before the EU-ETS was slower than during the later period (32% and 60%, respectively); the wood use experienced the same tendency (39% and 45%, respectively). The growth of fossil fuel consumption dropped from 8% to 2 % when the earlier period was compared to the time after the EU-ETS adoption. Despite the fact that causal links were not established to the emissions trading scheme, the analysis proposed that it has contributed to these changes in the fuel mix along with national support instruments.

Another indication – perhaps the clearest one – of the impacts of the EU-ETS was the effect on peat use in Finland and Sweden (see Figure 5-1).[109] The growth of peat consumption in Finland was observed to be positive despite the introduction of the EU-ETS: while it increased 70% between 2000 and 2003, it still grew 2004-2007 by 15%. In contrast, in Sweden where peat use grew at a rate of 49% before the EU-ETS, it actually decreased by 30% during the later period. These differences can be explained by the relative differences in the importance of peat to the energy mix in Finland and Sweden, and its treatment in the national support schemes (suspension of energy tax for peat in 2005, and feed-in tariff for peat in 2007 in Finland, while in Sweden biomass fuels and peat are similarly treated in the electricity certificate scheme).

It was shown that knowledge on interactions between policy instruments is crucial if one is to recognise and manage synergies and conflicts accruing from a range of policy interactions. Contributing to the advancement of coordination and coherence in the biomass policy field, it was suggested that the design and application of policies should ideally consider such interactions and measures should be adjusted accordingly. This entails, among others, clarifying policy objectives and making them consistent, as well as linking CO_2 reduction and its costs to the performance of the instruments.

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[109] Despite peat is not explicitly considered as a renewable energy source (cf. European Commission, 2009a), Paper V included peat due to its importance in energy production both in Finland and Sweden, and because these countries regard it a slowly renewable fuel (Sköldberg & Koljonen, 2006).

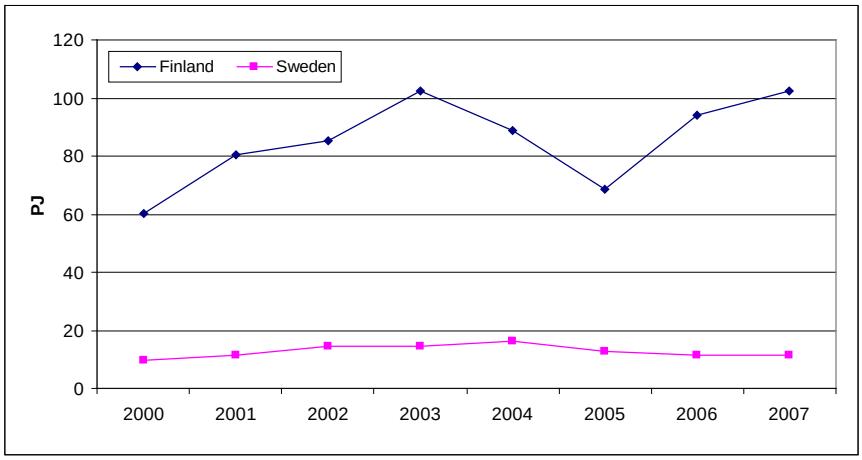

Figure 5-1: Gross inland consumption of peat between 2000 and 2007 in Finland and Sweden

Source: Eurostat (2009)

5.2 Underlying factors of biomass planning processes

While the planning process and content have been addressed here separately, in reality they are closely linked. This is supported by Alexander (1985) who indicates that ends (goals) and means to achieve them should not be examined separately. This and the next two sections will focus on the experiences on the planning processes, an issue that has been given lesser attention to date in the biomass policy field.

Paper IV sought to collate and synthesise the rich accounts of national and regional level actors involved in the biomass planning process. The lessons drawn from them are summarised and discussed here with the second research question in mind. This entailed examination of factors that are contributing to the success and failure of biomass planning. As background information, around one-third (4/11) of the countries in the study had not established a national biomass action plan (or equivalent) at the time of the interviews. Thus, the majority of the countries (7/11) in this research had prepared a plan and it was at the implementation stage (the Netherlands had no current action linked to the plan, however). At the regional level, 4/9 regions were developing a plan (or equivalent), whereas 5/9 after establishing their plans, had reached their implementation stage (see Table

5-2 for the jurisdictions and their plan status; for the informants backgrounds, see Appendix A).[110] Factors facilitating and hindering planning and the delivery of its outcomes are discussed in the next sections.

Table 5-2: Jurisdictions and their plan status at the time of the interviews

Country	**Abbreviation** [a]	**Plan status** [b]
Austria	AT	No plan (preliminary work)
Czech Republic	CZ (1/2)	Established (S)
Estonia	EE	Established (S)
Finland	FI (1/2)	No plan
Germany	DE	Established (S)
Greece	EL	No plan (preliminary work)
Ireland	IE	Established (S)
Netherlands	NL	Established (S) (no activity)
Spain	ES	Established (I)
Sweden	SE	No plan
United Kingdom	UK	Established (S)
Region	**Abbreviation**[a]	**Plan status** [b]
Dalarna (Sweden)	DAL	Established (I)
Emilia Romagna (Italy)	ER	In development (S)
Flanders (Belgium)	FL	Established (I)
North Karelia (Finland)	NK	Established (S)
North West England (UK)	NWE	Established (S)
Pomerania (Poland)	POM	In development (S)
South East Region (Ireland)	SEIE	Established (S)
South Tyrol (Austria)	ST	In development (I)
Southern Bohemia (Czech Republic)	SB	In development (S)

[a] Country and region abbreviations are used for brevity. When the jurisdictional opinions have been expressed in two separate interviews, these views have been indicated with numbers 1 and 2.

[b] S = specific biomass plan; I = biomass integrated into a (renewable) energy/climate plan.

[110] Noteworthy is that this and the following sections present additional material to Paper V. While the results will primarily present a composite of the views, examples may be based on single opinions; this does not however detract value from the work as every opinion is regarded as representative of possibly many other similar views. In some cases, the views have been given anonymously.

5.2.1 Motives

Both the plan and the interview analysis (Papers III and IV) looked into the motives and underlying desires that lead to the plan establishment to find out why biomass plans are being made. In the research underpinning Paper IV, it was observed that national and regional level motivations differ, particularly in terms of factors that could be termed 'micro' and 'macro' level factors. National planning is driven especially by the EU and national level targets, and by more general considerations such as reduction of import dependency and emission reductions (i.e. macro-level issues). In turn, regional level is stimulated by factors such a belief that biomass potentials can be leveraged for regional advantage, aspirations for bioenergy leadership and regional development (especially economic) and to less extent national (and EU) level goals. Thus, it appears that micro-level drivers are more of interest to the regions than those at the national level.

For countries without a national BAP – e.g. Finland and Sweden – bioenergy development has been successful in the absence of a specific biomass plan. Both countries have a long history of commercial biomass use for energy and of policy frameworks supporting the sector. These have generally emerged prior to EU biomass action plans or the like and are considered to have created favourable conditions for bioenergy in both countries.

These findings are supported by Paper III, which compared motives between national and regional levels based on their planning documents. It found that on the one hand, both levels often based their plans on security of supply and utilisation of the bioenergy potential, while on the other, national planning seemed to be more driven by environmental concerns and articulated the idea of taking account of other biomass uses while pursuing the growth of bioenergy. Regional planning appeared much more focused on strengthening the local economy and regional vitality. The purpose stated for the regional BAP also often coincided with the will to enhance the in-region expertise and know-how, and to develop the regional bioenergy sector (micro-level factors). Macro-level factors – such as the mandatory NREAP establishment at national level – appeared to be of less importance to regions in motivating planning. This suggests that in order to boost bioenergy development, its regional benefits need to be better highlighted and linked to higher level policy-making – a view supported e.g. by McCormick (2007).

5.2.2 Learning from an example or previous experience

Learning previous experiences can facilitate planning. Many national informants were aware of other national plans, but they did not seem to be utilised directly as models for planning. However, informants from countries such as Czech Republic indicated that they were utilised as a source of inspiration. Similarly, Ireland used examples from other similar EU countries as benchmarks in the development of the Irish BAP. Reasons given for not directly adopting other countries' modes of planning included that the national situation was considered different from other countries or plans (CZ2), or that BAP represented a continuum or revision of existing plans for the UK and Spain, respectively. The Dutch plan developers were regarded (by the Dutch informant) as 'experienced in the biomass field' and were able to detect the problems; in any case, they could not have benefited from other BAPs as being the first to develop one.

At the regional level, two thirds of respondents indicated that they did not seek guidance from other regional work. They opined that this was because of sufficient knowledge within the region (POM) and different kind of approach to planning compared to many other strategies (NWE). According to the North Karelian informant, their plan themes were based on "common sense". Nevertheless, two regional informants stated that national example had functioned as an inspiration or as a model for their jurisdictions (BS, SEIE).

5.2.3 Barriers or constraining factors

Planning at both levels encountered a range of barriers, both 'real' barriers and those that were not regarded as barriers *per se*, but more like issues to be considered. They can be divided into factors hampering the plan preparation phase and those that hindered the plan implementation. Comparison of the informant views (or lack thereof) on barriers suggests that such factors in the preparation phase have been easier to avoid and/or to overcome compared to the implementation stage.

In the preparation stage, two countries in particular faced institutional barriers such as non-cooperation of ministries (AT), bureaucracy in the approval process (CZ2) and a low prioritisation of the stakeholder consultation (AT). Rapid developments in the bioenergy field were reported as interrupting the BAP development process several times in Germany. The informant of North West England indicated that insufficient resources

to manage plan establishment alongside other work were compounded by a stakeholder group that was not adequately broad. Other regional barriers included difficulties in agreeing on targets with the regional government (SB), a low degree of political will (ER, SB) and awareness of local politicians on biomass (SB).

