

# **Biomass or Biomess?**

Examining sustainability schemes as way to address stakeholder concerns over the use of forest biomass

**Charlotte Sluka**

Supervisors

Philip Peck

Volker Türk

Thesis for the fulfilment of the  
Master of Science in Environmental Sciences, Policy & Management  
Lund, Sweden, June 2012

MESPOM Programme:

Lund University – University of Manchester - University of the Aegean – Central European University

**Erasmus Mundus Masters Course in Environmental  
Sciences, Policy and Management**

**MESPOM**



*This thesis is submitted in fulfilment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean (Greece), Central European University (Hungary), Lund University (Sweden) and the University of Manchester (United Kingdom).*

Supported by the European Commission's Erasmus Mundus Programme



Education and Culture

**Erasmus Mundus**

© You may use the contents of the IIIEE publications for informational purposes only. You may not copy, lend, hire, transmit or redistribute these materials for commercial purposes or for compensation of any kind without written permission from IIIEE. When using IIIEE material you must include the following copyright notice: 'Copyright © Charlotte Sluka, IIIEE, Lund University. All rights reserved' in any copy that you make in a clearly visible position. You may not modify the materials without the permission of the author.

Published in 2011 by IIIEE, Lund University, P.O. Box 196, S-221 00 LUND, Sweden,  
Tel: +46 – 46 222 02 00, Fax: +46 – 46 222 02 10, e-mail: [iiiee@iiiee.lu.se](mailto:iiiee@iiiee.lu.se).

ISSN 1401-9191





## **Acknowledgements**

I am highly grateful to Philip Peck, professor at the IIIIEE, whose expert guidance and challenging comments have proved invaluable over the past five months.

Special thanks go to Volker Türk, CSR-manager at E.ON Climate and Renewables GmbH, whose relentless support and unbiased advice made this thesis possible.

I would further like to thank Timo Kaphengst, senior fellow at the Ecologic Institute, for sharing his expertise and contacts.

Last but not least, I would like to express my gratitude to all 140 interviewees and survey respondents who volunteered their time to answer my questions and who often went out of their way to provide additional information.

## **Abstract**

Stakeholders are voicing concerns over the social and environmental impacts of components of Europe's renewable energy strategy that will significantly increase the region's demand for forest biomass. Energy companies must address these concerns if they are to manage financial, reputational, regulatory and competitive risks. Sustainability schemes may help reduce such risks by increasing the social trust and legitimacy in both the company and its supply chains. This paper examines how the application of sustainability schemes can help European utility companies address stakeholder concerns over the use of solid biomass in large scale energy generation. Both primary and secondary research techniques are applied for data collection and elements of stakeholder theory are used to set out (i) who the most relevant stakeholders are; (ii) what their principal concerns are; and (iii) how these concerns may best be addressed through sustainability schemes. The research involved an in-depth review of eleven sustainability schemes and a survey with responses from 140 biomass experts. The sustainability schemes were benchmarked against the EU's legislative requirements and against stakeholder ratings in order to show which sustainability criteria are covered by which scheme, and to what extent each scheme satisfies legal and stakeholder requirements.

The research results indicate that government representatives and NGOs are the most significant stakeholders. They also showed that, while no scheme currently addresses all concerns highlighted by these stakeholders, the criteria of the FSC, the PEFC, the ISCC and the IWPB are comparatively comprehensive. Further, results indicate that, in practice, the actual sustainability criteria may be less important for a scheme's trustworthiness than the name of the organisation leading the scheme. The work finds that NGO-led schemes engender the highest level of trust by stakeholders and are thus most likely to satisfy their demands. This comes despite equal or greater levels of stringency in a number of industry-led schemes. Despite the current legitimacy concerns with their efforts, this research indicates that utilities should continue their efforts; in particular under the IWPB certification system, as the scheme provides a valuable opportunity to consolidate the proliferation of existing standards. Regardless of which sustainability scheme is chosen, energy providers will benefit if they clearly recognise the significant limitations of sustainability schemes. When devising medium- to long-term strategies, they must proactively account for the risks that stem from a highly volatile policy environment created by increasingly vehement stakeholder opposition to the large-scale utilisation of biomass before locking themselves into substantive infrastructure investments.

**Keywords:** Renewable energy, woody biomass, sustainability certification, stakeholder opinions, utilities

## **Executive Summary**

The European Union's Renewable Energy Strategy aims for 20% of the EU's final consumption of energy to come from renewable sources by 2020. Forest biomass will likely constitute an essential part of the renewable portfolio of large energy providers, not only because it can be used in existing thermal power plants but also because, unlike other sources of renewable energy, it can provide baseload heat and power generation. As a result, the region's demand for wood is likely to increase significantly. Most experts agree that European forest biomass supplies are insufficient to satisfy this projected rise in demand. A large part of the woody biomass required for energy production is therefore likely to be imported from abroad.

Stakeholders are voicing concerns over the social and environmental impacts that this increased demand for wood may have. They fear that large-scale imports of biomass wood might be difficult to control and could create serious damage to forests, local communities and biodiversity. The activities of these stakeholders pose a business risk to energy companies operating in the European woody biomass sector. A variety of well-known NGOs are already publicly criticising the promotion of woody biomass for energy purposes and lobbying for a cut in subsidies. Moreover, public concerns have resulted in considerable dynamics in the policy field. This shows that public opinion in this area has a significant potential to influence politicians, and in turn legislators.

Energy companies must address these concerns if they are to manage financial, reputational, regulatory and competitive risks, as well as in order to ensure legal compliance. A number of legislative safeguards, such as the Renewable Energy Directive and the Timber Regulation have already been put into place and more specific legislative sustainability requirements for solid biomass can be expected at European level later in 2012. However, the research conducted indicates that legal compliance alone is unlikely to be sufficient to appease critical stakeholders. In tackling the sometimes hostile relationship between different interest groups and energy providers, companies need to improve the trust placed in them in order to attain socio-political and cognitive legitimacy.

Sustainability schemes may help reduce stakeholder risks by increasing the social trust and legitimacy in both the company and its supply chains. A large number of schemes aimed at addressing the sustainability concerns associated with biomass sourcing exist. However, in order to be able to reduce risks effectively, energy companies have to establish which of these schemes meet the concerns of their most important stakeholders and why.

This paper thus examines how the application of sustainability schemes can help European utility companies address stakeholder concerns over the use of solid biomass in large-scale energy generation. Both primary and secondary research techniques are applied for data collection and elements of stakeholder theory are used to set out (i) who the most relevant stakeholders are; (ii) what their principal concerns are; and (iii) how these concerns may best be addressed through sustainability schemes.

The research involved an in-depth review of the environmental, social, economic and governance criteria of the eleven sustainability schemes listed in the table below. The examined schemes represent a selection of the different types of sustainability schemes available. The results were organised in a comparative analysis table. The tabulated presentation of the scheme criteria allowed for an easy and quick comparison of the different schemes against each other and against the applicable legislative requirements. In a second step, primary research was conducted in order to identify sustainability concerns among stakeholders and to explore stakeholder perceptions of the sustainability schemes examined. A

total of 20 expert interviews were complemented by an online questionnaire, to which 120 representatives of government and private sector institutions, NGOs, and research institutes replied. The different schemes were then compared against the stakeholder ratings. The aim of this benchmarking exercise was to outline which sustainability scheme covers which criteria, and to what extent each scheme satisfies legal and stakeholder requirements.

Legislative Requirements	Utility Company Schemes	Voluntary Certification Schemes			
		Forest Certification Schemes	Stepwise Programmes	Legality Verification Schemes	RED Biofuel Schemes
RED Timber Regulation	IWPB E.ON GGL Laborelec	FSC PEFC	GFTN Smartstep	TLTV VLC Smartwood VLC	ISCC

The primary research conducted attracted an unusually high response rate, reflecting the strong involvement and concerns of many stakeholder groups with the issue of forest biomass. This paper found that companies should therefore not regard stakeholder opposition as a small hurdle that can be dealt with easily. Instead, they should allocate significant time and resources to this issue as part of their main business strategy.

The research results demonstrate that managers should take the claims of external stakeholders, particularly government officials and NGOs seriously, as they possess power, legitimacy, and urgency. Within the analysis frame applied, these attributes indicate that these stakeholders very likely have the ability to place significant constraints on the biomass sourcing operations of energy utilities. In the context of sustainability certification, the key stakeholders are particularly concerned about issues such as GHG emissions, biodiversity, land use rights and food security, as well as independent third party certification mechanisms. The investigation revealed especially intense discussions on the carbon balance of woody biomass sourcing at the highest scientific and policy levels.

The examination of sustainability schemes established that no scheme currently addresses all of the most urgent stakeholder concerns. Nevertheless, the results indicate that the forest certification schemes, as well as the ISCC and the IWPB are more comprehensive than others and go some way towards safeguarding sustainability.

However, the paper further shows that the question whether a sustainability scheme can be relied on to alleviate stakeholder concerns is largely one of trust. The results indicate that the actual sustainability criteria of a scheme seem to be less important for its trustworthiness than the name of the organisation leading the scheme. The analysis found that long-established, NGO-led schemes (particularly the FSC) enjoy the highest level of trust among stakeholders and are thus the most likely to satisfy their demands. This study indicates that, in the eyes of many stakeholders, the private sector currently lacks the necessary social trust to certify its own biomass sourcing operations. For utility companies looking to employ sustainability schemes as a tool to address stakeholder concerns, a lot thus speaks for relying on the long-established forest certification schemes as much as possible. This work shows that these are not only by far the best known sustainability schemes; stakeholders further rated them to be the most trustworthy and their sustainability criteria were found to be far more comprehensive than any other scheme's.



By contrast, the private sector schemes, particularly the IWPB, received the lowest scores of trustworthiness in the online survey. New schemes were found to take time to earn the trust of relevant stakeholders. Nevertheless, this work recommends that utility companies should continue their efforts under the IWPB. It is contended that the scheme provides a valuable opportunity to consolidate the proliferation of existing private sector schemes. This proliferation increases the risk that market participants will ‘forum shop’ for standards and therewith decreases the overall trust that stakeholders place in certification schemes. Importantly, the IWPB seems to be the only scheme examined where the criteria are in compliance with the upcoming legislative sustainability provisions on woody biomass.

Nonetheless, utilities should also be aware that it is likely that their efforts under the IWPB will be scrutinised very closely by stakeholders. The private sector will almost certainly be accused of greenwashing if efforts to genuinely ensure sustainability are watered down. It would be particularly impressive for stakeholders if the IWPB were to go a step further and impose a self-limitation on the total amounts of biomass that will be sourced by its members. Furthermore, the common sustainability criteria of Europe’s large pellet buyers have a good chance to become globally valid standards.

Independently of which sustainability scheme is chosen, energy companies must bear in mind the significant limitations of certification schemes. These include the risk of fraud and corruption, legitimacy concerns that stem from the lack of democratic control, limits in the amounts of credibly certified wood available and indirect effects which strongly affect sustainability but can only be covered to a very limited extent by sustainability schemes. In addition, certification schemes may not appease those who already hold the view that the large-scale use of woody biomass in energy generation is an inherently bad idea. The primary research conducted for this paper found a surprisingly high number of fervent opponents to solid biomass exploitation at the governmental level, in research institutes and even among representatives from the private sector. These considerations demonstrate that utility companies cannot blindly rely on certification schemes as an easy fix to the many sustainability concerns that woody biomass sourcing brings with it.

Therefore, instead of relying solely on certification, utilities should take additional precautions that will help to ensure the sustainability of the wood and are likely to render the material less controversial to stakeholders. As such, companies should try to source their forest biomass from within Europe as much as possible and develop vertically integrated supply chains. Utilities are further encouraged to place an outright ban on sourcing the wood with the highest GHG emissions (for instance from tropical palm plantations). Aiming for a cascade use of wood will help energy companies to source biomass from uncontroversial sources and might allow for the creation of synergies with other industries.

This paper concludes that the current subsidies will undoubtedly render this form of energy generation economically viable in the short- to medium-term. Nevertheless, energy companies must recognise that the sustainability concerns associated with forest biomass can only be managed to a certain extent and are unlikely to ever be solved. Therefore, when devising medium- to long-term strategies, it is strongly recommended that energy providers account for the risks that stem from vehement stakeholder opposition and the possibly resulting policy changes before locking themselves into substantive infrastructure investments.

# Table of Contents

<b>LIST OF FIGURES</b> .....	<b>II</b>
<b>LIST OF TABLES</b> .....	<b>III</b>
<b>ABBREVIATIONS</b> .....	<b>IV</b>
<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 OVERVIEW.....	1
1.1.1 <i>Europe’s renewable energy strategy</i> .....	1
1.1.2 <i>Utilities and stakeholder relations</i> .....	2
1.1.3 <i>The role of certification schemes</i> .....	3
1.2 RESEARCH QUESTION.....	4
<b>2 BACKGROUND: EU ENERGY POLICY &amp; ITS CONSEQUENCES</b> .....	<b>5</b>
2.1 EUROPE’S INCREASING DEMAND FOR BIOMASS.....	5
2.2 OVERSEAS SOURCING OF WOODY BIOMASS.....	6
2.3 SUSTAINABILITY CONCERNS RELATED TO WOODY BIOMASS SOURCING.....	7
2.3.1 <i>Environmental concerns</i> .....	7
2.3.2 <i>Social &amp; economic concerns</i> .....	11
2.4 LEGISLATIVE RESPONSES.....	12
2.4.1 <i>EU Timber Regulation</i> .....	12
2.4.2 <i>EU Renewable Energy Directive &amp; national schemes</i> .....	13
<b>3 METHODOLOGY</b> .....	<b>15</b>
3.1 THEORETICAL FRAMEWORK.....	15
3.2 OVERALL RESEARCH DESIGN.....	16
3.3 METHODS OF DATA COLLECTION.....	17
3.3.1 <i>Step 1 – Literature review</i> .....	17
3.3.2 <i>Step 2 – Comparative table</i> .....	18
3.3.3 <i>Step 3 – Stakeholder survey</i> .....	19
3.4 LIMITATIONS.....	20
<b>4 RESULTS OF PRIMARY RESEARCH</b> .....	<b>22</b>
4.1 PART I – TYPES OF STAKEHOLDER ORGANISATIONS & LOCATIONS.....	22
4.2 PART II – STAKEHOLDER CONCERNS & IMPORTANCE OF SUSTAINABILITY CRITERIA.....	23
4.3 PART III - STAKEHOLDER RATING OF SUSTAINABILITY SCHEMES.....	28
4.4 PART IV – FUTURE OUTLOOK.....	29
<b>5 IDENTIFICATION OF RELEVANT STAKEHOLDERS &amp; THEIR SUSTAINABILITY CONCERNS</b> .....	<b>31</b>
5.1 RELEVANT STAKEHOLDERS.....	31
5.2 STAKEHOLDER CONCERNS.....	32
5.2.1 <i>Social &amp; economic concerns</i> .....	32
5.2.2 <i>Concerns regarding standard-setting, monitoring &amp; governance mechanisms</i> .....	33
5.2.3 <i>Environmental concerns</i> .....	34
5.3 RISK IMPLICATIONS FOR UTILITY COMPANIES.....	37
<b>6 MEETING STAKEHOLDER CONCERNS THROUGH THE APPLICATION OF SUSTAINABILITY SCHEMES</b> .....	<b>39</b>
6.1 INTRODUCTION.....	39
6.2 COMPARATIVE TABLE OF SUSTAINABILITY SCHEMES.....	40
6.3 VOLUNTARY CERTIFICATION SCHEMES.....	45
6.3.1 <i>Forestry certification</i> .....	45
6.3.2 <i>RED Sustainability Schemes – the ISCC (EU Standard)</i> .....	47

6.3.3	<i>Stepwise programmes</i> .....	49
6.3.4	<i>Legality verification schemes</i> .....	50
6.4	COMPANY SUSTAINABILITY SCHEMES.....	51
6.4.1	<i>Green Gold Label</i> .....	51
6.4.2	<i>E.ON</i> .....	52
6.4.3	<i>Laborelec</i> .....	52
6.4.4	<i>IWPB</i> .....	53
6.4.5	<i>Evaluation of company sustainability schemes</i> .....	53
6.5	FURTHER CONSIDERATIONS.....	55
6.5.1	<i>Extent to which the examined sustainability schemes ensure legal compliance</i> .....	55
6.5.2	<i>Extent to which the examined schemes are trusted by stakeholders</i> .....	58
6.6	LIMITATIONS TO MEETING STAKEHOLDER CONCERNS THROUGH THE APPLICATION OF SUSTAINABILITY SCHEMES.....	60
<b>7</b>	<b>CONCLUSION</b> .....	<b>64</b>
7.1	SUMMARY OF FINDINGS.....	64
7.2	REFLECTIONS UPON THE THEORETICAL FRAMEWORK.....	65
7.3	RECOMMENDATIONS TO ENERGY COMPANIES & FUTURE OUTLOOK.....	66
7.4	RECOMMENDATIONS FOR FURTHER RESEARCH.....	69
	<b>BIBLIOGRAPHY</b> .....	<b>71</b>
	PERSONAL COMMUNICATIONS.....	75
	<b>APPENDICES</b> .....	<b>76</b>
	APPENDIX A.....	76
	APPENDIX B.....	79
	APPENDIX C.....	81
	APPENDIX D.....	84

## List of Figures

Figure 4-1	Geographic location of questionnaire respondents.....	22
Figure 4-2	Number of survey participants from different types of organisation.....	23
Figure 4-3	Environmental criteria considered particularly important by different stakeholder groups.....	25
Figure 4-4	Social and economic criteria considered particularly important by different stakeholder groups.....	26
Figure 4-5	Standard-setting, monitoring & governance mechanisms considered particularly important by different stakeholder groups.....	27
Figure 4-6	Stakeholder ratings of sustainability schemes.....	28
Figure 4-7	Percentage of respondents familiar with different sustainability schemes.....	29
Figure 4-8	Stakeholder opinions on how sustainability of the European woody biomass trade should be ensured in the future.....	30
Figure 6-1	Relationship between age, profile and stakeholder rating of schemes.....	59

## **List of Tables**

Table 3-1 Sustainability schemes selected for further evaluation. ....	17
Table 6-1 Comparative Table of the environmental sustainability criteria covered by different sustainability schemes and stakeholder opinions. ....	41
Table 6-2 Comparative Table of the social and economic sustainability criteria covered by different sustainability schemes and stakeholder opinions.....	42
Table 6-3 Comparative Table of the standard setting, monitoring & governance mechanisms covered by different sustainability schemes and stakeholder opinions.....	43

## **Abbreviations**

CoC	Chain of custody
CR	Corporate responsibility
DBFZ	Deutsches BiomasseForschungsZentrum
FAO	Food and Agriculture Organisation of the United Nations
FMU	Forest management unit
FSC	Forest Stewardship Council
GFTN	Global Forest and Trade Network
GGL	Green Gold Label
GHG	Greenhouse gas
ISCC	International Sustainability and Carbon Certification
IWPB	Initiative Wood Pellet Buyers
LUC	Land use change
M(E)P	Member of (European) Parliament
Mtoe	Million tonnes of oil equivalent
PEFC	Programme for the Endorsement of Forest Certification
RED	EU Renewable Energy Directive (2009/28/EG)
Timber Regulation	EU Timber Regulation (99/2010)
TLTV	Timber Legality and Traceability Verification
VLC	Verification of Legal Compliance
VLO	Verification of Legal Origin
ILUC	Indirect land use change
NREAP	National Renewable Energy Plan
WSED	World Sustainable Energy Days conference (28 February 2012 in Wels, Austria)

# 1 Introduction

This chapter provides a brief overview of the issues touched upon in this paper. It then introduces the research question.

## 1.1 Overview

The purpose of this paper is to examine how the application of sustainability schemes can help utility companies address European stakeholders' concerns over the use of forest biomass in large scale energy generation. It aims to give the reader an impression of (i) who the most relevant stakeholders are; (ii) what their principal concerns are; and (iii) how these concerns can be addressed through voluntary sustainability schemes. The paper is aimed at utility companies operating in the European woody biomass for energy sector.

This topic is very relevant to current developments because forest biomass is expected to play an important role in increasing the share of renewable energy production in Europe (Dossche, 2009). A global bioenergy commodity market with related financial services and linkages to other energy markets is now emerging (Ladanai & Vinterbäck, 2010b). At the same time, stakeholder concerns regarding the sustainability of sourcing woody biomass, particularly biomass from developing countries, are currently invoking heightened media interest and intense lobbying at political level (Birdlife International et al., 2011). With rainforests dwindling at frightening rates and biodiversity in crisis, national governments cannot always be relied on to adequately protect their natural resources (Wunder, Kaphengst, Timeus, & Berzins, 2011). Voluntary certification schemes may be able to provide independent sustainability standards that can serve as a tool for utility companies to address these concerns, yet they vary widely in their coverage and credibility (Ifeu Institute, 2011). The topicality of the issue renders the subject a dynamic and fascinating area of research.

### 1.1.1 Europe's renewable energy strategy

Decades of human reliance on fossil fuels for energy supply have led to highly elevated levels of greenhouse gases in the atmosphere, making climate change what German chancellor Angela Merkel has called "the greatest threat that human civilisation has ever faced".

Recognizing the urgency of the climate change threat, Europe has committed itself to cutting greenhouse gas emissions significantly. At the same time, energy security concerns have accelerated the trend away from import-dependent fossil fuels towards policy support of renewable energy production. "Europe currently imports EUR 400 billion worth of energy annually – with increasing instability in the Middle East, energy security has become a primary driver of bioenergy" (MEP Paul Rübzig at the 2012 WSED Conference in Wels).

It is hoped that renewable energy systems will help to maintain stable economies, provide clean, reliable low carbon power and facilitate the shift away from nuclear power which is taking place in some countries. As part of this, the European Union's promotion of lower carbon energy schemes provides opportunities for energy companies to switch the fuel source of large power stations from coal to woody biomass. Biomass constitutes an essential part of the renewable portfolio of large energy providers, not only because it can be used in existing thermal power plants but also because, unlike other sources of renewable energy, it can provide baseload heat and power generation (IWPB, 2012). Woody biomass is thus expected to play an important role in Europe's renewable energy portfolio.

Advocates of the use of forest biomass for heat and electricity production emphasise its potential to mitigate climate change and to secure energy supplies at European level (Stupak et

al., 2007). The utilisation of biomass for heat or power production is argued to be carbon-neutral (Al-Mansour & Zuwala, 2010). Proponents also believe that its usage has significant potential to create co-benefits such as rural employment and poverty reduction (Cotula, Finnegan, & Macqueen, 2011; Openshaw, 2010). Moreover, when tied to minimum levels of 'sustainability performance', supporters indicate that it can provide incentives for the adoption of sustainable forest management practices abroad (Ladanai & Vinterbäck, 2010a; Wunder et al., 2011).

However, a number of actors have voiced unease over the potential for negative social and environmental impacts related to the expected sharp increase in imports of woody biomass from abroad (Birdlife International et al., 2011; Dossche, 2009; Greenpeace, 2011). The concern is that large-scale imports of biomass wood from overseas might be difficult to control and could create serious damage to forests, local communities and biodiversity (Birdlife International et al., 2011). These risks are of particular importance because the extinction of species is already taking place at unprecedented rates and has long surpassed biological limits. Similarly, some forests are of unique biological value and have taken centuries to reach their current state, making it impossible to recover or replant them once they have disappeared. Yet they are dwindling rapidly, due to continued legal and illegal exploitation. Deforestation in turn can also lead to poverty aggravation and local shortages in food and raw materials (Wunder et al., 2011). These considerations are ever more important since the energy policies that are currently being enacted will lead to the creation of energy infrastructure that will remain in place for many decades.

In response to such concerns, a number of safeguards have been put into place at legislative level in order to promote the sustainability of woody biomass sourcing. At European level, the Renewable Energy Directive (RED, 2009) and the Timber Regulation (Timber Regulation, 2010) are of relevance. However, as woody biomass is expected to constitute the most important renewable energy source over the coming decade, the policy field remains dynamic and more specific legislative sustainability requirements for forest biomass can be expected in 2012 (Representative of the European Commission's DG Energy, personal communication, February 29, 2012; (ENDS Europe, 27 February 2012).

### **1.1.2 Utilities and stakeholder relations**

A 'utility' is an organisation that provides services to the general public. The present paper examines (and is directed at) those utility companies that provide or are aiming to provide heat and electricity which has been generated from forest biomass. These energy companies must consider both the sustainability risks and the corporate reputational risks inherent in importing woody biomass. Even if companies adhere to national and European legislative criteria for woody biomass sourcing, a negative perception by stakeholders may pose an investment risk (Bradley et al., 2011). A variety of well-known NGOs are already publicly criticizing the promotion of woody biomass for energy purposes and lobbying for a cut in subsidies (Birdlife International et al., 2011). Moreover, public concerns have resulted in considerable dynamics in the policy field (EU Official 2, personal communication, March 8, 2012). This shows that public opinion in this area has a significant potential to influence politicians, and in turn legislators, thus creating additional policy risk as an important element of broader business risk.

Neglecting sustainability could lead to financial, reputational, regulatory and competitive exposure. It could not only increase the risk of incurring legal liability but also negative media attention, as well as a loss of customers and business, which in turn could severely affect a company's competitiveness in the market and its ability to attract investors and talented employees (Bendell, Miller, & Wortmann, 2011). The perception of sustainability risks by

stakeholders is therefore significant to companies when setting up purchasing criteria for wood, particularly wood from vulnerable regions, as well as when evaluating the role that woody biomass should play in a company's renewable energies portfolio.

In order to address these risks, energy companies need to adhere to good standards of practice, to provide clear, credible monitoring, documentation and verification of performance and to use well-established pathways to communicate to broad stakeholder groups (Industry Representative 2, personal communication, March 23, 2012). According to Waddock and Smith (2000) "values-based, stakeholder-oriented global citizenship" of companies can only take place as a result of an honest and open stakeholder relationship.

This work has a point of departure with the observation that some large utilities in Europe are already working hard at addressing sustainability concerns but appear to feel challenged as they are forced to act in an environment of considerable uncertainty. A first step towards addressing this uncertainty is the collection of data on the concerns that motivate stakeholders to act upon these issues, not least as the political and policy risk is largely driven by stakeholder activism. Elements of stakeholder theory provide useful lenses for companies to determine (i) who the most relevant stakeholders are; (ii) what exactly their concerns are; and (iii) how these concerns can best be addressed, for instance through voluntary sustainability schemes.

### **1.1.3 The role of certification schemes**

For utility companies, certification might provide a means of addressing the sustainability concerns associated with woody biomass sourcing. With demand for wood on the rise, it seems certain that the supplies from well-managed forests in Europe will not suffice (Hewitt, 2010; Moiseyev, Solberg, Kallio, & Lindner, 2011). Market participants are already exploring opportunities in South America, Southeast Asia and Africa. In such areas the law cannot always be relied on to adequately protect local ecosystems. In such cases certification schemes provide an alternative to national legal enforcement (Bradley et al., 2011; Cotula et al., 2011). Even within Europe and North America certification schemes often go significantly beyond the legal sustainability requirements and could thereby help to address stakeholder concerns at home.

A variety of forestry management certificates and verification schemes have been set up to indicate the sustainability of a source. However, their stringency and credibility varies widely (Ifeu Institute, 2011). Similarly, their acceptability to those stakeholders that are of particular importance to energy companies has not been sufficiently investigated. Stakeholder acceptance will depend on more than just the stringency of a scheme. The large range of sustainability schemes available renders the issue unclear and confusing to many stakeholders (J. van Dam & Junginger, 2011). Credibility thus often depends on how well established a scheme is, as well as on a label's transparency, third party verification and its communication strategy (Ifeu Institute, 2011). Since well-established forestry management certificates are unlikely to cover all of the required biomass in the short to medium term, an investigation into the viability of lesser known schemes is indispensable (Ifeu Institute, 2011). This paper thus evaluates a selection of certification and verification systems that represent the different types of schemes available. The criteria employed by the different schemes are then benchmarked against the EU's legislative requirements, as well as against the importance that stakeholders accord to different criteria. The aim of this benchmarking exercise is to outline which sustainability criteria are covered by which certification system, and to what extent these satisfy and go beyond the legal and stakeholder requirements.



This paper explores areas of uncertainty and agreement among European stakeholders about the quality and trustworthiness of existing sustainability schemes and identifies sustainability criteria that any new or amended schemes should contain. Specifically, this study aims to identify which sustainability schemes are preferred by bioenergy stakeholders within Europe; how currently discussed criteria are perceived by them and where levels of uncertainty and agreement exist, providing energy companies with an improved basis for reducing the uncertainty regarding sustainability schemes. The results from this investigation will allow energy companies to adjust their procurement policies in order to manage stakeholder expectations more effectively. This can aid work to pursue a more sustainable path and to protect company value for the future.

## 1.2 Research question

This paper's research question can thus be formulated as such:

How can the application of sustainability schemes help European utility companies address stakeholder concerns over the use of solid biomass in large scale energy generation?

In order to deliver the knowledge required to address this question, the following tasks will be addressed:

1. Outline the EU's energy policy and the general debate concerning biomass as an energy source, including possible direct and indirect social, biological and economic consequences, both positive and negative.
2. Describe the sustainability standards and governance mechanisms employed by the different types of sustainability schemes and set them out in a detailed comparative table.
3. Identify relevant stakeholder groups.
4. Find out the sustainability concerns of the relevant stakeholders and delineate criteria and governance mechanisms that they deem important for inclusion in a sustainability scheme.
5. Explore stakeholder perceptions of existing sustainability schemes.

This study is, to my knowledge, the first attempt to apply stakeholder perceptions and sustainability concerns as a basis for comparing European sustainability schemes in the solid biomass for energy sector. In this rapidly developing field, it is hoped to provide valuable information to utility companies in their strategic planning.

The next chapter will address the first of the five tasks outlined above by describing the EU's energy policy and the general debate concerning biomass as an energy source. Chapter 3 will then introduce the theoretical framework and methodology employed in this paper, followed by the results and discussion sections.

## **2 Background: EU energy policy & its consequences**

The purpose of this section is to provide background information on the general debate concerning the EU's promotion of forest biomass as an energy source. It will further outline its possible direct and indirect social, biological and economic consequences.

### **2.1 Europe's increasing demand for biomass**

Large-scale efforts to implement renewable energy alternatives are being driven worldwide, but particularly in Europe, by rising energy prices, concerns over national security and increasing oil prices, as well as global warming caused by the emission of GHGs in excess of natural, regulatory and balancing levels. Europe has committed itself to cutting greenhouse gas emissions significantly. The overall aim of the EU's policy is that, by 2020, 20% of the EU's final consumption of energy and 10% of the energy consumed in the transport sector should come from renewable sources (RED, 2009).

The EU's energy policy provides incentives for an increased use of biomass in the energy sector. Woody biomass in particular is expected to play an important role in increasing the share of renewable energy generation in Europe. Since it can take the form of wood pellets, biogas, or biodiesel, woody biomass can be used both as a transport fuel, as well as for heat and electricity production, thereby theoretically contributing to both targets. Already today, 80% of the biomass used for energy comes as woody biomass (Dossche, 2009).

Europe's renewable energy targets will be matched by policies in Korea, Japan and the US, which similarly encourage the use of forest biomass (Wunder et al., 2011). As a consequence, worldwide demand for wood will increase dramatically. However, just by how much is difficult to estimate and a lot of conflicting literature exists on the matter.

In their critical examination of the Member State's NREAPs, Greenpeace (2011) conclude that energy from solid biomass in EU countries will increase from 53 Mtoe in 2005 to 90 Mtoe in 2020. From the same data Bradley et al. (2011), avid proponents of biomass for energy, calculate an increase in mainly woody biomass use for the production of electricity, heat, and transportation fuels of approximately 400 Mtoe. They believe that, by 2020 more than half of all renewable energy utilised in Europe will stem from bioenergy, its demand rising to three to ten times that of current levels. According to Hewitt (2010), electricity production from woody biomass will double in the decade leading up to 2020, while the amount of biomass used for heating and cooling will increase by half, adding up to an increased need of between 100 and 200 million cubic metres of biomass. Others have stated that the EU's consumption of 9.2 million tonnes of wood pellets in 2009 will rise to 105 - 305 million tonnes by 2020 (Sikkema et al., 2011)

In reality, the complexity of the matter has rendered predicting the increase in demand for woody biomass as a consequence of the EU's renewable energy policy very difficult. The collection, interpretation and reporting of data within the EU still lacks harmonisation for reasons of inconsistencies in definitions, scope and focus of forest monitoring and few reliable statistics on the production and use of wood within the EU exist (Dossche, 2009; Kautto & Peck, 2011). Some believe NREAPs to be a particularly unreliable reference for calculating the consequences associated with meeting the EU renewable energy targets. Birdlife International et al. (2011) argue that the statistics used to estimate quantities of solid biomass are of "varying quality", that the conversion factors used by Member States are problematic and that possible price fluctuations and policy changes are not accounted for. It must further be borne in mind that some studies calculating the woody biomass potential include wood from short rotation crops in their calculations while others consider this an agricultural practice.

