Transport Biofuels in Sweden:
Stakeholders’ perceptions of the Renewable Energy Directive’s governance of the industry

by

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Abstract

In order to sustain current climatic conditions, anthropogenic carbon emissions must be reduced, particularly in the fossil-fuel dependent transport sector. Liquid biofuels are currently the only commercial technology showing potential to replace up to 10% of Europe’s fossil fuel in transport by 2020, as required by the Renewable Energy Directive (2009/28/EC). However, liquid biofuel production can be as environmentally and socially detrimental as fossil fuels, and therefore require good governance. This report studies the implementation of the Renewable Energy Directive in Sweden to determine how useful it can be in governing the biofuel industry, to achieve its aim of reduced carbon emissions. Perspectives were gathered from affected actors in the liquid biofuel industry, by means of interviews and analysis of comment letters submitted in response to the Swedish Environment Agency’s Policy Guidelines to the Sustainable Criteria Law (Föreskrifter för Hållbarhetskriterier lag). Stakeholders were found to welcome the Sustainability Criteria law, but expressed caution regarding its implementation. Concerns centre on six aspects: administrative burden; obstructing the aim of RED; clarification; hindering competitiveness; gaps and suggestions for improvement. Certification schemes could be a valuable addition to governance, by providing harmonisation, but all verification of criteria must be carefully monitored to ensure credibility. Further alignment with governance in other sectors would enhance the usefulness of RED.

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Contents

List of Figures .......................................................................................................................... 4
List of Tables ............................................................................................................................ 4
List of Abbreviations ................................................................................................................ 5
Glossary of Swedish terms ........................................................................................................ 6
Part 1: Introduction ..................................................................................................................... 7
  1 Research Outline .................................................................................................................. 8
    1.1 Research Aim .................................................................................................................. 8
    1.2 Research Boundaries, Assumptions and Limitations ....................................................... 8
    1.3 Thesis Outline ................................................................................................................ 9
  2 Methodology .......................................................................................................................... 10
    2.1 Theoretical Perspective and Framework ....................................................................... 10
    2.2 Research Strategy ......................................................................................................... 11
    2.3 Methods ....................................................................................................................... 12
      2.3.1 Data collection ......................................................................................................... 12
      2.3.2 Data processing of interviews and comment letters ................................................. 13
Part 2: Biofuels in the Swedish Transport Sector ................................................................. 15
  3 Energy use in Swedish Transport ....................................................................................... 15
  4 Biofuel Production in Sweden ............................................................................................ 16
  5 Governance System for Liquid Biofuels .......................................................................... 16
    5.1 Governance at the EU level ........................................................................................... 18
      5.1.1 The Renewable Energy Directive (RED) ................................................................. 18
      5.1.2 The EU Common Agricultural Policy (CAP) ............................................................ 19
      5.1.3 Fuel Quality Directive (FQD) ................................................................................ 20
    5.2 Governance in Sweden ................................................................................................ 20
      5.2.1 The Hållbarhetskriterier lag (implementation of RED) ........................................... 20
      5.2.2 Taxes affecting the transport sector ....................................................................... 21
    5.3 Non-state governance ................................................................................................... 21
  6 Sustainability Aspects of the Biofuel Industry .................................................................. 22
    6.1 The Debates around Biofuels ....................................................................................... 22
Part 3: Results and Analysis ..................................................................................................... 24
  7 The biofuel industry in Sweden ........................................................................................... 24
    7.1 Actors, Networks and Agents in the Swedish Biofuel Industry .................................... 24
    7.2 Reactions of Biofuel Producers to Agents of Governance ............................................. 29
7.2.1 Gathering the stakeholder perspectives .......................................................... 29

8 Governance for sustainability .................................................................................... 35
8.1 Environmental Governance Mechanisms for Biofuels ........................................... 35
  8.1.1 Public Sector ........................................................................................................ 35
  8.1.2 Private sector initiatives ..................................................................................... 36
  8.1.3 Cross-sector mechanisms .................................................................................. 37
8.2 Voluntary schemes .................................................................................................. 38
8.3 Sustainability and RED ........................................................................................... 39

Part 4: Looking Ahead .................................................................................................. 41

9 Conclusion .................................................................................................................. 42

10 References ............................................................................................................... 43

Appendix 1 ..................................................................................................................... 46

Interview Guide .............................................................................................................. 46

Interview # 1: recorded notes ........................................................................................ 47
Interview # 2: recorded notes .......................................................................................... 49
Interview # 3: recorded notes .......................................................................................... 52

Notes from the Energiutblick 2011 Conference Session: ‘Sustainability Criteria for Biofuels’
(Göteborg, 16 March 2011) ............................................................................................ 55

A full list of actors that commented on the law and regulations .................................... 60