At the implementation stage, financial constraints seemed much more pressing at regional level compared to the national level. The fallout of the global economic crisis was explicitly noted to worsen the biomass status in South East Ireland. Differing features of the political system as a barrier were mentioned by the informants of Flanders (complexity of the national energy policy), Southern Bohemia (missing legislative measures such as a RES-heat law) and North Karelia (slow decision processes in general in the energy sector). In addition, the Flemish informant indicated that the lack of data on biomass availability has kept investors out of the sector. At national level, while Ireland and the UK reported that their implementation had proceeded largely to plan, Estonia mentioned serious hindrances in the implementation of planned actions. Due to state budget cuts two years after the plan establishment (i.e. in 2008), many initially planned activities were not realised in the country, and the work had to be refocused. This was connected to the lower priority given to the plan due to other problems (such as low agricultural product prices causing difficulties for farmers). A limited number of scientists conducting research (supporting the plan implementation) and a lack of knowledge and know-how have also impeded progress in the country. General biomass related barriers were highlighted by informants in Austria – most efficient mobilisation options have already been exhausted – and Ireland, where a lack of tradition of bioenergy and sustainable forestry, along with multilateralism of the process (e.g. requiring negotiations with a number of stakeholders) pose challenges to deliver bioenergy capacity.

On a more positive note, the barriers in the development process had been overcome in some instances. In Austria, after initial difficulties, mandatory targets eventually encouraged ministries to coordinate and engage various stakeholders. In the Czech Republic, open and frequent discussions with various stakeholders – especially about the biomass availability in the country – were reported to have helped deliver broader agreement for the plan. Informants in four other countries stated that a number of difficulties were overcome (or avoided) due to involvement of an 'appropriate' mix of stakeholders (NL), strong political leadership (IE) and thanks to the identification of factors hindering the preparation process (UK). At regional

level, crucial issues for the regional planning process – reported by the North West England's informant – consisted of allowing enough time for the plan establishment and stakeholder engagement across the sector. This would also have helped the Dutch BAP process; their BAP was described to have been made in a hurry with inadequate consideration of plan execution.

South East Ireland offered a regional example of a barrier for the uptake of the large scale CHP (due to a small number of companies in the region with a capacity to develop such plants), which could be overcome by the cooperation of public sector and industry. Their implementation process has also faced funding problems. The South-East Regional Authority (SERA) attempted to have a coordinating role within the steering committee guiding the process; it also tried to keep the committee on board despite the low funds and sought to get the region's energy agencies to implement the actions in the plan.[111] In Dalarna, the county board was also acting as a "coordinator for networking to reach the goals". In these instances, a coordinating body can be considered to have contributed to conquering some of the implementation obstacles. In North Karelia, a critical factor for implementation is perceived to be right level of training and trained installers.

5.2.4 Facilitating factors

Many informants highlighted – directly and indirectly – factors that are vital to affect the aims of planning. They are called here facilitating or success factors. The following items overlap with the factors overcoming the barriers.[112]

Continuity of policy was an important theme for Finland, Spain, Ireland and the UK. The Irish informant described it as maintaining a consistent theme when moving from one policy task to another, and as a means of ensuring effective use of available resources. The need for continuous review and checking of progress (monitoring), were stressed by the UK and Irish informants. The planning processes in Ireland and the UK were also recognised to be flexible, iterative and continuously evolving in which the actions are updated according to the industry and/or technology

[111] 90% of the BAP development was funded by Sustainable Energy Ireland (national body) and SERA is dependent on the energy agency funding to implement the actions.

[112] A summary table of both facilitating and hindering factors is provided in Paper IV.

development; flexibility is needed to ensure that the best practice is taken in (IE). These views were joined by the Spanish informant who characterised their planning as a living process; similarly, the informant from Flanders described their plan as a living document – "that is why…it leads to results". At regional level, North West England's informant stressed also the need for flexible approach due to rapid developments (EU process) in the field. Furthermore, the continuity of the regional planning process was most evident in Flanders and North Karelia. Their plans were presented as a part of an established planning process and there were mechanisms and responsible bodies in place to ensure implementation.

However, the informants in Finland and the Netherlands indicated different approaches. While substantial resources were reported to have been utilised in preparation of the Finnish renewable energy strategies and programmes, it appears to be the case that monitoring (and evaluation) received less attention or faded over time as work on new strategies was started. After the two year period of the Dutch plan being 'active', it was noted that the tasks in the plan had evolved into actions that were no longer connected to the BAP, and not coordinated by any plan. Thus, it was seen that action planning had come to its end.

Other essential elements, described by the Irish informant, included political and senior minister commitment, resources and time. In addition, the Irish informant highlighted "a grand vision and a well articulated, detailed action plan". The importance of both putting the plan into action (IE, NWE) and ongoing work with the plan (DAL) was brought forth. Business profitability was stressed as vital in North Karelia, as the change is not achieved by only ideas. In addition to a strong (wood energy) vision, good planning and evaluation resources and highly qualified staff in the region were reported to have been contributed to transforming the large wood resources in the Finnish region into a profitable bioenergy related business activity.

Another important issue raised by the national informants was the policy complementarity. The Irish informant indicated that this required ensuring that various policies touching upon biomass for energy are aligned by better communication between policy-makers. Complementarity also relates to being aware of the other planning done in the field affecting biomass use, such as material use planning in Germany and rural development plan in Estonia connecting to their BAPs. At the regional level it also appeared to be necessary to link the regional plan to other relevant policies and plans; such as energy, bioenergy, forestry and climate plans. Three regions also

indicated the importance of linkages to the national level planning (DAL, FL, SEIE). The consistency between these documents was reported to be checked in Flanders; i.e. that the targets are in line with both climate and renewable energy documents.

Moreover, the results indicate that it is vital to assign responsibility to ensure the actions are to be implemented. Specific groups were often responsible for many or all stages of the national planning process. While ministry actors were in the core of these groups at national level, at regional level it was often energy agency or other public sector bodies leading these groups. Also at regional level, specific groups or teams are seen to have had a key role in initiating the process and keeping it alive. A number of the informants also detailed the actual initiators of the planning process in the first place, understandably easier to identify than at national level. As an example, while the actual preparation of the South East Ireland's plan was performed by external consultants due to a lack of in-house expertise, the process was regarded to be well monitored by their steering committee.

5.2.5 Stakeholder engagement and communication

While certain aspects of stakeholder engagement can be regarded both as facilitators or barriers – and thus could have been discussed within the sections above, they are presented here separately.

A variety of actors were engaged in the planning process.[113] A common parameter within planning work at both levels was a specific group tasked with mediating and facilitating discussions between stakeholders. While ministry actors were at the core of these groups at national level, at regional level it was often energy agency or other public sector bodies tasked with leading such. Even if it was not possible to determine the full range of actor types taking part of the planning process (especially at regional level), the findings suggest that the stakeholder base seems to have been generally wider at national level, including industry (e.g. bioenergy associations and their members), market actors and farmers, forestry institutes and bioenergy specialists. As an exception at regional level, North Karelia brought into its plan development team highly qualified people from educational, business

[113] Note that the involvement in this study meant a contact or presence of certain actors at any stage of the process, e.g. in workshops, as the true nature and depth of the engagement were often not articulated by the informants.

and industry spheres. Around half of the countries (IE, ES, NL, SE, UK) appeared to have engaged sub-national actors, whereas more than half of the regions were reported to have involved national level actors (DAL, FL, NEW, SB, SEIE). Three regions communicated with other regions in the country (NK, NWE, POM).

As for the type of engagement, the communication between the actors varied in terms of extent (time span, number of actors), regularity and content. It seemed to be customary to listen and discuss with a larger stakeholder group in the preparation process at both levels. Naturally the sizes of these groups were indicated to be larger nationally (DE, IE, ES, NL, SE, UK); public consultation could constitute from 50 groups as in the German BAP development process, to hearing up to 200 actors for the climate and energy bill in Sweden. In Spain, most of the over 80 actors invited to the consultation for drafting of the newest national RE plan were biomass-related. Stakeholder fora in the form of seminars and workshops seemed to be more common at regional level, these were utilised, for instance, to show others that which was being planned, influence stakeholder decisions and hear their views. These meetings also had a purpose to make an inventory of bioenergy bottlenecks and come up with solutions (NL), collect a database of suppliers and producers (SEIE) and in general act as an input forming the basis for plan drafting (ER, SEIE). Meeting and consultation of stakeholders seemed to be more continuous in some countries (CZ, ES, IE, UK) compared to others, i.e. throughout the process. Multiple stakeholder fora were reported to have been arranged in half of the regions (ER, NWE, SB, SEIE).

A number of national informants indicated the importance of involving stakeholders in the planning process, and ensuring good communication between them. "Constructive and meaningful" engagement was crucial according to the Irish informant while the UK informants appraised "direct discussion" with government departments and the industry representatives. In practice however, these were hindered at national level for instance by shortage of resources (EE) and domination of industry and consumer groups in the consultation phase (IE). Strengthening stakeholder commitment was emphasised both by the Irish and Dutch informants. Despite the inclusion of market actors in workshops and working groups in the Netherlands, it was not considered that it made them feel committed to implement the plan. The Irish informant stressed that the strong commitment by the leaders is to be reinforced by the stakeholder commitment when the programmes are delivered as planned; after all,

successful implementation was considered to depend on the stakeholders (IE). The UK informants suggested a flexible structure for stakeholder engagement; this means matching "the nature of the task with the design of the group". At regional level, the issues being emphasised included highly skilled stakeholders on board in the preparation process (NK), collaborative and consultative nature of the process (SEIE) and balance between different actors (NWE). Challenges to involve relevant actors were expressed to include: not enough variable stakeholder base (NWE), and a reluctance of regional government (unlike e.g. local municipalities) to participate in the process as in Southern Bohemia.