What seems clear is that Europe's demand for woody biomass will increase steeply. While France and Germany are pursuing a model based on self-supply, up to 60 million tonnes of biomass will be required by main importing countries, such as the UK, the Netherlands, Belgium, Italy and Spain (Cotula et al., 2011). The UK alone may be outstripping its local supply by five or six times (Cotula et al., 2011).

This raises the question where these large amounts of woody biomass will come from and whether sufficient biomass can be sustainably sourced to satisfy the increasing demand. Most authors agree that the 2020 targets cannot be satisfied solely through increased wood production from within the EU (Hewitt, 2010). Several factors are likely to limit the additional mobilisation of forest resources from within the EU, such as scattered land ownership, as well as potential negative impacts on biodiversity, forest growth and carbon storage (Dossche, 2009). In attempting to estimate woody biomass resources from within the EU, Verkerk, Anttila, Eggers, Lindner, and Asikainen (2011) found that, while it would be possible to increase the availability of forest biomass "significantly" beyond the current level of resource utilisation, environmental, technical and social constraints would reduce this capacity to 50–71% of the theoretical potential. Similarly, the EUWOOD project, instigated by the European Commission, estimates the theoretical biomass potential from EU forests in 2010 to amount to nearly 1.3 billion cubic metres for 2010. However, environmental, technical and social constraints reduce this potential to 750 million cubic metres (ECN Energy Research, Copernicus Institute, Forest & Landscape Denmark, COWI, & Control Union Certifications, 2009; Mantau et al., 2010).

In an analysis of the European forest industries, Moiseyev et al. (2011) calculated that forest resource utilisation may well become a limiting factor in the contribution of forest biomass to the RED target by 2030. According to the Confederation of European Paper Industries (CEPI) all sectors in Europe will face a biomass deficit of up to 210 million tonnes by 2020. Others believe additional requirements to constitute around 80 million tonnes (Cotula et al., 2011). According to the FAO, European wood consumption for energy is expected to grow six times faster than forest products and fifteen times faster than sawn wood production (Florian Steierer, FAO, at the 2012 WSED Conference in Wels). A new 'heat and power road map', to be published by the IEA in June, will yet again provide new statistics (Adam Brown, IEA, Senior Energy Analyst at the 2012 WSED Conference in Wels).

Interviewees for the present study largely agreed that European biomass supplies are not sufficient to satisfy demand. One corporate interviewee called Europe's wood market a "Verdrängungsmarkt" in which different sectors and industries, such as pulp & paper and energy are crowding each other out (Industry Representative 7, personal communication, 30 March 2012). In this context, the large subsidies accorded to utility companies put this sector at an artificial advantage for the time being. According to some, the studies pointing out that not enough wood might be available have so far been ignored by policy makers (Representative of Fern, personal communication, March 21, 2012).

## 2.2 Overseas sourcing of woody biomass

With Europe unlikely to yield sufficient resources, a large part of the woody biomass required for energy production is likely to be imported from abroad. Imports will also be significantly less costly (Cotula et al., 2011). According to some, billions of Euros could be saved by importing lower-cost biofuels into the EU instead of supplying biomass locally (Bradley, Hektor, & Schouwenberg, 2010). The EU believes that 18% per cent of total biomass used will be imported by 2020 (Giulio Volpi at the 2012 WSED Conference in Wels).

At present the EU is importing 80% of the global wood pellet production (Wunder et al., 2011). The majority of pellets reaching the EU stem from Canada and to a lesser extent Russia and the USA. It is anticipated that availability of the latter will be reduced by US legislation requiring 25% renewable energy supplies by 2025. Russia's 2006 Forest Code is regarded as unclear, unreliable and insufficient to ensure compliance with the relevant European legislation (EU Official 1, personal communication, March 8, 2012). Other countries that currently export large amounts of woody biomass to Asia, such as Vietnam, South Africa, Chile and Australia may be uncompetitive in the EU due to higher shipping costs (Birdlife International et al., 2011). In a review of country reports written by IEA Bioenergy Task 40 members, Junginger et al. (2008) found that large amounts of wood pellets are currently exported by Finland, Canada and, to a lesser extent, by Norway and Brazil. Within the EU, they are imported by Sweden, the UK, the Netherlands and Belgium. For the latter two, pellet imports already contributed to a major share of their total renewable electricity production in 2008.

While these traditional suppliers will continue to play an important role, developing countries are likely to rise in importance as woody biomass source countries. Bradley et al. (2011) name Brazil (25 million tonnes/annum), the South-Eastern US-States, Argentina and Coastal Africa as large potential suppliers. Clenergen, a US company, has already acquired 5,000 hectares of land in Ghana and Guyana, with further intended plantations in Madagascar, Mozambique and Tanzania. Magindustries supplies wood chips to Europe from the Congo. The South Korean government too has signed long term leases (Cotula et al., 2011). A memorandum of understanding was signed between MGT Power and Brazilian plantation company, Suzano Papele Celulose. Vattenfall, which has so far relied on woody biomass supplies from Russia and the Baltic States, will require 7–8 million tonnes of biomass annually by 2020 in order to achieve its aim of reducing coal usage by 40% in Germany, the Netherlands and Denmark. In April 2010, Vattenfall and Baron MacBain struck a deal over one million tonnes of wood chips from Liberian rubber trees (Ifeu Institute, 2011).

## **2.3 Sustainability concerns related to woody biomass sourcing**

A number of actors have voiced unease over the potential for negative social and environmental impacts related to the expected sharp increase in demand for woody biomass. More than one billion people depend on forests for their livelihoods. They are further home to 90 per cent of terrestrial biodiversity. Of particular concern is that large-scale imports of biomass wood from overseas might be difficult to control and could create serious damage to forests, local communities and biodiversity.

The additional demand for woody biomass stemming from the energy sector is likely to raise international wood prices, which could in turn further aggravate social and biological pressures. With rainforests dwindling at frightening rates and biodiversity in crisis, the potential exporting countries often have weak or vulnerable land rights and governance structures that cannot always be relied on to protect their natural resources and to care for local, forest-dependent communities by ensuring compliance with regulations and sustainability requirements (Wunder et al., 2011).

### **2.3.1 Environmental concerns**

#### **2.3.1.1 GHG emissions**

The main purpose behind the European Union's renewable energy targets is to reduce the region's emission of greenhouse gases. Al-Mansour and Zuwala (2010) argue that co-firing coal and biomass is the most effective means of reducing CO<sub>2</sub>, because the most CO<sub>2</sub>-intense

energy carrier, coal, is replaced by “zero net emission” biomass. With further potential to reduce NO<sub>x</sub> and SO<sub>2</sub> emissions, they assert that biomass constitutes a low-cost, low-risk, near-term sustainable energy development.

However, other authors have questioned the effectiveness of using biomass as a form of renewable energy. Further to assessing the CO<sub>2</sub> reductions resulting from coal-biomass co-firing in Flanders, Vanneste, Van Gerven, Vander Putten, Van der Bruggen, and Helsen (2011) warned of possible rebound effects resulting from the policies promoting co-combustion of wood waste. In particular, they found that increasing the percentage of coal-based electricity from 8 to 10% of the total electricity generation at the expense of gas-based generation, would completely undo the CO<sub>2</sub> reductions achieved by substituting coal with wood waste.

Even more prominent are an increasing number of scientific reports alerting to the potential for creation of a ‘carbon debt’. A study by the Manomet Center for Conservation Science (2010) found that using wood for energy results in an initial carbon debt. This is because burning wood releases more CO<sub>2</sub> into the atmosphere per unit of energy than fossil fuels (McKechnie, Colombo, Chen, Mabee, and MacLean 2011). The eventual regrowth of the trees recaptures the CO<sub>2</sub> and the debt is ‘paid off’. Depending on forest management actions and natural disturbances, if forests then continue to grow a ‘carbon dividend’ can be achieved after several decades. In line with this, the chairman of the independent scientific committee advising the European Environment Agency, Professor Detlef Sprinz, has been quoted as saying “it is wrong to assume that bio-energy is ‘carbon neutral’ by definition - it depends what you replace it with” (Neslen, 2012).

A study conducted by Joanneum Research, identifies the carbon debt mentioned in the Manomet Report as a “major flaw in the way carbon savings from forest-derived biomass are calculated in EU law, as well as under UNFCCC and Kyoto Protocol mechanisms” (Bird, Pena, & Zanchi, 2010). According to their analysis, situations may well arise where the carbon debt is not be paid off for hundreds of years.

According to McKay (2006), forest carbon most significantly increases emissions when biomass is sourced from standing trees compared to residues. McKay (2006) calculates that, depending on the biomass source (harvest residues/standing trees), the forest carbon losses in electricity generation from wood pellets delay net GHG mitigation by 16-38 years. This delay increases to up to 74 years when applied to ethanol produced from residues and to 100 years for production from standing trees. Emissions further depend on the region, biotope and the type of forest management conducted (Industry Representative 1, personal communication, March 13, 2012). In any case a carbon deficit of longer than 30-50 years is unlikely to be useful in the EU’s current aim to decarbonise Europe by 2050 (Neslen, 2012).

### **2.3.1.2 Deforestation and forest degradation**

Among the biggest environmental risks related to utilizing woody biomass as a renewable energy source are deforestation and forest degradation (Representative of the European Commission’s DG Energy, personal communication, February 29, 2012). These issues, rather ironically, are responsible for 20% of worldwide greenhouse gas emissions (Cotula et al., 2011); Representative of Birdlife Europe, personal communication, March 14, 2012). As Daniel Howden writes in *The Independent*, “In the next 24 hours, deforestation will release as much CO<sub>2</sub> into the atmosphere as eight million people flying from London to New York. Stopping the loggers is the fastest and cheapest solution to climate change”.

To what extent the EU's energy policy may contribute to deforestation is unclear. According to Birdlife International et al. (2011), the NREAPs confirm that the biggest increase in EU biomass sourcing will stem from direct wood supply, such as fellings and residues, as indirect supplies from forest by-products are already being used now. A Greenpeace (2011) report confirms this and states that the organisation believes that the EU's energy policies are already contributing to forest degradation in Canada, where natural forests are increasingly being felled. By contrast, Bradley et al. (2011) praise Canada's "excess biomass from unutilised allowable cut and urban wood hog piles, mill residues, unmerchantable timber and an almost unlimited wood supply from insect infested BC forests", which could reach 50 million tonnes annually.

Ladanai and Vinterbäck (2009) believe that, while regional shortages could occur, the overall demand for industrial round wood and wood fuel in 2050 can be met without any further deforestation. They believe sufficient land to be available and argue that, since only 0.5-1.7% of global agricultural land are currently used for growing energy crops, a 10% efficiency increase through manuring, irrigation, fertilizing and/or improved management through the cultivation of idle land, would create sufficient energy potential to satisfy the total worldwide energy demand. Despite all this, many forests even within northern European countries, such as the UK, are poorly managed from a sustainability point of view (McKay, 2006).

### 2.3.1.3 Loss of biodiversity

Deforestation and forest degradation are also directly linked to the loss of biodiversity. Primary forests, which have not yet been subject to human intervention, are regarded as particularly valuable. However, even managed forests are often home to delicately balanced ecosystems, which can be easily destroyed. For instance, intensive forest management can imply an increasing removal of stumps and deadwood. This has been argued to carry positive consequences in Mediterranean climates, where it can prevent wildfires, which in themselves tend to release large amounts of carbon emissions (Stewart, Powers, McGown, Chiono, & Chuang, 2010). However, when analysing the impacts of intensified biomass removal on the amount and type of deadwood in forests of 24 European Union member states, P. J. Verkerk, Lindner, Zanchi, and Zudin (2011) found that the biodiversity dependent on deadwood would be likely to suffer without additional management measures. Deadwood removal has been said to be the single most important factor for forest-dependent species to become endangered in Scandinavian countries, as it affects the moisture conditions and temperature of the soil, as well as soil acidity and the amount of biomass available as nutrients (Birdlife International et al., 2011). While the amount of deadwood in Europe increased slightly during 1990 - 2005, it remains well below optimal levels from a biodiversity perspective in most European countries and the European Environment Agency (EEA) is warning against counting deadwood as a potential bioenergy resource (Dossche, 2009).

The removal of logging residue and stump removal can further decrease a forest's carbon sink capacity (Finnish Environment Institute, 2011). A recent study published in *Science* showed that the additional use of forest residues and the increase of harvesting levels in existing forests decreases carbon storage and depletes terrestrial carbon stocks (Wise et al., 2009).

Short rotation coppice and large-scale plantations have been suggested as ways to improve biomass availability and thus reduce the loss of biodiversity from deforestation. Some authors have even emphasised the potential of wood fuel production to increase biodiversity, and give alley cropping as an example of a sustainable means of supplying biomass resources (Ladanai & Vinterbäck, 2010a). Already today, the wood imported for power plants in the EU from developing countries stems to a large extent from biomass plantations (Cotula et al., 2011). However, plantations also have the potential to create a number of negative side effects,

especially if they consist of exotic species. New plantations require land, the supply of which, some analysts argue, is already limited (Dossche, 2009). Additionally, monoculture plantations are low in biodiversity value and frequently require a higher use of fertilizer and pesticides. They can, however, also have positive effects, depending on what they replace. For instance, the reforestation of land that was cleared, then grazed and degraded has been found to carry positive environmental effects (Peck, Berndes, & Hektor, 2011).

#### **2.3.1.4 Land use change**

A paper by Searchinger, Heimlich, and Houghton (2008) started the discussion on the possible impacts of ILUC as a consequence of biomass production. The Ifeu Institute (2011) explains that where natural landscape is changed into agricultural land in order for energy crops to be grown this is a type of land change use. This land change use is direct where natural land is converted into agricultural land in order for energy crops to be grown on that land. Indirect land change use occurs where the energy plantation does not directly but only indirectly lead to the loss of natural landscape. For instance, if trees are planted on land previously used for growing food, this food will have to be grown elsewhere in the world.

Land use change likely carries a number of usually negative environmental consequences, such as a loss of biodiversity and a loss of food security. It can have positive (carbon sequestration) or negative (carbon loss) impacts on carbon stocks, depending on the previous land-use.

So far, the public focus has been on the negative impacts of ILUC resulting from agricultural biofuel plantations, as these tend to be more likely to convert land that was previously forested or used for food production. Appendix V of the RED outlines the method to be employed in calculating the GHG balance of biofuels for the purpose of that directive. This includes emissions from direct but not indirect land use change. This is due to the difficulties that exist in estimating effects as complex and as unpredictable in terms of space and time as indirect land use change. For instance, the use of one hectare for biomass does not necessarily mean that the new agricultural area will also measure one hectare.

In February 2012, the European Commission published an internal study calculating the GHG balance of biofuels when taking into account emissions resulting from ILUC. The study finds that, under a significant number of circumstances, the use of biofuels made from palm oil, soy, and rape are in fact worse for the climate than regular fossil fuels. Experts had previously raised alarm that the conversion of natural land for biofuel production would impede the EU from meeting its emissions reduction targets, warning that exclusive consideration of LUC for bioenergy production at legislative level would minimise LUC but at the same time significantly increase ILUC (Lange, 2011).

With regard to woody biomass, these concerns are less urgent, as long as the forest where the wood is sourced remains a forest and is not clear-cut and converted into something different. The European Commission is therefore considering introducing a requirement for “regeneration” of the forest in any upcoming sustainability criteria for solid biomass (Representative of the European Commission’s DG Energy, personal communication, February 29, 2012).

#### **2.3.1.5 Others**

Other environmental concerns associated with woody biomass sourcing relate to its potential to deteriorate the quantity and quality of available water resources. Harvesting and transport operations can cause air pollution. Furthermore, the unregulated disposal of waste and the use of chemicals as pest control and fertilizer carry high risks for ecosystems. Genetically modified organisms, which some argue to be better suited for bioenergy production because they could

lead to increases in bio-ethanol production by 50% (Dossche, 2009), bear unknown risks through unexpected mutations or cross-fertilisation (Wunder et al., 2011). Finally, some have questioned whether the net energy balance, between the energy needed to source woody biomass and the energy produced by burning it, really renders woody biomass a feasible energy source.

Overall, the environmental impacts of energy wood production depend on the type, intensity and scale of production, as well as on the tree species and harvesting system used – and not all impacts are necessarily negative. Wunder et al. (2011) outline a number of potential environmental benefits of increased demand for woody biomass, such as afforestation, and therewith reduction of water runoff and sediment loss. Wood plantations can further potentially reduce the exploitation of old forests.

### **2.3.2 Social & economic concerns**

In their 2012 Briefing to the European Parliament, Wunder et al. (2011), on behalf of the Ecologic Institute provide a comprehensive description of the potential social impacts that the increased demand for biomass can have, particularly in developing countries. According to the authors, a race towards cheap but fertile land in developing countries is leading to large scale land acquisitions that can diminish the access of rural and indigenous communities to land. This is particularly likely to happen in countries where local communities do not have legally recognised customary land use rights and therewith limited decision-making powers in the reallocation of property. Birdlife Europe confirmed that they are already seeing social impacts in the form of massive land acquisitions in Africa and that they have been asked to help on this issue by Birdlife Africa (Representative of Birdlife Europe, personal communication, March 23, 2012).

The high demand for water of many fast growing tree species may deprive rural communities of access to ground-water. Tree species specifically planted for energy wood are mostly fast growing types, such as Salix, Poplar, Eucalyptus and Acacia. This situation is likely to be aggravated by the use of polluting pesticides and herbicides (Wunder et al., 2011).

The export of woody biomass from countries that are highly dependent on their biomass as a raw material and for local energy production, such as sub-Saharan Africa and developing Asia can further lead to local energy security issues. For instance, Vattenfall's Liberian biomass project is said to have doubled the local price in charcoal (Wunder et al., 2011).

Direct competition for fertile lands may lead to the loss of income opportunities and to a rise in food prices (UNEP, 2012). To counter this, agroforestry systems, such as the Cia Mineira de Metais in Brazil, have been devised that can combine energy wood plantations and food production (Wunder et al., 2011). The question of food competition is a highly complex one - as J. van Dam, Junginger, and Faaij (2010) indicate, it can actually profit farmers in the form of higher prices and income.

Other social impacts associated with woody biomass sourcing include unfair labour conditions on biomass plantations, including threats to the health and safety of workers and their families and even breaches of human rights. NGOs have further criticised large corporations for cashing in on the natural resources of developing countries without sharing the benefits equitably or contributing to the economic stability of the source community, for instance by way of employment creation .

Despite the many concerns listed above, a number of authors do emphasise potentially positive environmental, social and developmental consequences resulting from biomass



production. Some argue that the intensive use of forest products constitutes a win-win solution for the economy and the environment, as it maintains the land in a forested state while providing an income for forest owners (Moore, 2010). Ladanai and Vinterbäck (2010b) emphasise the social and economic benefits of forest resources that have long contributed to society and driven economic growth. EU Officials believe that bioenergy brings growth and jobs (Giulio Volpi at the 2012 WSED Conference in Wels). In the UK Forestry Standard, rural income and development have been identified as clear benefits that can come with sustainable forest management (McKay, 2006). Biomass plantations in the global South can create jobs and facilitate the provision of improved energy access (Cotula et al., 2011). For instance, the woody biomass energy sector in Sub Saharan Africa has created a significant job market, employing tens of thousands of people (World Bank & AFREA, 2011). Openshaw (2010) confirms the potential of biomass energy to contribute to large-scale employment and therewith poverty alleviation. After all, one pillar of sustainability is economic, and it can thus be argued that forests have a higher likelihood of being sustainably managed if they bring economic gains. This is particularly important in developing countries, which value the opportunity to develop from economic gains made from forest products (Industry Representative 1, personal communication, March 13, 2012).

## 2.4 Legislative responses

In response to such concerns, a number of safeguards have been put into place at legislative level in order to promote the sustainability of woody biomass. The Treaty on the Functioning of the European Union and the Treaty on the European Union do not provide for a common forest policy. Instead, a number of policies and laws affect European forestry in a sometimes confusing manner. These include the EU Biodiversity Policy, the Rural Development Regulation of the Common Agricultural Policy, the EU Water Framework Directive, the RED and a number of forestry specific policies and action plans (Birdlife International et al., 2011). These initiatives promote sustainable forest management in Europe but do not address sustainability risks of biomass production in non-EU countries, which have the potential to export high amount of biomass in a near future (Langue, 2012). Here the Renewable Energy Directive (RED, 2009) and the Timber Regulation (Timber Regulation, 2010) are of relevance.

### 2.4.1 EU Timber Regulation

From March 2013, the Timber Regulation will require traders who place timber products on the EU market to exercise ‘due diligence’ and to ensure that their products were not obtained in contravention of the applicable legislation in the country of harvest. The regulation states that

*only operators that place timber and timber products on the internal market for the first time should be subject to the due diligence system, while a trader in the supply chain should be required to provide basic information on its supplier and its buyers to enable the traceability of timber and timber products (Timber Regulation, Article 15).*

An energy company that imports woody biomass into the EU must therefore implement a due diligence system to avoid placing illegal timber on the market. If the energy company sources woody biomass from within the EU, the obligation is to provide traceability information. The applicable legal standard of care is that of a “reasonable person” entering into an agreement with another party. The due diligence system put into place must include procedures on access to information, risk assessment and risk mitigation.

## 2.4.2 EU Renewable Energy Directive & national schemes

The RED encourages the use of energy from renewable resources. The directive distinguishes between biofuels, bioliquids and solid and gaseous biomass for electricity, heating and cooling.

The RED includes a sustainability scheme, which is however only applicable to biofuels and bioliquids. The legislation states that raw materials will only be eligible for financial support and count towards national renewable energy targets if they comply with certain sustainability requirements. (RED, Article 17). Equivalent legally binding criteria do not currently exist for woody biomass at EU level. However, the Commission has recommended to the member states to develop similar sustainability criteria for solid biomass at national level (COM (2010)11 final). The first national legislations have already been put into place by Belgium, the Netherlands and the UK.

The Netherlands and the UK cooperated in the development of their sustainability requirements (J. M. C. van Dam, 2009). Their mandatory systems for biomass co-firing include verification schemes and sustainability criteria for the whole supply chain. They lay down social and environmental sustainability criteria, as well as the bodies and procedures required to accredit existing sustainability standards to the meta-standard (Hämäläinen, Panapanaan, Mikkilä, Linnanen, & Heinimö, 2011). The UK's sustainability criteria for woody biomass include a minimum greenhouse gas emissions saving of 60% compared with EU average fossil-fuel use, and restrictions to prevent the conversion of valuable land, such as primary forests and other land important on carbon or biodiversity grounds.

In the Netherlands, the Ministry of Environment's project group 'Sustainable Production of Biomass' compiled a set of generic sustainability criteria and corresponding sustainability indicators for the production and processing of biomass for energy, fuels and chemistry. The criteria orient themselves to already existing conventions and certification systems while at the same time following a so-called triple P (people, planet and profit) approach. The criteria have thus been divided into six categories, three on the triple P approach and three specific to biomass; (i) greenhouse gas balance; (ii) competition with food, local energy supply, medicines and building materials; (iii) biodiversity; (iv) economic prosperity; (v) social well-being; and (vi) environment (Hämäläinen et al., 2011).

Belgium has installed a system that grants green certificates but covers only raw material by country report, as well as using the audit of the processor to assess the GHG balance. In Belgium the sustainability of energy is regulated at the regional level and the three different regions, Brussels, Flanders, and Wallonia have chosen to apply different certificate systems (J. M. C. van Dam, 2009). Other projects to develop concrete sustainability criteria, although with more limited scope, include the national governments of Canada, Switzerland, the US, Germany and Brazil (Peck et al., 2011).

These increasingly divergent national sustainability regulations pose a potential obstacle to the trade in biomass and create a distortion of the internal EU market (Langue, 2012). Within this market, utility companies will play a major role in meeting the EU's renewable energy targets. However, they require a well-functioning biomass market that can guarantee a reliable and lasting supply (Ladanai & Vinterbäck, 2010b). As there is broad consensus that sustainability is directly relevant to long-term security of supply, IEA Task 40 has been researching the feasibility of a commodity market that can secure demand and supply of sustainable bioenergy (IEA Task 40, 2007). However, in order to achieve this, a clear, stable and uniform regulatory framework will be required. Not just a number of NGOs but also many industrial actors are therefore in favour of EU-wide binding sustainability criteria for solid biomass (Giulio Volpi

at the 2012 WSED Conference in Wels; Representative of Birdlife Europe, personal communication, March 14, 2012).

In its 2010 Biomass Report, the Commission committed to reporting on the progress of the national sustainability schemes and the appropriateness of additional sustainability criteria at EU level by 31 December 2011 (COM(2010)11 final). This report has been delayed and Commission officials have recently indicated that it will now likely come out later in 2012. Further, they have hinted that the introduction of a Europe-wide set of sustainability criteria for woody biomass is likely (Representative of the European Commission's DG Energy, personal communication, February 29, 2012; ENDS Europe, 27 February 2012). However, the various actors that will be included in the creation of a new scheme, such as government bodies, NGOs, the private sector, think tanks and international organisations have different ideas on what the objectives of the policy should be and the measures that should be applied to attain objectives (J. van Dam & Junginger, 2011). Thus far it seems that the new criteria will largely follow the 2010 Commission report and also adopt its GHG accounting methodology<sup>1</sup>. A formal recognition of voluntary certification schemes, similar to that for biofuels, is apparently likely (Representative of the European Commission's DG Energy, personal communication, February 29, 2012).

One important element in the creation of this new legislative scheme is that the biomass sustainability criteria will be binding in two ways; they will create a floor, as well as a ceiling. This is because, despite being justified on environmental grounds, the sustainability legislation will officially be based on Article 95 of the EC Treaty, which regulates the internal market<sup>2</sup>. In practice this means that, while being obliged to introduce the new sustainability requirements, member states will not be allowed to implement legislation that is stricter or more relevant to their markets than the new EU-wide scheme. This currently constitutes a major point of disagreement within the EU (EU Official 2, personal communication, March 8, 2012).

---

<sup>1</sup> This is likely to come under criticisms from environmental organisations. Fern argues that the GHG methodology for biofuels and bioliquids is not relevant to biomass. This is because there exist a much larger variety of technologies that convert biomass into energy with very different conversion efficiencies. An ambitious standard for energy conversion efficiency must therefore be included in any woody biomass sustainability scheme. Furthermore, different production and processing of biomass might release varying amounts of GHG emissions. In addition, the current accounting scheme does not take into account the fact that forests grow over longer time periods and over larger areas than bio-crops. NGOs further argue that the correct choice of the fossil fuel reference is important. While fossil fuels can only mainly substitute diesel or gasoline, it is less clear which raw material is being substituted when wood is used to produce power and heating. It would be incorrect to always use the most CO<sub>2</sub> intense fuel source as a comparator (Dossche, 2009).

<sup>2</sup> The RED introduction states that regard must be had "to the Treaty establishing the European Community, and in particular Article 175(1) thereof, and Article 95 thereof in relation to Articles 17, 18 and 19 of this Directive [...]". A similar formulation is to be expected for the article regulating the sustainability of woody biomass.

## 3 Methodology

### 3.1 Theoretical framework

Europe's renewable energy strategy is requiring many energy utilities to change their business models. The woody biomass sector in particular involves moving into areas of business that are new for them and requires the creation of entirely new global supply chains. As any change of practice, this carries a number of financial, reputational, and regulatory risks. The shift to biomass is thus precarious. However, logistically biomass constitutes a prime pathway in the renewables sector; not only can it be utilised within the existing infrastructure but it is also not subject to the same fluctuations as solar and wind energy. Energy companies must thus try and balance adaption to the EU's energy strategy while limiting business risks.

For utility companies operating in the woody biomass for energy sector, keeping sustainability risks to a minimum requires addressing the concerns of key stakeholders. The case of the Canadian forest company MacMillan Bloedel demonstrates the power that environmental stakeholders can exert on the private sector. An industry leader in innovation, the company's forest products were imitated by industry worldwide. However, because the company was felling old-growth trees, environmentalists began protesting against the company's operations in 1996. Six years later, the company was dissolved. Since then, a good number of authors have tried to analyse the process that exerted such powerful influences over the company (Lertzman & Vredenburg, 2005; Näsi, Näsi, Phillips, & Zyglidopoulos, 1997; Tindall & Robinson, 2006; Winn, 1997). The case clearly demonstrates the degree of influence that external stakeholders can have over companies in this sector. Contrary to what some have argued, globalisation has not left companies without constraints, as stakeholder organisations have created worldwide networks and gone global too (Boutilier, 2009).

Since sustainability risk management in the biomass sector involves addressing stakeholder concerns, it will help utility companies to understand the points addressed by this paper, namely (i) who the most relevant stakeholders are; (ii) what their principal concerns are; and (iii) how these concerns can best be addressed, for instance through voluntary sustainability schemes. With this in mind, the main theoretical framework chosen for this paper is Stakeholder Theory. This management concept was chosen because it provides a theoretical structure for addressing all three of the above points. Stakeholder Theory is thus introduced in this section and applied in more detail in the discussion throughout this paper.

Stakeholder Theory, as originally created by Edward Freeman, identifies stakeholder groups of relevance to corporations and recommends methods of managing these different groups. Abundant interpretations of Stakeholder Theory are offered in the literature, though a basic distinction can be drawn between Stakeholder Theory and the conventional input-output model of the company which regards corporations as converting investor, employee, and supplier inputs into customer outputs (Donaldson & Preston, 1995). In most countries, business law takes the traditional view that a company has a fiduciary duty to put the interests of its shareholders first. Freeman's Stakeholder Theory points to other parties that can affect or be affected by a company. These include political groups, trade unions, associated corporations, customers, employees, communities, trade associations, government bodies and the public at large. The theory field also contains elements both for stakeholder identification and for assessment of relative stakeholder salience – the degree to which managers (should) give priority to competing stakeholder claims (Mitchell, Agle, & Wood, 1997). Mitchell et al. (1997) determine the importance of different stakeholder groups to a firm by examining their individual legitimacy (socially accepted and expected structures or behaviour), power (the extent a party has means to impose its will in a relationship), and urgency (time sensitivity or

criticality of the stakeholder's claims). The conceptual framework of stakeholder salience provided by such authors helps analysts explain how even external stakeholders can gain substantive power over companies. It can further help to identify who the most relevant stakeholders in the organisation's social environment may be – insights particularly relevant to actors in the biomass for energy sector.

When investigating the second point mentioned above, namely what the relevant stakeholders expect from the firm, it is also worth taking a step back and scrutinizing the factors that initially lead stakeholders to target a particular firm. Hendry (2006) found taking a hostile, disaffected posture toward the natural environment and stakeholders to constitute an important factor in a company's being targeted as an adversary by stakeholders, with potentially costly consequences for the company. In contrast, companies maintaining a proactive and benevolent position toward the natural environment and stakeholders were frequently selected to be allies of these groups.

In tackling the sometimes hostile relationship between different interest groups and energy providers, companies need to improve the trust placed in them in order to attain socio-political and cognitive legitimacy (Boutilier, 2009). An important step in gaining such legitimacy in an emerging industry such as the forest biomass for energy sector is to enable stakeholders to assess the performance of that industry (Aldrich & Fiol, 1991). As will be shown later in this paper, industry-wide CR standards in the form of a sustainability schemes, based on stringed targets and independent, public verification can constitute an important first step in this direction.

### 3.2 Overall research design

According to Hämäläinen et al. (2011), dynamic processes, such as stakeholder opinions can best be analysed in the form of descriptive research. Both primary research techniques, such as surveys and interviews and secondary data collection techniques, such as literature reviews can be relied on for such descriptive research (Joppe, 2004). The methodology employed in this paper consisted of three steps.

- 1) Step 1: An extensive literature review was carried out. The information obtained was used to write the background section to this paper and to build up the theoretical framework. The literature review further served to identify which (i) stakeholder groups; (ii) sustainability schemes; and (iii) sustainability criteria appeared most relevant to examine in this paper.
- 2) Step 2: An in-depth review of the detailed environmental, social, economic and governance criteria of the eleven sustainability schemes selected in Step 1 was carried out and the results were organised in a comparative analysis table. The tabulated presentation of the results allow for an easy and quick comparison of the different schemes against each other and against the applicable legislative requirements.
- 3) Step 3: An online questionnaire and interviews were conducted with the stakeholders identified in Step 1 in order to
  - i. understand the importance accorded by stakeholders to the sustainability criteria identified in Step 1. This also helped to identify sustainability concerns among stakeholders;
  - ii. explore stakeholder perceptions of the sustainability schemes examined in Step 2;
  - iii. outline stakeholder opinions on what form (legislative, voluntary or other) any future sustainability scheme should take.

### 3.3 Methods of data collection

#### 3.3.1 Step 1 – Literature review

A broad review encompassing Stakeholder Theory, legal provisions, certification schemes and literature published on the use of solid biomass for energy generation over the past ten years was carried out in order to gather a comprehensive understanding of the topic. This included a variety of academic papers sourced from scientific publication databases. Since this area of research is very new and dynamic, and the number of peer reviewed articles is limited, these were complemented by reports of reputable think tanks, governments, and international organisations active in the field.