List of Figures
Figure 1: Governance for sustainability - the four spheres (Source: O’Connor, 2006) ........... 10
Figure 2: Relationship between various environmental governance systems (Source: Delmas & Young, 2009, p8) ......................................................................................................................... 11
Figure 3: Use of energy in road transport, by fuel type (compiled from data in Energimyndigheten, 2010 energy in transport) *NOTE: logarithmic scale used on the vertical axis ...................... 15
Figure 4: Transformation pathways from feedstock to biofuel (Source: Börjesson et al. 2009, p20)
Orange = used in Sweden. Red = liquid biofuel discussed in this report ............................ 16
Figure 5: Network of actors, and agents of governance, in the biofuel industry in Sweden ....... 24
Figure 6: Governance mechanisms in Sweden in the biofuel industry ................................. 35
Figure 7: O’Connor’s four spheres of sustainability (redrawn from Delmas & young, 2009) .... 39

List of Tables
Table 1: Characteristics of interviews held ...................................................................... 13
Table 2: Description of higher level biofuel blends .......................................................... 16
Table 3: Timeline of policy development in biofuels governance/regulation .................... 17
Table 4: Sustainability requirements in RED .............................................................................. 19
Table 5: Actor group – Liquid biofuel producers ....................................................................... 25
Table 6: Actor group - Customers and consumers ...................................................................... 26
Table 7: Actor Group - Trade associations .................................................................................. 27
Table 8: Actor Group - Public sector providing governance .......................................................... 28
Table 9: How producers have responded, to comply with the new Sustainability Criteria law ....... 29
Table 10: Summary of comments and opinions of stakeholders (P = Public sector; PPr = Public/Private; Pr = Private sector; CS = Civil Society) ................................................................. 30

List of Abbreviations

CAP Common Agricultural Policy
EPA Environmental Protection Agency
EC European Commission
EU European Union
FQD Fuel Quality Directive (2009/30/EC)
FSC Foresty Stewardship Council
GHG Greenhouse gas
HBK Hållbarhetskriterier
IACS Integrated Administration and Control System
ILUC Indirect Land Use Change
LPIS Large Parcel Identification System
SEA Swedish Energy Agency
SLU Sveriges Lantbruksuniversitet
SWWA Swedish Water and Wastewater Association
## Glossary of Swedish terms

<table>
<thead>
<tr>
<th>Swedish name</th>
<th>English name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avfall Sverige</td>
<td>Swedish Waste Association</td>
</tr>
<tr>
<td>Energigas</td>
<td>Swedish Gas Association</td>
</tr>
<tr>
<td>Fortum AB</td>
<td>Fortum – Energy company, part-owned by Stockholm municipality</td>
</tr>
<tr>
<td>Hållbarhetskriterierlag</td>
<td>Sustainability Criteria law</td>
</tr>
<tr>
<td>Hållbarhetskriterier förordning</td>
<td>Sustainability Criteria statutory instrument</td>
</tr>
<tr>
<td>Hållbarhetskriterier föreskrifter</td>
<td>Sustainability Criteria policy guidelines</td>
</tr>
<tr>
<td>Jordbruksverket</td>
<td>Swedish Board of Agriculture</td>
</tr>
<tr>
<td>Lantbrukarnas Riksförbund</td>
<td>The Federation of Swedish Farmers</td>
</tr>
<tr>
<td>Lantmännnen</td>
<td>Lantmännen–Large corporate group, owned cooperatively by Swedish farmers, with branches for food, energy and agriculture</td>
</tr>
<tr>
<td>Miljöbalken</td>
<td>Environmental Code</td>
</tr>
<tr>
<td>Naturskyddsföreningen</td>
<td>Swedish Society for Nature Conservation</td>
</tr>
<tr>
<td>Naturvårdsverket</td>
<td>Swedish Environmental Protection Agency</td>
</tr>
<tr>
<td>Regel Rådet</td>
<td>Swedish Better Regulation Council</td>
</tr>
<tr>
<td>Remissvar</td>
<td>Statement of opinion, comment letter</td>
</tr>
<tr>
<td>Skatteverket</td>
<td>Swedish Tax Agency</td>
</tr>
<tr>
<td>Skogforsk</td>
<td>Forestry Research Institute of Sweden</td>
</tr>
<tr>
<td>Skogsstyrelsen</td>
<td>National Board of Forestry</td>
</tr>
<tr>
<td>Skogsårdslagen</td>
<td>Forestry Law</td>
</tr>
<tr>
<td>SLU - Sveriges Lantbruksuniversitet</td>
<td>Swedish University of Agricultural Sciences</td>
</tr>
<tr>
<td>SPI – Svenska Petroleum Institute</td>
<td>Swedish Petroleum Institute</td>
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<tr>
<td>Svebio (Svenska Bioenergiföreningen)</td>
<td>Swedish Bioenergy Association</td>
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<tr>
<td>Svensk Energi</td>
<td>Swedenergy – Trade Association for companies trading, producing or distributing electricity in Sweden</td>
</tr>
<tr>
<td>Svensk Fjärrvärme</td>
<td>Swedish District Heating Association</td>
</tr>
<tr>
<td>Svensk Vatten</td>
<td>The Swedish Water and Waste Water Association</td>
</tr>
<tr>
<td>Svenska Trädbränsleföreningen</td>
<td>Swedish Wood Fuel Association</td>
</tr>
<tr>
<td>SWEDAC – Styrelsen för ackreditering och teknisk kontroll</td>
<td>Swedish Board for Accreditation and Conformity Assessment</td>
</tr>
<tr>
<td>Tillsynsmyndighet</td>
<td>Responsible authority</td>
</tr>
<tr>
<td>Trafikverket</td>
<td>Swedish Transport Board</td>
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<tr>
<td>Transportstyrelsen</td>
<td>The Swedish Transport Agency</td>
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Part 1: Introduction