Relevant to this – and the discussion on learning from an example (Section 5.2.2) – is the sharing of experiences and best practices. As indicated in Paper III, there is little evidence of such information exchange between biomass planning teams at both national and sub-national levels. This is supported by a view of one regional biomass project leader: the sharing of knowledge and experiences often happens within the projects, but only to a limited extent between different projects (B. Callanan, personal communication, April 11, 2011).[114]

5.2.6 Concluding remarks

To conclude this sub-section, the national and regional planning processes have encountered a number of hindering factors – some of them substantial – that challenge the implementation of biomass plans. Barriers posed by insufficient time and resources, unsuccessful stakeholder engagement and shifting political focus, along with fast developing field are common to those indicated for policy implementation in general (see Section 3.1.3: Implementation). However, it can be argued that some of these hindering factors are specific to bioenergy policy due to the multiplicity of policy fields that it intersects with. The related challenges include engagement with a sufficiently broad stakeholder base and coordination of actions between the levels. This analysis does, however, indicate that these challenges have been overcome and/or anticipated especially at national level. There, the greater resources and authority of national actors have helped them to establish and implement plans aligned with sound policy principles, in line with the discussion in Chapter 3.

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[114] Mr. Callanan is a coordinator of one of the Regions of Knowledge-projects (see Section 1.1.2) called BioMob (Biomass Mobilisation).

Regarding such sound policy features, there are strong indications that the consideration of the plan as a living document and maintenance of an adaptive, flexible, and continuously evaluated/updated process are particularly important. Stakeholder engagement is also widely sought, and to a certain extent, experience is drawn from the example of others. However, sharing of good practices seems to be limited between biomass planning teams. Policy coherence appears to be recognised – and to a certain extent 'practiced'.

5.3 Roles and functions of biomass planning

This section sheds light on the various roles of biomass planning documents and importance assigned to them, thus, contributing to the understanding of what outcomes can be expected from the plans. It is based mostly on Paper IV findings, but also presents and discusses some of the results of Paper I and III. As mentioned earlier, the items discussed here expand from the content of Paper IV.

5.3.1 Definition and scope of a biomass action plan

In order to illuminate what is actually meant by a biomass action plan (also considered here explaining its function), the differences between the definitions of planning documents were examined. The national informants described *strategy* as having a long-term view and overall targets, representing higher level issues and "the line you follow". It also paints "more of a national picture", is a document including an overview, but lacking detail. Furthermore, it is setting the context and rationale and is implemented through an action plan. One regional informant portrayed the strategy as that which formed the policy.

In turn, *action plan* is understood as more concrete than a strategy, and providing the details that are needed to deliver "the increase in the use of biomass set out in the strategies". To achieve this, Ireland was developing a bioenergy roadmap to implement their strategy (referred to as their 'BAP' in Papers I-III); this roadmap is portrayed as being "a compromise between the political and administrative", and "something that is flexible and subjected to change", and thus "a living document" to be iterated regularly. For some informants however, the planning document can include elements from both strategy and action plans. As for regional views, for Southern Bohemia an action plan is a step-by-step plan that includes real targets and

specific measures. For the informants of North West England and Flanders, it is something that is regularly reviewed and updated and reporting on progress of tackling renewable energy and bioenergy barriers, respectively. In South-East Ireland, the plan was decided to be called implementation plan, as it sounded more forward-thinking.

Papers I and IV show that while the distinction between the documents is largely agreed upon, the planning documents can be referred to as something different to that which they in reality are used for in practice. For instance, the German and Irish BAPs were reported by the informants to actually be strategies, whereas three plans can be regarded as a mixture of a strategy and an action plan (EE, ES, UK) based on the definitions and approaches reviewed in Paper I. The Dutch BAP is understood to represent an action plan as it was stated by the informant to have only an abstract strategy behind it.

Another issue of interest is the scope of the BAP, i.e. how other uses of biomass have been considered in the plan – not least as it is often named a *biomass* plan rather than just a *bioenergy* plan. Indeed the NREAP template indicates that a "national biomass strategy is crucial to plan the role and the interaction of uses between the energy end uses and interaction with non-energy sectors" (European Commission, 2009d, p. 52). This work confirms that which was already mentioned in the introduction (Section 2.1): energy use of biomass has been accorded the highest priority and while other uses are discussed (especially in terms of competition for biomass resources; see also Papers I and III), they are usually given much less attention. This is also true at regional level, which often considers other uses to a lesser extent (see Section 5.1.1). However, at least in the case of the BAP of the Czech Republic, it was claimed that the ministry wanted to have a wider scope than the plan developer. Here it was claimed that the national bioenergy association, made up of industry representatives, limited the focus. The mandate included within the NREAPs can be considered to force countries to pay attention to "a level playing field" of different uses – something that the Austrian informant stressed.

5.3.2 Importance and the roles of the BAP

Interviews also allowed investigation of the roles BAPs may serve. These roles can be grouped into five categories – tools of information, discussion, collaboration, coordination and transformation. For instance, the BAP of the Czech Republic was considered to offer a platform for discussion, while

an output of the Estonian plan was regarded to provide a lot of information on biomass potentials and "knowledge and know-how for enterprises". Based on the information available in the German BAP, it was intended to be used to advance understanding on the conditions and options available. At regional level, South-East Ireland facilitated the collation of a databank of information that did not exist before, e.g. case studies and list of suppliers and producers. It has also facilitated networking and collaboration with actors from within the region. While for North West England, the plan coordinated "fractured, localised delivery of services" and informed adjacent regions about their actions; for Dalarna the plan acts as a tool to map out the resources and possibilities. In North Karelia, the key task of the plan is to transform the energy management system. Similarly and matching the intent of transformation by planning, the Dalarna informant indicated that the plan is not only a plan for the region; it is "a way of working". For Southern Bohemia, the (proposed) plan was something that was to make the politicians aware about the necessary actions to be taken.

The roles also reflect the definition and decision-making level of the planning documents. For instance the Irish BAP was actually regarded to be more of an aspirational document, and a first step to spell out the goals. However, it was also recognised that another framework is needed to implement that, and for that purpose, Ireland was developing a roadmap at the time. Also, the Czech BAP was held to represent a more strategic level as it was not considered as offering concrete solutions at regional level. For Germany, the existing laws and market development were argued to be more important, and faster to deliver than the plan.

Furthermore, the importance of plan establishment was explicitly expressed by the Pomeranian informant; she supported the view that biomass plan should be made by every region in the country as biomass has the largest potential in the country. The respondent of Dalarna thought that it is better to have "a detailed plan even if you don't reach the goals" than having no plan at all. However, the informant representing Emilia Romagna expressed concerns about the fate of the planning document. While their document was indicated to be recognised by the regional decision-makers, it was uncertain to what extent the plan was introduced and utilised in the regional policy-making.[115]

[115] Regional biomass projects developing plans, such as BioRegions and MAKE-IT-BE, often support the first steps of local communities and regions in their planning; that is

5.3.3 National and regional level competencies

The role and function of planning at these two levels is better understood through examination of the competence (i.e. authority or capacity to bring about the planned changes) of each level to make decisions on biomass and bioenergy related matters. While countries such as Austria, Italy and Spain assign most of the authority to regions (provinces), other countries are more centrally administered like Ireland, Finland, the Netherlands and Sweden. However, it is not straightforward; in Ireland for example, land use planning and waste management are dealt with at local (/county) level. Another example was provided by Belgium, in which the division of authority in different energy related matters is complex and complicates definition of action plans (e.g. the federal renewable energy target is divided down to regional shares in certain matters). The level of competence and power of regions to decide on their own actions is closely linked with the funding source. Policy and subsidies are primarily decided at the national level (e.g. feed-in tariffs and taxes), and regions have less budget or remit to manoeuvre with. Ireland offered a good example of the limited options for regions to act; despite the generation of a comprehensive plan that South East Ireland had come up with (see Paper III), the region is forced to accept the current administrative structures that do not allow true regional level plan implementation. Therefore, they were reported to focus on those things they can do, such as networking and promoting awareness.

5.3.4 Concluding remarks

To conclude this section on roles and functions of biomass plans and planning, the research has shown that, in addition to the (intended) goal achievement, a biomass plan is seen to serve a number of other roles – the richest examples were provided by the regional actors. This reflects that which was presented in Section 2.5.2; compared to those roles mentioned there – tools of communication, control and demonstration of political will – biomass plans appear to essentially add additional roles to that mix, such as transformation and information. However, while they have seemed to attempt the removal of bottlenecks for biomass use – one of the intended

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the agenda definition and preparation of the plan. However, the endorsement and adoption of the plans by local authorities is not guaranteed. Also, the project time frames do not usually allow following the implementation of the plans (based on M. Papapetrou, personal communication, December 10, 2010; M.G. Tommasini, personal communication, January 25, 2011).

tasks of BAPs (as presented in Section 1.2.2), they do not appear to match other intended functions, such as to harmonise data and look beyond just energy use. It is also unclear to what extent the plans are used as communication tools to raise awareness of a wider audience; as was suggested by the EU BAP.

While the planning document terms seem to be generally agreed, there appears to be gamut of definitions that are used interchangeably. However, the explanations provided here help to clarify what can be expected from these plans; a document with operational elements is expected more likely to deliver the desired results (as argued in Paper I). Moreover, scope of biomass planning is still largely limited to energy use only, as it has been shown here. The acknowledgement of regional competences at national level may be one of the key factors to harness the energy and motivation of the regions to deliver the national level targets.