##### 3.3.1.1 Identification of relevant stakeholders

Active stakeholders were identified by way of internet searches, through the websites of interest groups, NGOs and industry participants as well as through the homepages of bioenergy organisations and conference participation lists. Because this is a dynamic field that has only recently emerged, the internet was the quickest and most reliable way to obtain a complete picture of the relevant stakeholders and their activities.

##### 3.3.1.2 Sustainability scheme selection

The schemes to be examined were selected in the following manner. In addition to the legislative sustainability requirements outlined above, five categories of sustainability scheme had been identified as relevant to woody biomass in the literature review. These included (i) private sector schemes created by utility companies, (ii) forest certification schemes, (iii) stepwise programmes, (iv) legality verification schemes, and (v) biofuel certification schemes accredited under the RED Directive. At least one scheme was selected to represent each category. Therefore, to the knowledge of the author, all relevant existent categories were covered by at least one scheme. Table 3-1 summarises the sustainability schemes studied in this paper.

*Table 3-1 Sustainability schemes selected for further evaluation.*

Legislative Requirements	Utility Company Schemes	Voluntary Certification Schemes			
		Forest Certification Schemes	Stepwise Programmes	Legality Verification Schemes	RED Biofuel Schemes
RED Timber Regulation	IWPB E.ON GGL Laborelec	FSC PEFC	GFTN Smartstep	TLTV VLC Smartwood VLC	ISCC

The private sector schemes examined included the Initiative Wood Pellet Buyers (IWPB), E.ON's biomass sourcing policy, Laborelec's sustainability scheme and the Green Gold Label (GGL). They were selected because they represent a sample of the different types private sector scheme that currently exist. Gereffi, Garcia-Johnson, and Sasser (2001) distinguish between industry-led schemes that involve external verification but from the same industry (second party schemes) and schemes that rely on first party certification, usually corporate in-house sustainability guidelines that do not involve external parties. Laborelec and GGL are examples of second party schemes that have been used and tested for a comparatively long time. E.ON's sourcing policy constitutes an example of first party certification – an approach taken by a number of utility companies in the market. The IWPB was held to be relevant

because the scheme was created by a number of large energy companies, which together make up over 70% of the European market and utilise half of the global wood pellet production. All four schemes are specifically targeted at woody biomass sourcing.

With respect to the voluntary certification schemes, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) were selected because they constitute the best known forest management schemes of their kind and are the only ones to operate at a global level. The Global Forest and Trade Network (GFTN) and the Smartstep programme are both well-known stepwise programmes that were set up by reputable NGOs. Out of the multitude of legality verification schemes available, the Timber Legality and Traceability Verification (TLTV) scheme and the Smartwood programme appear to be the most widely used at a global level. The International Sustainability and Carbon Certification (ISCC) was chosen to represent the RED biofuel schemes because it is widely supported by both industry and NGOs. Furthermore, its principles can not only be applied to biofuels but also to solid biomass.

### 3.3.1.3 Sustainability criteria selection

A sustainability schemes is composed of a number of principles and criteria that can be of environmental, social, or economic nature. Additionally, schemes contain a number of standard setting, monitoring & governance mechanisms. When evaluating sustainability schemes, it is essential to test them against the most important of these criteria. Clear consensus which criteria are critical has not yet emerged (Buchholz, Luzadis, & Volk, 2009). The purpose of this step was to find a set of objective criteria that the sustainability schemes selected above could be assessed against and that would allow for easy comparison of those schemes against one another. Furthermore, this set of criteria would be used to evaluate stakeholder priorities in the online questionnaire.

A review of the relevant literature on sustainability criteria was conducted. Six articles collecting expert advice, academic opinions or conducting surveys were found and examined further. A summary of each of these papers, as well as a table of the sustainability criteria that they identify as important can be found in Appendix A. Table A1 is divided into social criteria, economic criteria and environmental criteria. The table adds up how many academic papers judged a particular criterion to be important. Each criterion that was mentioned by two or more papers was selected for further study. Because standard setting, monitoring & governance mechanisms were covered less comprehensively in the literature, these were selected by examining the mechanisms employed by long-established certification schemes, mainly the FSC.

### 3.3.2 Step 2 – Comparative table

An in-depth review of the detailed environmental, social, economic and governance requirements of the eleven sustainability schemes selected in Step 1 was carried out. A table was then created which compares each scheme against the sustainability criteria identified in Step 1. The legislative sustainability schemes were also included in the table. The results are presented in Table 6 in Section 6 of this paper (the “Comparative Table”).

The aim of the Comparative Table is to provide a qualitative comparison of the sustainability standards employed by the private sector, by biomass certification schemes and by law within the European Union.

### 3.3.3 Step 3 – Stakeholder survey

#### 3.3.3.1 Study population

Representatives of the relevant stakeholder groups identified in Step 1 were selected for inclusion in the interviews or the online questionnaire. The sampling method used to identify this study population was purposive, as opposed to random. Purposive sampling constitutes the leading strategy in the majority of qualitative research (Patton, 1990). Trochim (2002) describes purposive sampling as sampling with a purpose in mind, in the form of specific predefined groups that are being sought. Trochim differentiates between several types of purposive sampling. The sampling carried out here constituted a form of ‘expert sampling’ because only persons with a known or demonstrable expertise in the area were selected. It was further a form of “heterogeneity sampling” because, rather than representing the views of each stakeholder group proportionately, the approach sought to include all opinions and to get a broad spectrum of ideas. Additionally, the snowballing method was used. During interviews experts were asked who they thought the most relevant stakeholders in the field were. Those recommended stakeholders who were then interviewed were asked for further recommendations. A population of 350 bioenergy stakeholders was thus identified.

#### 3.3.3.2 Online questionnaire

The online questionnaire was conducted because this survey form allowed for a large number and a wide variety of stakeholders to be reached within the limited time and financial means available. This means of data collection permits flexibility in displaying questions and answer options (such as pull down menus, check boxes and help screens), reduces the time needed for analysis due to central database collection, avoids paper and postage costs and renders receipts and replies by stakeholders instantaneous. Similar questionnaires have proven to be useful for this type of study in previous research on the topic (Buchholz et al., 2009; Delzeit & Holm-Müller, 2009; Hämäläinen et al., 2011; Magar et al., 2011).

The questions posed were based on the literature review, as well as on advice from professors and industry professionals, all having extensive expertise in the bioenergy field. The online tool chosen was ‘Survey Methods’, an internet survey software that assists in the design, distribution and analysis of online questionnaires.

The questionnaire consisted of four parts. Buchholz et al. (2009) found that the importance that is attached to varying sustainability criteria will often depend on an expert’s geographical work region, on their expertise and on their spatial scale of focus. Therefore, in Part I of the questionnaire, participants were asked to provide their name, organisation and location.

In Part II stakeholders were shown the list of sustainability criteria and governance mechanisms created in Step 1. In order to get participants to prioritise some criteria instead of simply selecting them all, they were asked to choose up to six criteria that they considered to be particularly important for the credibility and effectiveness of a biomass sustainability schemes. Response options were multi-option variable. Respondents were further given the opportunity to add criteria that they thought were missing from the list.

Part III of the questionnaire asked participants to rate the environmental criteria, social/economic criteria, governance mechanisms and the general trustworthiness of some of the sustainability schemes selected in Step 1 on a five point scale. Buchholz et al. (2009) describe this type of answer option as not requiring extensive guidance and constituting a good, mutually exclusive measurement tool that covers the whole range of responses. Not all of the sustainability schemes identified in Step 1 were tested in the questionnaire, as this would have rendered the survey too lengthy.



The final part (IV) of the questionnaire asked participants what form any future sustainability scheme should take. They were prompted to choose whether the sustainability of woody biomass sourcing should be ensured at national, European, voluntary, private or NGO level.

The opportunity to add own comments and criteria was given throughout the questionnaire and in a final remarks section at the end, in order to provide all participants with an opportunity to express their opinion. Throughout the questionnaire technical words and acronyms were explained and a link to the websites of the relevant sustainability schemes was provided. The format, wording, placement and content of the survey were drafted following recommendations by Trochim (2002).

Participants received an explanatory email with a link to the online survey in March 2012. The survey remained open for six weeks. An approximate total of 350 stakeholders received the questionnaire, of which 120 completed the survey.

### **3.3.3.3 Interviews**

Trochim (2002) emphasises that interviews tend to be more effective for gathering personal impressions than other means of primary data collection. This is why interviews are particularly useful for gathering relevant opinions and primary data on an issue (Joppe, 2004). Participants that were identified as particularly active and influential in the literature review were therefore asked to participate in face-to-face or phone interviews. A total of twenty interviews were conducted. In addition, the World Sustainable Energy Days conference (WSED), which took place in February 2012, was attended and relevant stakeholders were interviewed there. Handwritten notes were made during the interviews. The methodology applied during the interview process followed techniques recommended by Trochim (2002) on wording, response format and placement of questions, in order to avoid leading respondents to conclusions.

The interviews were semi-structured and based on the questionnaire but adapted depending on the expertise of the interviewee. The interview responses were not included in the graphs and statistics of the results section (Chapter 4) as their content was too varied for formal coding. Instead, insights from this material are incorporated in the text of the paper in the form of quotations.

### **3.3.3.4 Ethical considerations**

All respondents were given the option to remain anonymous through the use of a radio button in the online survey and through a specific question in interviews. No responses in the questionnaire were made obligatory. The financial support of the paper by E.ON Climate & Renewables was expressly mentioned in the explanatory email, in the online survey and in each of the personal interviews.

## **3.4 Limitations**

Interviews are very time consuming and resource-intensive which poses limits upon how many interviews can be conducted within the frame of a Master's thesis. Furthermore, as Trochim (2002) points out, the interviewer becomes a measurement instrument and ideally interviewers should be well-trained in how to respond to any contingency, which was not the case in the present study. Therefore, while a lot of useful information was gathered during the interviews, the fact that most were telephone interviews and the fact that the interviewer was not professionally trained, may have limited the depth of the responses obtained. Furthermore, knowing that the results would be published some actors may have tried to appear more powerful or knowledgeable than they are (Boutilier, 2009).

Due to the limited time and financial resources available, only a certain number of relevant stakeholders could be approached through the online survey. The questionnaire could not be kept open for longer than six weeks. The questionnaire may have further been limited by the fact that some questions required in-depth expertise on sustainability schemes and a good number of participants (despite being experts in the biomass field) were unable to answer all the questions.

Online questionnaires generally tend to have quite low response rates and it may have been more advantageous to conduct personal interviews with a larger number of stakeholders. In the light of this, the comparatively high response rate to the online questionnaire of 30% was surprising. The response rate to both the questionnaire and the interview requests may have on occasion been aided and on other occasions been dampened by the fact that the study was financially supported by E.ON Climate & Renewables. While some respondents expressed a desire to communicate their concerns to E.ON through this study, several stakeholder representatives expressly declined to participate because of the company's involvement. Interestingly, even though the stakeholder survey was sent to roughly equal numbers of representatives from governments, NGOs, research institutes and the private sector, a very high number of responses were received from research institutes, which lead to a response bias in the result analysis.

Dozens of very different sustainability schemes exist and more are currently being developed. In the beginning of 2010, there were 67 on-going certification initiatives aimed at ensuring the sustainability of various forms of bioenergy (J. van Dam et al., 2010). Time constraints allowed for only a limited selection of sustainability schemes to be analysed. This paper is thus not meant to provide comprehensive guidance to all relevant sustainability schemes within the EU. Nevertheless, the selected schemes tend to be some of the most widely used schemes in their respective categories.

During the selection of sustainability criteria to be analysed further, equal weighting was accorded to each of the six academic papers analysed, despite the fact that the geographical regions and number of stakeholders examined by each varied (Appendix A). The final responses thus do not represent the various stakeholder groups and countries equally. Moreover, many evaluation criteria had to be summarised under larger headings; for instance, concerns about both 'child labour' and 'discrimination' were summarised under the heading 'human rights'.

The stakeholder sampling method (purposive sampling through literature review and snowballing) may have meant that the noisiest stakeholders with the most publications were perceived as the most important. A further danger with purposive sampling and especially with quota sampling is that one has to determine the specific characteristics of who is going to be interviewed and on what to base the quota. For instance, in the present case this could be according to organisation, expertise, education, geographical location, origin, gender, age, race etc. It is difficult to determine whether for instance organisation, expertise and geographical location are the only or even the most relevant variables for selecting interviewees (Trochim, 2002). The success of the snowballing technique is highly dependent on the first stakeholders contacted. In the context of stakeholder analysis, it is usually held to be safest to begin with the stakeholders suspected of being the most antagonistic towards the focal organisation (Boutilier, 2009). However, due to the funding of this study by E.ON, the most antagonistic stakeholders refused to cooperate in the study, which made this approach somewhat problematic.

## 4 Results of primary research

This section lays out the results of the online stakeholder survey. Out of the 350 invited experts, 120 responded to the questionnaire. This high response rate was matched by a multitude of expressions of interest in the results of the study by stakeholders and further correspondence with experts. This reflects the strong interest in and topicality of the topic.

The survey results were processed by grouping responses, systematic coding, summarizing main convergences, tabulating and graphing. Results were analysed using Microsoft Excel and the licensed survey tool Survey Methods®, using both graphical and numerical data representation tools. This section portrays the outcomes of the online survey in graphical form. The results are then analysed in more depth in the discussion sections (Chapters 5 & 6) of this paper.

### 4.1 Part I – Types of stakeholder organisations & locations

The results of Part I of the questionnaire, which asked participants about their geographic location and the type of organisation that they work for are depicted in Figures 4-1 and 4-2 below.

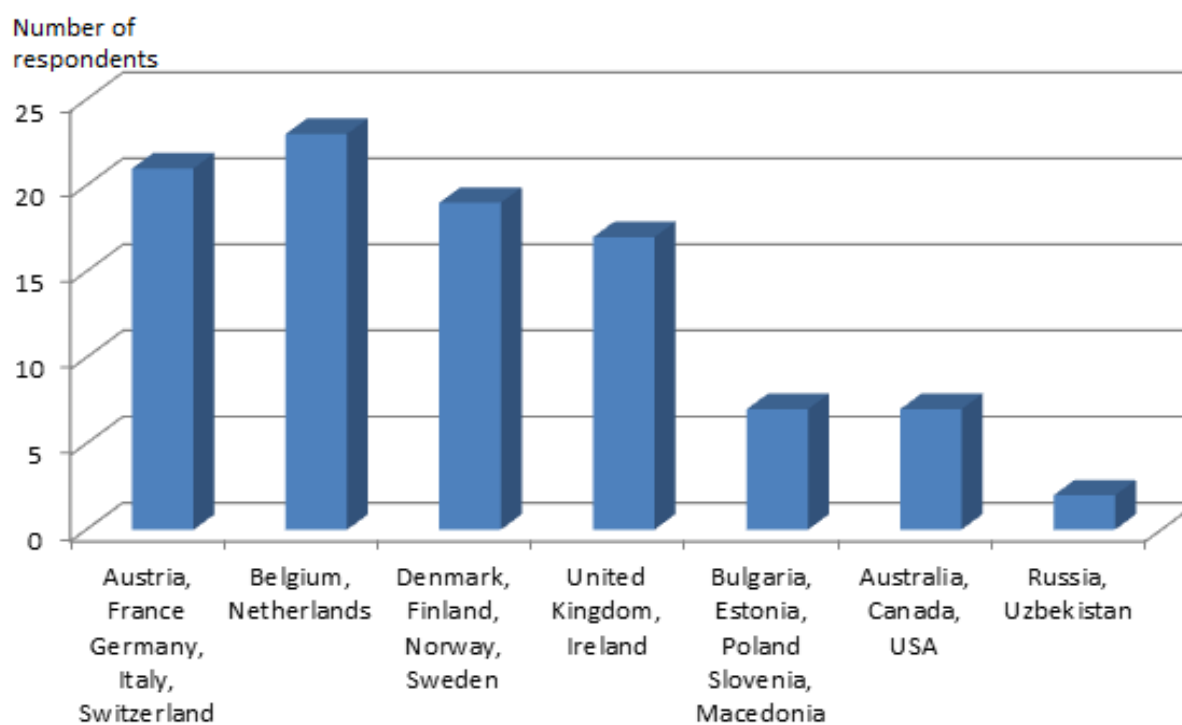


Figure 4-1 Geographic location of questionnaire respondents.

Figure 4-1 demonstrates that the response rates were particularly high from countries where mandatory sustainability legislation has been introduced (Belgium, Netherlands, UK). In addition, the response rate from Belgium was high because all EU representatives and European lobbying groups are based there. Albeit the questionnaire being primarily aimed at respondents from within the EU, some experts based in the EU's trading partner countries, such as Russia, Canada and the USA also participated.

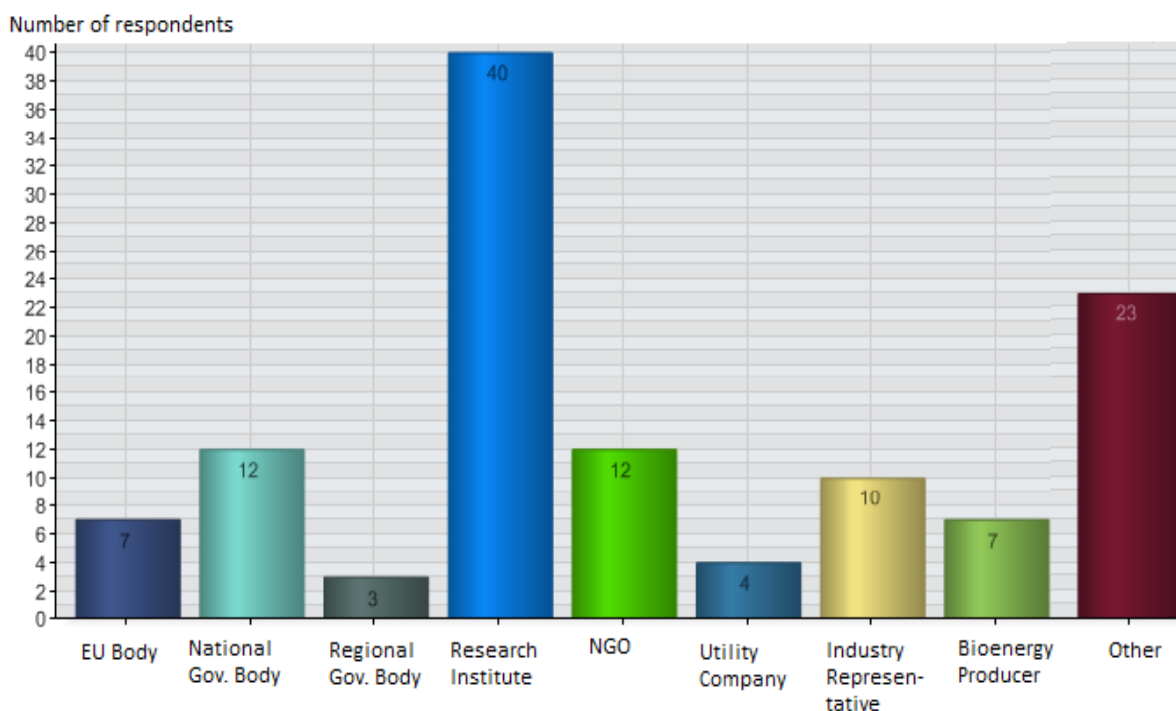


Figure 4-2 Number of survey participants from different types of organisation.

Even though the stakeholder survey was sent to roughly equal numbers of representatives from governments, NGOs, research institutes and the private sector, Figure 4-2 shows that a very high number of responses were received from research institutes. The column “Other” includes consultancies, forest managers, timber harvesting companies, international organisations and citizen watchdogs. A complete list of participating organisations can be found in Appendix B.

## 4.2 Part II – Stakeholder concerns & importance of sustainability criteria

In Part II of the questionnaire, stakeholders were presented the list of sustainability criteria and governance mechanisms that had been identified as particularly relevant to woody biomass in Step 1 of the methodology (Appendix A). Participants were asked to select up to six criteria from each of the three categories (environmental criteria, social & economic criteria, governance mechanisms) that they considered to be particularly important. The complete set of responses can be found in Figures C1-C3 at Appendix C.

In order to better be able to differentiate between the concerns of different types of stakeholders, Figures 4-3 – 4-5 below divide respondents into three groups; (i) government bodies, (ii) research institutes & NGOs, and (iii) the private sector. Research institutes and NGOs were grouped together because they were difficult to distinguish, with many respondents indicating their organisation to be both an NGO and a research institute. The two groups also showed similar response tendencies. The graphs below depict the importance that each of the three stakeholder groups attaches to the sustainability criteria.



Figure 4-3 shows that the GHG emissions associated with the use of biomass for energy represent a major concern among stakeholders. Additional environmental criteria suggested by stakeholders in this category included the long-term sustainability of ecosystem services, multiple use forestry & values optimisation and the reduction of wildfire risk.

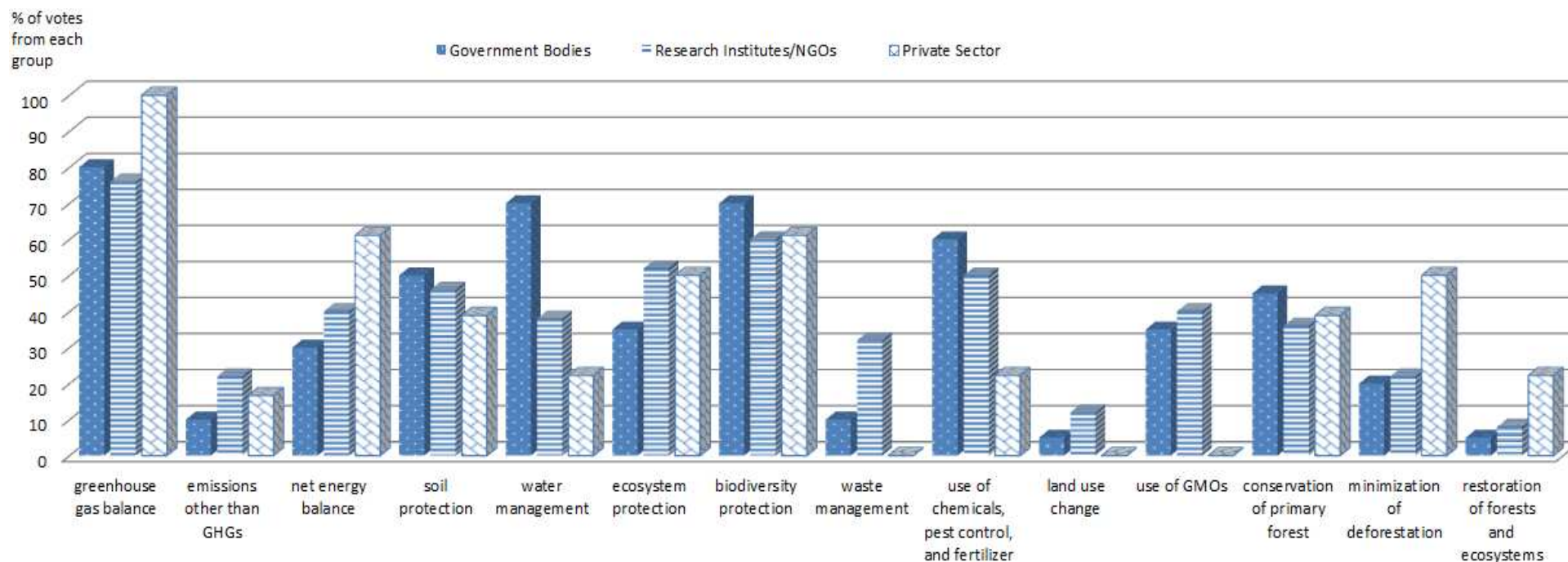


Figure 4-3 Environmental criteria considered particularly important by different stakeholder groups.

Figure 4-4 shows that preferences for different social and economic criteria were fairly divided among stakeholders. However, a majority did emphasise the importance of avoiding competition with food and raw materials, as well as of labour conditions and land use rights. Other criteria suggested by stakeholders included the consideration of local cultural values and preventing the risk of production from being shifted towards smallholders.

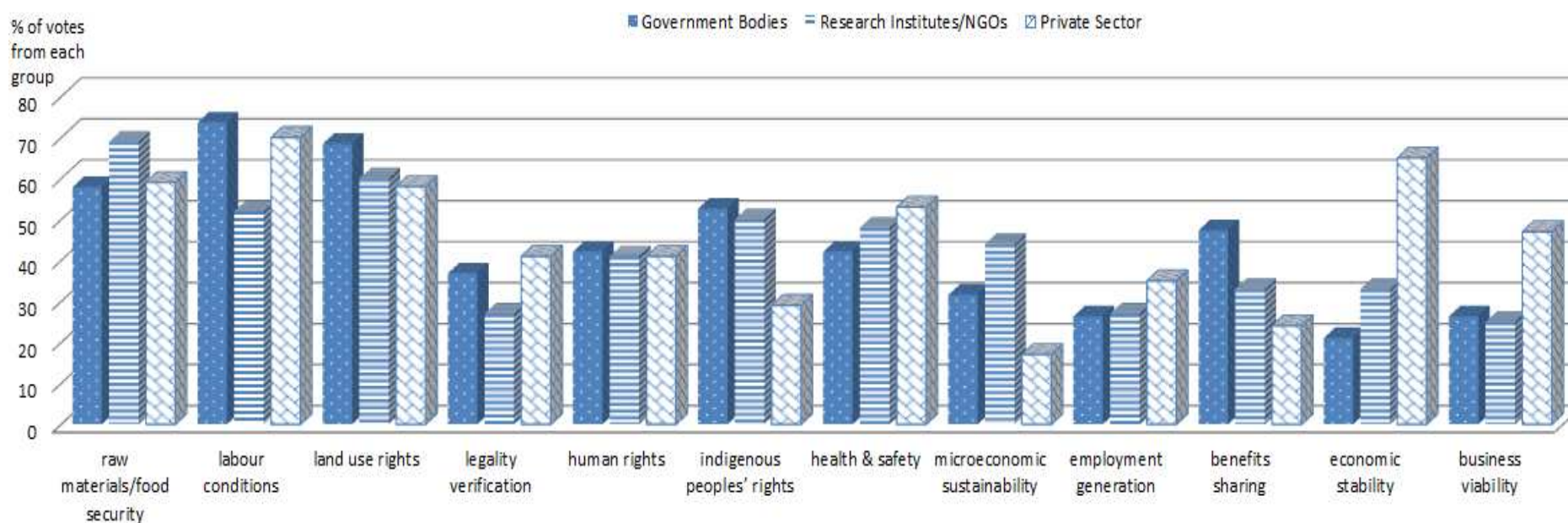


Figure 4-4 Social and economic criteria considered particularly important by different stakeholder groups.

Figure 4-5 gives a picture of the responses under the “standard-setting, monitoring & governance” category. Here stakeholders showed a clear concern about the certification, accreditation and verification procedures of sustainability schemes. Additional criteria mentioned by stakeholders included clear sanctions upon non-compliance and adherence to IAF (International Accreditation Forum) standards in order to guarantee the necessary independence between standard setting mechanisms.

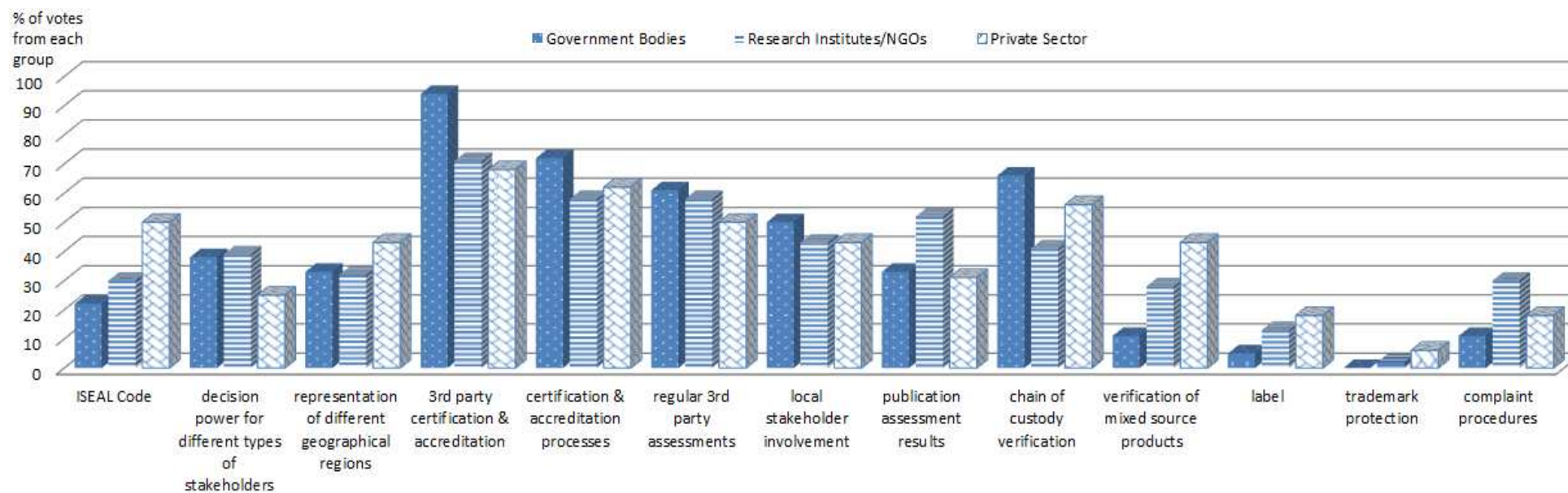


Figure 4-5 Standard-setting, monitoring & governance mechanisms considered particularly important by different stakeholder groups.



### 4.3 Part III - Stakeholder rating of sustainability schemes

Part III of the questionnaire prompted participants to rate the environmental, social and economic criteria, the governance mechanisms and the general trustworthiness of a number of sustainability schemes on a five point scale. As a way of comparing ratings between schemes but within criteria, an average rating was calculated for each criterion of each scheme. One point was given for a “very poor” rating, two points for “weak”, three points for “adequate”, four for “good” and five for “excellent”. “Criteria unknown” ratings were not counted but included in a separate graph (Figure 4-7). The results are summarised in Figure 4-6. Figure 4-7 depicts the extent to which respondents were familiar with the different schemes.

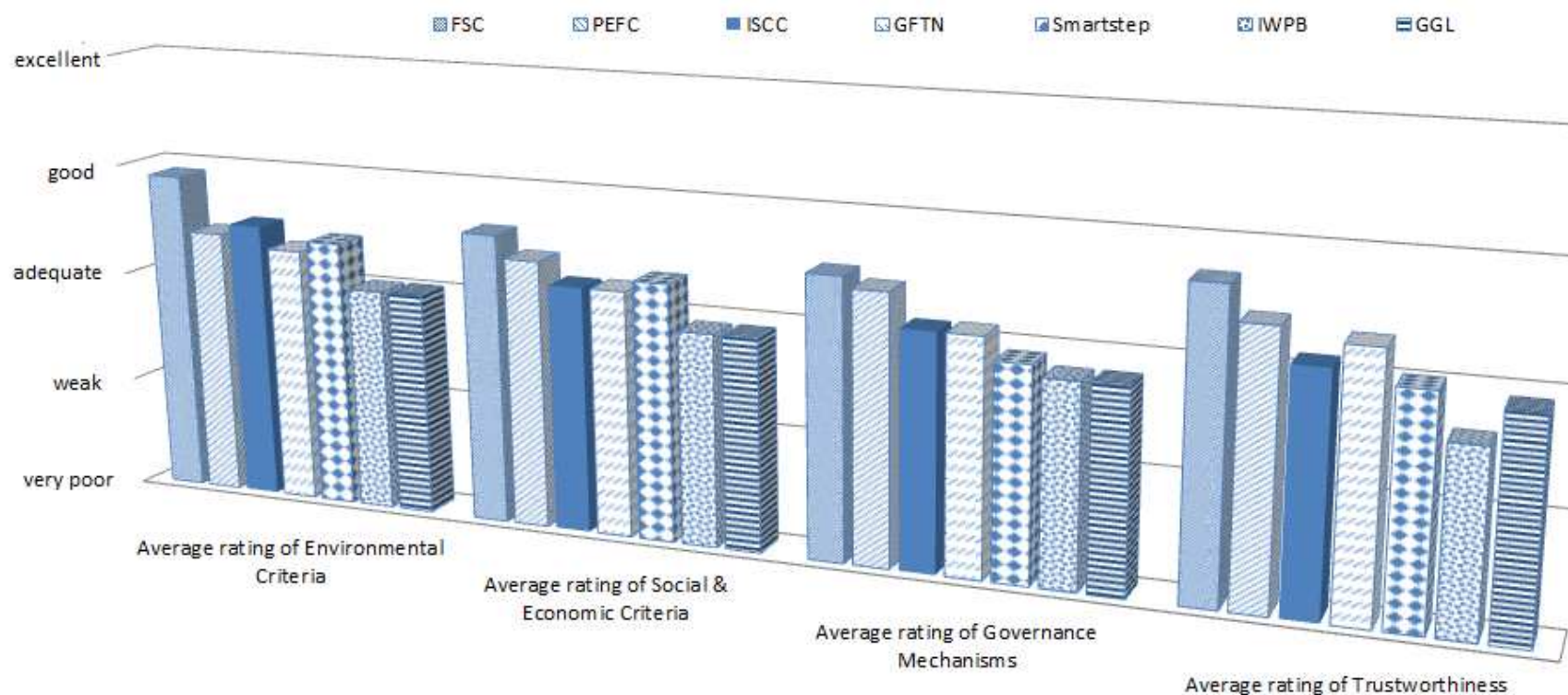


Figure 4-6 Stakeholder ratings of sustainability schemes.