The Kyoto Protocol places an obligation on all countries to reduce national carbon emissions to below 1990 levels. The EU has set the target at 20% by 2020 (European Parliament 2009b). The transport sector is responsible for 28% of the EU’s carbon emissions (Amezaga et al. 2010) and is the sector where the least progress has been made in replacing fossil fuels – renewable transport fuels only account for 3.29% of the EU’s fuel consumption in transport (EUROSTAT 2011, p80). The transport sector is also highly dependent on oil imports, giving rise to both economic insecurity and long-term supply insecurity (De Santi et al. 2008, Amezaga et al. 2010). Therefore, the transport sector has a separate target, requiring that 10% of the energy in transport must come from renewable energy sources by 2020.

The liquid biofuels (henceforth just biofuels) ethanol and biodiesel are currently the most important renewable fuel, accounting for around 80% of the EU total renewable transport fuel production in 2008 (EUROSTAT 2011, p76-80), and have shown rapid increase in production globally in the past 15 years (Fischer et al. 2009). However, recent heavy criticism challenges their sustainability. A thorough cost-benefit analysis by the Biofuels Task Force of the Joint Research Centre found that the overall costs of biofuels for transport outweighed the benefits, and that biomass is more effectively used for other forms of energy (De Santi et al. 2008). Biofuels’ environmental sustainability has been questioned due to their potential high life-cycle emissions of greenhouse gases that rival fossil fuel emissions (Fargione et al. 2008, Searchinger et al. 2008) and negative impacts on biodiversity if badly managed (The Royal Society 2008). Social sustainability questions revolve particularly around the competition for land and water with food, and bad labour conditions (Schlegel and Kaphengst 2007).

In response to these criticisms, RED incorporated a detailed set of sustainability criteria that biofuels must comply with in order to count towards the target. One limitation to governing negative impacts of biofuel production that the sustainability criteria cannot sufficiently address is that EU regulations are not legally binding on countries outside the EU. Furthermore, the bureaucratic process of proposing, formulating and passing legislation in governments is slow and cumbersome (Delmas and Young 2009). Time is particularly important for technological developments such as in the biofuel industry (developing present and new technology) because large investments of economic capital are required. Without clear guidance from governments (i.e. state governance) on what the regulatory conditions might be in the future, it is difficult to make feasibility calculations for the investments, so they may only be made once legislation has been finalised, therefore delaying the growth of the industry (Bomb et al. 2007). So, the question is how useful can RED and state governance be, in guiding the necessary development of renewable energy for transport, which means biofuels for the short-term, until more effective alternatives are commercialised. An interesting and unusual characteristic of RED is that it provides an opening for collaboration with voluntary certification schemes. Why it is unusual is that voluntary certification schemes originally evolved as private-civil

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1 See the OFID-IIASA report “Biofuels and Food Security” (Fischer et al. 2009) for a very comprehensive, detailed review of liquid biofuels, their development globally, their production processes, and their impact on the environment and food security

2 Discussed and further defined in Chapter 5.3
partnerships, as an alternative form of governance to state governance (from a government or international public body such as the EU), when state governance was lacking (e.g. the forestry certification schemes, Auld et al. 2008). Now, they have the potential to become public-private-civil partnerships, and could provide an interesting solution to RED’s limitation of not being able to effectively govern activities in states outside its jurisdiction. From a sustainability science perspective, it is also important to ask how sustainable the RED legislation is: is it flexible to adapt to changing renewable energy sources so that it will be valid for a long time, and does it take into consideration social, economic and environmental aspects?

Of the European member states, Sweden has the highest share of renewable energy in terms of total energy consumption, with 44.4% in 2008 (EUROSTAT 2011, p71), and one of the highest shares of renewable energy in transport with 5.4% in 2009 (Energimyndigheten 2010a, p73). Sweden also has a long history of governance mechanisms targeting increased renewable energy (Johansson et al. 2002, Nilsson et al. 2004), and is one of the few EU countries to have already implemented RED in national law. Therefore, I have focused on Sweden in my study of how useful RED can be for governing the biofuel industry.