The importance assigned to biomass planning documents is evident. Nevertheless, given the multitude of regional planning activities taking place in various European regions (as indicated in Section 1.1.2 and Paper III), there is a need to clarify how the established plans are applied in reality in regional decision- and policy-making.

5.4 Perceptions of and approaches to planning tools

In this section, the diversity of perceptions to planning is explored. This includes mapping approaches to NREAP preparation, planning guidelines, coordination of planning, and investigation of general views on planning. The findings presented in this section are based on Paper IV, but expands from the content of that paper.

5.4.1 Approach to NREAP preparation

This issue mostly concerned the national level due to the requirement to establish national renewable energy action plans. At the time of the interviews, it was already known that they must be established, and the NREAP template guiding the plan making was just about to be, or had recently been, published. Therefore, the details on the NREAP preparation or whether the existing BAP would be used as a basis for planning often had not yet been determined. This aside, the informants indicated that at least

half of the countries were going to use their existing climate/energy/ bioenergy plans and strategies as a basis for their NREAPs. The BAP and the experience generated during its development were regarded to be of benefit to the NREAP development in Estonia and the Netherlands. While it was indicated that the NREAP process has replaced existing biomass related planning processes at least in Belgium, it also appears to form a parallel, supporting process in other countries (as in the UK). In some cases, it seemed to be something that just had to be done for the EC.

The approach to NREAP planning raises a question of whether the integration of biomass into another plan (e.g. renewable energy, energy or climate plan) adequately considers all items that are required to be covered by NREAPs (or other items discussed earlier in this work). As Table 5-2 indicates, while all but one of the national level plans were so called 'specific' BAPs, regional biomass planning works were also specific in six regions.[116] Thus, three regional plans integrated biomass into renewable energy (FL), energy (ST) and climate plans (DAL). While one national informant held that a specific plan for biomass would be needed in order to aim for optimisation of the biomass use to balance the use of industrial raw material and energy use and respond to environmental issues, another opined that "biomass is too important, too central in everything, [and has] too many interactions between the other markets...". One regional informant (NWE) supported the national views on the need for biomass to have a specific approach due to its unique properties (e.g. transportability) within the renewable energy sector.

Related to the barriers to the plan preparation (discussed in Section 5.2.3), the preparation of a NREAP posed a challenge for the different ministries to cooperate (and divide the work). This is because the NREAP topics usually fall within the scope of more than one ministry or governmental department. In response to this, it appeared that one ministry was usually responsible for the plan making, while others assisted in the process. This was the case in Czech Republic, where the ministry of industry was assigned to lead the process, while agriculture and environment ministries 'assisted'; in Estonia, the responsibility was assigned to the ministry of the economy while the agricultural ministry was in a supporting role. In Finland, the

[116] As presented in Section 1.1.2, specific plans focus entirely on biomass, while integrated plans address biomass e.g. within energy, climate and forestry plans. The informant of Flanders argues that their renewable energy plan is 80% biomass-related. However, it has been categorised as an integrated plan.

NREAP work was held to have increased cooperation between different ministries (spurring a ministerial coordination group); this was also the case in Austria. In Austria and the Netherlands the energy agencies were expected to have a large role in developing the plan. At regional level, this issue was touched upon only by Flanders. As a result of the complex governmental structure in Belgium; the majority (85%) of the matters to be covered in the NREAP is regional – reflecting the fact that the country is divided into three regions. While the responsibilities of the NREAP formulation had not yet been decided, the informant held that the coordination of the process is very important.

5.4.2 Guidelines

Regarding the importance and the need for a common template or guidelines (such as the NREAP template) literally to guide planning, a gamut of opinions was generated. While generally guidelines were considered as something positive, there were some reserved or negative perceptions. Noteworthy is that Finland's two informants expressed opposite views on the usefulness of the guidelines. This indicates clearly that there can be differing opinions *within* a country (and not only between countries).

Those with positive views expressed that the EC guidelines would facilitate the writing of the plan (DE), motivate the work (EE), and provide "a common communication method among different actors" (EL). The complexity of the biomass field is also regarded as something that requires guidelines for planning (DE, NL), as without them comparison is difficult (NL). For Spain the template represented a broad suite of items to be considered, but it was recognised that some of these may not concern the country and that the same would be true for other member states; however the guidelines are considered necessary to meet the mandatory objectives. In Ireland, the NREAP template is intended to "leverage the importance given to the document by the EC staff with -- domestic stakeholders".

More cautious opinions included views like that the future problems cannot currently be foreseen (EL).[117] Also, while the German informant considered the template helpful, he doubted that such guidelines that would have been able to address the fast developments in the bioenergy market. When their

[117] The Greek informant also argued that the RES-Directive does not promote efficient use of biomass, i.e. for heat, because it deals with final energy instead of useful energy.

plan was being developed, such guidelines were considered impossible to prepare. While one of the UK informants was of the opinion that a checklist approach that gives flexibility would be useful, Ireland welcomed guidelines as long as they are not prescriptive and limit the countries. This was considered to enable the provision of data that reflects what the countries are actually doing and avoids wasting resources on something that it is not useful (UK). One of the Finnish informants (FI2) disparaged the manner in which the EU dictates how countries should achieve targets in a form of a strict template. The Czech informant (CZ2) expressed that common guidelines are difficult to implement in the same form in all EU countries.

It is also worth noting the approach towards the NREAP guidelines. A few informants used words such as "fill out" or "fill in" (UK, SE, FL) or "copy-paste" (ES) when they described their NREAP preparation process. This contrasts with the comment of the Irish informant that they could "take advantage of the opportunity presented by the Commission asking something, to put together something very much worthwhile". However, such wording from informants does not necessarily signify that NREAP planning is not perceived to be useful. Indication of that is given by the representative from Flanders who argued that it is "not just a hollow document".[118]

As for regional level views on the issue, a similar range of opinions was observed. Most regional informants were primarily supportive or positive regarding guidelines for biomass planning. However, half of them emphasised that such guidelines need to consider the regional differences. Views were expressed that they would help to structure the development of the plan (ER/ST) and provide guidance on the ways to engage regional actors in the process (SB). While guidelines that recognise both the 'what' (content) and 'how' (process) aspects of planning were supported (ER/ST, NWE), the Pomeranian informant was of the opinion that planning guidelines should be similar for both levels. The informant of Flanders stated that "it makes perfect sense to ask everything in one template" (i.e. to include biomass within all RES in the NREAP), and thought that while no template can cover the complexity of biomass, for now the EC template

[118] In addition, one of the UK informants (UK1) noted that "where requirements are placed on member states to provide information to the European Commission, then those will be complied with. If the European Commission decide on a template then that will be "filled in"."

goes into sufficient detail. It also forces the member states to take a longer term view than normal political cycles.

However, the South-East Irish informant pointed out that guidelines can at times hinder the process and thus they should be very broad to accommodate differences between regions, and that the "regions need to adapt their plans to their regions". This necessitates the formation of a responsible body guiding the process and putting down "the terms of reference". In the case of South East Ireland, this role was taken by a steering committee. Along the same lines, two regional informants appeared to support general guidelines (POM, ER/ST) or general guidelines that are not binding (ER/ST). The informant from North Karelia was the only regional actor that did not see the value in common guidelines. This was based on the view that regional differences contribute to richness, which is created through shared will. In this case, the uniqueness of North Karelia was generated by strong organisations forming 'an engine group'. This was considered to be possible also in other regions if the actors and organisations can find each other. Regional informants also expressed views that if the template and consequent plan are too detailed, the plan is difficult to get accepted by the regional government (FL, SB). Similarly, there may be difficulties in gaining acceptance when the goals are specific and quantified (DAL). The last point contrasts with the idea of sound targets as they are always specific.[119] This can be seen to be attributed at least partly to the limited portfolio of resources available at a regional/local level.

In line with Paper III, the national level guidelines appear to ensure the completeness and comparability of plans in addition to the support for future reporting on the implementation of the RES-Directive. At regional level, the guidelines developed by various regional projects appear to be project specific; while they have seemed to have sought completeness and regional relevance, comparability is limited to the plans within the projects (see Section 1.1.2 and Paper III for some of those projects).

5.4.3 Coordination (top-down or bottom-up?)

Related to the discussion on the links between national and regional level planning, it was found that despite regional planning activities taking place in most of the countries, their plans were not linked to the national plan. This

[119] See Section 3.1.3: Goals and objectives.

phenomenon was explicitly indicated by the German, Finnish and Spanish informants. They neither seemed to be coordinated in any way – confirmed by four national informants. This is linked to the issue whether the planning should be a top-down or bottom-up process. This implies processes that are either coordinated or perhaps imposed by the national level or a voluntary initiative instigated by the regions.

For instance, the Swedish county level planning is generally bottom-up and voluntary; the Dalarna informant expressed that there is no need to "dictate it from the government". This view was shared by the Spanish informant; there is no intention to "propose any specific development for the regions" or make "regional allocation of the [national] target". In contrast, however, one of the Finnish informants argued that it would be good that these plans would be somehow in accordance and coordinated with each other in order to avoid a situation when the regions plan to use biomass more than their own potential. One of the Czech respondents (CZ2) expressed that "there has to be synergy between each other", i.e. between the planning carried out at these levels.

In Estonia – in which there are no regional plans due to the small size of the regions – the involvement of counties and towns is seen as very important, not least as their individual biomass potential is large. This stated, the Estonian informant favoured a top-down approach. In the Netherlands – despite the top-down approach – this is already happening, when three provinces have taken the initiative to form the "Energy Valley" under terms put in place by a special agreement with the national government. A top-down approach is also supported by the German informant. While he opined that while regional plans may be useful for specific regions, both regional and national levels are of insufficient scale to determine desirable solutions for biomass use and deal with complex interactions. Thus, the larger path should be first determined at global level (e.g. G-8) before establishing lower level plans.