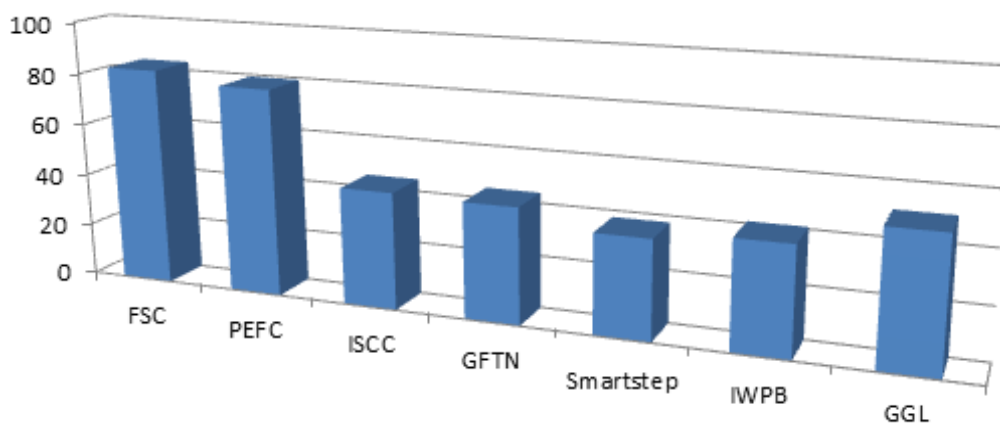


Figure 4-7 Percentage of respondents familiar with different sustainability schemes.

Since Figure 4-6 only displays the average ratings accorded to each sustainability scheme, the standard deviation was calculated in order to assess the homogeneity of participants' ratings and the variation of ratings from the averages displayed above. A high standard deviation tends to show a distribution of ratings over a large range of values and indicates low consensus, while a low standard deviation indicates that ratings were very close to the mean. The average standard deviation of the ratings for all schemes was 1.037. It varied between 0.962 for the GFTN and 1.187 for the ISCC. This relatively low standard deviation indicates a fairly high consensus among participants.

The height of some of the columns of Figure 4-6 does perhaps not vary as much as one might expect. Therefore it may be difficult to tell whether the average ratings accorded to each of the schemes even differ significantly from merely looking at Figure 4-6. It thus makes sense to calculate whether the variations between the average ratings are statistically significant. In order to test this, the statistical test of variance ANOVA was used to look at differences among the average ratings that stakeholders accorded to each of the schemes. The analysis yields a statistic,  $F$ , which indicates if there is a significant difference among three or more sample means. The alpha level was set at 0.05. In the present case  $F = 14$  ( $F_{\text{Crit}} = 2,72$ ) and  $P = 2.2$ . Since  $p \geq 0.05$ , the variance of the average ratings between different sustainability schemes is statistically significant. This demonstrates that respondents did discern between the schemes and accorded significantly different ratings to them according to their individual perceptions of each scheme.

#### 4.4 Part IV – Future outlook

The final part of the questionnaire asked stakeholders what form they thought any future sustainability scheme should take. Respondents were permitted to tick multiple options. Figure 4-8 below depicts the responses to this question.

A further question asked whether respondents believed that the biofuel sustainability criteria under the RED would provide an adequate basis for similar EU-wide sustainability criteria for woody biomass. Respondents were divided on this, and replied “Yes”, “No” and “Unsure” fairly equally.

Finally, only 16% of respondents indicated that in their opinion that adherence to the Timber Regulation will adequately ensure the sustainability of wood imported into Europe. By contrast, 39% did not think that the Regulation will ensure sustainability and 45% were unsure.

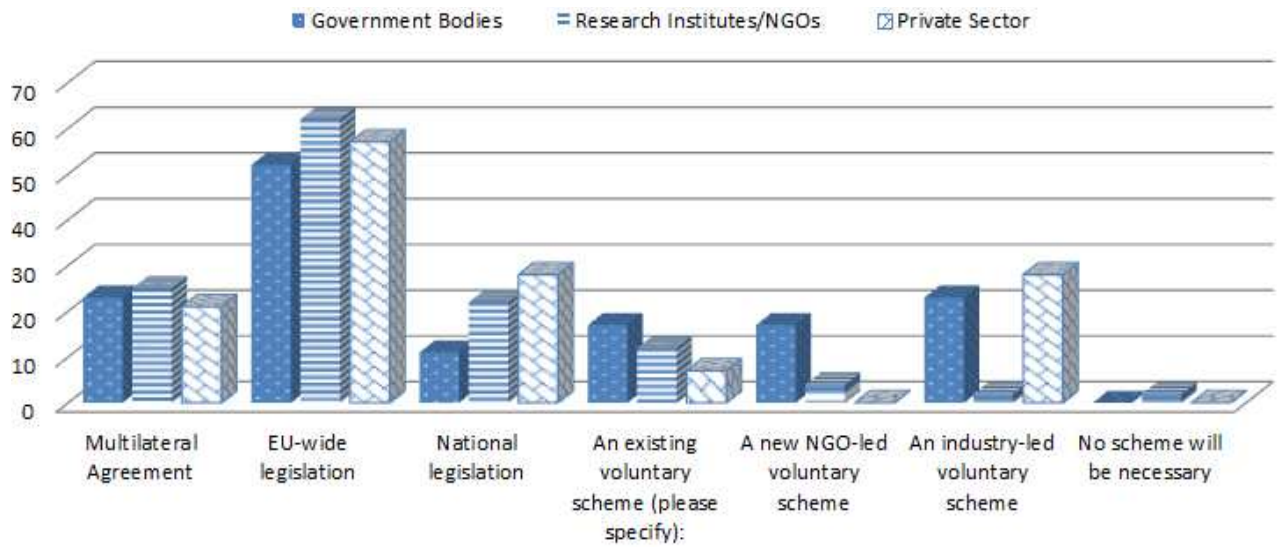


Figure 4-8 Stakeholder opinions on how sustainability of the European woody biomass trade should be ensured in the future.

## 5 Identification of relevant stakeholders & their sustainability concerns

It is the purpose of this paper to show how utility companies can address stakeholder concerns over the use of solid biomass in large scale energy generation through the application of sustainability schemes. The first steps to answering this research question are to lay out (a) who the relevant stakeholders are, and (b) stakeholders' sustainability concerns. Throughout the research conducted for this paper, industry actors identified this as one of the largest knowledge gaps that was hindering them from addressing sustainability concerns effectively. This section thus aims to answer these questions by drawing on Stakeholder Theory and the literature review. It then deepens the analysis by scrutinizing the relevant results of the online survey and complementing it with inputs from the interviews conducted.

### 5.1 Relevant stakeholders

The literature review revealed a large number of actors that are involved in the biomass for energy sector to one extent or the other. Respondents to the online questionnaire, for instance, included representatives of government and private sector institutions, NGOs and, to a large extent, think tanks (Figure 4-2).

The Stakeholder Theory concept of stakeholder salience introduced earlier can help to answer one of the relevant questions identified above, namely who the most relevant stakeholders in the biomass for energy sector are. Mitchell et al. (1997) seek to determine the relative importance of different stakeholder groups to a firm by examining their individual legitimacy (socially accepted and expected structures or behaviours), power (the extent a party has means to impose its will in a relationship), and urgency (time sensitivity or criticality of the stakeholder's claims). In their analysis, the authors arrive at several different stakeholder categories. "Latent Stakeholders" only possess one of the three identifying characteristics above and may not even be recognised as stakeholders. For instance, "Discretionary Stakeholders" have legitimacy but not power to influence the firm, nor urgent claims. Therefore managers should generally not allocate precious time and resources to them. Similarly, "Demanding Stakeholders" satisfy the "urgency" criterion but lack power and legitimacy and therefore do not warrant management attention. "Expectant Shareholders" are those parties that satisfy two out of three criteria. "Dominant Stakeholders", which are both powerful and legitimate, fall under this category, as well as "Dependent Stakeholders", who lack power but have urgent legitimate claims. While the former will directly influence a firm, the latter are likely to be represented through the advocacy or guardianship of other stakeholders. "Dangerous Stakeholders" are those characterised by urgency and power that however lack legitimacy rendering them coercive and possibly even violent. Finally, stakeholder salience will be highest where all three attributes, power, legitimacy and urgency are combined. These "Definitive Stakeholders", or those with the potential to become such, are those that management should accord priority.

From the perspective of Stakeholder Theory, this analysis deems that the most important stakeholders for utilities are government representatives, as they ultimately decide on policies and subsidies in the sector. However, within Europe the large, well-established NGOs also satisfy the three basic requirements of stakeholder salience: power, legitimacy and, above all, urgency (Mitchell et al., 1997). They therefore form a second category of "definitive stakeholders". NGOs have traditionally formed part of the European political landscape and thus possess a high degree of "individual legitimacy", though some are perhaps perceived to be more 'reasonable' than others. Some also possess the financial and communicative means to exercise "power", for instance through influencing public opinion and political decisions,

such as the imposition of sustainability legislation. Not all stakeholders in the sector satisfy the “urgency” requirement – however, those that do are particularly active in the field. Judging from interviews and literature reviews, the most active European NGOs in the field are ActionAid, Biofuelwatch, BioenergyAction, the European Environmental Bureau, Fern, Friends of Earth, Transport & Environment, Birdlife, Greenpeace, Milieudefensie and Oxfam. The latter four have been actively engaged in the biomass issue for six or more years (Jinke van Dam et al., 2008). ActionAid, Biofuelwatch and BioenergyAction are mostly active at a local level within the UK. The European Environmental Bureau, Fern, Friends of Earth, Transport & Environment, Birdlife, Greenpeace, Milieudefensie and Oxfam are lobbying and publishing at the EU level. The WWF is also involved in the issue but tends to take a softer stance because, according to an interviewee, “it has its own high ambitions on bioenergy” (EU Official 1, personal communication, March 8, 2012). A summary of recent reports published by these ‘salient’ stakeholders can be found in Table D1 of Appendix D

## 5.2 Stakeholder concerns

Until a few of years ago, NGOs were generally still very positive about the opportunities offered by sustainable bio-energy production (Dwivedi & Alavalapati, 2009; Jinke van Dam et al., 2008). According to one government official, NGOs were very slow to wake up to the challenges presented by biomass in the energy sector. They then demanded binding sustainability criteria without specifying which ones. “Only recently have some NGOs woken up to realise the depth of the problem and are slowly starting to investigate solutions in meaningful ways” (EU Official 2, personal communication, March 8, 2012).

NGOs views now range from cautious approval of small-scale projects to vehement opposition to the concept as a whole. One NGO representative summarised the sentiment expressed by a number of survey respondents like this: “At a time of a carbon overloaded atmosphere, polluted air and stressed forests, increased cutting and burning of forests is about the dumbest thing we can do. So called ‘green’ groups promoting such stupidity should be exposed for their complicity in the destruction of the world’s forests, and increases in carbon emissions. Cutting and burning forests is NOT ‘green’ energy, and never will be.”

The primary research conducted revealed a broad range of specific concerns among stakeholders that included most of the issues introduced in the background section to this paper. However, a number of issues particularly stood out.

### 5.2.1 Social & economic concerns

With respect to social and economic issues, respondents to the survey were fairly divided on which criteria they considered to be most significant (Figure 4-4). Surprisingly, legality verification and human rights were not at the top of the list of criteria considered important for inclusion in sustainability schemes. This may reflect a belief that these matters are in any case covered by the EU Timber Regulation and international human rights conventions.

By contrast, land use rights were considered to be particularly important by research institutes and NGOs and this is reflected in a number of recent well-publicised reports on the issue. For instance, FIAN, Friends of the Earth, GRAIN and the Oakland Institute have each published reports arguing that land deals have negative impacts on local communities (FIAN, 2010; Friends of the Earth, 2010; GRAIN, 2008; The Oakland Institute, 2010). Oxfam has issued a report on land acquisitions by large corporations involved in the biomass for energy sector (Oxfam, 2011) and Ecologic has drafted a briefing to the European Parliament warning of this as one of the negative social consequences of woody biomass sourcing (Wunder et al., 2011). For similar reasons, raw materials and food security were at the top of the stakeholder survey.

For example, although Vattenfall have argued that the Liberian rubber trees they are currently sourcing would otherwise be wasted and rot, Friends of the Earth Scotland and Rainforest Rescue (Friends of the Earth Scotland & Rescue, 2010), as well as Wunder et al. (2011) have contended that these trees may in fact have been used for creating charcoal for local consumption.

By contrast, respondents from the private sector attached great importance to factors such as ‘economic stability’ and ‘business viability’. This makes sense, given that these criteria indicate the ability of bioenergy projects to be run profitably without subsidies, perhaps demonstrating that the sector is uncomfortable with relying purely on government subsidies.

Social issues play an increasingly important role on many leading research institutes’ and NGOs’ agendas (Turcksin et al., 2011). Nevertheless it should be noted that in previous studies, as well as in this current survey experts have accorded a much higher significance to environmental, rather than social or economic criteria. Even ‘employment generation’, which is very frequently discussed in sustainability forums (see RSB, 2008; IEA Bioenergy Task, 2006) received a relatively low ranking – and is in fact ignored by most sustainability schemes in practice (Figure 4-4). This might be due to the fact that many environmental criteria address the direct consequences of deforestation and are therefore easier to translate than wider socio-economic criteria. J. van Dam and Junginger (2011) confirm that indirect impacts are frequently given less priority because of the limitations of sustainability schemes to influence impacts that take place on a macro-level. At times, social criteria are accorded less priority because issues such as child labour are considered by some to be the responsibility of the country of production.

The widespread environmental concern could further reflect the geographical origin of the experts interviewed. Stupak, Lattimore, Titus, and Smith (2011) found that developing countries often preoccupy themselves more with social issues, such as access to firewood and working conditions, while developed countries appear to be more concerned with environmental consequences. The preference for environmental criteria may also be due to biomass experts giving higher priority to those areas they know best (J. van Dam & Junginger, 2011). The surveys could therefore perhaps have been improved by questioning experts from a wider breadth of disciplinary foundations.

### **5.2.2 Concerns regarding standard-setting, monitoring & governance mechanisms**

Figure 4-5 clearly demonstrates that for stakeholders of all professional backgrounds by far the most important “administrative” aspects are verification-related. Survey respondents of all categories were most concerned with third party certification and accreditation, regular third party assessments of local conditions and chain of custody verification. Stakeholder-related criteria, such as adherence to the ISEAL code of standard setting, representation of stakeholders from different geographical regions and complaint procedures, perhaps surprisingly received less attention, even from NGOs.

The preoccupation among stakeholders with verification reflects justified concern over corruption. The FAO (2010) has identified the risk of fraud, corruption and other illegal practices as one of the main challenges to the implementation of criteria for sustainable biofuels. One surveyed expert commented that “my information on the FSC in the tropical region is that it is routinely violated by traders able to ‘work the system’, for instance by double book-keeping or false trails through second and third countries (often in the transformation process from log to final product)”.

### 5.2.3 Environmental concerns

Among the environmental criteria offered for consideration in the online survey, the GHG balance, water management, biodiversity protection and the use of chemicals, pest control and fertilizer were considered particularly important by research institutes and NGOs (Figure 4-3), perhaps reflecting these organisations' detailed understanding of the importance of such criteria to the overall health of an ecosystem. It should be noted that the criteria 'biodiversity protection' and 'ecosystem protection' may have been regarded as similar by respondents and may therefore have 'stolen' responses from each other. Thus they would have received even higher ratings, had they been combined. By comparison, in an earlier stakeholder survey performed by Buchholz et al. (2009), only two criteria, energy balance and greenhouse gas balance, were perceived as critical by most respondents.

In the present survey, many industry actors regarded the rather intangible criteria highlighted by NGOs as being "unduly complicated" and "difficult to manage", instead expressing a preference for criteria fixing the "net energy balance" and the "minimisation of deforestation". The latter is regarded by some NGOs as an attempt by industry to avoid making real commitments (NGO Representative 2, personal communication, March 11, 2012). This is because under the IPCC definition of 'forest' a forest remains a forest even if it is clear-cut, as long as it is regenerated within twenty years.

The importance bestowed by many stakeholders on the 'net energy balance', the idea that any process employed to obtain energy must gain substantially more energy than it uses, was considered by Buchholz et al. (2009) to be striking. It constitutes an interesting result in light of the controversial debate on how this balance should be considered in bioenergy schemes. Dale (2007), for instance, dismisses the concept as 'silly', while Hall, Balogh, and Murphy (2009) emphasise the need for obtaining a 'minimum energy return on investment'. However, the present questionnaire reveals that it is mainly industrial actors that are concerned with the energy intensity of woody biomass sourcing, conceivably because the energy intensity of their sourcing operations presents a cost factor for them, or perhaps energy outlay can be regarded as a proxy for GHG emissions.

Interestingly, the issue of land use change, which constitutes a major topic of debate in the biofuels field (particularly liquid biofuels for transport), was regarded as one of the least important by questionnaire respondents (Figure 4-3). One respondent commented that "for biomass, LUC is much less of an issue, but carbon stocks are of paramount importance." This reflects the fact that forests are less likely than biofuels plantations to displace food crops, as wood is normally sourced from existing forests.

#### 5.2.3.1 The carbon question

All participant groups in the online survey expressed strong concerns about the greenhouse gas balance of woody biomass sourcing (Figure 4-3) and it was the issue named by far the most frequently in personal communications conducted as part of this research (for instance, Representative of Birdlife Europe, personal communication, March 23, 2012; DBFZ Representative, personal communication, March 20, 2012; Representative of Fern, personal communication, March 21, 2012; Representative of the European Commission's DG Energy, personal communication, February 29, 2012; Representative of Client Earth, personal communication, March 14, 2012). Many interviewees emphasised that felling trees and shipping them across the globe for energy production can only make sense if the aim of the environmental policies promoting this is achieved – namely a significant reduction in greenhouse gas emissions compared to fossil fuel burning.

For a long time, scientists have argued that substituting fossil fuels with wood fuels could avoid as much as 97-98% of GHG emissions (Ladanai & Vinterbäck, 2010a). In addition, using biomass for electricity and heat production is generally held to provide larger CO<sub>2</sub> emissions reductions than biofuels for transport, due to the absence of energy intensive intermediary processing operations (Peck et al., 2011). The issue of carbon debt has only surfaced relatively recently, following the publication of a number of predominantly American studies questioning the carbon neutrality of biomass (Manomet Center for Conservation Science, 2010). Consequently, the US EPA is now reassessing the assumption that using biomass in energy creation is carbon neutral (Biomass Energy Resource Center, Forest Guild, & Spatial Informatics Group, 2012). In January 2012, EPA's Science Advisory Board released a draft report rejecting the notion that biomass can automatically be treated as carbon neutral, especially when burning whole trees rather than residues. It advised that "only when bioenergy results in additional carbon being sequestered above and beyond the anticipated baseline (the 'business as usual' trajectory) can there be a justification for concluding that such energy use results in little or no increase in carbon emissions"<sup>3</sup>.

Other research has challenged the accuracy of GHG accounting methods for biomass, which has led to a rethinking of accounting approaches (Searchinger et al., 2009; J. van Dam et al., 2010). For instance, two studies commissioned by Birdlife International, Transport & Environment and the European Environmental Bureau found gaps to exist in the current accounting scheme for GHG emissions (Bergsma, Croezen, Otten, & van Valkengoed, 2010; Bird et al., 2010). The organisations criticise that under the UNFCCC countries often opt not to include emissions resulting from 'forest management', meaning that emissions from harvesting wood are often not accounted for. Similarly, the emissions that occur when biomass is burned are often not taken into consideration, because the Kyoto Protocol excludes emissions resulting from a decrease in forest stocks in non-Appendix 1 countries. Russia and Canada do not account for forest management emissions in commitments under the Kyoto Protocol - the US has not even ratified it. The organisations refer to these gaps as "carbon laundering".

At the European policy level, NGOs and government officials alike are criticising the lack of a debate on the issue, both at a scientific level and at the policy level (EU Official 2, personal communication, March 8, 2012; Representative of Fern, personal communication, March 21, 2012). "The discussion is being framed in the wrong way and the wrong questions are being asked" (Representative of Client Earth, personal communication, March 14, 2012). For instance, in a recent European study, Repo, Tuomi, and Liski (2011) found a comparatively limited carbon debt time for branches (4 years) and stumps (22 years). However, the study did not consider the cutting of full trees and made some errors in its terminology, for instance confusing indirect and direct emissions<sup>4</sup>. In an interview, one EU government official accorded this mix up to "an inability to admit that biomass is not carbon neutral, as that would be heresy". She continued to say that

*All that is currently admitted to is some sort of indirect (i.e., uncertain, therefore less important) impact. It is not unlike considering the Earth the centre of the Universe, with the Sun and everything else revolving around it, but then admitting that they move in a complicated sort of way (sometimes backwards). Unfortunately, the*

---

<sup>3</sup> 1-19-12 DELIBERATIVE DRAFT report of the Biogenic Carbon Emissions Panel. This draft is a work in progress. It does not represent the consensus view of the Panel or the Science Advisory Board. [http://yosemite.epa.gov/sab/sabproduct.nsf/ea5d9a9b55cc319285256cbd005a472e/45e511bd3c19b6d3852579890065c7ac/\\$FILE/1-18-12%20Biogenic%20Carbon%20Advisory%20-%20CLEAN%20COPY.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/ea5d9a9b55cc319285256cbd005a472e/45e511bd3c19b6d3852579890065c7ac/$FILE/1-18-12%20Biogenic%20Carbon%20Advisory%20-%20CLEAN%20COPY.pdf)

<sup>4</sup> For instance, it stated that: "The indirect carbon dioxide (CO<sub>2</sub>) emission from producing bioenergy occur when carbon in the logging residues is emitted into the atmosphere at once through combustion".



*carbon neutrality assumption is more dangerous than the geocentric model: the Ptolemaic system was imperfect, but did not do any damage, while the carbon neutrality assumption can have truly catastrophic consequences* (EU Official 2, personal communication, March 8, 2012).

Interviewees accorded this reluctance to address the carbon question to the fact that the EU policies promoting biomass and their respective subsidies have already been put into place and entrenched in the legislation. Therefore questioning these policies would potentially entail substantive administrative and political costs. Yet such discussion may be difficult to avoid, following a recent opinion of Scientific Committee of the European Environment Agency (2011) on greenhouse gas accounting in relation to bioenergy. This opinion refers to the notion of carbon neutrality as a “serious accounting error”, specifying that “this assumption is not correct and results in a form of double-counting, as it ignores the fact that using land to produce plants for energy typically means that this land is not producing plants for other purposes, including carbon otherwise sequestered”.

The carbon question is now spearheading many NGO campaigns. Interviewees from the European Commission have stated to be under immense pressure from outside and within to investigate the issue further (Representative of the European Commission’s DG Energy, personal communication, February 29, 2012). An article in *The Guardian* quotes a ‘Brussels insider’ as saying “we’re paying people to cut their forests down in the name of reducing greenhouse gas emissions, and yet we are actually increasing them. No-one is apparently bothering to do any analysis about this” (Neslen, 2012). Green MEP, Bas Eickhout was quoted in the press as stating “There are good scientific reasons to distinguish between infinite renewable sources – like wind and solar and hydro on the one hand - and biomass, which is like fossil fuels but on a shorter rotation time” (Neslen, 2012). An interviewee feared that “using woody biomass is not carbon neutral. The EU policy took off before science was ready” (DBFZ Representative, personal communication, March 20, 2012). A Fern Briefing recommends that different GHG thresholds be established for the production, processing and energy conversion phase of woody biomass sourcing and that all inefficient processes should be excluded from EU subsidies (Dossche, 2009). Greenpeace has asked the EU to take into account the upfront carbon debt of wood-based bioenergy and the length of time required for the emissions to become carbon neutral when performing carbon lifecycle assessments of wood-based energy (Greenpeace, 2011). One government official survey respondent commented that “the carbon neutrality assumption is absolutely false and the EU policy is questionable at best”.

Given these intense discussions at the highest policy level it is not surprising that 98% of industry representatives in the online survey consider the issue to be particularly important, as it may affect future policy support to the industry. In the light of these concerns, even government and industry representatives are openly alarmed about the sustainability of using biomass in energy generation. An industry representative stated to be very concerned that companies may have taken the decision to get involved in biomass without knowing how the carbon issue would develop: “Should the public debate on this turn in a couple of years, then the investments being made now could be at risk” (Industry Representative 3, personal communication, March 4 2012). Another believed that “if you take biomass as a general abstract topic there is much more to say against than for it” (Industry representative 7, personal communication, March 30 2012). Therefore, some argue that “importing wood chips for electricity does not seem to be a good strategy. It is shocking how much we are paying for electricity in terms of subsidies and to what extent transparency is lacking” (EU Official 1, personal communication, March 8, 2012).

### 5.3 Risk implications for utility companies

“Whether one regards corporations as planet-destroying or planet-saving, corporations’ actions are constrained by the other social actors in their network” (Boutillier, 2009). Having mapped the most important stakeholders and their (often negative) perceptions of the sustainability of using biomass in for energy generation, the next step in addressing the research question is to outline the dangers that this negative perception can imply for energy providers. This section builds on both Stakeholder Theory and real-life examples in order to help demonstrate why stakeholder concerns should be met by companies.

In 1951 Edward Freeman was the first to develop Stakeholder Theory, which demonstrated the importance of stakeholders other than shareholders to a firm (Freeman, 2010). Around the same time, stakeholder activism began to increasingly focus on corporations rather than governments, thereby attaching a tangible target to a broader cause, a causal mechanism that relied on the threat of financial harm. In a number of high-profile cases, brand-name apparel firms were targeted by labour activists seeking improved working conditions in Indonesia; anti-Burma campaigners in the US went directly against the multinational corporations trading with the country’s ruling junta; and NGOs attempted to stop the violence in Sierra Leone by campaigning against the firms trading diamonds with the country’s warlords (Spar, 2007).

Forest campaigners too, have in the past carried out large public media campaigns. For instance, the Rainforest Action Network managed to pressure, the world’s largest home-improvement retailer, Home Depot Corporation to embrace FSC certification through a series of well dramatized and publicised demonstrations (Meidinger, 2006). So far, the lobbying efforts in the European woody biomass energy sector have often taken place at a local level; in the UK, MP for Edinburgh Sheila Gilmore recently praised community activists who successfully fought plans to build a biomass power plant at Leith Docks; ActionAid has installed targeted adverts on London buses; and Biofuelwatch and Friends of the Earth are protesting locally against the conversion of the Ironbridge power plant by E.ON. The local anti-biomass campaign against Helios’ Southampton biomass plant shows that these local movements have the potential to grow into well-organised, professional and well-informed protest groups with hundreds of followers within just a few months (Williamson, 2012). A number of interviewees from industry fear that stakeholders are now commencing to exert substantive pressure at the European level. One EU Official confirmed that the Commission is only now beginning to feel intense lobbying from NGOs. She suspected that the delay took place because many NGOs had previously “burned themselves on the issue of biofuels” by first promoting them to be public and then having to perform a U-turn when realising the possibly negative environmental side effects (EU Official 2, personal communication, March 8, 2012)

The rise and fall of biofuels constitutes a very relevant example to the present case. Within a period of eighteen months the public perception of biofuels changed from biofuels constituting an environmentally friendly solution to the dependence on fossil fuels in transportation (Eurobarometer Survey, 11 November 2010) to biofuels being a “publicly funded environmental disaster” (Representative of a European Research Institute, personal communication, March 1 2012), that is responsible for food insecurity (Wunder et al., 2011), that is more polluting than fossil fuels (Kafsack, February 2012) and that kills Orang-Utans (ZDF, 2012). This shift in public perception was confirmed in a recent study by Upham, Tomei, and Dendler (2011). However, scientists too have become more sceptical of biofuels. A report of the European Environment Agency Scientific Committee from September criticised the current biofuels policy (European Environment Agency, 2011). A month later, a letter signed by more than 150 economists and scientists from around the world reached the European Commission, the U.S. Environmental Protection Agency and the California Air

Resources Board, urging the institutions to include indirect land use change emissions in biofuels policies (Union of Concerned Scientists, 2012). As a result of these concerns, ILUC will now be included in the EU biofuels policy, a significant change to the European legislation, which the private sector will have to adapt to retrospectively.

A similar change in public perception in the area of solid biomass and the associated policy changes could be very dangerous to those energy providers that have incorporated biomass energy into their medium-to long-term plans. A call to reconsider the EU's carbon accounting rules for biomass emissions was launched at the European Parliament in on 29 March 2012 and the issue is said to cause "widespread alarm in policy-making circles" (Neslen, 2012). An EU official responding to the questionnaire found it likely that "something similar to the ILUC debacle" will occur. He criticised that "ILUC renders the promotion of biofuels pointless, if not disastrous for the environment" and said that "the same will happen with woody biomass. Under NGO pressure carbon debt will become a major issue, scientific studies will confirm this, undermine the policy and it will once again create a mess and make the EU less credible".

A variety of well-known research institutes and NGOs are already now publicly criticizing the promotion of woody biomass and lobbying for a cut in subsidies at European level (Birdlife International et al., 2011; Dossche, 2009). Negative media attention tends to focus on the issues of deforestation, loss of biodiversity and carbon debt. A recent heading in *The Guardian*, one of the UK's most widely-read newspapers, read "renewable energy targets are driving tree-cutting for biomass energy – and may cause Europe to miss its 2020 carbon target" (Neslen, 2012). A different article claims that "there are already reports of concessions being granted for the destruction of rainforests to establish tree plantations for wood chips and wood pellets, as a result of the growing global market in biomass" (Williamson, 2012). It cites a study by M. Wise et al. (2009) which predicts that there might be no natural forests left by 2065 as a result of this increased demand for wood.

Public opinion in this area has a significant potential to influence politicians, and in turn legislators, thus creating policy risk as an important element of investment risk (Bradley et al., 2011). For utility companies this could imply financial, reputational, regulatory and competitive exposure as well as endangering trade relationships. Pruitt and Friedman (1986), for example, found that NGO boycott campaigns can have extremely negative impacts on shareholder wealth, reducing average firm market value by \$120 million. Interviewees from the private sector too thought that the sustainability of biomass would be "a major threat to the business in the future" (Industry Representative 8, personal communication, March 30 2012). Reputation in particular constitutes a key element for the biomass sector, which relies on subsidies for its existence. A bad reputation carries the risk of influencing regulators to change the criteria for subsidies. This renders the reputational threat much more direct in the biomass field than in other sectors.

The perception of sustainability risks by stakeholders is therefore significant to companies when setting up purchasing criteria for wood, as well as when evaluating the role that woody biomass should play in a company's renewable energies portfolio. Responses to the online survey demonstrated that pure adherence to the law is unlikely to suffice: for instance only 16% of respondents believe that adherence to the Timber Regulation, which is designed to ensure legality will adequately safeguard the sustainability of wood imported into Europe. Instead, the stakeholder concerns outlined above must be directly addressed. The promotion of bioenergy is not possible without public acceptance (Magar et al., 2011). The 'price of doing business' in the sector is that biomass used for energy has to be both sustainable and to be clearly seen to be sustainable.

## **6 Meeting stakeholder concerns through the application of sustainability schemes**

The following chapters evaluate the extent to which sustainability schemes can both help to ensure sustainability and to reinforce a perception of sustainability by establishing an element of trust between utility companies and their stakeholders.

### **6.1 Introduction**

Having outlined stakeholder concerns and the risks that these concerns imply for utility companies, the next step is to identify to what extent these concerns can be addressed through the application of sustainability schemes. In developing his perspective of Stakeholder Theory, Hendry (2006) encourages managers to actively attract positive attention from NGOs, for instance by developing goals and interests similar to those of the NGOs, being open to new, creative ideas and developing contacts with NGOs. Aldrich and Fiol (1991) emphasise that in any new business sector, trust is a critical first-level determinant of success in the absence of information and evidence regarding a new activity. As a form of corporate responsibility (CR), certification could even positively influence a company's business. In a detailed review of the literature on Stakeholder Theory from recent years, Li and Toppinen (2011) found that more and more corporations acting in the forest industry are coming to view CR as a way of differentiating their product rather than a financial effort that might damage their immediate stakeholders. Even as far back as 2001, a meta-analysis of 95 studies by Margolis and Walsh (2001) arrived at the conclusion that companies with better corporate social performance records tend to be more profitable.

A number of utility companies, such as the members of the IWPB, are already working hard at increasing the social trust placed in them but feel quite challenged in accommodating the various, sometimes conflicting demands placed on them. Many stakeholders criticise company sourcing policies for not being stringent enough and generally distrust the constraints that major players in the power sector have placed on themselves. In designing sustainability criteria for this new business sector, companies will have to work towards socio-political acceptance and socio-cognitive legitimacy. According to Aldrich and Fiol (1991) a new process attains socio-political legitimation only if the general public, key stakeholders, government officials and key opinion leaders accept a venture as appropriate under existing norms and laws. Thus, legitimacy can be measured by assessing government subsidies to the industry, public acceptance of an industry and the public prestige of its leaders. In the case of biomass energy, subsidies have already been put into place, thus clearly reflecting significant degrees of political legitimacy at specific time points. Yet uniform support by the by the general public, or even the very government leaders who created these subsidies is lacking, with substantive disagreements taking place within the European Commission (EU Official 2, personal communication, March 8, 2012).

Aldrich and Fiol (1991) further identify "cognitive legitimacy" as necessary to achieve acceptance in a new industry. According to the authors, this can be gained through guidelines that enable stakeholders to compare and assess performance in an emerging industry. Consistent, industry-wide CR standards in the form of a sustainability scheme, based on stringent targets and independent, public verification can constitute an important first step in this direction.

Worldwide, CR standards are becoming an important tool and are increasingly supported by governments. Bendell et al. (2011) explain how governments can "prescribe" the use of CR standards through new regulations. They can further "promote" CR standards, by influencing the standards or assisting their adoption by enterprises in some way. The mandatory endorsement by

the European Commission of seven biofuel certification schemes under the RED constitutes both a promotion and a prescription of CR standards. A similar approach is likely to be employed once mandatory sustainability criteria are put into place for solid biofuels (Representative of the European Commission's DG Energy, personal communication, February 29, 2012).

Certification schemes can present an opportunity for firms and citizens to act on their concerns about practices in other regions of the world without contravening international trade law. They can further act beyond governmental budget constraints. Bendell et al. (2011) call this a privatisation of the regulatory function of government that nevertheless protects the democratic participation of citizens. For companies, certification schemes in the form of sustainability certification may have the potential to provide risk management and market access, as well as being an instrument for environmental marketing.

Since the beginning of the 1990s, a variety of voluntary certifications for biomass have become operational. The development of criteria for biomass used in bioenergy has intensified since 2005. A number of private sector schemes, such as Laborelec and GGL were followed by crop-specific standards developed by multi-stakeholder initiatives and more generic biomass standards. Recently, a number of biofuel schemes entered the market with the aim to facilitate compliance with the RED (Vissers, Paz, & Hanekamp, 2011). In the beginning of 2010, there were 67 on-going certification initiatives aimed at ensuring the sustainability of various forms of bioenergy (J. van Dam et al., 2010). Schemes compete with each other for business and with government regulatory programs for acceptance (Meidinger, 2006). Efforts towards harmonisation of sustainable biomass certification criteria at an international level have been made by a great number of organisations. However, clear consensus on which framework should become standard practice and which indicators are critically important has not been achieved and existing schemes differ vastly. It is therefore vitally important for the parties involved to understand the different sustainability criteria employed by these schemes and the way that they are viewed by stakeholders.

## 6.2 Comparative table of sustainability schemes

As outlined in the methodology, Step 2 of the research involved an in-depth review of the detailed environmental, social, economic and governance requirements of eleven sustainability schemes that represent the different types of schemes available. Only some of the schemes examined were specifically designed for woody biomass sourcing for energy and heat production. The RED biofuel scheme, for instance, focuses on liquid biofuels and agricultural products. However, its scope of application could, if necessary, be extended to forestry (Ifeu Institute, 2011). Similarly, forest certification schemes were not specifically created to certify woody biomass to be used in energy and heat production but can be applied to this kind of purpose.

The Comparative Table (Table 6) below allows for a quick and easy comparison of the different schemes against each other and against the applicable legislative requirements. It further serves to demonstrate to what extent the sustainability benchmarks identified as important in the stakeholder survey are actually covered by existing schemes. The table indicates the extent to which each scheme covers environmental, social, economic and governance criteria. It translates each provision into one of three categories: "extensively covered", "partially covered" and "not covered". The choice of category for each provision was made by the author based upon in-depth examination of the provisions of each scheme. A much more detailed Excel spreadsheet, laying out the exact provisions of each scheme and the corresponding stakeholder survey ratings was created as part of this work but is not included in the main body of this paper for the sake of brevity. This spreadsheet can be accessed by following this link: <https://skydrive.live.com/redir.aspx?cid=2737f0fc37314f1c&resid=2737F0FC37314F1C1344&parid=root>

Table 6-1 Comparative Table of the environmental sustainability criteria covered by different sustainability schemes and stakeholder opinions.
































































































































































































 Extensively covered  Partially covered  Not covered	RED	Timber Reg.	FSC	PEFC	GFTN	Smartstep	TLTV VLC	R.A. VLC	ISCC	IWPB	GGL	Laborelec	E.ON	Importance accorded by Stakeholders
greenhouse gas balance														High
carbon storage in soil														Not rated
net energy balance														Medium
soil protection														Medium
water management														Medium
ecosystem protection														Medium
waste management														Low
biodiversity protection														High
use of chemicals, pest control, fertilizer														Low
land use change														Medium
use of GMOs														Low
emissions other than GHGs (air quality)														Low
conservation of primary forest														Medium
minimisation of deforestation														Medium
sustaining yield of land														Not rated
restoration of forests and ecosystems														Medium
Stakeholder Perception – Environmental Criteria			Good	Good	Average	Average			Average	Average	Average			
Stakeholder Perception – Trustworthiness of Scheme			Good	Good	Average	Weak			Average	Weak	Average			

Table 6-2 Comparative Table of the social and economic sustainability criteria covered by different sustainability schemes and stakeholder opinions.









































































































































































































































































































































 Extensively covered  Partially covered  Not covered	RED	Timber Reg.	FSC	PEFC	GFTN	Smartstep	TLTV VLC	R.A. VLC	ISCC	IWPB	GGL	Laborelec	E.ON	Importance accorded by Stakeholders
competition with need for raw materials/food security														High
labour conditions/fair trade														High
property/land use rights														High
legality verification														Medium
respect for indigenous people's rights														Medium
respect for human rights														Medium
human safety and health														Medium
microeconomic sustainability/improvement of local conditions														Medium
employment generation														Low
equitable sharing of benefits														Medium
long term economic stability														Medium
cost efficiency/business viability														Low
Stakeholder Perception – Social & Economic Criteria			Good	Good	Average	Weak			Average	Weak	Average			

Table 6-3 Comparative Table of the standard setting, monitoring &amp; governance mechanisms covered by different sustainability schemes and stakeholder opinions.

 Extensively covered  Partially covered  Not covered	RED	Timber Reg.	FSC	PEFC	GFTN	Smart step	TLTV VLC	R.A. VLC	ISCC	IWPB	GGL	Laborelec	E.ON	Importance accorded by Stakeholders
ISEAL Standard Setting Code														Medium
different types of stakeholder accorded democratic voting powers on decision-making boards														Medium
stakeholders of different geographical origin are represented on decision-making boards														Medium
certification and accreditation by independent third party bodies														High
transparent and clear certification & accreditation processes														High
regular third party assessments of management activities and social and environmental impacts														High
local stakeholder involvement in such assessment procedures														Medium
publication of assessment results														Medium
chain of custody verification														High
legal origin verification non-certified materials in mixed source products														Medium
existence of a label														Low
effective trademark protection														Low
complaint procedures														Low
Stakeholder Perception – Governance Mechanisms			Good	Good	Average	Weak			Average	Weak	Average			





## 6.3 Voluntary certification schemes

### 6.3.1 Forestry certification

Two main global sustainable forestry management certification organisations exist: the Forest Stewardship Council (FSC) and the Programme for Endorsement of Forest Certification (PEFC). Among survey respondents they constituted the most widely known and the most trusted schemes (Figures 4-6 & 4-7). While the FSC has historically been more trusted by NGOs (Schepers, 2010), the two organisations' standards have over time become quite similar. Together both schemes have certified over 310 million hectares worldwide, of which 36% are FSC- and 64% PEFC-certified. This constitutes nearly 10% of the total area under forest management, an impressive share of the total which demonstrates that forest certification has played an important role since its establishment twenty years ago. Yet, demand for certified wood currently far exceeds supply (Proforest, 2010).

#### 6.3.1.1 The FSC

Based in Bonn, the FSC was set up in 1993 following the UN Conference on Sustainable Development. It is an independent, non-governmental, stakeholder owned organisation and is represented in more than fifty countries. It is the only forestry certification scheme that is recognised by ISEAL to follow the ISEAL Code of Good Practice for Setting Social and Environmental Standards. Environmental, social and economic organisations have equal voting power in the FSC's General Assembly, which has a three chamber system. The chambers are further subdivided into Southern and Northern countries, each with equal decision making powers. This partially counteracts criticisms of a higher membership by northern countries. The FSC's heterogeneous network lends scientific robustness to its standards (Eden, 2008). Based on a fixed set of principles and criteria, national working groups develop national FSC standards. If there are no national working groups, the accredited certifiers develop so-called generic standards, which are valid until a national standard is developed (Meidinger, 2006). The National Initiatives Manual contains specific requirements for FSC-accredited national and regional standards. With the introduction of the "FSC-STD-60-006 process requirements for the development and maintenance of Forest Stewardship Standards", national standards no longer need to be developed by an FSC accredited National Initiative (Vissers et al., 2011).

#### 6.3.1.2 The PEFC

The PEFC was created in 1999 by an association of European Small Forest Owners as an alternative to the FSC. Feeling disadvantaged by the lower environmental and labour standards in developing countries, many European forestry interests had initially supported the idea of certifying tropical timber but reacted angrily when it became clear that requiring certification only of wood from developing countries would be deemed to violate international trade laws. According to Meidinger (2006), certification within Europe was unwelcome due to the small size of many European forest owners, which rendered financing FSC certification difficult. It was also counter to the high regard in which the European forestry industry held itself. Traditional forestry interests, primarily landowners and European forest products corporations largely control the PEFC, which tend to have longstanding relationships with European government forestry ministries (Meidinger, 2006). The FSC is particularly popular with small private forest owners that profit from the provisions for regional and group certification. Around 500 000 forest owners, managing more than 200 million hectares of forest are certified by the PEFC. CoC certification has been accorded to more than 8 500 companies (Biomass Technology Group, 2008).

Unlike the FSC, the PEFC plays no role in the development of international forestry principles and instead establishes a mechanism for mutual recognition of national certification schemes. Thirty five national certification systems are currently members, of which 30 have a PEFC-endorsed national scheme. While concrete standards are developed at national level, all must comply with intergovernmental principles (J. van Dam et al., 2010). These Sustainability Benchmark Criteria consist of more than 250 criteria derived from international intergovernmental processes and international conventions, such as CITES, the CBD and the Kyoto Protocol. The difference between the local systems accredited by the PEFC can be considerable, as they differ not only in their sustainability criteria but also in their accreditation, reporting, and complaint procedures.

### 6.3.1.3 FSC vs. PEFC

There is a long history of rivalry between the FSC and the PEFC. Forest owners and industry tend to give more favourable reviews of the PEFC, while comparisons by NGOs are generally in favour of the FSC (Hämäläinen et al., 2011; Savcor, 2005; WWF, 2005). NGOs have criticised the PEFC for representing an uneven balance of stakeholders in favour of industry and of having endorsed weak certification schemes, notably the Sustainable Forest Initiative and the Canadian Standards Association, which permit forestry companies to adapt the criteria that they are certified against (Biomass Technology Group, 2008). Furthermore, many of the schemes endorsed by the PEFC employ ‘system’ rather than ‘performance’ standards – the former dictate a specific management system that must be in place without however specifying any minimum level of performance to be attained (Fern, 2004). By contrast, all national FSC schemes are performance based. Interviewees acknowledged the PEFC’s image problem, while highlighting that the organisation has recently become more stringent than the FSC in relation to labour standards in the CoC (EU Official 1, personal communication, March 8, 2012).

However, others have questioned certain FSC rules, the environmental effectiveness of which is not established and which are expensive to maintain. One example is the obligation to set aside 5% of each area (Savcor, 2005). EU Officials describe the FSC as having excellent visibility and as being popular with retailers, if being slightly arrogant. In interviews, concern was expressed at the fact that not all countries, particularly in Central Africa, have their own national standards. The PEFC was said to have an advantage in terms of being more welcome in countries like Brazil and China where local authorities tend to be against the involvement of foreign NGOs, such as the WWF which is associated with the FSC. In terms of the area of forest certified and number of chain-of-custody certificates issued the FSC has been more successful in developed than in developing nations, raising questions as to its ability to protect biodiversity (Schepers, 2010).

Responses to the online survey accorded better ratings to the FSC than to the PEFC. Yet it is unclear exactly why. Stakeholders rated particularly the PEFC’s environmental criteria much lower than the FSC’s (Figure 4-6). However, the Comparative Table (Table 6 1-3) demonstrates that the environmental, social and economic standards of the two schemes are largely comparable. With respect to social & economic criteria, the FSC may appear slightly more comprehensive than the PEFC in that it expressly takes into account long term economic stability and the equitable sharing of benefits. Yet, the PEFC can pride itself with being the only system that requires compliance with all fundamental ILO conventions in forest management worldwide.

The two schemes differ most in their standard-setting and governance mechanisms. The Comparative Table shows that many of the FSC’s criteria in this category are more comprehensive than those of the PEFC. Yet, survey participants’ ratings of the schemes’

governance mechanisms do not seem to reflect this difference (Figure 4-6). This may be due to the fact, as indicated by Figure 4-5, that survey participants attached particular importance to criteria concerning certification and verification. The Comparative Table shows that both schemes cover these criteria equally well. The PEFC is only less strong on standards meant to ensure the inclusion of non-corporate stakeholder groups. This may explain why the PEFC most frequently comes under criticism from these particular groups. Furthermore, it likely explains the FSC's significantly higher rating of trustworthiness (Figure 4-6).

A report from the Sierra Club (2009) entitled "Choosing a forest certification system: why is one so much better than the others?" shares this view. The report estimates the FSC to be superior (i) in membership diversity, numbers, credibility and influence; (ii) due to its broader global reach and experience; (iii) due to its stricter, more prescriptive forest management standards; (iv) because it requires tangible results and improvements on the ground; (v) because its transparency and stakeholder consultations are higher; (vi) because it has the tightest controls over its certificates, labels, claims, product content and sourcing of any forest certification system; and (vii) due to its more inclusive collaboration and problem solving.

Another separate, but important consideration is that the most urgent concern of all survey participants, namely the GHG balance is not (yet) covered by the forestry certification schemes. One survey participant commented that

*bioenergy is supported with an environmental rationale (most notably GHG reduction). Any scheme that does not address GHG is next to irrelevant. Those schemes that consider GHG, but do not consider carbon stock changes on land and/or emissions from combustion (but rather consider biomass to be carbon neutral) are fundamentally flawed and cannot be used to substantiate the environmental claim used to justify support.*

In response to this, the 2008 FSC General Assembly has indicated its interest in expanding its criteria to non-timber management objectives, such as biofuels and climate change and has established the 2009 Forest Carbon Working Group (FCWG), which advises the Board of Directors on matters related to climate, forest-based carbon programmes and greenhouse gas accounting. The FCWG indicated in a 2011 discussion paper that it believes the FSC to be in a good position to incorporate carbon stewardship by way of monitoring the forest carbon resources but not by getting directly involved in carbon offset quantification and verification (Vissers et al., 2011).

Should the lack of GHG requirements be addressed, then their expertise, reputation and breadth of sustainability criteria render both the FSC and the PEFC good options for utility companies aiming to satisfy stakeholder concerns. However, the forestry certifications' biggest 'flaw' is probably that they are simply unable to certify as much wood as will be needed under the new EU policies. One interviewee said that because there is so much pressure to produce large quantities of wood, forest certification schemes have already become weaker: "for instance, under the FSC the removal of stumps is now permissible, which is not sustainable" (Representative of Fern, personal communication, March 21, 2012). Since the well-established forestry management certificates are likely to cover only a small percentage of the required biomass (Ifeu Institute, 2011), an investigation into the viability of the lesser known schemes below is of particular urgency.

### **6.3.2 RED Sustainability Schemes – the ISCC (EU Standard)**

As outlined above, binding sustainability criteria applicable to woody biomass have not (yet) been put into place at EU level under the Renewable Energy Directive. By contrast, binding norms were put into place for biofuels under the RED .On 19 July 2011, the first seven RED-compliant voluntary schemes were recognised by the Commission. Out of these seven

schemes, the ISCC is described in more detail in this paper, as its standards are widely used and because it has been said to be among the most easily transferable to woody biomass (Ifeu Institute, 2011).

Established in the beginning of 2010, the ISCC certifies biomass and bioenergy. Its development was aided by over 250 stakeholders from Latin America, Europe and South East Asia. With some 700 customers in 45 countries, it is supported by major private sector parties. It was the first certification system for biomass to be approved by the German authorities in 2010 (Vogelpohl & Hirschl, 2010)<sup>5</sup>. The production of biomass is dealt with in Document ISCC202, which outlines six principles and their respective criteria. Appendix 1 to the document distinguishes between ‘major musts’ and ‘minor musts’. For a successful audit, all major musts have to be complied with, while 60% of the minor musts have to be fulfilled. The ISCC can operate as a meta-standard to the extent that it can (i) either provide gap certification where only those elements of the ISCC standard, that are not already covered by the standard of another certification system, are audited, or (ii) fully recognise certification by another system and simply provide the ISCC logo in addition (Scarlat & Dallemand, 2011).

Survey respondents rated the ISCC’s environmental and social criteria to be “adequate”, bestowing it a rather average overall score (Figure 4-6). A look at Comparative Table 6 however, shows that the ISCC’s criteria are quite comprehensive compared to other schemes. In particular, those criteria rated to be highly important by stakeholders are all present. The ISCC addresses water issues in a broad and detailed way with highly elaborate requirements which are designed to facilitate practical implementation (Fehrenbach, 2011). When it comes to social criteria, the ISCC is exceptional in taking into consideration food security. On the other hand it does not mention indigenous peoples’ rights. This may be due to its predominantly Western European membership structure (Vogelpohl & Hirschl, 2010). For countries that have ratified the respective ILO Conventions, the ISCC simply assumes that the corresponding social requirements are fulfilled, which seems illusory. Compliance control within EU Member States that have implemented cross compliance is only necessary for the protection of areas of high conservation value, high carbon stock and peatland (Scarlat & Dallemand, 2011). The ISCC’s breath of environmental, social and economic criteria cannot be compared to that of the forest certification schemes. Furthermore, because the ISCC was created primarily with biofuels in mind its GHG reduction minimum of 35% is rather weak. Yet, interviewees have described the ISCC as encompassing an impressive range of criteria, which are only sometimes a little bit too soft (DBFZ Representative, personal communication, March 20, 2012).

The Comparative Table demonstrates that the ISCC’s monitoring and verification mechanisms, the importance of which was particularly emphasised by stakeholders (Figure 4-5), are more advanced than those of most other schemes. However, similarly to the PEFC, the ISCC’s standard setting mechanisms are rather limited in their inclusion of different stakeholder groups. This may explain the relatively low score that the ISCC received for this category in the stakeholder survey (Figure 4-6).

The RED biofuel schemes have only recently been established and their success remains to be seen. They comply with or go beyond all the requirements of the RED, which makes them interesting to energy companies. However, it remains unclear whether they sufficiently satisfy stakeholders. One possible flaw might be the relative inexperience of these new certification

---

<sup>5</sup> The ISCC certification system ensures compliance with the RED, as well as with the German sustainability ordinances (Biotreibstoff-Nachhaltigkeitsverordnung (ordinance on requirements pertaining to sustainable production of biofuels) and Biomassestrom-Nachhaltigkeitsverordnung (ordinance on requirements pertaining to sustainable production of bioliquids for electricity production)).

organisations, which could prove a serious weakness when dealing with corruption-riddled developing countries. Furthermore, the new EU sustainability requirements for solid biomass will differ from the RED requirements and appropriate adaptation by the ISCC will have to take place. If it does, then the ISCC could certainly be a good option for utility companies aiming to meet stakeholder concerns.

### 6.3.3 Stepwise programmes

Also known as ‘transition schemes’, the aim of stepwise programmes is to aid companies and forest managers in achieving certification. They provide a clear path towards reaching forest certification, while allowing forest managers to access to market benefits from an early stage, for instance by displaying a certification label. They particularly help smallholders with limited capacity and financial resources to implement a certification system (J. M. C. van Dam, 2009). Examples include the Rainforest Alliance’s Smartstep programme and the WWF’s Global Forest and Trade Network (GFTN).

The GFTN connects around 300 companies, communities, NGOs, and entrepreneurs in more than 30 countries. So far, 22 million hectares of forest have been certified and a further 6.4 million hectares are currently in progress to certification. With \$73 billion or 9% of the global trade in forest products, the GFTN assumes an important place in international forest commerce (Proforest, 2010). In order to join the programme, participants must publicly commit to applying for ‘credible certification’ within a time-bound action plan and to only use legally sourced wood. What precisely is meant by ‘credible certification’ is not formally clarified – but a 2009 WWF report criticizing the PEFC seems to indicate that only FSC certification would be acceptable. Forest companies must achieve certification of one FMU within five years and of all their FMUs within ten years. Trade Participants must create an action plan to eliminate unwanted sources, including illegal timber. They must achieve CoC certification for one facility within one year and for all facilities within five years. However, being a stepwise programme, the GFTN does not actually provide a verification statement on the legality of its participants- this can be done by enrolling in a separate legality verification scheme (Proforest, 2010).

Smartstep, an independent third party auditing service provided by the SmartWood Program of the Rainforest Alliance is currently the world's leading FSC Forest Management certifier. Developed in 2005, Smartstep has enrolled three participants in Ghana and one in Thailand, for a total of more than 314 000 hectares of forest. Its requirements include participation in a gap analysis, followed by an action plan. Participants further commit to undergoing annual audits and public reporting requirements, with the aim to achieving FSC certification within five years. As a minimum, applicants have to prove the legal right to harvest in the FMU, as per SmartWood VLO standards, principles 1 - 3. However, since Smartstep is not a legality standard, participants may not make claims of legally verified products unless legality verification is obtained. The material handling must be tracked through an approved CoC control system such as the SmartWood generic CoC certification (Proforest, 2010).

Comparative Table 6 demonstrates that both stepwise programmes have very similar environmental, social and economic criteria. The GFTN goes a step further to the extent that it takes into account LUC. However, survey participants accorded very moderate importance to LUC in the context of solid biomass (Figure 4-3). As with the full forest certification schemes, one of the most important stakeholder concerns, the GHG balance, is not addressed by either scheme. More variance between the two schemes can be found in the standard setting, monitoring & governance mechanisms section. Here, adherence to the ISEAL Standard Setting Code by the Smartstep programme stands out. Yet, the Comparative Table demonstrates that both programmes examined are relatively weak on those criteria of

particularly high importance to stakeholders, namely those related to certification, verification and accreditation (Figure 4-5).

Neither the GFTN, nor the Smartstep programme is very widely known, even among experts (Figure 4-7). Given this, their ratings are surprisingly high. Interestingly, the Smartstep programme is given higher ratings for both its environmental and its social & economic criteria than then GFTN. Yet its trustworthiness is rated lower. Perhaps this indicates that stakeholders set a high level of trust in any WWF-led scheme and that involvement of this NGO is more important than the actual criteria set. It may further reflect that fact that the GFTN has been in place for much longer than the Smartstep programme and has had more time to build trust.

Smartstep programmes constitute a very useful and important tool because they lead forest managers who are unable to achieve fully certification in the right direction. From the point of view of energy companies, their support by well-known NGOs renders the stepwise programmes better than no certification at all. In particular, it appears that they could prove useful as an emergency interim measure for energy providers genuinely unable to obtain fully certified wood in the market over a short time period. Yet, the above evaluation has shown that these schemes are unable to adequately meet some of the most urgent stakeholder concerns. Furthermore, when relying on stepwise certification, utility companies should always ascertain that legality verification is provided at the same time.

#### **6.3.4 Legality verification schemes**

The purpose of legality verification schemes is to show that wood was legally sourced in its country of origin. Two different types of legality verification scheme exist: verification of legal origin (VLO) and verification of legal compliance (VLC) schemes. VLO merely confirms that the timber company had the legal right to harvest. VLC goes further and requires compliance with all laws relevant to the forest management activities. Only VLC schemes are analysed in this paper.

Verification schemes are often used to respond to requests for proof of legality, mainly by companies that are faced with shortages of FSC/PEFC certified wood and that must meet legislation, such as the US Lacey Act and the EU Timber Regulation, which requires timber to be independently verified. Yet, unlike the forest certification systems, voluntary legality verification does not necessarily ensure compliance with international good practice in certification, accreditation, standard setting processes, labelling and product tracing, which means that the schemes tend to differ quite significantly from one another with respect to how they define legality. According to Proforest (2010), only some of the large number of existing schemes cover the criteria demanded by EU and US legislation.

Arguably the most widely applied voluntary legality verification programmes are the Timber Legality and Traceability Verification (TLTV) scheme by SGS and the Rainforest Alliance's VLC schemes. The TLTV was established during SGS audits in Cameroon and the Congo in 2005, at the initiative of private sector clients who needed proof of legality for European markets. The TLTV has a production and a chain of custody component. The CoC component ensures that no unverified or illegal wood enters the supply chain. Companies are awarded a 5-year TLTV Statement if they meet the criteria. Today, 45 companies hold a CoC statement and 7.5 million hectares of forest are TLTV-verified in the Republic of Congo, Democratic Rep. of Congo, Cameroon, Tanzania, Papua New Guinea, Indonesia and Malaysia. Denmark, France, the Netherlands, and the United Kingdom have officially recognised the TLTV as evidence of the legality of timber products. Under the Rainforest Alliance's VLC programme, the first generic standards were developed in 2008 and have

recently been revised. A national standard has been put into place for Sabah Malaysia. The scheme involves the development and monitoring of a timber tracking system in order to monitor timber movements.

The Comparative Table shows that the two schemes' sustainability criteria and governance mechanisms are very similar. The TLTV is slightly more inclusive when it comes to environmental criteria, in that it expressly mentions soil protection, water management, waste management, chemical and air quality, most of which were accorded medium importance by survey respondents (Figure 4-3). In return, the Rainforest Alliance's programme is relatively stringent on the issue of land use change.

In order to keep the questionnaire to a manageable length, the legality verification schemes were not included in the stakeholder survey. Yet, it can be seen from the Comparative Table that overall, both schemes' performance is rather mixed when it comes to the criteria considered to be most important by stakeholders. While they do cover biodiversity protection, working conditions and land use rights to a certain extent, the provision of a GHG accounting procedure and the inclusion of indirect effects such as competition with food production, would go far beyond these schemes. While they are therefore likely to suffice as a tool to establish compliance with the Timber Regulation, they are unlikely to appease critical stakeholders. They are further unlikely to be of aid when EU-wide sustainability criteria are introduced for solid biomass. Legality verification schemes will therefore be of limited use to utility companies in addressing stakeholder concerns.

## 6.4 Company sustainability schemes

The fact that energy providers have to justify the sustainability of their end product to the consumer has stimulated companies, such as E.ON, DRAX, Electrabel and Essent to develop their own biomass certification systems (J. M. C. van Dam, 2009). Essent's Green Gold Label was initially developed for the company's own use, while Laborelec developed its sustainability scheme in order to present carbon and energy balances for obtaining green certificates. More recently, the IWPB has been created with the aim to harmonise the multitude of private sector standards.

### 6.4.1 Green Gold Label

Now owned by the independent Green Gold Label Foundation, GGL was set up in 2001 by Dutch energy company Essent and Skall International (now Control Union Certifications). Currently over 25 suppliers of biomass are registered as certified producers (Vissers et al., 2011).

Different standards apply to specific parts of the supply chain, covering all of production, processing, transport and final energy transformation<sup>6</sup>. Energy producers must adhere to GGL Standards 1, 4 and 6. GGLS8 contains detailed instructions for calculating GHG emissions and orientates itself mainly along the methods used in the EU RED, as well as the Dutch sustainability criteria. Forest managers have to be certified under the GGL or another recognised label and additionally fulfil Standard GGL1 in order to be able to sell certified biomass. The following other forestry labels are recognised under the GGL label: FSC, PEFC, Canadian Standards Association, Sustainable Forestry Initiative, and the Finnish Forest Certification System. In relation to forestry management, GGLS5 is only recognised for a maximum of four years, by the end of which certification under another one of the above

<sup>6</sup> GGLS1: Chain of Custody Processing Standard; GGLS2: Agricultural Source Criteria; GGLS4: Criteria for full supply chain from raw material to end user of biomass; GGLS5: Forest Management Criteria; GGLS6: Power company criteria; GGLS7: Conservation stewardship criteria; GGLS8: Green House Gas Balance



systems has to be finalised. The weakest one of these forestry systems therefore effectively determines the GGL standard for solid biomass (Ladanai & Vinterbäck, 2010b).

#### 6.4.2 E.ON

E.ON has put into place internal standards concerning Environmental Management, Human Rights, Responsible Procurement, Health and Safety and Communities. These apply both within the group and to companies in which E.ON has a majority share or operative responsibility. Contractors and suppliers are also expected to meet minimum standards and audits are carried out at suppliers' facilities in order to monitor CR standards. As part of this process, risk profiles are created for individual suppliers.

Since 2009, E.ON's Responsible Procurement Policy is supplemented by a Biomass Purchasing Amendment, which aims to "address the societal, environmental and reputational risks" that biomass purchasing carries. It establishes "(i) what types of biomass may be used for energy and biogas generation, and under which conditions; (ii) a ban on the use of human food as biomass for the above purposes; (iii) that the use of animal feed and renewable crops grown as energy sources and agricultural residue for fuel is only permitted within the corresponding national or EU legal boundaries - and only insofar as it does not distort local or global price stability and security of supply; and (iv) that timber and other forestry products may only be used for energy and biogas generation insofar as they are certified to meet corresponding international standards such as FSC and PEFC".

#### 6.4.3 Laborelec

The Laborelec label is a certification system for imported biomass pellets that was developed in 2005 by Belgian Electrabel, a subsidiary of GDF SUEZ in conjunction with SGS. The aim of the scheme is to inform pellet suppliers not only of Electrabel's sustainability requirements and of the requirements under the Belgian green certificate system, but also of the technical specifications necessary for firing the pellets at a thermal power plant (Vissers et al., 2011). It is composed of nine documents that cover different procedures and aspects of the supply chain.

There are three essential elements to the Laborelec scheme. (1) An audit of the pellet supplier by an independent local institution constitutes a central element of the certification process<sup>7</sup>. Based on this audit, SGS Belgium calculates the overall energy and GHG balances for the supply of each feedstock as described in Document 5 (2011.2 – Energy Carbon Balance Form). This takes into account the fossil energy and electricity for making the biomass suitable and transporting it to the biomass plant (Vissers et al., 2011). (2) A second element in the Laborelec scheme is a country report, which is required under Belgium law to be prepared by an independent body in order to demonstrate that the management of the natural resources that are traded from a certain country or region of origin are well-managed (Document 07 (Feb2009) – Country report on sustainability of natural resources).<sup>8</sup> (3) Finally, Document 8

<sup>7</sup> The pellet producer first makes a declaration (Document 2 (2011.2 Pellet Supplier Declaration form)) and so does the transportation company (Document 04 (2009.2 – Pellet Transport Declaration Form)). The audit follows the structure of Document 3 (2012.1 – Pellet Supplier Audit Procedure) and contains data about the origin and type of biomass, as well as its certification, production, transport and energy usage.

<sup>8</sup> Here a meta-standard which relies on existing standards is used. For woody biomass, this can be the FSC, the PEFC, CSA-SFM (Canadian Standards Association's Sustainable Forest Management), SFI (Sustainable Forest Initiative), FFCS (Finnish Forest Certification System), an APSC Approved pre-scope certificate of one of the endorsed forest management certification systems, with the intention of full certification. If the biomass has not been certified then an auditor must verify that the principles of the FSC are complied with – while not all criteria have to be adhered to and no complete certification process is conducted, it has to be established that the basic criteria are being complied with.

(2009.1 -Forest Inspection Procedure) puts into place a sustainability certification process that is applied to each wood pellets production unit.<sup>9</sup>

Unfortunately it is very unclear from the information provided how exactly the three schemes outlined above relate to and complement each other. Documents 7 and 8 in particular seem to contradict each other and it is not clear when an audit of the local forest conditions is to be carried out. Audits appear to play a central role in the scheme but the selection and accreditation of the required independent third party is not specified. Neither is the frequency of the audits. The Laborelec scheme would significantly gain in transparency if the nine documents, which were created separately over a time period of three years, were updated, consolidated and (if transparency is intended for international audiences) if they were written in clear and correct English language.