A regional view on the issue is offered by South-East Ireland, whose plan objective was stated to reflect the will to "shift the focus on national level down to region". The South East Ireland informant considered that if the planning process is brought to a lower level, i.e. regionalised, some things are easier to coordinate and make people "feel more involved in the process".

5.4.4 General views on planning

In addition to the planning actor opinions described above, something still needs to be said that can offer extra insights into planning. The usefulness of the BAP process as a whole is one such item. For instance in Germany, the BAP process was not initially considered important as the existing laws – e.g. in terms of affecting stakeholder decisions. The preparation process served as a useful learning exercise and the plan was seen to gain more importance on the course of the process. Informants indicated that there was a considerable period of "waiting and seeing" (IE) and a number of stops in the process due to rapid developments in the field (DE) and lower priority (EE). However, the introduction of mandatory targets and action planning (within the NREAP framework) forced people to work together (AT) and organise monitoring better (FI).

Relevant to this discussion, while the majority of countries and regions in this study appear to be planning proponents, perhaps the most contrasting example is the view of Sweden (not) to plan. The Swedish informant indicated explicitly that planning as delineated within the BAP and NREAP process does not match the reality in the country. The stated reason was that the country relies significantly on market economic mechanisms and has the approach of "looking for the driving forces" from markets rather than seeking to "talk about quantitative things for the future". Also in Spain, instead of imposing any targets at regional level, the approach is to "stimulate the market, and the market will develop what [that which] is more feasible for them". This said, however, this study has clearly shown that the Spanish do plan at a national level in this area.

5.4.5 Concluding remarks

The perceptions and approaches to planning discussed here offer a glimpse into the thought processes of planning actors. The details presented here relate that planning and planning tools are generally seen as something worthwhile. However, while guidelines are considered useful, it is indicated that they should be flexible and need to accommodate regional and national differences. They should also allow for comparability to facilitate the tracking the progress towards targets. While flexibility has been expressed as a key theme, it must also be recognised that this is easier said than done. It can be questioned to what extent common guidelines can be both flexible and account for the complexity of the biomass field.

As for the communication and collaboration between the national and regional levels, it appears to be weak. In addition, plans, and their targets and actions between these levels seem not well coordinated with each other, either. This indicates a lack of regionalisation in biomass policy, and supports the findings of the discussion in Section 6.1.2.

CHAPTER

SIX

6. Conclusions

This final chapter summarises the main findings, draws conclusions and recommendations from them and presents areas where further research is desirable. The content also highlights the value of the research work, and delineates how the thesis contributes to the present state of knowledge in the biomass policy field.

6.1 Main findings and reflections

This work set out to explore biomass-to-energy planning with a comprehensive review and assessment of that which constitutes sound biomass policy interventions. Initial work established that there are clear calls for a coordinated approach to biomass policy and establishment of sound biomass policy in general. It was shown that these have been spurred by factors such as the slow progress of bioenergy and conflicts between biomass use for energy and for other purposes. Significant evidence was found that there is a serious lack of coordination, integration and coherence in the policy fields intersecting biomass use. Further, concerns were documented regarding the potential for negative impacts in areas such as food security, biodiversity and water quality.

Work proceeded with examination of how the need for a coordinated approach to biomass policy and establishment of sound biomass policy in general can be met. The main body of the work was conducted with the guiding view that biomass planning must aim to maximise the socio-economic and environmental benefits and capture synergies between policies, their tools and consequent actions while also preventing or reducing negative impacts of bioenergy production.

An initial literature review and observations in the field helped define the primary aim of this thesis: *to advance understanding of that which constitutes coherent and sustainable biomass policy interventions*. With this purpose in mind, research was designed to address and respond to two main research questions.

Research Question 1: *How can more coherent biomass policy be achieved in the EU?*

Research Question 2: *How can national and regional level biomass planning experiences contribute to the improvement of future biomass planning?*

6.1.1 Towards more coherent biomass policy

The current situation for biomass action planning at national and regional levels was investigated in search for items for improvement in the light of the sound policy and planning criteria. In doing so, this work focused on the design of a policy tool rather than the actual outcomes of its implementation. The analysis generated insights on how to ameliorate existing planning difficulties and to assist those countries and regions that have not yet planned their biomass use comprehensively.

Pursuant to the above, a number of findings and reflections are proposed addressing the first research question. The main findings naturally overlap with each other and are strengthened by the findings to the second research question.

Current biomass-to-energy plans are heterogeneous and display serious shortcomings: This research indicates that while the basic elements of a coherent approach are present in the planning documents at both national and regional level, they displayed inconsistencies, heterogeneity and other serious shortcomings.

- Plans varied extensively in a number of areas; for instance in the levels of effort applied in assessing biomass resources, in expression and record-keeping of such data (e.g. differing units and reference years), documentation of biomass use and the specificity of targets. In some instances these reflect the uniqueness of jurisdictional circumstances and the design to suit the needs of a particular country or region. However, this greatly complicates the comparison of the plans and, consequently, the determination of overall resources and the amount of biomass needed to achieve the targets.

- Shortcomings were found in several areas. Important examples include inadequate monitoring and evaluation of plans, poor

assessment of the impacts of biomass use and a general lack of recognition of the links between national and regional level planning. Implications of these are that the progress towards targets will not be appropriately evaluated, and that the probability that realisation of planned items is achieved is reduced. Secondly, it is unclear whether the use of biomass is conforming to the principles of sustainability embodied in the set of recommendations outlined at the outset of this work. Thirdly, a lack of acknowledgement of regional level directions and failure to incorporate such considerations in higher level planning may hinder the target achievement overall in the EU.

It can be concluded that in their current form – and due to an absence of abovementioned parameters – the plans at both levels are insufficient to deliver coherent, sustainable bioenergy development. Moreover, this research shows that there is scope for improvement in terms of biomass planning within NREAPs. Therefore, biomass-to-energy planning needs to be improved both within specific biomass planning and in integrated planning efforts such as the NREAP framework.

Biomass demands a coherent strategic planning and management approach: The diverse and complex character of biomass production and utilisation has been shown to demand a combination of strategic planning and management approaches. The various jurisdictional levels of planning, the large number of uses for biomass and overlaps in such, multiple stakeholders and interests, and frequent interlinks or overlaps in policies must be coordinated in planning activities.

- The work indicates that in order to address and better (vertically) integrate multiple jurisdictional levels, a certain type of formal, institutionalised collaboration structure would be needed. This has potential to achieve the coordination of actions and objectives at various levels. While national level plans do show signs of such formal collaboration structures at national level (horizontal integration), it is unclear how well they engage sub-national actors.

- The research found that while stakeholder engagement is considered as vital to achieve success at both levels, there is a need to establish communication channels and platforms that can better deal with multiple stakeholder interests. Broad, diverse and ongoing stakeholder engagement processes are still largely inadequate.

- The systematic analysis of impacts on other sectors needed to help account for the large number of biomass uses and overlaps in such is not yet taking place. The EC NREAP template has shown a basic approach to this, but is currently insufficient to encourage countries to carry out comprehensive assessments.

- There are indications that targets and objectives of policy instruments and their respective policies are not often streamlined for consistency and complementarity.

Biomass planning must adopt a more structured approach: While this work highlighted some of the challenges, it also identified some important practices that can help navigate past them. A sound policy and planning framework as defined in this work proved a useful tool to dissect and structure the preparation and evaluation of biomass plans. While the framework was utilised here as a set of desirable processes and outcomes against which plans were evaluated, it can also be used as a checklist of items to structure planning work. It is held that a more structured approach will contribute to a more coherent, sustainable and eventually successful use of biomass for energy and the achievement of related goals. This research indicates that a coherent biomass-to-energy planning should include the principal elements of:

- formulation of a vision;
- resource assessment based on sound methodology and data (including appropriate and comparable data representation);
- the setting of SMART targets based on the awareness of the strengths, weaknesses, opportunities and threats (SWOT);
- formulation of a strategy and action plan with measures to boost biomass availability considering other biomass uses;
- adequate stakeholder engagement throughout the process;
- implementation and monitoring of the progress;
- impact assessment of taken measures founded on life cycle assessment and paying attention to all sustainability dimensions;
- evaluation of the results and feeding them back to the decision-making of a new round of planning.

These elements mix the basic elements of both *process ("how" or procedural component)* and of *the substance ("what" or content component)* of the planning process, and naturally overlap.

Planning processes should embrace adaptation and continuous improvement: This work finds that the traditional, rational decision-making model is not applicable to real life situations found in the biomass/energy field, and does not account for the complexity inherently linked to natural world, including the biomass field. While the previous point indicates a need for a structured approach, it is not intended to imply that an extremely rigid set of rules should be followed. In contrast, a strategic approach to policy-making suggested here includes an adoption of the ideas of continuous learning, flexibility and adaptation. This demands a forward- and outward-looking approach and inclusivity, i.e. involving stakeholders throughout the planning process.

This work has outlined a strategic planning approach that includes the abovementioned elements. This requires both flexible and adaptive approaches to accommodate for uncertainty *and* formal planning with long-term shared vision due to the complexity and diversity of the biomass field.

Policy instrument interactions need to be assessed: This research highlights the need for recognition of policy instrument interactions within the planning framework. The examination of the impacts of policy interactions on biomass use yields insights on how to improve the design of policy interventions. While the interactions between different policy instruments – such as the EU-ETS and national climate/bioenergy policy instruments – and their impacts are challenging to evaluate, this work finds that such assessments are required in order to create a more coherent policy mix. Such work should be performed in order to *inter alia:*

- identify synergies – for example as in the combination of the EU-ETS and feed-in tariff shifting the Dutch energy system from fossil fuels to renewables;
- avoid negative effects – such as the reduction of peat use due to the EU-ETS compensated for by suspending its energy tax and introducing feed-in tariff in Finland;
- deal with conflicting outcomes – such as the competition for wood expected to increase in the near future in Finland, Sweden and the UK;
- to improve understanding of the better design of support schemes and individual policy instruments, and improve cost-effectiveness of policy and, consequently, reduce regulatory burden to economies.

Planning must look beyond just energy use: This research showed – both from the perspective of planning documents and process – that biomass planning has a general tendency to look the issue from an energy viewpoint. Reflecting what was mentioned earlier, the consideration of other uses in the plans does not match the requirement to evaluate the impact on other sectors as required by the NREAP process; also the recognition of overall optimal use is only in its initial stages. Corroborating this finding, the analysis of planning processes showed that while approaches looking beyond energy use are recommended (e.g. in the NREAP template, and in sectoral rhetoric), this does not seem to be widely endorsed or applied in practice at either regional or national levels. A planning document (or process) specifically devoted to biomass and its better use could facilitate the adoption of such approaches. This would enable the better acknowledgement of the unique properties of biomass, optimisation of resources and recognition of interactions between different markets.

6.1.2 Learning from national and regional level planning experiences

The research approached the second research question with exploration of views held by actors engaged in biomass planning. It sought to identify underlying factors that facilitate or hinder successful biomass use for energy. The work also cast light on the role and functions of biomass plans and planning, and on the different ways in which planning tools are perceived. There are important lessons to draw from the examination of the planning processes in selected jurisdictions at both national and regional levels. This discussion also adds experiences gained from the analysis as a whole to the examination of planning processes.

Work towards flexibility and continuity of process:
The work showed that while the jurisdictions encountered a number of barriers in the planning process, many of them appear to have knowledge of how to overcome them.

- There were several general barriers to policy implementation such as insufficient time and resources, financial problems and rapidly shifting political focus. However, it was indicated that critical issues particularly pertinent to bioenergy planning still exist that have not been adequately addressed. These include the need to achieve a broad stakeholder consensus and coordination of actions between the levels. The existence of such issues indicates a necessity for

better identification and recognition of barriers specific to bioenergy planning.

- While the national level actors have access to greater resources and authority to overcome factors hindering the process, in many instances, regional level jurisdictions have less capacity and resources with which to conduct planned actions. As such, there is a need to strengthen regional level capacities and to better harness the strong will of many regions to develop their own bioenergy resources.

- A process that is flexible, continuous and engages stakeholders throughout the process is held to be vital for (more) successful planning outcomes. Further, there are strong indications that high levels of motivation (in particular in the form of explicit political commitment or 'political will'), actions that clearly display that the plan is seen as a living document, and maintenance of an adaptive, flexible, and continuously evaluated/updated process is particularly important. These need to be recognised in the many levels of planning for bioenergy to meet the expectations that many actors have of it.

- Political leadership and a responsible body coordinating the process were indicated to be some of the key issues to be addressed in order to overcome barriers related to stakeholder confidence and involvement. If policy-makers are committed to the delivery and the communication of this to the stakeholders, the likelihood for stakeholder commitment is to increase and along with it, the delivery of targets. However, such a 'cascade' of commitment does not yet exist in many of the jurisdictions addressed by this study.

- The introduction of an obligatory planning framework within the RES-Directive has been shown to address a number of the barriers in the planning process. Not least as it appears that it has forced different governmental departments to work together and create a monitoring mechanism(s) to ensure continuous progress checks. The regions however, are freer to develop their own plans and this has resulted in various forms of planning. This planning may well emphasise target setting (a positive item) but the regions are indicated to be often weak in plan implementation. While mandatory planning may not be a viable option for regions, a formal national level call for regional and local level planning along with the formulation of a coordinating and information exchange

body can be options to promote improvement in regional level work, particularly in those regions where there has been low engagement to date.

- As there have been successes and good examples of biomass planning work in different member states (and their regions), there are significant opportunities for best experiences and practices to be shared more widely in order to 'spread' vital knowledge of the factors facilitating planning processes. However, this work has found limited evidence of such actions both between national BAP teams and regional project work.

Acknowledging and expanding from the multifaceted roles of plans: The work showed that the intended (and practical) roles of planning documents are multifaceted.

- This study indicates that while these partly overlap with the roles in other fields mentioned at the outset of this work – such as devices of goal achievement, control and communication – biomass plans appear to have additional roles, such as supporting systemic transformation; providing important, new information to the actors in the field; and advancing understanding of available options. It appears that the plans are primarily utilised within the biomass community, and it is unclear to what extent they are used to demonstrate political will and raise awareness of a wider audience of the benefits of biomass (or to clarify complexity and trade-offs). The plurality of roles supports the notion that biomass planning is widely seen as useful. However, multiplicity (in roles, in target audiences, and even in goals) may complicate plan evaluation against its possible outcomes (target achievement versus e.g. the transformation of the energy sector).

- The planning documents assessed in this study do not match many of the functions intended by those providing recommendations specifically for biomass planning. As established in Section 1.2.2, the plans are to harmonise biomass data, plan the role and the interaction of uses, and to clarify expectations and objectives relevant to different uses of biomass. While the NREAP requirement at national level has addressed the harmonisation of data to a significant extent, there is a gap between the current and intended roles and functions concerning planning beyond energy spheres. This relates to the earlier finding regarding the widening the scope from energy use only.

Clarify plan definitions: While the two main concepts (strategy and action plan) important to the function of planning documents are commonly understood to be different, their consistent application is not straightforward. There also appears to be gamut of related definitions that are used interchangeably in the bioenergy sphere. This matter is held to be of importance, as the manner in which the definition is interpreted by jurisdictional actors plays an essential role in determining that which the planning document is expected to deliver. This work finds that a more consistent use of terminology of planning documents, and understanding of the bounds of their role, would constitute an important improvement.

Develop comprehensive, yet flexible guidelines: This work demonstrated that both planning in general, and guidelines steering the planning are largely perceived worthwhile by national and regional actors. However, it is indicated that they should be flexible, broad enough to accommodate regional and national differences. There is thus a challenge to design guidelines that are flexible, enable comparison, and are comprehensive enough to deal with the complexity of biomass.

Coordinate planning and more explicitly recognise lower level actions: The work showed that both top-down and bottom-up approaches were advocated by biomass planners. However, reflecting the sound planning items in Chapter 3, successful biomass for energy planning requires a combination of these – not an 'either' 'or' approach.

- It was found that collaboration between actors and coordination of plans, targets and actions are generally weak between the jurisdictional levels. In other words, there is a lack of vertical integration – shown in this work to be essential to strategies promoting sustainable development. Related to this issue, the flow on benefits that may be achieved by regionalisation of policy appear to be a 'lost opportunity' without effective coordination of planning between the levels. Regional stimuli need to be recognised in higher level policy-making in order to help biomass policy and planning achieve its intended outcomes. Empowerment of regions to harness their potential (and thus leverage the significant motivation seen among many of them) may be one of the key issues to strengthen national level target achievement.

- While coordination in general was argued to enhance communication, help build mutual confidence and reconcile differences between actors (see Section 2.4.5), needs for coordination and integration of planning between levels appear to be mirrored by the need to harness synergies and better recognise the strengths of regional planning at higher level policy-making. Those strengths indicated in the plan analysis included mobilisation of new biomass resources and involvement of stakeholders. Such synchronisation of planning does not currently take place.

- This research indicated that the interest in regional biomass planning has considerably grown in the past few years; linking to what was put forth above, this in turn raises a need to share experiences about best planning practices.

Regional level commitment can strengthen the efforts of national governments to combat climate change and achieve other environmental benefits. At a more practical level, national level work needs to recognise ground level directions of work taking place at regional levels if it is to deliver a realistic picture of what can be achieved and a basis for planning how to achieve it.

To conclude the discussion on findings and their reflections, an important line of questioning in light of the common EU targets lies in what it is that ultimately helps member states to meet their goals. This work strongly suggests that coordination of (and by) planning is necessary to effect desired changes. Generalising from this study, it is proposed that this will be particularly true for the vast majority of EU states that have limited experience in modern biomass for bioenergy. The diversity and complexity of biomass field places intricate demands on its planning, and this is reflected in the plan content, process and actors involved in the process.

This work has showed that many of the findings between the analysis of planning documents and processes match – such as weak approach to look beyond energy use and poor coordination of actions between the levels. Nevertheless, as it was expected, the planning documents did not always represent the 'truth' – or the 'reality'. While stakeholder engagement appeared to be a somewhat poorly addressed item in the national level plans, it was shown that it was better in reality. Nor did the plans did reveal the barriers their implementation faced. This means that the understanding of ways to improve planning requires examination of both the means and the

ends of planning. It also suggests that while a formal planning document is important in directing a desired development – and taking the first step towards successful implementation in order to realise the intended strategies, as indicated in Section 2.5.2 – continuing work with the plan is necessary. Thus a plan can be seen as a vehicle of ongoing improvement. This supports the discussion of strategic planning literature in Chapter 2. The findings serve the purpose of a valuable learning exercise that can assist in the future design and implementation of biomass policies.

6.2 Recommendations

Reflecting the above findings, this section provides a number of recommendations. While it is desired that the findings guide future policy and plan design and realisation in general, they are especially pertinent to actors involved in and informing planning at national and regional levels. This work thus contributes to informing actors involved in planning on the items leading for a more coordinated and coherent approach.