#### **6.4.4 IWPB**

Formed in early 2010, the Initiative Wood Pellets Buyers (IWPB) is a working group of large European utilities that will play a major role in the growth of biomass-fired power generation (IWPB, 2012). The group consists of Vattenfall, Delta, RWE/Essent, Laborelec/GDF Suez, E.ON, Drax International and Dong Energy. Together the companies use over 70% of the European market volume and half of the global wood pellet production in large thermal power plants (SQ Consult, 2011). The European inspection companies Control Union, Inspectorate and SGS are also associated with the IWPB.

The IWPB was created largely in response to a lack of liquidity in the solid biomass market. Large biomass plants rely on long-term procurement contracts for pellets. However, if any interruption or temporary stop in the plant's activities occurs it is essential for a utility company to be able to retrade its pellets in order to keep storage costs at a reasonable level. The trade in wood pellets between utilities has so far proven difficult, due to differences in (i) procurement contracts for wood pellets; (ii) the technical specifications for pellets; and (iii) the sustainability principles applicable to wood pellets sourcing (IWPB, 2011). In a meeting in January 2012, a first set of sustainability criteria was discussed with NGOs. On 26 March 2012, the IWPB agreed on a final set of draft sustainability principles. These however have not yet however been formally endorsed by the IWPB members.

#### **6.4.5 Evaluation of company sustainability schemes**

Comparative Table 6 provides a concise overview over the different standards covered by the private sector schemes. In the category 'environmental criteria' the IWPB's latest set of criteria is by far the most comprehensive (Table 6-1). Designed specifically for the procurement of woody biomass, the scheme covers most of the environmental criteria considered important by a majority of survey respondents (Figure 4-3). Importantly, at 60% the GHG minimum reduction target of both the IWPB and the GGL are more ambitious than the targets under the RED and likely to be in line with the targets to be established under the new EU legislative requirements (EU official, personal communication, February 2012). By contrast, E.ON's sourcing policy does not include any GHG reduction targets, despite the importance that survey participants attach to this criterion (Table 6; Figure 4-3). In its Global Climate Change and Environment Policy Statement, the company merely commits to reducing the CO<sub>2</sub> intensity of its power generation by half compared to 1990 levels and to render half of its fuel mix carbon free (including nuclear and renewables) by 2030. E.ON's participation in the IWPB is likely to cover this omission.

<sup>9</sup> The sustainability criteria assessed in this audit are based on the principles developed by the Cramer Commission in the Netherlands. No such verification must be carried out if FSC certification is provided.

In the category ‘social and economic criteria’, both E.ON’s procurement criteria and the IWPB perform very well, while the GGL’s criteria are more limited than any other scheme’s (Comparative Table 6-2). With respect to the standard setting, monitoring and governance mechanisms, all private sector schemes’ criteria are very limited (Comparative Table 6-3). E.ON’s choice to cover none of the points in this latter category makes sense in so far as that the scheme is not a certification scheme but merely an internal sourcing policy, which is likely to be complemented through the IWPB. Yet, even the IWPB needs to perform better in this category, if it is to meet the criteria rated to be highly important by respondents to the online survey (Figure 4-5). In particular, clear, independent and regular certification and assessment procedures would need to be laid out if the scheme is to meet the credibility demands of the stakeholders. The current criterion that “compliance with the principles must be verified by independent inspection companies” is too vague and insufficient. At the same time, a mechanism to ensure chain of custody verification must be found. In this respect, the GGL is ahead of the IWPB.

E.ON’s procurement policy and the Laborelec scheme were not included in the online survey in order not to render the questionnaire unduly lengthy. Nevertheless it can be said that, out of all four private sector schemes examined, the Laborelec scheme appears to meet stakeholder expectations worst. This may be related to the fact that the Laborelec criteria are both very difficult to find and very ‘messy’ in their structure, with different documents seemingly covering similar topics and contradicting each other. It was therefore challenging to truly evaluate the Laborelec scheme. This in itself however speaks against the scheme, as critical stakeholders are unlikely to be impressed by a scheme that does not lay out its principles in a clear, transparent and comprehensible manner. Vagonyte (2012) has criticised the Laborelec scheme for missing important aspects, such as carbon neutrality, resource efficiency and soil carbon. Furthermore, the difference between ‘will’ and ‘aim to’ criteria is said to be unclear, as is the actual benchmark for the meta-standard approach. Vagonyte (2012) holds that Laborelec’s methodology for calculating GHG emissions, while including the power plant and its efficiency, are not sufficiently defined and should cover net carbon stock change, the changing intensity of forest management (a land use management factor), as well as ILUC in the case of forest plantations.

Stakeholder opinions on the IWPB and the GGL varied. Both schemes scored exactly the same ratings for their environmental, social and economic criteria and both were judged worse in these categories than any other scheme (Figure 4-6). This cannot be justified by the schemes’ actual criteria, which (at least of paper) look quite ambitious (Comparative Table 6). In this light, it appears that the negative rating is more likely to be related to the schemes’ private sector origin. With respect to the GGL, survey participants have also commented negatively on the division between ‘major musts’, ‘minor musts’ and ‘shoulds’. Furthermore, while the GGL incorporates third party verification, its management and standard setting processes have been criticised for being less transparent than the traditional forest certification systems (Biomass Technology Group, 2008).

In the case of the IWPB, which has only recently been established, the negative rating is likely to stem from the fact that the scheme has not actually been finalised yet. Its criteria are therefore not very well known among experts (Figure 4-7). Nevertheless, the IWPB represents an obvious choice for utility companies looking to meet stakeholder concerns. Its sustainability principles expressly ensure compliance with the sustainability laws of the Netherlands, the UK and Belgium. Furthermore, its principles are based on well-established criteria, worked out by a variety of expert panels. The first three criteria are based on the RED Directive with a clarification for forestry. The 60% threshold for savings in GHG emissions with respect to fossil fuels exceeds that defined for liquid biomass in the RED and adheres to

the figure proposed in the UK for the grant of Renewables Obligation Certificates to power plant, as well as taking account of the fact that green certificates are awarded in proportion to the life-cycle GHG savings of solid biomass in Belgium. Principles 4-8 (the environmental and socio-economic criteria) are based on the Cramer Principles and emphasise that the quality of the audit should reflect the supplier and/or country specific risks related to the fulfilment of those principles. Principle 9 addresses general corporate responsibility issues, such as health & safety, human rights, discrimination, corruption etc. by referring to each IWPB Member's individual Code of Conduct (Vagonyte, 2012).

The IWPB further presents a viable option for utility companies because the common sustainability criteria of Europe's large pellet buyers would have a good chance to become globally valid standards, thereby replacing the individual commitments made by pellet producers. This would affect pellet production worldwide, as it is likely that the IWPB criteria would become the first globally applicable sustainability scheme for pellets. The creation of one common set of sustainability guidelines will significantly facilitate the trade of wood pellets between the different energy companies. The common agreement will have political advantages too. Industry has been faster than the European policy makers at taking the first step, creating a favourable starting position that will allow it to act quickly and persuasively, should binding rules be established at European level. Not only will the involved companies be prepared to meet the new sustainability standards, but these laws are likely to be influenced by industry preferences as well.

Arguments against the IWPB include the inherent distrust that many non-private sector stakeholders carry against private sector schemes. The IWPB is completely new and will have to fight hard to be accepted as credible certification. Some believe that it simply constitutes an attempt by utility companies to create a "stamp to make wood look sustainable" (FAO Representative, personal communication, February 2012). Others point to the fact that, in the light of the overly abundant proliferation of sustainability schemes, no new scheme is needed. One survey participant commented that "from a forest owner point of view, it is unrealistic to request us to go through the effort to align our practices with yet another scheme".

To conclude, it will be more challenging for utility companies to meet stakeholder concerns by way of a private sector scheme. Out of all private sector schemes examined, the IWPB appears to offer the best way forward, but only if the companies involved stringently adhere to the limitations that they have set themselves. If trust is to be engendered, then this adherence must be verified at regular intervals by independent third parties with sufficient experience in the sector.

## 6.5 Further considerations

Energy companies aiming to rely on sustainability schemes to address stakeholder concerns should take some additional factors into consideration, which are outlined in this section.

### 6.5.1 Extent to which the examined sustainability schemes ensure legal compliance

A large majority of survey respondents from all professional backgrounds voted for binding EU-wide sustainability legislation (Figure 4-8). This is significant because it stands in stark contrast to a 2009 EU consultation, in which 36% of respondents were against extending the biofuel sustainability criteria to solid biomass on the grounds that additional criteria would be burdensome and discourage biomass production (European Commission, 2009).

Legislative proposals for solid biomass sustainability criteria are likely to be made over the coming months. Paradoxically, this is likely to render sustainability schemes more, rather than less relevant. Similarly to the sustainability legislation on biofuels under the RED, the upcoming legislation is likely to rely on a system that provides for the approval by the European Commission of a number of voluntary certification schemes, compliance with which will ensure compliance with the new EU Regulation (Representative of the European Commission's DG Energy, personal communication, February 29, 2012). Therefore, an important consideration for energy providers is the extent to which the sustainability schemes examined in this paper will ensure legal compliance under the new provisions. The sustainability requirements for biofuels under the RED likely constitute a good indication of the types of criteria that can be expected (Representative of the European Commission's DG Energy, personal communication, February 29, 2012). A comparison to the RED is also relevant because a few national governments have already implemented RED-related requirements for woody biomass at national level.

Under the RED, biofuel crops must not come from land with high biodiversity values, such as primary forests, protected areas and highly biodiverse grasslands, as well as land with high carbon stocks (wetlands, peatlands, forest with canopy cover of above 30%). Existing EU legislation setting up minimum requirements for agricultural and environmental conditions must be complied with for biomass produced within the EU. While the RED does not include social requirements, the European Commission is obliged to report every two years on the impact of the increased demand of biofuels on social sustainability in the EU and in third countries. In doing so, regard is to be had to eight ILO Conventions<sup>10</sup>. The absence of social criteria in the RED is mainly a result of WTO provisions under the GATT requiring the non-discrimination of national and imported products, as well as the TBT Agreement, under which technical regulations may not create unnecessary obstacles. In particular, it is uncertain whether making subsidies for bioenergy dependent on social criteria falls within the exceptions under articles XX of the GATT. However, no such restrictions apply to voluntary certification scheme. If a legislative system is put into place that requires voluntary schemes for solid biomass to be approved by the EU and these schemes contain social criteria then this could be a way of implementing social criteria despite the WTO restrictions<sup>11</sup>.

Comparative Table 6 shows that the RED criteria are not particularly comprehensive. Wunder et al. (2011) confirm that the RED's binding sustainability criteria for biofuels only address the major environmental impacts. In their opinion, the exclusion of ILUC, for instance, constitutes a major weakness. Birdlife International et al. (2011) contend that the RED criteria "not only lack ambition; the current formulation also has serious shortcomings such as the lack of a proper instrument to ensure that emissions from forest management are taken into account" (Birdlife International et al., 2011). NGOs further argue that under the current sustainability criteria, the 'no go areas', meant to protect biodiversity rich and high carbon stock land have many shortcomings and loopholes. These include lack of clarity for protected

---

<sup>10</sup> Convention concerning Freedom of Association and Protection of the Right to Organise (No 87); Convention concerning the Application of the Principles of the Right to Organise and to Bargain Collectively (No 98); Convention concerning Equal Remuneration of Men and Women Workers for Work of Equal Value (No 100); Convention concerning the Abolition of Forced Labour (No 105); Convention concerning Discrimination in Respect of Employment and Occupation (No 111); Convention concerning Minimum Age for Admission to Employment (No 138); Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (No 182)

<sup>11</sup> Since voluntary biomass certification systems do not suffer the same WTO limitations as mandatory certification, stricter and more comprehensive criteria can be formulated under such certification systems. This could imply that the installation of obligatory certification requirements might turn out to be less effective than voluntary measures (Biomass Technology Group, 2008). The question is whether voluntary certification could and should be regarded as a tool to make up for very general or missing criteria at legislative level. If so, it is to be considered whether this can be done in a politically and democratically legitimate way (Vogelpohl & Hirschl, 2010).

areas criteria, uncertainties with regards to definitions, gaps in the peatland criteria and lack of protection for forests with under 30 per cent canopy cover. The criteria are further said to lack guidelines on carbon-conscious forest management, including criteria to assess the ecological, social and carbon-balance impacts (Dossche, 2009).

Despite the fact that the RED does not comprehensively cover all areas, the Comparative Table shows that most of the schemes examined fail to achieve at least some of the RED criteria. The forest certification schemes, which are in many respects much more comprehensive than the RED, will have to add elements specific to the biomass for energy sector, i.e. criteria on the GHG balance, and soil carbon storage. The stepwise and legality verification programmes lack the necessary depth in their environmental requirements and may not be able to provide the necessary auditing standards. The ISCC was designed to ensure compliance with the RED and even goes beyond most of its requirements. Yet it would have to adjust to the wood-specific requirements of the new legislative scheme. That would, among other things, likely require more ambitious GHG reductions than 35%. Among the private sector schemes, only the IWPB appears to be in full compliance with the RED (Comparative Table 6).

As of March 2013, energy providers will further have to ensure compliance with the Timber Regulation. The Comparative Table demonstrates the limited nature of the restrictions imposed by the Timber Regulation. An energy company that imports woody biomass into the EU must implement a 'due diligence' scheme to avoid placing illegal timber on the market. If the company sources woody biomass from within the EU, the obligation is to provide traceability information. The sole aim of the Regulation is therefore to ensure that the local law in the country of origin has been complied with.

In seeking compliance with the Timber Regulation, many energy companies are likely to rely on established certification or legality verification schemes that possess knowledge of local forestry conditions and can act as monitoring organisations under the Regulation. While particular forest certification schemes will not be preapproved under the Timber Regulation, the Regulation requires adherence to a number of "risk assessment criteria". These include third party "assurance of compliance with applicable legislation, which may include certification or other third-party verified schemes which cover compliance with applicable legislation"<sup>12</sup>.

An important finding of this paper is that not all schemes will sufficiently cover these legality verification requirements; in particular the stepwise programmes cannot be used as legality standards, as participants may not make claims of legally verified products unless legality verification is obtained by enrolling in a separate legality verification scheme. Furthermore, Comparative Table 6 shows that many of the sustainability schemes examined may not provide sufficient chain of custody verification. Under the Timber Regulation operators can either develop their own due diligence system or use one developed by a monitoring organisation. The Regulation specifically provides that monitoring organisations must be approved by the European Commission, which will publish a list of accepted monitoring organisations later this year. These organisations, likely to be private entities, can provide EU operators with operational due diligence systems. To what extent the schemes examined will adapt their chain of custody verification procedures in order to obtain official approval by the European Commission remains to be seen.

---

<sup>12</sup> For now, the Regulation specifically allows for FLEGT and CITES certificates as acceptable proof. The European Commission aims to adopt more detailed rules on the due diligence system by 3 June 2012.

In considering how sustainability schemes can be used to meet stakeholder concerns, utility companies should bear in mind that pure legal compliance is unlikely to be sufficient to appease critical stakeholders. According to the survey results, only 16% of respondents believe that adherence to the Timber Regulation will adequately ensure the sustainability of wood imported into Europe, while 39% do not think that the Regulation will ensure sustainability and 45% are unsure. Similarly, only one third of respondents indicated that in their opinion the biofuel sustainability criteria under the RED would provide an adequate basis for similar EU-wide sustainability criteria for woody biomass.

### 6.5.2 Extent to which the examined schemes are trusted by stakeholders

As a final consideration, the question whether sustainability schemes can be used to alleviate stakeholder concern is largely one of trust. The current proliferation of sustainability schemes increases the risk that market participants will ‘forum shop’ for standards and therewith decreases the overall trust that stakeholders place in certification schemes (Adam Brown, IEA, Senior Energy Analyst at the 2012 WSED Conference in Wels). A harmonisation of standards is thus favoured by many private sector participants and NGOs and it is supported by WTO rules (IUCN & Shell, 2010; J. van Dam & Junginger, 2011). For utility companies, the existence of too many national systems will hinder trade and create an unfair advantage for organisations in less stringent countries (Eurelectric, 2010). Furthermore, it renders it increasingly difficult to for all parties to keep an overview of which certification scheme stands for what, which increases the uncertainty and confusion among stakeholders.

Certification can only be meaningful if critical stakeholders are familiar with the certification scheme employed. A survey respondent pointed out that “the exact criteria in most labelling systems will to most stakeholders remain unknown, also for the so called expert. This is to a large extent a problem with most labelling systems, and way it is often difficult to get the desired result in the market from such systems”. Stakeholders unfamiliar with the exact criteria of a scheme tend to go by the trust that they place in the organisation promoting the scheme. This will frequently work out at the advantage of schemes set up by environmental organisations. Figure 4-7, for instance, shows that less than 40% of the survey respondents were familiar with the Rainforest Alliance’s Smartstep programme – a small number, considering that the survey was targeted at experts. Nevertheless, this scheme received a higher average rating in all categories even than the better known private-sector scheme GGL.

New schemes, such as the IWPB will take time to earn the trust of relevant stakeholders. Figure 6-1 below visualises the relationship between (i) the number of years that a sustainability scheme has been in existence, (ii) the extent to which it is known by stakeholders, and (iii) the average rating it received in the questionnaire. The diagram therefore highlights the importance that the age and experience of a scheme exert on its trustworthiness. The more recently a system has been developed the more weaknesses it will have – or be perceived to have. More established systems tend to be more reliable because the rules have been tested for longer and weaknesses have ideally been removed through the frequent repetition of democratic processes (Ifeu Institute, 2011). The GFTN constitutes the only “odd one out” in this Figure because, while it has been established for longer than any other scheme, it is not technically a full-blown certification scheme and therefore received a lower stakeholder rating than could have been expected from its age.

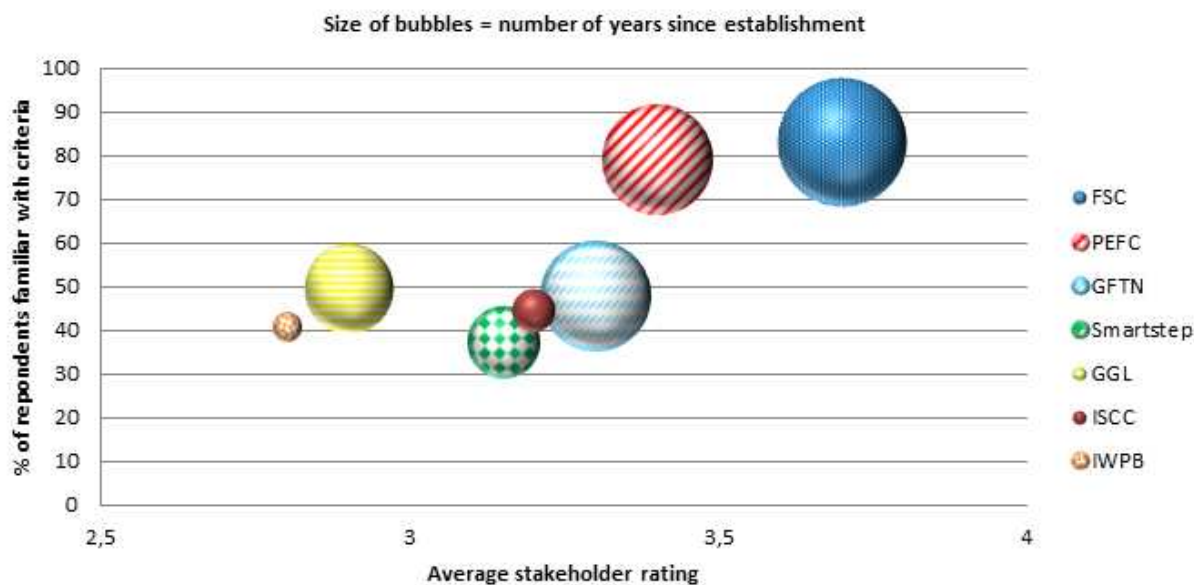


Figure 6-1 Relationship between age, profile and stakeholder rating of schemes.

As McDermott (2011) points out, almost no research has been carried out on the dynamics of local to global trust in certification schemes. Instead, social scientists have focused on the “legitimacy” of certification as a governance mechanism and a form of “transnational democracy” (E. Meidinger, 2011). This analysis indicates that stakeholder ratings of trustworthiness are not necessarily proportionately correlated to the stringency of a scheme’s criteria (Comparative Table 6/ Figure 4-6). Among survey respondents, opinions on the different certification schemes differed most with respect to their perceived trustworthiness (Figure 4-6). Previous research indicates that NGO-led schemes enjoy a competitive advantage in this area, due to their assumed independence from corporate interests, a finding reinforced by this study (Raynolds, Murray, & Heller, 2007). By contrast, private sector schemes will have to disprove a presumption that they have been created with the sole aim of meeting perceived consumer preferences rather than being environmentally and socially sound. For instance, Figure 4-6 demonstrates that the PEFC has not yet been able to rid itself of its inferior image compared to the FSC. This comes despite an increasing likeness of its criteria to those of the FSC and despite the fact that experts now estimate some of the PEFC’s social standards to be superior to those of the FSC. This might be partly explained by the different stakeholder groups involved in the two systems: one was originally created by NGOs and is supported by the WWF; the other stems from a private sector initiative.

Overall, the private sector schemes, particularly the IWPB received the lowest scores of trustworthiness in the online survey (Figure 4-6). With respect to the IWPB the current lack of trust is understandable, given that the scheme has not even been finalised. By comparison, the stepwise programmes, which are operated by well-known environmental organisations, receive higher ratings than the private sector schemes in all categories, despite the fact that their requirements are much less stringent and despite the fact that they only constitute a step towards certification, rather than certification itself. A study by Bouslah, M'Zali, Turcotte, and Kooli (2010) found that “the long-run post-event abnormal returns suggest that certification has, on average, a negative impact on firm financial performance”. Yet, they go on to emphasise that the effect of forest certification on firm financial performance varies depending on who grants the certification, since “only industry-led certifications<sup>13</sup> are

<sup>13</sup> The study examined the Sustainable Forestry Initiative, the Canadian Standards Association and ISO14001



penalised by financial markets, whereas non-governmental organisations-led Forest Stewardship Council certification is not”.

For utility companies looking to employ sustainability schemes as a tool to address stakeholder concerns, a lot speaks for relying on the long-established forest certification schemes as much as possible. Firstly, they are by far the best known of all schemes (Figure 4-7). Secondly, they are rated to be the most trustworthy (Figure 4-6). Thirdly, a look at the Comparative Table shows that their environmental, social and economic criteria are far more comprehensive than any other scheme's. Both schemes' environmental criteria are excellent in almost all categories apart from those that are perhaps more specific to the biomass for energy context, such as GHG Balance, carbon storage in soil and net energy balance. Both schemes are currently looking to address these issues. The standard setting, monitoring & governance mechanisms of the forest certification schemes too, go beyond any other scheme.

However, since FSC- and PEFC-verified wood supplies are unlikely to suffice in the short- to medium term, the IWPB may present an opportunity to consolidate the large number of existing private sector schemes. The good news for the IWPB is that government representatives seem to be relatively comfortable with the establishment of an industry-led voluntary scheme (Representative of the European Commission's DG Energy, personal communication, February 29, 2012). Unfortunately, research institutes and NGOs seem less happy with this option (Figure 4-8). In finalising the provisions of the IWPB, utility companies should have regard to the sustainability benchmarks and governance mechanisms identified in Figures 3-5 in order to ensure that stakeholder concerns are adequately addressed.

## 6.6 Limitations to meeting stakeholder concerns through the application of sustainability schemes

It is important to the analysis of how stakeholder concerns can be met through the application of sustainability schemes to consider the limitations to this approach.

A recent study found that many NGOs are very sceptical towards the efficacy of certification schemes for woody biomass (Upham et al., 2011). This is because, up to now, certification has been unable to stop land use change and deforestation in producer countries. It even falls short of considering complex social issues. One interviewee of this study summarised the fear of many stakeholders when he said that certification schemes are “about products made in countries where corruption, poor governance and a total lack of accountability and disregard for habitats and forests is the norm or certainly endemic”

International organisations have identified the risk of fraud, corruption and other illegal practices as one of the main challenges to the implementation of criteria for sustainable biofuels (FAO, 2010). As one Eastern European survey participant commented, “certification is not fool proof and has had many cases of failures, even within Europe. I remember an instance where FSC employees that had been sent to Hungary for verification purposes were shown fake sites and did not realise that they were issuing certificates to a non-existent entity”. A study by the Ifeu Institute (2011) confirms that it is very difficult for utility companies to check whether the documentation provided by a wood supplier is in line with what is happening in reality. It gives the example of FSC certified wood from Indonesia, where the documentation of teak wood plantations was modern and exemplary but where in practice illegal fellings led to significant damages. These eventually resulted in the revocation of the certification. Vogelpohl and Hirschl (2010) warn that this difficulty in controlling the verification and monitoring of criteria could result in reduced reliability and corporate greenwashing.

The Ifeu Institute (2011) emphasises that it is usually poverty among the local population that leads to corruption and illegal deforestation, either for self-use or for illegal sales. The risk is particularly high for new certification schemes with little local experience or those certification schemes that put less emphasis on the involvement of the local population. The less the local population is involved in the production chain the more illegal use can be expected. Therefore, the creation of a sustainability scheme cannot only be based on expert opinion but must involve local stakeholders and, importantly, those workers that will in the future be responsible for enforcing the criteria decided upon (J. M. C. van Dam, 2009). The stronger the tie of the local population to the forest as their property the more interest is there in protecting this property. For instance, FSC certified forests in Guatemala have a rate of deforestation that is 20 times lower than that in the nearby conservation area. An external investor that does not involve the local population in the supply chain takes the risk of reprisals in the form of illegal fellings. The democratic legitimation of the use of the forest is thus essential. Vogelpohl and Hirschl (2010) confirm that legitimacy concerns that stem from the lack of democratic control constitute a primary difficulty with voluntary certification. While land use rights form part of many certification schemes, none look at the type of power structure that allocated these land use rights. In undemocratic government structures the land allocation lacks democratic legitimacy. For instance, the certification of forests in the Congo is generally questioned by Greenpeace because the decisions over forest concessions are not based on democratic principles (Ifeu Institute, 2011).

Yet, it can be difficult to equally involve all the stakeholders in the certification process. FSC certifications in South America for instance are often accused of not including all stakeholders. This is due to difficulties in reaching these groups, lacking communication infrastructure, insufficient motivation by the plantation managers and illiteracy among stakeholders. In countries where state sanctions are inefficient and unreliable, certification systems take on the significant burden of replacing state functions. Therefore, limited national governance structures may require additional control mechanisms in countries with weak enforcement systems (J. M. C. van Dam, 2009). This is rarely possible in a complete way. However, it is in these regions that independent certification is needed and gains in importance. This can be difficult in tropical forests, where the ecological consequences of actions are often unclear. Local knowledge of the certifying organisation is therefore essential (Ifeu Institute, 2011). Local knowledge is further required due to the large regional differences in stakeholders, legislative framework, crop types and environmental vulnerability. This means that criteria not only have to be specific enough to be enforced but also flexible enough to allow regional adjustments (J. M. C. van Dam, 2009).

In considering to what extent certification schemes can be used to address stakeholder concerns, utility companies should bear in mind that there are a number of factors which strongly affect sustainability but can only be covered to a very limited extent by sustainability schemes. For instance, macro-effects, caused by higher wood prices causing the expansion of plantations and increased logging in other parts of the world can never be covered by certification schemes (Wunder et al., 2011). Lammerts van Bueren (2010) argues that forest certification fails to have any effect against the most important threat to biodiversity, which is the conversion of natural forests – certification after all is a tool for forest management, not for land-use planning at a landscape scale bigger than the FMU. One survey participant warned that “certification schemes can demonstrate how products are produced, but they are not suitable for assessing what would happen in the absence of production, or how the product would be used if it were not used for the intended purpose. Therefore, they cannot efficiently address displacement effects and counterfactual scenarios, which are essential. As bioenergy investments tend to lock in both the infrastructure and the land (forest) for many decades to come, when alternatives are considered, we have to look into the future”. If such

factors are regarded as important by influential stakeholders, then sustainability schemes can lose their protective function towards importers of woody biomass, who might even be criticised for ‘greenwashing’ (Ifeu Institute, 2011).

The risk of being accused of greenwashing is one that should not be taken lightly by utility companies. For instance, the failure of BP’s rebranding campaign from “British Petroleum” to “Beyond Petroleum”, which was perceived as being ingenuine by NGOs led to large financial and reputational losses by the company. Due to the distrust between NGOs and utility companies, this is relevant particularly to industry-led schemes, such as the IWPB. Vogelpohl and Hirschl (2010) for instance warn that certification schemes run the risk of being overly strongly influenced by certain interest groups that may push for non-state certification to avoid stricter government regulation. One interviewee commented that “industry was very much against sustainability criteria for biomass in the past, now they are the loudest at demanding criteria: this is because they don’t want good criteria but just want a good image”. Another posed the critical view that “utility companies just want a stamp to make biomass look sustainable” (FAO Representative, personal communication, February 2012).

On a practical level, utility companies may face limitations in the amounts of credibly certified wood available. Representatives of utility companies commented that, despite their willingness to pay a higher price for certified wood, suppliers were currently unable to deliver. One interviewee confirmed that “at the moment, the chain of custody systems are not set up to prove that the forests are well-managed (Industry representative, personal communication, March 2012). Others remarked the presence of reluctance, especially on the part of traditional suppliers from Canada to accept the necessity of certification. As one representative of a utility company put it “some traders charge a massive premium to discourage utilities from asking for certified wood. They do not seem to understand that this is a hard requirement not something we can negotiate on” (Industry Representative 4, personal communication, March 30 2012)

The sudden increase in demand for certified wood is likely to exert considerable pressure on existing schemes to certify more forests, faster. At the same time, a larger number of new schemes have been hurriedly set up in order to profit from the increased demand. These new schemes tend to have very little experience in the certification sector and lack local knowledge. Due to the low technical feasibility of high quality certification, there is pressure to weaken the quality of the standards employed (Jinke van Dam et al., 2008). A rush to deliver may therefore render the risk of corruption even higher.

A further limitation to meeting stakeholder concerns through sustainability schemes is that past cases show that even where companies put considerable efforts into evaluating the effects of their operations in developing countries, they still run the risk of becoming the target of criticism. Vattenfall’s sourcing of rubber trees from Liberia, for instance, was criticised by a variety of think tanks and NGOs despite their previous consultation with the Ifeu Institute (Ifeu Institute, 2011). A number of NGOs believe that even FSC and PEFC certified forests are not all well-managed, including those in developed countries such as Canada, the US and Sweden (Greenpeace, 2009). Birdlife International et al. (2011) state that, in their opinion, certified forests do not automatically qualify as sustainable. Biofuelwatch criticises E.ON, whose sourcing policy endorses the FSC and the PEFC because apparently “E.ON’s definition of ‘sustainable wood’ means wood certified by voluntary schemes, including schemes known to have repeatedly certified clear-cutting of biodiverse and ancient forests, wood from plantations linked to human rights abuses and land grabs, and even illegally logged wood” (Biofuelwatch, 2012).

The dangers inherent in woody biomass sourcing from abroad are easily communicated to the general public. As one industry actor put it: “What you are saying to the public is that you are going to burn forests from Brazil or Indonesia, without doing anything useful with the wood beforehand. People will automatically think of Orang-Utans and biodiversity destruction. This will be a real issue when it comes to communicating with the public. We can’t say clearly and succinctly why using woody biomass in energy generation is good. Therefore no certification will convince people that their tax money should subsidise this form of energy generation” (Industry Representative 6, personal communication, March 18, 2012).

These considerations raise the question whether certification schemes can ever adequately address stakeholder concerns at all. A number of interviewees and survey respondents emphasised very strongly that “no scheme will be sufficient”. One NGO representative stated that “a sustainability scheme will never be enough. Scientists have long warned of the limits to certification schemes. In the policy domain this discussion is not yet prevalent enough. People seem to have forgotten where the real limits lie” (Representative of Fern, personal communication, March 21, 2012).

Certification is furthermore unlikely to appease the growing number of stakeholders who believe the large-scale use of biomass in energy generation to be an inherently bad idea. One survey respondent stated that “tree-fuelled biomass energy is dirtier than fossil fuels, and those who promote it are either clueless ‘greenies’ or industries laughing all the way to the bank.” Another said that “biomass power plants are last century’s technology. No more should be built”. Similarly, an interviewee emphasised that “the limited amount of biomass we have should not be used in large scale energy generation” (Representative of Fern, personal communication, March 21, 2012).