Importantly, this thesis was directed towards policy- and decision-makers dealing with biomass use for energy (see Section 1.6). The findings are intended to be especially relevant to the actors informing planning at national and sub-national levels. As such, the following recommendations are primarily aimed to this group of actors.

General improvement of policy coherence

- Increased efforts are required to improve biomass-to-energy planning both within specific biomass planning and in integrated planning efforts such as the NREAP framework.

- A more structured approach to biomass planning that combines flexibility and adaptation to accommodate for uncertainty *and* that includes formal planning with a long-term shared vision should be pursued. When the formal plan has been established, clear mechanisms should be implemented to continue work with it.

- In conformance to the policy coherence definition proposed in this work, planning effort should be pursued to seek coherence by ensuring that different stakeholders for biomass use work together for common goals and results (or react to policy stimuli in such

ways) while creating synergies and minimising contradictions between various policy objectives.

- Greater efforts are required to identify and recognise both barriers and facilitating factors specifically pertinent to biomass planning. One of the latter is to create a 'cascade' of commitment – from political level to stakeholders.

- Efforts are required to achieve better biomass planning via expansion of the point of departure beyond energy use; this requires that systematic analysis of impacts on other sectors and the pursuit of optimisation of different uses are conducted.

- Checks need to be made that targets and objectives of policy instruments and their respective policies are streamlined for consistency and complementarity. Policy instrument interactions should also be assessed in order to create more coherent policy mixes. The design and application of policies should ideally take account of interactions and measures should be adjusted accordingly.

Planning tools

- Agreement of terms and consistent application of terminology for planning should be pursued.

- Work should be undertaken to design guidelines that are flexible, enable comparison and are comprehensive enough to deal with the complexity of biomass.

Improvement of communication and sharing of experiences

- More distinct and formalised communication channels and platforms that can better deal with multiple stakeholder interests should be established.

- Development of improved mechanisms to share best experiences and practices more widely and spread important knowledge is required.

Coordination and integration of actions at different levels

- Planning efforts should seek to adopt both top-down and bottom-up approaches, and synchronise actions between levels.

- Higher level policy-makers should recognise and assess regional stimuli and the regional capacities to effect changes.

- Institutional collaboration should be pursued in order to coordinate and vertically integrate multiple jurisdictional levels.

6.3 Contribution of the thesis

This thesis contributes to biomass-to-energy planning design and implementation. The following points intend to clarify that which has been achieved by this research, and reflect what was highlighted in the problem definition (Section 1.2) and research questions (Section 1.3).

First, in order to clarify how more coherent biomass policy can be achieved, this thesis has systematically examined major aspects of biomass planning from both descriptive and prescriptive perspectives, i.e. why and how planning is currently being done, how it can be improved, and what the formal plans include at the moment but should consider in the future. It also closely followed and documented the EU process and the evolution of the policy guiding biomass planning. This has clearly delineated a gap between the existing plans and the (potential) form of plans that will have greater ability to bring about coherent and sustainable development by means of bioenergy. The work has delivered an outline of an improved content and process in the form of a sound policy and planning framework. This framework is to be utilised to fill that gap.

Second, the research examined processes to develop and implement biomass plans at two jurisdictional levels. This work identified the realities of the planning practices – contributing to the understanding to those factors that can facilitate or hinder successful bioenergy development and providing insights to corroborate the findings from planning document analysis. The work identified ways to overcome planning barriers and manners in which to support the development of planning guidelines that both structure the process and are flexible enough to accommodate and reflect differences within countries and regions.

Third, the work has responded to filling a notable gap in the knowledge on the role, scope and function of biomass planning documents, namely BAPs at national and regional levels. The research clarified the range of definitions encompassing planning in the biomass policy context and highlighted the various roles the planning documents may have. The work also clarified that while the scope is usually narrowed to energy use of biomass, some support was found for specific biomass plans so as to sufficiently consider other uses and optimise the resource use.

Fourth, this work explored the different views and attitudes to guidelines and to planning in general. Such understanding can contribute positively to future policy and plan design and realisation. The findings – for instance those offering better understanding of the attitudes of jurisdictional actors to guidelines for biomass planning – can help policy-makers comprehend the motivation of the countries and regions to plan and ultimately the work that must be performed to achieve targets.

Fifth, additional value to research in this area was provided by the adoption of a regional focus. This entailed the determination of the status of regional planning. In addition, a number of issues pertinent to the role and capability of the regions in contributing to national level planning and target achievement have been identified in this work.

Finally, this research applied a combination of disciplines and research methods to the data collection and analysis of biomass planning processes and documents. It has established a broad view on how to proceed from ideas to action, and sought stimulus from practices and models developed in various planning fields. This delivers a useful approach that can be applied to advance more coherent biomass policy design.

6.4 Further research

This thesis has clarified pathways towards a more coherent approach to biomass policy with the aim to assist the development of better biomass plans and their successful implementation. The prospect of the transition to bioeconomy reinforces the need to view biomass utilisation in a wider context, not least as mentioned in Section 1.1.3, it is expected that competition for biomass resources will increase – already indicated in this research to some extent. There is a need for more research on how to steer this transition so that biomass utilisation is still sustainable.

Regarding more specific items, further research needs lie on seeking more evidence regarding the success of biomass planning, as this research has excluded an outcome evaluation of the planning documents. As for the impact of policy instrument interactions on biomass use, more research on regional and local levels would be needed to clarify the lower level impacts, as biomass is used for products that can be subjected to both local and international competition. In addition, while this research shows that there is scope for betterment in terms of biomass planning within NREAPs, the analysis of the NREAPs will show how well these items have been covered and what chances they have to forward more coherent biomass use.

In addition, the function and fate of biomass planning in regional and local contexts merits additional study, as the actors at lower levels are the ones eventually making the bioenergy development happen. Also, the great number of regional plans developed or being developed at the moment speaks for such supplementary examination.

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Appendix A – Other publications by the author

The following is a list of other publications by the author and research colleagues, which are of relevance to the thesis work:

Kautto N. (2010). *Planning biomass for energy: Examining the why, how and what of sound biomass policy*. IIIEE Working Paper. Lund: The International Institute for Industrial Environmental Economics at Lund University.

Schwaiger, H., Türk, A., Arasto, A., Vehlow, J., Kautto, N., Sijm, J., Hunder, M., Brammer, J. (2009). *The EU Emissions Trading Scheme and Biomass, JER 4.1, Final Report*. Bioenergy Network of Excellence, Overcoming barriers to bioenergy.

Kautto, N., & Jäger-Waldau, A. (2009). *Renewable Energy Snapshots 2009*. JRC Scientific and Technical Reports, EUR 23819 EN. Luxembourg: Office for Official Publications of the European Communities.

Kautto, N. and Peck, P. (2009). *Achieving effective biomass strategies: Linking regional and national biomass action plans*. Paper presented at the 17th European Biomass Conference and Exhibition, Hamburg, Germany. June 29 - July 3.

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Appendix B – List of interviewees

The following tables provide the details about the individuals interviewed during the research.

Paper IV regional informants and their organisation at the time of the interviews

Name/region	Organisation	Date and method
Bengt-Olof Danielsson (Dalarna)	Gävle Dala Energikontor (GDE)	February 2009; face-to-face
Ruben Guisson (Flanders)*	VITO (Flemish Institute for Technological Research)	July 2009; face-to-face
Asko Puhakka (North Karelia)	North Karelia University of Applied Sciences, Centre for Natural Resources	February 2009; face-to-face
Nigel Blandford (North West England)	Envirolink Northwest	July 2009; telephone
Katarzyna Grecka (Pomerania)	Baltic Energy Conservation Agency	February 2009; face-to-face
Sheevaun Thompson (South East Region of Ireland)	South-East Regional Authority	February 2009; face-to-face
Dietmar Überbacher (South Tyrol, Emilia Romagna)*	Ökoinstitut Südtirol/Alto Adige	February 2009; face-to-face
Name withheld (Southern Bohemia1)	Energy Centre Ceské Budejovice (ECČB)	February 2009; face-to-face
Name withheld (Southern Bohemia2)	Energy Centre Ceské Budejovice (ECČB)	February 2009; face-to-face

* Clarifications provided in July/August 2011.

Paper I and IV national informants (overleaf). Note: Paper I included information only from the national informants in Germany, Estonia, Ireland, Netherlands, Spain and the UK**.**

Name/ country	Organisation	Date and method
Herbert Tretter (Austria)	Austrian Energy Agency	November 2009; telephone
Leona Simkova (Czech Republic1)	Ministry of Agriculture, Organic Farming and Renewable Energy Resources Department	May 2009; telephone
Vladimír Stupavský (Czech Republic2)	CZ Biom	May 2009; email
Martti Mandel (Estonia)	Ministry of Agriculture, Agricultural Market Regulation Department, Plant Products Bureau	April 2009; telephone
Erkki Eskola (Finland1)*	Ministry of Employment and the Economy, Energy Department	May 2009; telephone
Petteri Kuuva (Finland2)	Ministry of Employment and the Economy, Energy Department	May 2009; telephone
Name withheld (Germany)	Beuth Hochschule für Technik Berlin, Fachbereich Architektur	September 2009; telephone
Vassilis Kilias (Greece)	Centre for Renewable Energy Sources, Energy planning support	May 2009; telephone
Richard Browne (Ireland)	Department of Communications, Energy and Natural Resources, Renewable and Sustainable Energy Division	April 2009; telephone
Ria Kalf (Netherlands)	Dutch Bio-Energy Association	May 2009; telephone
Hugo Lucas (Spain)*	IDAE (Institute for Diversification and Saving of Energy), Departamento de Coordinación y Apoyo a la Dirección de Energías Renovables	April 2009; telephone
Sven-Olov Ericson (Sweden)*	Ministry of Enterprise, Energy and Communication	May 2009; telephone
Name withheld (United Kingdom1)*	Department of Energy and Climate Change, Bioenergy and Renewable Materials Team	April 2009; telephone
Name withheld (United Kingdom2)*	Department for Environment, Food and Rural Affairs	April 2009; telephone

* Clarifications provided in July/August 2011.

Paper V informants

Informant/country	Organisation	Date and method
Ahti Fagerblom (Finland)	Finnish Forest Industries Federation, Director of Energy and Climate Policy	October 2008 (clarifications provided October 2009); email & telephone
Name withheld (Finland)	Ministry of Employment and the Economy	October 2008 (clarifications provided October 2009); telephone
Eija Alakangas (Finland)	VTT Technical Research Centre of Finland	October 2008; telephone
Name withheld (Finland)	VTT Technical Research Centre of Finland	October 2008; telephone
Tiina Koljonen (Finland)	VTT Technical Research Centre of Finland	October 2008; telephone
Lars-Erik Axelsson (Sweden)	Swedish Forest Industries Federation	October 2008 & November 2008; telephone & email
Bo Rydén (Sweden)	Profu	October 2008; telephone
Håkan Sköldberg (Sweden)	Profu	October 2008; telephone
Matti Parikka (Sweden)	Energimyndigheten (Swedish Energy Agency)	October 2008, telephone
Bert Daniels (Netherlands)	Energy Research Centre of the Netherlands (ECN)	November 2008; telephone
Marc Londo (Netherlands)	Energy Research Centre of the Netherlands (ECN)	November 2008; face-to-face
Marijke Menkveld (Netherlands)	Energy Research Centre of the Netherlands (ECN)	November 2008; telephone
Ton van Dril (Netherlands)	Energy Research Centre of the Netherlands (ECN)	November 2008; telephone
Kees Kwant (Netherlands)	SenterNovem	January 2009; telephone
Stuart Goodall (UK)	Confederation of Forest Industries (UK) Ltd (ConFor)	January 2009; telephone

Appendix C – Interview protocol

The following interview protocol was used to guide the interviews at national and regional levels for the research underpinning Paper IV (Paper I utilised some of the information yielding from these interviews). Questions somewhat varied between jurisdictions (both at the same level and between levels – e.g. regional/regional and national/regional) largely depending on whether the jurisdiction had established a biomass action plan (or it was in development). The protocol addressed two main themes.

0: Please describe your role in the biomass action plan development or implementation.

THEME 1: Status and the development process of the BAP

STATUS:

1. What is the situation/status of the development of the national/regional BAP or strategy in your country/region?

    a) What is the situation of the implementation and monitoring?

    b) [Other questions related to the status e.g. about the nature of targets]

DEVELOPMENT PROCESS:

2. What motivated your country/region to establish a plan? (/what were the primary motives for making a biomass plan or strategy?)

3. Were there any barriers or obstacles to the development of the plan? (/what were the barriers for the development of the plan/for not having a plan?)

4. How did you come up with those themes in your national/regional BAP? Has your national/region taken model from /linked in any other way with any other region/national level plan?

5. What is the definition of a biomass action plan/strategy in your country/region?

a) Does it also concern non-energetic uses of biomass?

6. Have you had any information exchange with the national or regional level actors in your country in terms of the BAP development? If yes, what kind?

a) How do you see the stakeholder involvement in the BAP process?

b) [Other detailed questions on stakeholder engagement such as composition of groups etc.]

7. What has been learnt from the process?

THEME 2: Future development of BAPs (and regional planning)

8. How do you see now the importance/role of the biomass plan in your jurisdiction?

9. Do you think the national plan can be integrated in a national REAP?

a) If so, how? If not, why?

[Additional question: What is your opinion about a need for a specific biomass plan?]

10. What is your opinion on guidelines or a template for BAPs/biomass in REAPs?

11. How do you view the REAP process?

12. Are you aware of any regional biomass plans or strategies in your country?

a) If yes, are they linked to the national level plan?

13. If the two levels of action are compared, that is national and regional levels, which areas do you think would be better covered at national level/regional level (if any)?

14. Would you like to add anything else/provide any other information?

Appendix D – Participation in conferences, workshops and meetings

General conferences and workshops	Date	Place	Role of the researcher
EU Biorefinery Conference	19-20 Oct 2006	Helsinki (FI)	Observer/ participant
Bioenergy 2007 - 3rd International Bioenergy Conference and Exhibition	3-4 Sept 2007	Jyväskylä (FI)	Speaker, co-author of a conference paper
UNECE/FAO Policy Forum: Opportunities and Impacts of Bioenergy Policies and Targets on the Forest and Other Sectors	10 Oct 2007	Geneva (CH)	Observer/ participant
World Bioenergy 2008	27-29 May 2008	Jönköping (SE)	Speaker, co-author of a conference paper
16th European Biomass Conference and Exhibition	2-6 June 2008	Valencia (ES)	Speaker, co-author of a conference paper
World Sustainable Energy Days, Regional Biomass Action Plans	25-27 Feb 2009	Wels (AT)	Speaker, author of a conference paper
17th European Biomass Conference and Exhibition	30 June-3 July 2009	Hamburg (DE)	Speaker, co-author of a conference paper
ELOBIO Final Seminar	25 March 2010	Brussels (BE)	Observer/ participant
COP-15 side-events: IEA-RETD workshop on Better Use of Biomass for Energy and Biobased Economy	14 & 15 Dec 2009	Copenhagen (DK)	Observer/ participant
World Climate Forum, Green Gap Roundtable on bioenergy	30 Sept 2010	Copenhagen (DK)	Observer/ participant

Energy policy planning	**Date**	**Place**	**Role of the researcher**
3rd Meeting on National Biomass Action Plans (DG TREN)	6 Feb 2008	Brussels (BE)	Observer/ participant
2nd BAP Driver Expert Meeting	10 Dec 2008	Berlin (DE)	Observer/ participant
3rd BAP Driver Expert Meeting	7 Oct 2009	Brussels (BE)	Observer/ participant
AEBIOM workshop on 'Template for national action plans'	19 March 2009	Brussels (BE)	Observer/ participant
JRC Workshop on methodologies for city sustainable energy action plans	18 -19 May 2009	Ispra (IT)	Observer/ participant
AEBIOM workshop on 'Bioenergy within the NREAPS'	25 March 2010	Brussels (BE)	Observer/ participant

Bioenergy Network of Excellence	**Date**	**Place**	**Role of the researcher**
General research meetings			
Bioenergy NoE Researchers Meeting 2006	16-18 Oct 2006	Helsinki (FI)	Speaker
Bioenergy NoE Researchers Meeting 2007	1- 3 Oct 2007	Bad Blumau (AT)	Observer/ participant
Bioenergy NoE Researchers Meeting 2008	20 -22 Oct 2008	Stratford (UK)	Observer/ participant
Bioenergy NoE Final Meeting 2009	2-3 Nov 2009	Brussels (BE)	Observer/ participant
Project meetings on EU-ETS and biomass			
Work package IA12, Second meeting	7-8 Sept 2009	Karlsruhe (DE)	Observer/ participant
Work package IA12, Third meeting	4-5 Dec 2006	Amsterdam (NL)	Observer/ participant
JER 4.1, First meeting	12-13 Sept 2007	Ispra (IT)	Task leader
JER 4.1, Second meeting	16-17 Jan 2008	Warsaw (PL)	Task leader
JER 4.1, Third meeting	14-15 May 2008	Birmingham (UK)	Task leader

Appended papers

The following papers are appended to the thesis:

Paper I: Kautto, N. & Peck, P. National biomass action plans in Europe – Looking for a coordinated approach to biomass policy. Submitted to *Energy Policy* in November 2010.

Paper II: Kautto, N. & Peck, P. (2011). From optional BAPs to obligatory NREAPs: understanding biomass planning in the EU. *Biofuels, Bioproducts and Biorefining* 5(3): 305-316.

Paper III: Kautto, N. & Peck, P. Regional biomass planning – Contributing to the realisation of biomass potential in the EU? Submitted to *Renewable Energy* in February 2011.

Paper IV: Kautto N. & Peck, P. Lessons from biomass planning at national and regional level in the EU. Submitted to *Biofuels, Bioproducts and Biorefining* in August 2011.

Paper V: Kautto, N., Arasto, A., Sijm, J. & Peck, P. (2011). Interaction of the EU-ETS and national climate policy instruments – Impact on biomass use. *Biomass and Bioenergy* (article in press).

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Niina Kautto
Towards More Coherent and Sustainable Biomass Policy: Examining European biomass-to-energy planning
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Advancing the Frontier of Extended Producer Responsibility. The management of waste electrical and electronic equipment in non-OECD countries
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Martin Kurdve
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Niina Kautto

Towards More Coherent and Sustainable Biomass Policy

Examining European biomass-to-energy planning

Coordination of policies embracing biomass use has been called for in order to speed up progress towards the European Union renewable energy and climate change goals. Policy coordination and coherence is also required if the many complex and diverse issues constraining sustainable bioenergy development are to be addressed.

This doctoral thesis explores planning documents and processes relevant to biomass use for energy at both national and regional levels in the EU. The research also investigates the interaction between policy instruments and their impact on biomass use. To this end, the work reviews good practice in policy-making and strategic planning in the context of biomass for bioenergy. With a primary basis in qualitative research, the thesis provides insights into how a more coherent approach to biomass policy may be achieved and how biomass planning experiences could contribute to the improvement of future biomass planning. The work advances understanding of how to pursue more coherent and sustainable biomass policy interventions. Improvements in these directions can facilitate more sustainable biomass utilisation for energy.

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