These comments certainly do not reflect the position of all relevant stakeholders. Many well-recognised NGOs, such as the WWF, actively encourage and are themselves involved in the development of sustainability certification. Nevertheless, the limitations outlined above are significant. They demonstrate that utility companies cannot blindly rely on certification schemes as an easy fix to the many sustainability concerns that large-scale woody biomass sourcing brings with it.

## 7 Conclusion

This section provides research findings and concrete recommendations that should help utilities not to make a biomess out of their biomass operations. It then provides a brief review of the theoretical and conceptual frameworks employed in the analysis. The paper finishes by delivering a set of recommendations for European energy companies and by delineating areas in need of further research.

### 7.1 Summary of findings

It is not easy to give a straight-forward answer to the question how European utility companies can address stakeholder concerns over the use of solid biomass in large-scale energy generation through the application of sustainability schemes – or even if sustainability schemes can do so. Energy providers first need to establish (i) who the most relevant stakeholders are; (ii) what their principal concerns are; and (iii) how these concerns can best be addressed. This paper applied elements of Stakeholder Theory to help demonstrate that managers should take the claims of external stakeholders, particularly NGOs seriously, as they possess power, legitimacy, and urgency. Within the analysis frame applied, these attributes indicate that NGOs very likely have the ability to place significant constraints on the biomass sourcing operations of energy utilities.

Interviews and an online survey were relied on to establish that, in the context of sustainability certification, key stakeholders are particularly concerned about issues such as GHG emissions, biodiversity, land use rights and food security, as well as independent third party certification mechanisms.

The stakeholder analysis in this paper shows that utility companies would be wise to address these concerns very seriously indeed, as they pose a risk of financial, reputational and competitive exposure as well as endangering trade relationships – evidence of all of these risks have been found in this study. In addition, the case of biofuels shows that fervent stakeholder opposition and scientific uncertainty have a high likelihood to lead to regulatory risks in the form of policy changes.

As part of a company's business strategy, sustainability schemes have the potential to cushion these risks by increasing the social trust that stakeholders place in the firm and thus the legitimacy of its actions. This research evaluated seven voluntary and four company-based sustainability schemes against the stakeholder concerns identified during primary research. It established that no scheme currently addresses all of the most urgent stakeholder concerns. Nevertheless, the results indicate that the forest certification schemes, as well as the ISCC and the IWPB are more comprehensive than others and go some way towards safeguarding sustainability.

As expected, the analysis found that long-established, NGO-led schemes (particularly the FSC) enjoy the highest level of trust among stakeholders and are thus the most likely to satisfy their demands. The results of this study may be counterintuitive to many readers insofar as that they indicate that the actual sustainability criteria of a scheme seem to be less important for its trustworthiness than the name of the organisation leading the scheme. Despite their less comprehensive criteria, the WWF's GFTN and the Rainforest Alliance's Smartstep Programme thus appear to be more trusted by stakeholders than any private sector scheme. This also appears to support the postulations that Aldrich and Fiol (1994) made within their work outlining the importance of socio-cognitive legitimacy – insights utilised in the development of this analysis. This study indicates that, in the eyes of many stakeholders, the

private sector currently lacks this legitimacy and therewith the necessary social trust to certify its own biomass sourcing operations.

Despite this finding, this work recommends that utility companies should continue their efforts under the IWPB. Even though the scheme received comparatively poorer ratings than the other schemes examined, this is at least in part due to its recent establishment. It is contended that the scheme provides a valuable opportunity to consolidate the proliferation of existing private sector schemes. Consolidation could help to reduce stakeholder confusion and thus increase trust and legitimacy. Furthermore, the IWPB currently seems to be the only scheme where the criteria are in compliance with the upcoming legislative sustainability provisions on woody biomass.

However, utility companies should also be aware that it is likely that their efforts under the IWPB will be scrutinised very closely by stakeholders. The private sector will almost certainly be accused of greenwashing if efforts to genuinely ensure sustainability are watered down. In order to ensure that the IWPB enjoys broad stakeholder support and rapid uptake and compliance by businesses, the scheme's criteria must be strengthened to (i) render a company truly accountable; (ii) be independent from those to whom the standards apply; (iii) be appropriate to the energy sector; (iv) actually achieve its desired impact; and (v) avoid a proliferation of standards by way of promoting interoperability (Bendell et al., 2011).

Independently of which sustainability scheme is chosen, utilities must bear in mind the significant limitations of certification schemes. For one, there are a large number of uncontrollable variables that mean that even the most stringent certification scheme cannot guarantee the sustainability of the sourced wood. Many stakeholders are aware of this and find sustainability schemes inadequate to address their concerns. In addition, certification schemes may not appease those who already hold the view that the large-scale use of woody biomass in energy generation is an inherently bad idea, such as the survey respondent who urged to “get corporations out of government because certification schemes do not protect forests, they just enable their continued exploitation”. The primary research conducted for this paper found a surprisingly high number of fervent opponents to solid biomass exploitation at the governmental level, in research institutes and even among representatives from the private sector.

In light of the financial imperatives in the sector, the current subsidies will undoubtedly render this form of energy generation economically viable in the short- to medium-term. Nevertheless, energy companies must recognise that the sustainability concerns associated with forest biomass can only be managed to a certain extent and are unlikely to ever be solved. Therefore, when devising medium- to long-term strategies, it is strongly recommended that energy providers account for the risks that stem from vehement stakeholder opposition and the possibly resulting policy changes before locking themselves into substantive infrastructure investments.

## **7.2 Reflections upon the theoretical framework**

This paper strongly relied on Aldrich and Fiol's (1991) account of stakeholder theory, which emphasises that companies will have to work towards socio-political acceptance and socio-cognitive legitimacy. The findings in this paper support many of the postulations made by these authors. However, Aldrich and Fiol's argument that socio-political legitimacy can be measured by assessing government subsidies to the industry was not confirmed. It appears that other factors, such as international pressure to reduce carbon emissions, lobbying interests, incomplete scientific knowledge and a political unwillingness to address these scientific doubts have played a role in the European biomass sector. Therefore, in assessing

legitimacy, it is not sufficient to assess only one or two metrics alone or a skewed and unrealistic picture may result. Instead, this work clearly shows that one must look at a broader spectrum of socio-cognitive and socio-political parameters.

With respect to gaining cognitive legitimacy, the authors argue that in any new business sector, trust is a critical first-level determinant of success in the absence of information and evidence regarding the new activity. Such postulations were supported by the current research, which established that stakeholder opinions are largely dependent on trust. Yet, Aldrich and Fiol's theory seems to suggest that this trust and the resulting cognitive legitimacy can simply be gained by providing "guidelines that enable stakeholders to compare and assess performance in an emerging industry". This point was only partially confirmed by the results of this paper, which suggest that trust does not so much originate from standards and criteria but from the reputation of an organisation, which may not be based on hard facts. The results of this study show that public perception is influenced by many factors and can be based on preconceptions. Aldrich and Fiol's theory does not explicitly take into account such preconceptions. The theory therefore insufficiently addresses the fact that stakeholder trust is not always based on hard facts and can be subject to an element of human complexities.

A second account of stakeholder theory that this paper strongly relies on is Mitchell et al.'s (1997) determination of the relative importance of different stakeholder groups. This theory was employed in order to identify stakeholders of relevance to energy companies. The theory proved very useful for rationalising the role of government officials and NGOs as two examples of "Definitive Stakeholders". However, limitations to Mitchell et al.'s theory were also identified. Most notably, its categorisation of stakeholders tends to divert manager attention away from stakeholders that perhaps 'deserve' the attention - at least from a moral point of view. This relates particularly to "Dependent Stakeholders", who lack power but have urgent legitimate claims - local communities and the environment itself fall under this category. Mitchell et al.'s approach can therefore be criticised for automatically according higher priority to powerful economic actors. While the focus of this paper was to give unbiased advice to utilities, the approach may have been improved by considering moral values.

Finally, many authors on Stakeholder Theory argue that corporate responsibility should be used as a way to get closer to stakeholders and to differentiate a firm's product (see Li and Toppinen (2011); Margolis and Walsh (2001)). As discussed, adherence to a sustainability scheme can be regarded as a form of CR. However, this paper found that, at least in the biomass for energy sector, managers must take certification more seriously than this account of Stakeholder Theory may lead them to believe. It is contended that, in this sector, certification has actually become a licence to operate, rather than a way to differentiate the final product. This theoretical conjecture is therefore only of limited value here.

### **7.3 Recommendations to energy companies & future outlook**

The primary research conducted attracted an unusually high response rate. It is held that this reflects the strong involvement and concerns of many stakeholder groups with the issue of forest biomass. It demonstrates that this topic will remain highly relevant for some time to come. Companies should therefore not regard stakeholder opposition as a small hurdle that can be dealt with easily. Instead, they should allocate significant time and resources to this issue as part of their main business strategy.

This paper clearly establishes that utilities sourcing woody biomass for the purposes of energy generation must ensure that the sustainability of this wood is adequately certified. They must

realise that, particularly in Europe, “any investment in biomass must come from a certified sustainable source, or the investment is at risk” (Bradley, Hektor, & Deutmeyer, 2011).

However, the discussion in this paper further outlines the limits that sustainability schemes encounter both in guaranteeing *de facto* sustainability and in ensuring a stakeholder perception of sustainability. Therefore, instead of relying solely on certification, utilities should take additional precautions. These precautions will help to ensure the sustainability of the wood and are likely to render the material less controversial to stakeholders. As such, companies should try to source their forest biomass from within Europe as much as possible. In doing so, they should aim to develop vertically integrated supply chains that involve regional suppliers (Ryckmans, 2011). This will not only keep transport costs down and significantly lower the risk of corruption but it will further attract positive attention for supporting the local economy.

This paper identified the carbon balance of biomass as one of the most prevalent stakeholder concerns. From a life cycle perspective, the GHG emissions of wood combustion vary significantly, depending on the regional origin of the biomass, the species and age of the wood, and the harvesting techniques employed, among others. Companies should take these differences into consideration; that may entail the placing of an outright ban on sourcing the wood with the highest GHG emissions (for instance from tropical palm plantations). This will not only impress stakeholders but likely also be in line with new limits on GHG emissions under the upcoming EU legislation.

One way of achieving minimal GHG emissions would be to aim for a cascade use of wood. This could for instance imply reserving the tree stems for paper production or furniture and allocating the by-products and recycled wood for energy production. This is not happening sufficiently at the moment, partly because not enough by-products are always available, partly because the EU legislation promoting this cascade use is poorly implemented. A newspaper quotes Ariel Brunner from Birdlife Europe as stating that “we are seeing a lot of energy production from virgin forests and a lot of paper or wood waste is not being recovered or recycled. There has actually been a decrease in separate collections of organic waste and more going into incineration and landfill” (Neslen 2012).

Cascade use would help energy companies to source wood from uncontroversial sources, such as wood waste. One industry representative confirmed that “focusing on wastes and feedstock from well-regulated countries is the safer way to proceed” (Industry Representative 5, personal communication, 16 March 2012). Ideally, this might allow for the creation of synergies with other industries, such as saw mills and the pulp and paper industry, a powerful lobbying group that has in the past expressed its discontent with the subsidies accorded to the energy sector and the resulting competition for resources.

More generally, this paper recommends that energy companies take active steps towards critical stakeholders and try and involve them in solving sustainability concerns. The elements of Stakeholder Theory considered in this paper argue that managers should actively seek to develop contacts with stakeholders in order to avoid being targeted as an adversary (Hendry 2006). Research by Gold (2011) confirms that “involving NGOs and residents in early stages of bio-energy projects via transparent two-way communication considerably increase societal acceptance”. This will by no means be easy. Cuppen and Breukers (2010) describe the sustainability of bioenergy as a controversial and complex question that involves a large variety of ideas, opinions, preferences, values and knowledge claims. A survey respondent urged to keep in mind that “this is a field in which many stakeholders have core interests. It will probably not be possible to reach consensus by presenting arguments; this will be more



difficult the more detailed the proposal.” Yet, the research conducted as part of this paper found that many stakeholders do accept that, as long as the EU legislation promoting the use of biomass for energy generation is in place, biomass will be used for just that. One NGO representative admitted that “of course you cannot really expect companies not to take the subsidies: they are there to make profits” (Representative of Birdlife Europe, personal communication, March 23, 2012). Many stakeholders now accept that the potential problems resulting from an increased demand for woody biomass cannot be attributed to a single stakeholder group alone. Rather, they result from the interplay between climate scientists, policy makers, utilities companies, pellet producers, forest managers, the wood industry, and illegal loggers, among others. Therefore, at least some stakeholders will accept that cooperation may be the only way to reach solutions that are in everyone’s interest and best for the environment.

At EU level, utilities should push for an open discussion of unaddressed questions, such as carbon debt. Not only will this help to directly tackle the issue that most stakeholders identified as their most prevalent concern. It will further give utility companies certainty in their medium- to long-term investments. At the same time, private sector representatives should use these discussions to highlight the positive aspects of bioenergy generation. As Boutilier (2009) puts it, “active participation in the creation of sustainability systems should be seen as an opportunity for corporations to shape the regulation that will eventually govern them”. Many authors have highlighted the positive effects that sustainability certification can have. Among others, it has been shown that it can lead to substantive social, economic and environmental improvements, including more balanced power relations between stakeholders, improved worker safety, improved access to eco-sensitive markets and better environmental planning, leading to a higher proportion of deadwood and species diversity (Cashore, Gale, Meidinger, & Newsom, 2006; Savcor, 2005).

Finally, the private sector should make the most of the IWPB. With companies representing over 70% of the European market volume and half of the global wood pellet production behind it, the IWPB constitutes a powerful instrument to manage stakeholder expectations and can ensure sustainability on several levels. For one, the IWPB criteria are quite strict and likely to be more comprehensive than the upcoming EU sustainability legislation. While this legislation is being created, the companies should therefore use their influence at EU level in order to try and make the EU criteria equally strict. This will prevent other firms from forum shopping for schemes and re-establish some of the trust lost by stakeholders through the proliferation of schemes

It would be particularly impressive for stakeholders if the IWPB were to go a step further and impose a self-limitation on the total amounts of biomass that will be sourced by its members. This limit should be based on estimations of the amounts of biomass available. This would be in line with the many stakeholders who argue that the starting point of the EU renewables policy should not be how much biomass member states want to burn under their NREAPs but how much biomass can be sustainably sourced.

With respect to the risk of corruption, which was highlighted to be a major obstacle to certification in this paper, the IWPB could safeguard its position by establishing risk profiles of different countries or regions and conducting environmental and social impact assessments. According to the results of these assessments, controls for woody biomass imports could then either be made stricter or in extreme cases, imports could be banned altogether.

The companies involved in the IWPB could be even more ambitious and use its mechanisms to establish a set of international sustainability standards. Such undertaking would be difficult

but not impossible, since a very large proportion of the world's wood pellets goes to Europe. An international agreement between large energy companies would be particularly impressive for stakeholders and the general public, because a similar agreement would be very difficult to establish in the policy sphere. Importantly, the creation of such standards must take the form of a multi-stakeholder initiative, including partners from different types of organisations, as well as the global South in order to avoid criticism. The upcoming Earth Summit in Rio de Janeiro, at which international leaders and industry will discuss possibilities of green growth (and which is closely watched by stakeholder organisations), may constitute the ideal forum to openly suggest international biomass sourcing standards to other industry leaders. In this framework, the initiative might even be able to rely on international administrative and financial support.

## 7.4 Recommendations for further research

The carbon balance of woody biomass burning constitutes one of the most prevalent concerns among stakeholders. It is therefore important that scientists investigate and clearly set out the facts on this topic beyond doubt. It was shown in this paper that the current estimations of GHG emissions and length of carbon debt vary extremely, and often in line with the researcher's background. In order to avoid accusations of bias, independent scientific recommendations should be delivered both to policy makers and to energy companies in order to help them decide what types of wood can be sourced from which regions in order to avoid unduly high GHG emissions.

Similarly, it should be clearly and independently established how much wood is available for use in the bioenergy sector, both from Europe and from abroad. This research should take into account competing uses of wood and restrictions imposed by sustainability concerns.

These two scientific accounts of GHG emissions and of the amounts of wood available could then be used as a starting point for an open discussion about the future of the biomass energy policy at EU level. Only then can clear signals on the long-term financial viability of biomass infrastructure be sent to the private sector.

At the same time, engineers must focus on providing alternatives to biomass energy. At the moment biomass constitutes a prime pathway in the renewables sector; not only can it be utilised within the existing infrastructure but it is also not subject to the same fluctuations as solar and wind energy. Research must aim to improve these alternative forms of energy to such an extent that the need for bioenergy is decreased and therefore pressure on world forests is reduced.

With respect to the upcoming EU sustainability legislation, further legal research will be required. In particular, international lawyers should clarify to what extent social and economic criteria can be implemented in national sustainability legislation under WTO rules. As discussed in this paper, the biofuel sustainability criteria under the RED do not incorporate social criteria for fear that these may not be GATT-compliant. However, legal certainty on this does not exist. This point should be established clearly at international level before the new EU legislation is put into place. The incorporation of social and economic criteria would render this legislation a lot more effective and less dependent on voluntary certification schemes.

The discussion in this paper established that the increasing demand for wood and forest certification could have positive effects if handled in the right way. Among others, it could contribute to the creation of jobs, improve local economies, help reforestation and improve local forest management. Most of the currently existing certification schemes do not exploit

these potentially positive effects to the full extent. Rather, many schemes appear to limit themselves to trying to make things 'less bad'. The institutions involved should therefore focus their research on techniques that help turn the demand for wood into a positive effect for the environment, for instance by instigating a sense of ownership and value for forests among local communities.

As McDermott (2011) points out, almost no research has been carried out on the dynamics of local to global trust in certification schemes. This paper found that trust is the most important factor for addressing stakeholder concerns. Therefore, this phenomenon should be investigated further. In particular, it should be clearly established to what extent the stringency of a scheme's criteria, its age and the type of organisation leading the scheme affect stakeholder trust.

Finally, a large number of certification schemes for solid biomass are currently being established. Further research should monitor the implementation processes of these schemes, highlight their commonalities and promote coordination among the different initiatives in order to avoid further proliferation. Ideally, one set of certification indicators and criteria should be agreed on, in order to nurture stakeholder trust, avoid forum shopping, remove trade barriers and send a clear message of sustainability requirements to forest managers. In doing so, the schemes should be compared against the criteria highlighted as being of importance in this paper. In addition, further research should establish to what extent the schemes can cope with the limitations outlined in the limitations section of this paper.

Utility companies should continue to monitor the development of the EU policies and how stakeholders are affected by the new legislative and certification initiatives. They should further investigate who the growing numbers of fervent opponents to the large-scale use of woody biomass are and what consequences should be drawn from this opposition. To this end, it is recommended that they follow the activities of IEA Bioenergy Tasks 40, 43 and 38, which in January 2012 initiated a strategic study entitled "Monitoring sustainability certification of bioenergy". The initiative is currently in the process of consulting stakeholders on how the new biomass certification schemes are operating and impacting on the biomass market. First results will be presented at the European Biomass Conference in June 2012.

## Bibliography

- ActionAid, BirdLife International, ClientEarth, European, Environmental Bureau, FERN, . . . Wetlands International. (2010). Mit Vollgas zur Zerstörung: Europas Biokraftstoffpläne und deren Auswirkungen auf Klima und Natur.
- Al-Mansour, F., & Zuwala, J. (2010). An evaluation of biomass co-firing in Europe. *Biomass and Bioenergy*, 34(5), 620-629. doi: 10.1016/j.biombioe.2010.01.004
- Aldrich, H. E., & Fiol, C. M. (1991). Fools Rush in? The Institutional Context of Industry Creation. *The Academy of Management Review*, 19(1), 645 - 670.
- Bendell, J., Miller, A., & Wortmann, K. (2011). Public policies for scaling corporate responsibility standards - Expanding collaborative governance for sustainable development. *Sustainability Accounting, Management and Policy Journal*, 2, 263-293.
- Bergsma, G. C., Croezen, H. J., Otten, M. B. J., & van Valkengoed, M. P. J. (2010). Biofuels: indirect land use change and climate impact. Delft: CE Delft.
- Biofuelwatch. (2012). Object to E.ON's mega-biomass plans at Ironbridge Retrieved 15 May, 2012, from <http://bioenergyaction.com/2012/02/09/biomass-ironbridge/>
- Biomass Energy Resource Center, Forest Guild, & Spatial Informatics Group. (2012). Biomass Supply and Carbon Accounting for Southeastern Forests.
- Biomass Technology Group. (2008). Sustainability Criteria & Certification Systems for Biomass Production. Enschede, Netherlands.
- Bird, N., Pena, N., & Zanchi, J. (2010). The upfront carbon debt of bioenergy. Graz: Joanneum Research.
- Birdlife International, Bond Beter Leefmilieu, Client Earth, Fern, Friends of the Earth Scotland, Milieu Defensie, . . . European Environmental Bureau. (2011). Woody Biomass for Energy: NGO Concerns and Recommendations.
- Bouslah, K., M'Zali, B., Turcotte, M.-F., & Kooli, M. (2010). The Impact of Forest Certification on Firm Financial Performance in Canada and the U.S. [Article]. *Journal of Business Ethics*, 96(4), 551-572. doi: 10.1007/s10551-010-0482-5
- Boutilier, R. (2009). *Stakeholder Politics: Social Capital, Sustainable Development and the Corporation*. Sheffield, UK: Greenleaf Publishing Ltd.
- Bradley, D., Hektor, B., & Deutmeyer, M. (2011). A Proposed Bio-trade Equity Fund: Report for IEA Bioenergy Task 40: Climate Change Solutions Canada, Svebio/HPP AB, CHOREN Industries GmbH.
- Bradley, D., Hektor, B., & Schouwenberg, P.-P. (2010). World Biotrade Equity Fund Study For IEA Task 40 Biotrade.
- Buchholz, T., Luzadis, V. A., & Volk, T. A. (2009). Sustainability criteria for bioenergy systems: results from an expert survey. *Journal of Cleaner Production*, 17, Supplement 1(0), S86-S98. doi: 10.1016/j.jclepro.2009.04.015
- Cashore, B., Gale, F., Meidinger, E., & Newsom, D. (2006). *Confronting sustainability: Forest certification in developing and transitioning countries*. Yale: Yale School of Forestry and Environmental Studies.
- Cotula, L., Finnegan, L., & Macqueen, D. (2011). Biomass energy: Another driver of land acquisitions? London, UK: IIED.
- Cuppen, E., & Breukers, S. (2010). Q methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands. *Ecological Economics*, 69, 597 - 591.
- Dale, B. E. (2007). Thinking clearly about biofuels: ending the irrelevant “net energy” debate and developing better performance metrics for alternative fuels. *Biofuels, Bioproducts and Biorefining*, 1(1), 14.
- Delzeit, R., & Holm-Müller, K. (2009). Steps to discern sustainability criteria for a certification scheme of bioethanol in Brazil: Approach and difficulties. *Energy*, 34, 662 - 668.
- Donaldson, T., & Preston, L. E. (1995). The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications. *The Academy of Management Review*, 20(1), 65-91.
- Dossche, V. (2009). Increased use of biomass: recommendations for ensuring it is environmentally responsible and socially just *Bioenergy and forests briefing note 4*. Brussels, Belgium: Fern.
- Dwivedi, P., & Alavalapati, J. R. R. (2009). Stakeholders' perceptions on forest biomass-based bioenergy development in the southern US. *Energy Policy*, 37.
- ECN Energy Research, Copernicus Institute, U. U., Forest & Landscape Denmark, U. o. C., COWI, & ControlUnion Certifications. (2009). Technical assistance for an evaluation of international schemes to promote biomass sustainability. Brussels, Belgium: European Commission Directorate-General for Energy and Transport.
- Eden, S. (2008). The work of environmental governance networks: Traceability, credibility and certification by the Forest Stewardship Council. *Geoforum*, 40(3), 383-394. doi: 10.1016/j.geoforum.2008.01.001
- ENDS Europe. (27 February 2012). EC to propose EU-wide criteria for biomass.
- Eurelectric. (2010). Position paper on sustainability criteria for solid and gaseous biomass, in reaction to EC COM (2010) 11 final.
- European Commission. (2009). Results of the Public Consultation on the preparation of a report on requirements for a sustainability scheme for energy uses of biomass Brussels.

- European Environment Agency. (2011). Opinion of the EEA Scientific Committee on Greenhouse Gas Accounting in Relation to Bioenergy.
- FAO. (2010). Criteria and indicators for sustainable woodfuels. Rome: FAO / IEA Bioenergy.
- Fehrenbach, H. (2011). How bioenergy related water impacts are considered by certification schemes. *Biofuels, Bioproducts and Biorefining*, 5(4), 464-473. doi: 10.1002/bbb.313
- Fern. (2004). Footprints in the forest, current practice and future challenges in forest certification. Gloucestershire: Fern.
- FIAN. (2010). Land grabbing in Kenya and Mozambique, A report on two research missions – and a human rights analysis of land grabbing.
- Finnish Environment Institute. (2011). *Weaker carbon sink capacity of forests undermines the majority of climate benefits from forest energy*. Retrieved from <http://www.environment.fi/default.asp?contentid=375282&lan=en>
- Freeman, R. E. (2010). *Strategic management: a stakeholder approach*. Cambridge: Cambridge University Press.
- Friends of the Earth. (2010). Arica up for grabs.
- Friends of the Earth Scotland, & Rescue, R. (2010). Biofuels for Europe driving land grabbing in Africa.
- Gereffi, G., Garcia-Johnson, R., & Sasser, E. (2001). The NGO-Industrial Complex *Foreign Policy* 125, 56-65.
- Global Forest Coalition. (2010). Wood based bioenergy: the green lie.
- Gold, S. (2011). Bio-energy supply chains and stakeholders. *Mitigation and Adaptation Strategies for Global Change*, 16(4), 439-462. doi: 10.1007/s11027-010-9272-8
- GRAIN. (2008). Seized: The 2008 Land Grab for Food and Financial Security.
- Greenpeace. (2009). Under the cover of forest certification - How the FSC has failed to prevent the destruction of high conservation value forests in Sweden. Sweden.
- Greenpeace. (2011). Fuelling a BioMess, why burning trees for energy will harm people, the climate and forests.
- Hall, C. A. S., Balogh, S., & Murphy, D. J. R. (2009). What is the minimum EROI that a sustainable society must have? *Energies*, 2, 25-47.
- Hämäläinen, A., Panapanaan, V., Mikkilä, M., Linnanen, L., & Heinimö, J. (2011). Sustainability criteria for biomass – views of Finnish stakeholders. *International Journal of Energy Sector Management*, 5(2), 307-326. doi: 10.1108/17506221111146048
- Hendry, J. R. (2006). Taking Aim at Business. *Business & Society*, 45(1), 47-86. doi: 10.1177/0007650305281849
- Hewitt, J. (2010). Flows of biomass to and from the EU - an analysis of data and trends: FERN.
- IEA Task 40. (2007). Sustainable international bioenergy trade: securing supply and demand. .
- Ifeu Institute. (2011). Kriterien zur nachhaltigen Beschaffung holzartiger Biomasse für die Strom- und Wärmegewinnung im Land Berlin. Heidelberg: Institut für Energie- und Umweltforschung Heidelberg GmbH.
- IUCN, & Shell. (2010). *Workshop Summary: Towards Harmonization for Biofuel Sustainability Standards*. [http://cmsdata.iucn.org/downloads/biofuel\\_sustainability\\_standards\\_workshop\\_report\\_final.pdf](http://cmsdata.iucn.org/downloads/biofuel_sustainability_standards_workshop_report_final.pdf).
- IWPB. (2011). Report No 1. In W. G. o. S. Principles (Ed.): Initiative Wood Pellet Buyers.
- IWPB. (2012). Proposal for Sustainability Principles for Woody Biomass Sourcing and Trading -Final draft version: 26 March 2012.
- Joppe, M. (2004). The research process.
- Junginger, M., Bolkesjö, T., Bradley, D., Dolzan, P., Faaij, A., Heinimö, J., . . . Wit, M. d. (2008). Developments in international bioenergy trade. *Biomass and Bioenergy*, 32(8), 717-729. doi: 10.1016/j.biombioe.2008.01.019
- Kafsack, H. (February 2012). Biokraftstoff schadet Klima, *Frankfurter Allgemeine Zeitung*.
- 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.
- Ladanai, S., & Vinterbäck, J. (2009). Global Potential of Sustainable Biomass for Energy. Uppsala: SLU, Institutionen för energi och teknik Report 013.
- Ladanai, S., & Vinterbäck, J. (2010a). Biomass for Energy versus Food and Feed, Land Use Analyses and Water Supply. Uppsala: SLU Institutionen för energi och teknik.
- Ladanai, S., & Vinterbäck, J. (2010b). Certification Criteria for Sustainable Biomass for Energy. Uppsala: Swedish University of Agricultural Sciences.
- Lammerts van Bueren, E. (2010). Forest-related standards and certification schemes. *ETFRN Newsletter*, 51.
- Lange, M. (2011). The GHG balance of biofuels taking into account land use change. *Energy Policy*, 39(5), 2373-2385. doi: 10.1016/j.enpol.2011.01.057
- Langue, F. (2012). *The EC report on sustainable solid biomass: status and key issues*. Paper presented at the 2nd Joint Workshop on extending the RED sustainability criteria to solid bioenergy, Den Haag.
- Lertzman, D. A., & Vredenburg, H. (2005). Indigenous Peoples, Resource Extraction and Sustainable Development: An Ethical Approach. *Journal of Business Ethics*, 56(3), 239-254.
- Lewandowski, I. M., & Faaij, A. P. C. (2006). Steps towards the development of a certification system for sustainable bioenergy trade. *Biomass and Bioenergy*, 30(2), 83-104.

- Li, N., & Toppinen, A. (2011). Corporate responsibility and sustainable competitive advantage in forest-based industry: Complementary or conflicting goals? *Forest Policy and Economics*, 13(2), 113-123. doi: 10.1016/j.forpol.2010.06.002
- Magar, S. B., Pelkonen, P., Tahvanainen, L., Toivonen, R., & Toppinen, A. (2011). Growing trade of bioenergy in the EU: Public acceptability, policy harmonization, European standards and certification needs. *Biomass and Bioenergy*, 35(8), 3318-3327. doi: 10.1016/j.biombioe.2010.10.012
- Manomet Center for Conservation Science. (2010). Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources. In T. Walker (Ed.). Brunswick, Maine.
- Mantau, U., Saal, U., Prins, K., Steierer, F., Lindner, M., Verkerk, H., . . . Anttila, P. (2010). EUwood - Real potential for changes in growth and use of EU forests. Final report. (pp. 160). Hamburg, Germany.
- Margolis, J. D., & Walsh, J. P. (2001). *People and Profits? The Search for a Link between a Company's Social and Financial Performance*. Mahwah, USA: Erlbaum.
- McDermott, C. L. (2011). Trust, legitimacy and power in forest certification: A case study of the FSC in British Columbia. *Geoforum*. doi: 10.1016/j.geoforum.2011.11.002
- McKay, H. (2006). Environmental, economic, social and political drivers for increasing use of woodfuel as a renewable resource in Britain. *Biomass and Bioenergy*, 30(4), 308-315. doi: 10.1016/j.biombioe.2005.07.008
- McKechnie, Colombo, Chen, Mabee, & MacLean. (2011). Forest bioenergy or forest carbon? Assessing trade-offs in greenhouse gas mitigation with wood-based fuels. *Environment Science Technology*, 45(2).
- Meidinger. (2006). The administrative law of global private-public regulation: The case of forestry. *EUROPEAN JOURNAL OF INTERNATIONAL LAW*, 17(1), 47-87. doi: 10.1093/ejil/chi168
- Meidinger, E. (2011). Forest certification and democracy. *European Journal of Forest Research*, 130(3), 407-419. doi: 10.1007/s10342-010-0426-8
- Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *The Academy of Management Review*, 22(4), 853-886.
- Moiseyev, A., Solberg, B., Kallio, A. M. I., & Lindner, M. (2011). An economic analysis of the potential contribution of forest biomass to the EU RES target and its implications for the EU forest industries. *Journal of Forest Economics*, 17(2), 197-213. doi: 10.1016/j.jfe.2011.02.010
- Moore, P. (2010). *Confessions of a Greenpeace Dropout: The Making of a Sensible Environmentalist*: Beatty Street Publishing Inc.
- Näsi, J., Näsi, S., Phillips, N., & Zyglidopoulos, S. (1997). The Evolution of Corporate Social Responsiveness: An Exploratory Study of Finnish and Canadian Forestry Companies. *Business and Society*, 36(3), 296-321.
- Neslen, A. (2012, 2 April 2012). EU carbon target threatened by biomass 'insanity', *The Guardian*. Retrieved from <http://www.guardian.co.uk/environment/2012/apr/02/eu-renewable-energy-target-biomass>
- Openshaw, K. (2010). Biomass energy: Employment generation and its contribution to poverty alleviation. *Biomass and Bioenergy*, 34(3), 365-378. doi: 10.1016/j.biombioe.2009.11.008
- Oxfam. (2011). Land and Power - The growing scandal surrounding the new wave of investments in land.
- Patton, M. Q. (1990). *Qualitative Evaluation of Research Methods*
- Peck, P., Berndes, G., & Hektor, B. (2011). Mobilising Global Bioenergy Supply Chains - Keys to unlocking the potential of bioenergy: Report for the Swedish Energy Agency Lund, Sweden: IIIIEE.
- Proforest. (2010). Review of timber legality verification schemes. Oxford: Proforest.
- Pruitt, S., & Friedman, M. (1986). Determining the Effectiveness of Consumer Boycotts: A Stock Price Analysis of Their Impact on Corporate Targets. *Journal of Consumer Policy*, 9, 375-387.
- Raynolds, L., Murray, D., & Heller, A. (2007). Regulating sustainability in the coffee sector: A comparative analysis of third-party environmental and social certification initiatives. *Agriculture and Human Values*, 24(2), 147-163.
- Directive 2009/28/EC of the European Parliament and of the Council othe promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (2009).
- Repo, A., Tuomi, M., & Liski, J. (2011). Indirect carbon dioxide emissions from producing bioenergy from forest harvest residues. *GCB Bioenergy*, 3(2), 107-115. doi: 10.1111/j.1757-1707.2010.01065.
- Ryckmans, Y. (2011). *Initiative Wood Pellets Buyers Sustainability criteria for solid biomass in large scale power plants*. Paper presented at the IWPB Meeting 16March, Rotterdam.
- RSB. (2008). Global Principles and criteria for sustainable biofuels production. (Vol. Version Zero). Lausanne: École Polytechnique Fédérale.
- Savcor. (2005). Effectiveness and efficiency of FSC and PEFC forest certification on pilot areas in Nordic countries. Helsinki: Savcor Inufor Oy.
- Scarlat, N., & Dallemand, J.-F. (2011). Recent developments of biofuels/bioenergy sustainability certification: A global overview. *Energy Policy*, 39(3), 1630-1646. doi: 10.1016/j.enpol.2010.12.039
- Schepers, D. H. (2010). Challenges to Legitimacy at the Forest Stewardship Council. *Journal of Business Ethics*, 92(2), 279-290. doi: 10.1007/s10551-009-0154-5

- Searchinger, T., Hamburg, S., Melillo, J., Chameides, W., Havlik, P., Kammen, D., . . . Tilman, G. (2009). Fixing a Critical Climate Accounting Error. *Science*, 326.
- Searchinger, T., Heimlich, R., & Houghton, R. (2008). Use of U.S. croplands for biofuels increases greenhouse gases through emissions from land-use change. *Science*, 319(5867), 1238-1240.
- Sierra Club. (2009). Choosing a Forest Certification System: Why Is One So Much Better Than the Others?
- Sikkema, R., Steiner, M., Junginger, M., Hiegl, W., Hansen, M. T., & Faaij, A. (2011). The European wood pellet markets: current status and prospects for 2020. *Biofuels, Bioproducts and Biorefining*, 5(3), 250-278. doi: 10.1002/bbb.277
- Spar, D. L. (2007). *The Power of Activism - Assessing the Impact of NGOs on Global Business*. Harvard Business School. Boston.
- SQ Consult. (2011). Biobased business: After international trade of biofuels, solid biomass flourishes. Same risks, same solutions?, *Newsletter, Fall Issue*. Retrieved from <http://www.sqconsult.com/blog/newsletter-sq-consult-fall-2011-issue/>
- Stewart, W., Powers, R., McGown, K., Chiono, L., & Chuang, T. (2010). Draft report: Potential positive and negative environmental impacts of increased woody biomass use for California. Berkeley: Center for Forestry, University of California Berkeley.
- Stupak, I., Asikainen, A., Jonsell, M., Karlton, E., Lunnan, A., Mizaraite, D., . . . Tamminen, P. (2007). Sustainable utilisation of forest biomass for energy-possibilities and problems: Policy legislation certification and recommendations and guidelines in the Nordic Baltic and other European countries. *Biomass and Bioenergy*, 31(10), 666-684.
- Stupak, I., Lattimore, B., Titus, B., & Smith, C. T. (2011). Criteria and indicators for sustainable forest fuel production and harvesting: A review of current standards for sustainable forest management. *Biomass and Bioenergy*, 35, 3287 - 3308.
- The Oakland Institute. (2010). (Mis)investment in Agriculture, The Role of the International Finance Corporation In Global Land Grabs.
- Regulation No 995/2010 of the European Parliament and of the Council laying down the obligations of operators who place timber and timber products on the market (2010).
- Tindall, D. B., & Robinson, J. (2006). *Network Diversity and Social Movement Identification*. Paper presented at the International Sunbelt Social Network Conference, Vancouver, Canada.
- Trochim, W. M. K. (2002). *Research Methods Knowledge Base*. New York, NY: Cornell University.
- Turcksin, L., Macharis, C., Lebeau, K., Boureima, F., Van Mierlo, J., Bram, S., . . . Pelkmans, L. (2011). A multi-actor multi-criteria framework to assess the stakeholder support for different biofuel options: The case of Belgium. [Article]. *Energy Policy*, 39(1), 200-214. doi: 10.1016/j.enpol.2010.09.033
- UNEP. (2012). Energy Technology Factsheet.
- Union of Concerned Scientists (2012). [International Scientists and Economists Statement on Biofuels and Land Use].
- Upham, P., Tomei, J., & Dendler, L. (2011). Governance and legitimacy aspects of the UK biofuel carbon and sustainability reporting system. *Energy Policy*, 39(5), 2669-2678. doi: 10.1016/j.enpol.2011.02.036
- Vagonyte, E. (2012). *Progress of the PellCert Project on Criteria and Indicators*. Paper presented at the 2nd Joint Workshop on extending the RED sustainability criteria to solid bioenergy, The Hague.
- van Dam, J., & Junginger, M. (2011). Striving to further harmonization of sustainability criteria for bioenergy in Europe: Recommendations from a stakeholder questionnaire. *Energy Policy*, 39(7), 4051-4066. doi: 10.1016/j.enpol.2011.03.022
- van Dam, J., Junginger, M., Faaij, A., Jürgens, I., Best, G., & Fritsche, U. (2008). Overview of recent developments in sustainable biomass certification. *Biomass and Bioenergy*, 32(8), 749-780. doi: 10.1016/j.biombioe.2008.01.018
- van Dam, J., Junginger, M., & Faaij, A. P. C. (2010). From the global efforts on certification of bioenergy towards an integrated approach based on sustainable land use planning. *Renewable and Sustainable Energy Reviews*, 14(9), 2445-2472. doi: 10.1016/j.rser.2010.07.010
- van Dam, J. M. C. (2009). *Sustainability of bioenergy chains: the result is in the details*. Utrecht University, Utrecht.
- Vanneste, J., Van Gerven, T., Vander Putten, E., Van der Bruggen, B., & Helsen, L. (2011). Energetic valorization of wood waste: Estimation of the reduction in CO2 emissions. *Science of The Total Environment*, 409(19), 3595-3602. doi: 10.1016/j.scitotenv.2011.04.059
- Verkerk, Anttila, P., Eggers, J., Lindner, M., & Asikainen, A. (2011). The realisable potential supply of woody biomass from forests in the European Union. *Forest Ecology and Management*, 261(11), 2007-2015. doi: 10.1016/j.foreco.2011.02.027
- Verkerk, P. J., Lindner, M., Zanchi, G., & Zudin, S. (2011). Assessing impacts of intensified biomass removal on deadwood in European forests. *Ecological Indicators*, 11(1), 27-35. doi: 10.1016/j.ecolind.2009.04.004
- Vissers, P., Paz, A., & Hanekamp, E. (2011). How to select a biomass certification scheme? Report for the NL Agency, Ministry of Economic Affairs, Agriculture and Innovation *Partners for Innovation BV*. Amsterdam, Netherlands.

- Vogelpohl, T., & Hirschl, B. (2010). *Voluntary Bioenergy Certification: A Legitimate Approach to Account for Social Aspects in Environmental Governance?* Paper presented at the Human Dimension of Global Environmental Change, Berlin.
- Waddock, S., & Smith, N. (2000). Relationships: The Real Challenge of Corporate Global Citizenship. *Business and Society Review*, 105, 147-162.
- Williamson, L. (2012, 5 May 2011). Why is the UK backing biomass power?, *The Guardian*. Retrieved from <http://www.guardian.co.uk/environment/blog/2011/may/05/biomass-power-costly-climate-solution>
- Winn, M. I. (1997). *Fury for the Sound: The Women at Clayoquot*. Vancouver, Canada: TellTale Productions.
- Wise, M., Calvin, K., Thomson, A., Clarke, L., Bond-Lamberty, B., Sands, R., . . . Edmonds, J. (2009). Implications of Limiting CO2 Concentrations for Land Use and Energy. *Science*, 324(5931), 1183-1186. doi: 10.1126/science.1168475
- World Bank, & AFREA. (2011). Wood-Based Biomass Energy Development for Sub-Saharan Africa. Issues and Approaches The International Bank for Reconstruction and Development / The World Bank Group and the Africa Renewable Energy Access Program (AFREA).
- Wunder, S., Kaphengst, T., Timeus, K., & Berzins, K. (2011). Briefing to European Parliament: Impact of EU Bioenergy policy on developing countries. Berlin, Germany: Ecologic Institute.
- WWF. (2005). The effects of FSC certification in Estonia, Germany, Latvia, Russia, Sweden and the UK, an analysis of Corrective Action Requests *Summary Report*. WWF European Forest Programme.
- ZDF (Writer). (2012). Sumatra: Orang-Utan-Wald brennt. Düsseldorf, Germany.

## Personal Communications

Interviews were conducted on an anonymous basis. Organisations are provided to the extent that this was authorised by interviewees.

February 28, 2012	Representative of Ecofys Research Institute
February 28, 2012	NGO Representative 1
February 29, 2012	FAO Representative
February 29, 2012	Representative of the European Commission's DG Energy
March 1, 2012	Representative of a European Research Institute
March 4, 2012	Industry Representative 3
March 8, 2012	EU Official 1
March 8, 2012	EU Official 2
March 11, 2012	NGO Representative 2
March 13, 2012	Industry Representative 1
March 14, 2012	Representative of Client Earth
March 14, 2012	Representative of Birdlife Europe
March 16, 2012	Industry Representative 5
March 18, 2012	Industry Representative 6
March 20, 2012	DBFZ Representative
March 21, 2012	Representative of Fern
March 23, 2012	Representative of Birdlife Europe
March 30, 2012	Industry Representative 2
March 30, 2012	Industry Representative 4
March 30, 2012	Industry Representative 7



## **Appendices**

### **Appendix A**

#### **Summary of the literature examined in the search of relevant sustainability criteria**

Buchholz et al. (2009) surveyed 137 experts from various backgrounds in order to identify levels of agreement on 35 evaluation criteria for bioenergy. The experts were asked to rate environmental, social and economic factors according to practicality, relevance, reliability, and importance.

In attempting to find evaluation criteria for Brazilian bioethanol, Delzeit and Holm-Müller (2009) interviewed a variety of national stakeholders from industry, government, NGOs and research institutes.

Hämäläinen et al. (2011) interviewed a series of stakeholders in Finland about the development of EU-wide evaluation criteria for biomass production.

Lewandowski and Faaij (2006) extracted standards from existing certification schemes, sets of evaluation criteria and guidelines on the management of resources, selecting those which were deemed suitable for the bioenergy trade.

When examining 157 international, national and local forest certification schemes, as well as 10 international processes and organisations, Stupak et al. (2011) specifically searched for criteria and indicators relevant to forest fuel production and harvesting.

J. van Dam and Junginger (2011) collected several hundred responses by stakeholders to a questionnaire regarding the harmonization of evaluation criteria for bioenergy within the EU.

A summary of the sustainability criteria selected for inclusion in this study based on the above literature reviews can be found in Table A1 below.

Table A1: Sustainability criteria selected for inclusion in the questionnaire based on literature reviews.

	Buchholz, Luzadis, Volk (2009)	Delzeit, Holm- Müller (2009)	Hämäläinen, Panapanaan, Mikkilä, Linnanen, Heinimö (2011)	Lewandowski, Faaij (2006)	Stupak, Lattimore, Titus, Tattersall Smith (2011)	Van Dam, Junginger (2011)	Total
Environmental Criteria	greenhouse gas balance	✓	✓	✓	✓	✓	6
	carbon storage in soil		✓			✓	2
	net energy balance	✓		✓		✓	4
	soil protection	✓		✓	✓	✓	5
	water management	✓			✓	✓	4
	natural resource efficiency	✓					1
	ecosystem protection	✓	✓		✓	✓	5
	waste management	✓			✓		2
	crop diversity	✓					1
	adaptation capacity (env. hazards & climate change)	✓					1
	biodiversity protection	✓	✓	✓	✓	✓	6
	use of chemicals, pest control, fertilizer	✓		✓			2
	land use change	✓				✓	2
	use of GMOs	✓				✓	2
	ecosystems connectivity	✓					1
	emissions other than GHGs	✓	✓				2
	conservation of primary forest		✓	✓			2
	minimization of deforestation				✓		2
	sustaining yield of land					✓	2
	preventing desertification				✓		1
Restoration of forests and ecosystems		✓			✓	2	

		Buchholz, Luzadis, Volk (2009)	Delzeit, Holm- Müller (2009)	Hämäläinen, Panapanaan, Mikkilä, Linnanen, Heinimö (2011)	Lewandowski, Faaij (2006)	Stupak, Lattimore, Titus, Tattersall Smith (2011)	Van Dam, Junginger (2011)	Total
Social Criteria	stakeholder participation	✓			✓			3
	competition with need for raw materials/food security	✓		✓	✓	✓	✓	5
	labour conditions/fair trade	✓	✓	✓	✓	✓	✓	6
	planning	✓						1
	property/land use rights	✓		✓	✓		✓	4
	legality verification	✓		✓	✓	✓		3
	indigenous people's rights	✓			✓			2
	respect for human rights	✓	✓	✓	✓		✓	5
	human safety and health		✓		✓			2
capacity building				✓			1	
Economic Criteria	microeconomic sustainability/ improvement of local conditions	✓			✓		✓	3
	employment generation	✓			✓	✓		3
	equitable sharing of benefits				✓	✓		2
	long term economic stability	✓			✓			2
	cost efficiency/business viability			✓	✓			2
	macroeconomic sustainability	✓						1

## Appendix B

Table B1: Organisations representatives of which participated in the online survey

AEBIOM	Copernicus Institute - Utrecht University	Fern	Institute for Ecological Economy Research
ÄFAB/IRETIse	DBFZ	Finnish Forest Industries Federation	IUCN NL
Agencija za prestrukturiranje energetike, ApE d.o.o.	Department of Energy & Climate Change (UK)	Finnish Forest Research Institute	Joanneum Research
Agentschap NL	DNV KEMA	Flemish Energy Agency	Lappeenranta University of Technology
Agriforest SA	Dovetail Partners, Inc.	FOPER project	Leuphana University Lüneburg
Angus Biofuels	Drima Marketing	FORCE Technology	Louisiana Forest Products Development Center, Louisiana State University
Birdlife Europe	E.ON Climate & Renewables	Forest Products Association of Canada	Massachusetts Forest Watch
Birdlife International	Ecofys	GDF SUEZ Energy Netherlands	GDF SUEZ Energy Netherlands
Black Sea Energy Research Centre	Enova SF	German Federal Agency for Nature Conservation	Ministry of Agriculture, Forestry and Water Economy
BLT Wieselburg	European Commission	German Federal Ministry for Food, Agriculture and Consumer Protection	NEPCon
Bowland Bioenergy Ltd.	European Forest Institute	Global Fire Monitoring Center (GFMC)	Norwegian University of Life Sciences
Buccleuch BioEnergy Ltd	European Parliament	GREENS/EFA IN THE EUROPEAN PARLIAMENT	O.Oe. Energiesparverband
Cambridge University	FAO	IEA Task 40/First Bioenergy AB	Oeko-Institut
CEI-Bois	Federacja Zielonych "GAJA"	IEEP	Organisation for Security and Co-operation in Europe
CIRAD	Federal Ministry of Food, Agriculture and Consumer Protection (Germany)	IFEU	Østkraft A/S
Confor: Promoting forestry and wood	Federal Office for the Environment (Germany)	IIIEE	Partners for Innovation
Control Union Certifications	Federal Statistical Office (Germany)	Imperial College London	Pathfinder Renewable Energy
PEFC International			

PEFC Netherlands  
Probos Foundation  
Saint-Petersburg Forestry Research Institute  
Swedish Forest Agency  
Swedish Bioenergy Association  
The Biomass Monitor  
The Forestry Commission of Great Britain  
Treelogic Wood Energy Ltd  
UNECE/FAO Forestry and Timber Section  
University of Copenhagen  
University of Eastern Finland  
University of Leeds  
University of Natural Resources and Life Sciences, Vienna  
UPM Tilhill  
Utrecht University  
Vienna University of Technology  
VITO  
VTT, Technical Research Centre of Finland  
Wood Pellet Association of Canada  
World Bioenergy Association  
WWF International

## Appendix C

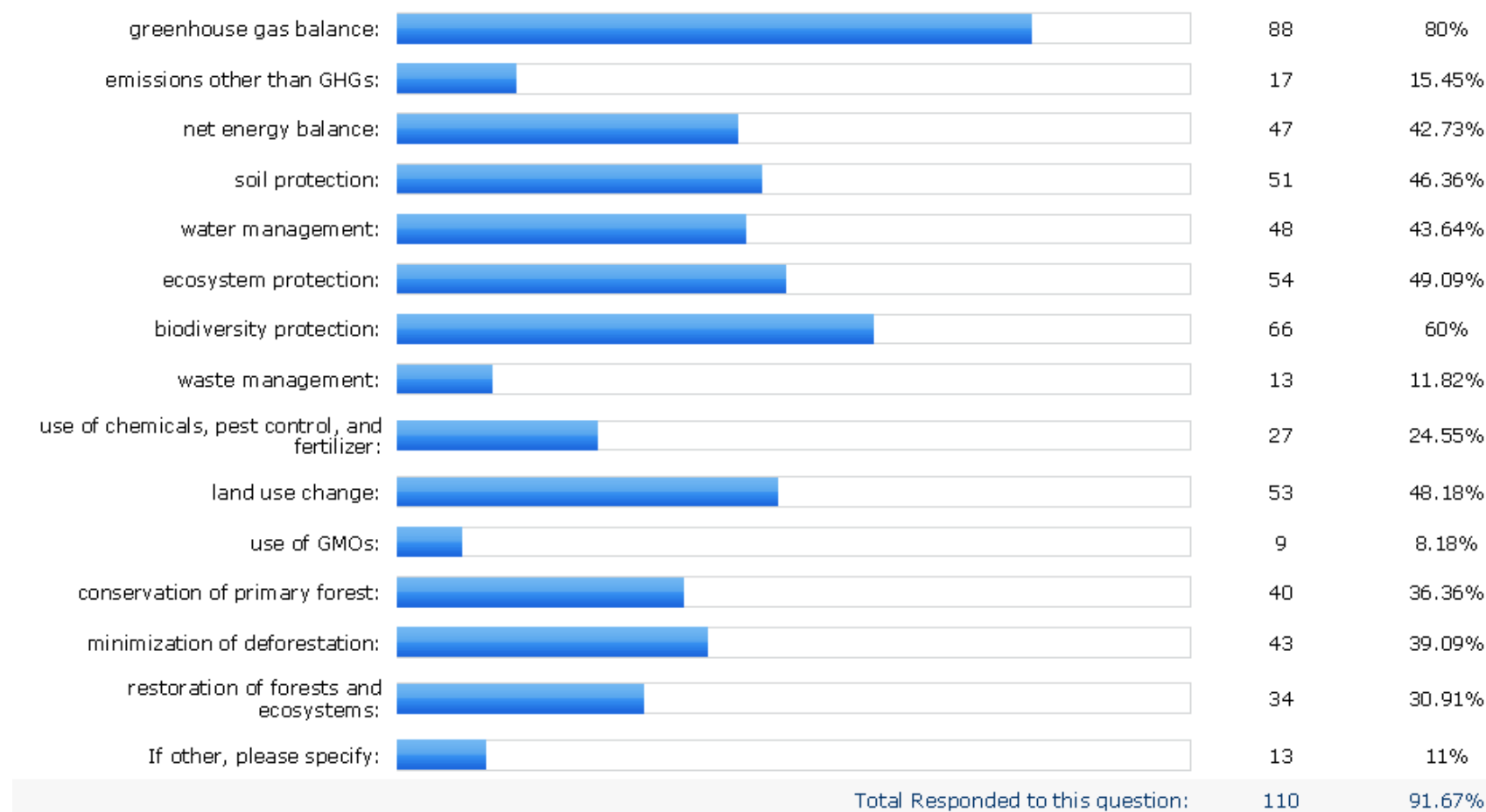


Figure C1: Environmental criteria considered particularly important by all stakeholder groups.

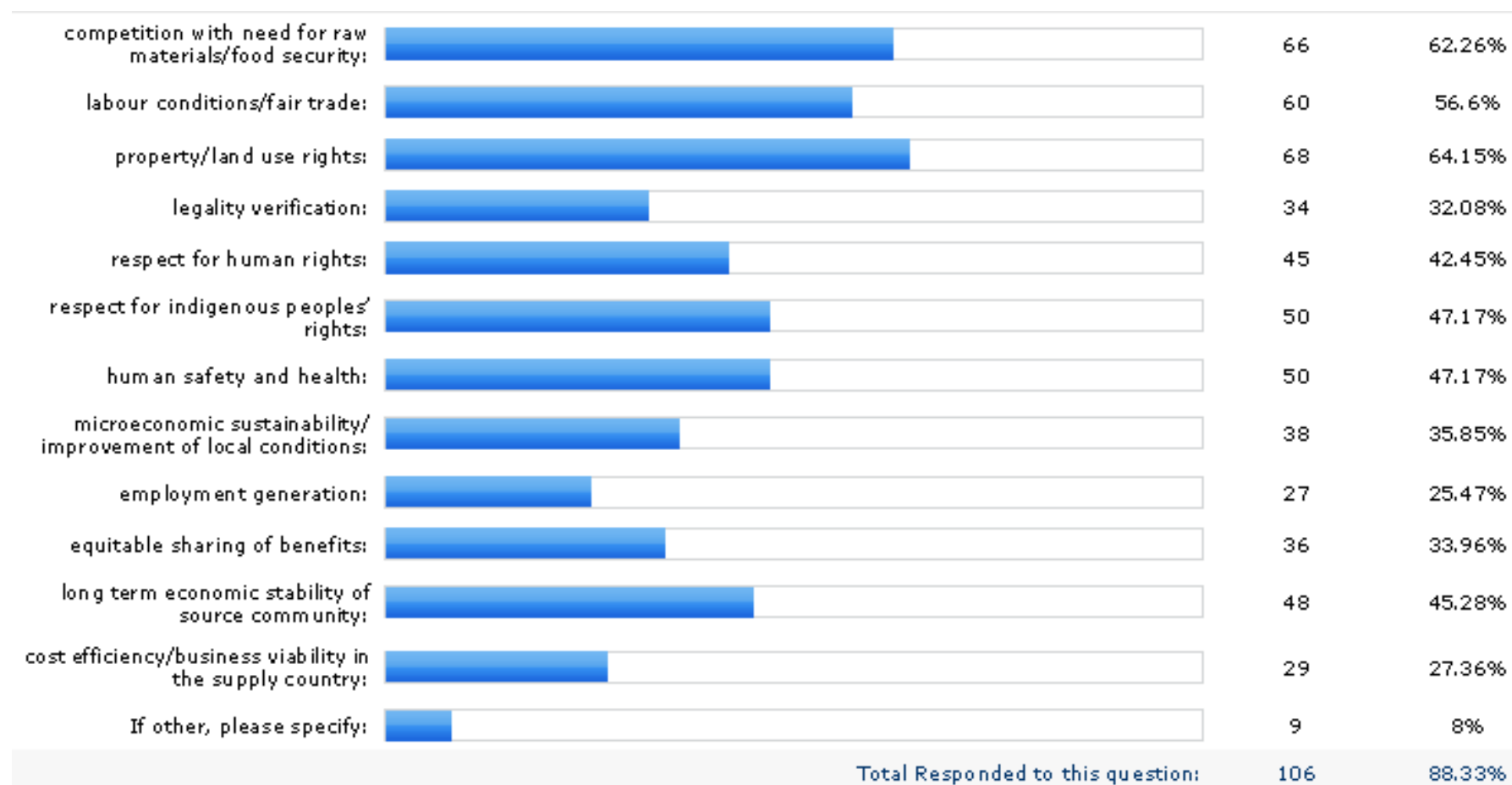


Figure C2: Social and economic criteria considered particularly important by all stakeholder groups.

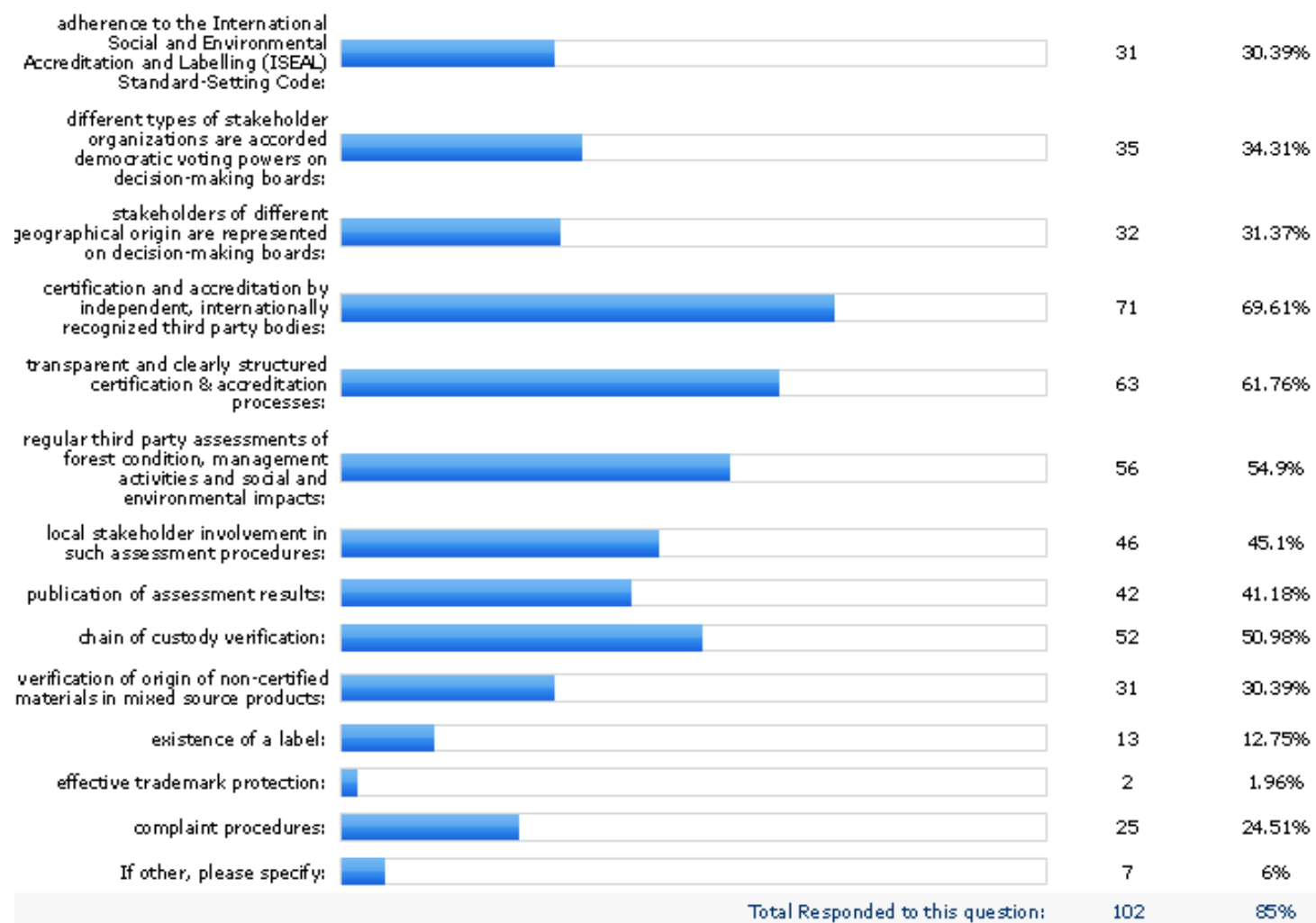


Figure C3: Standard-setting, monitoring & governance mechanisms considered particularly important by all stakeholder groups.



## Appendix D

*Table D1: Reports recently published by salient stakeholder organisations.*

**Birdlife International, Bond Beter Leefmilieu, Client Earth, Fern, Friends of the Earth Scotland, Milieu Defensie, NOAH Friends of the Earth Denmark, Suomen luonnonsuojeluliitto, Terra and the European Environmental Bureau (2011)**

The organisations jointly published a report entitled “Woody Biomass for Energy: NGO Concerns and Recommendations”. The main demands of this report are that (i) “truly renewable sources” like solar, wind and wave energy should be prioritised; (ii) the EU should discourage or exclude the use of biomass in inefficient energy-generation processes; (iii) sustainability criteria for biomass should be different from the criteria that have been developed for biofuels or the recommendations that have been taken up in the Biomass Report because “these criteria do not only lack ambition; the current formulation also has serious shortcomings such as the lack of a proper instrument to ensure that emissions from forest management are taken into account”; and (iv) policies shift the biomass-for energy market away from most woody and agricultural biomass feedstock and towards feedstock generated from wastes and residues that do not place direct or indirect pressures on land and resource use (Birdlife International et al., 2011).

**Fern (2009)**

A Fern Briefing of December 2009 recommends that different GHG thresholds be established for the production, processing and energy conversion phase of woody biomass and that all inefficient processes should be excluded from EU subsidies. In order to achieve this, the report argues for absolute GHG performance figures for different pathways to be set up instead of trying to compare GHG savings. Forest management needs to be well defined by the adoption of a set of criteria and indicators that ensures that forestry operations are environmentally sound, socially just and contribute to the objectives of the Renewable Energy Directive. Specific attention needs to be given to ensure that forest products are legally sourced, come from forest management units that respect rights of local peoples, and are based on a forest management plan that meets the principles and criteria of good forest management as set out by the Forest Stewardship Council (FSC) or equal schemes (Dossche, 2009) .

**Birdlife International, Transport & Environment and the European Environmental Bureau (2010).**

Two scientific studies commissioned by these organisations critically highlight the unresolved questions surrounding carbon debt (Bergsma et al., 2010; Bird et al., 2010).

**Ecologic (2011)**

This European think tank, has drafted a briefing to the European Parliament warning of the social and ecological consequences of woody biomass sourcing (Wunder et al., 2011).

**FIAN, Friends of the Earth, GRAIN and the Oakland Institute (2008-2010)**

These organisations have all published reports arguing that land deals in developing countries have negative impacts on local communities (FIAN, 2010; Friends of the Earth, 2010; GRAIN, 2008; The Oakland Institute, 2010).

**Greenpeace (2011)**

Greenpeace has asked the EU and its member states to establish a mandatory sustainability scheme, which: (i) ensures that wood-based bioenergy is produced in a way which results in significant reduction of greenhouse gas emissions, while increasing the total forest and other terrestrial carbon stocks and preserving critical forest and other ecosystem services and the biodiversity upon which they depend; (ii) prohibits sourcing or deriving bioenergy commodities from intact forests, lands with high biodiversity value, wetlands and peat lands (“no-go areas”), including from plantations made by the conversion of such areas, natural forests or fertile agricultural lands; (iii) prevents the harvest and combustion of standing trees (regardless of quality, i.e. whether commercial, non-commercial, damaged or diseased) for the production of electricity or heat; (iv) takes into account the upfront carbon debt of wood-based bioenergy and the length of time required for the emissions to become carbon neutral, when performing carbon lifecycle assessments of wood-based energy (Greenpeace, 2011).

**Global Forest Coalition (2010)**

Published the report “Wood based bioenergy: the green lie” (Global Forest Coalition, 2010).

**ActionAid, BirdLife International, FERN, ClientEarth, Friends of the Earth Europe, European Environmental Bureau, Greenpeace, Transport & Environment, Wetlands Intl. (2010)**

Published a critical report on the impacts of ILUC (ActionAid et al., 2010).

**Friends of the Earth Scotland and Rainforest Rescue (2010).**

Although Vattenfall argues that they use Liberian rubber tree waste that would otherwise be burned or would rot, these organisations believe that the trees are used for creating charcoal for local consumption (Friends of the Earth Scotland & Rescue, 2010).

**Oxfam (2011)**

Oxfam has issued a report on land grabbing by large corporations involved in the biomass for energy sector (Oxfam, 2011).

**Others**

Other NGOs that are actively campaigning in the area of solid biomass include the WWF, Practical Action, the NFU and Natural England.