1 Research Outline

1.1 Research Aim

In this research project I will explore the impact of RED on the liquid biofuel industry for transport in Sweden, and analyse how useful RED might be in the overall governance context. I present information provided by Swedish biofuel producers, regarding what effect RED is having on them and on the biofuel industry. I will also investigate what perspectives other stakeholders from the biofuel industry have on the implementation of RED in Sweden. For this project, ‘liquid biofuels’ refers only to commercially-available first generation biofuels; second-generation biofuels still in the development stages are only discussed briefly toward the end of the report.

Therefore, the aim of my project is:

“To discuss how useful the EU Renewable Energy Directive can be in governing the liquid biofuel industry”

The main research questions guiding my project to achieve the above-stated aim are:

1) How is RED being implemented in Sweden?
2) What are the perspectives of stakeholders on the implementation of RED?
   a. In order to determine the relevant stakeholders, a mapping of the Swedish biofuel industry is required.
3) How sustainable is RED as a governance mechanism?

1.2 Research Boundaries, Assumptions and Limitations

First of all, I limited the analysis to the biofuel industry in Sweden, focussing on the handful of companies in Sweden that produce or import biofuels. Secondly, I limited the biofuels I studied to liquid biofuels – i.e. biogas was excluded from the primary investigations of the research.
Why Sweden? I chose Sweden for several reasons. After Germany, Sweden has the highest consumption of biofuels in transport in Europe (5.4% in 2009, Energimyndigheten 2010b). It is also one of a handful of member states to have implemented RED (Interviewee #1). Furthermore, the Swedish government has a vision to achieve “a vehicle fleet that is independent of fossil fuels” by 2030 (Regeringskansliet 2010, p4), so it is particularly interesting to explore the impact of RED on the Swedish biofuel industry in the presence of such an ambitious vision.

Why liquid biofuels? I chose to limit my research to liquid biofuels, i.e. ethanol and biodiesel, because the RED sustainability criteria focus on liquid biofuels. Furthermore, ethanol and biodiesel accounted for 91% of the renewable transport fuel used in Sweden in 2009 (Energimyndigheten 2010b). This thesis project is limited to first generation liquid biofuels: because they account for the majority of biofuel consumption by volume, and they have the largest negative impacts and therefore need more attention in policy to ensure sustainable production and consumption.

Limitations: I was unable to secure an interview with the largest ethanol importer in Sweden, nor with one of the biodiesel producers (they were unavailable) but I have been able to gain information from their websites, and from other company websites or reports mentioning them. As a result, and providing my second limitation, all my data is for locally produced liquid biofuel, using feedstock grown either in Sweden or another European member state. I have no data on sugarcane-ethanol from Brazil, and therefore how RED impacts these imports. Finally, I did experience a language barrier to some extent – predominantly because I could therefore not do adequate background research on the Swedish law, and it took a relatively long time to process the responses to public consultation (remissvar) that formed a large part of my data.

1.3 Thesis Outline
In this first Part, an introduction to the governance of biofuels in the transport sector was given, and the first chapter presented the aim, research questions and boundaries for this thesis. Chapter 2 describes the thesis process, detailing the methodology, research strategy and data collection methods used in the project. Part 2 gives a quick introduction to energy use in Sweden (Chapter 3), what biofuels are (Chapter 4), an overview of both the EU and Swedish policy in place to govern biofuels (Chapter 5), as well as the challenges faced by biofuels (Chapter 6). The results of the research project are presented and analysed in Part 3 in Chapters 7and 8. Chapter 7 presents the interviews and textual study of stakeholder perspectives, while Chapter 8 discusses the currently available environmental governance mechanisms, and incorporates the stakeholder perspectives in a discussion of governance from a sustainability perspective. In Chapter 9, ‘Looking forward’, the research findings are summarised, some conclusions are drawn and some directions for further research suggested.
2 Methodology

2.1 Theoretical Perspective and Framework

As a natural scientist by training, I have previously tended in my thinking toward scientific realism, which assumes that we can describe the world with science (Bryman 2008), and that somewhere there is a right answer to everything. However, the more I have learnt of environmental problems, and in studying a transdisciplinary program discussing sustainability science, I realise that scientific realism is not enough – there is not a right answer to many environmental problems because they are complex and persistent, and solving one problem often has unforeseen impacts somewhere else in the system. Biofuels is just such an example – biofuels were seen as the ideal replacement for fossil fuels, but now it appears that to simply focus on the end-use of biofuels ignores the impact of cultivation of biofuels, the competition for land and food, and the risk of causing increased hunger, poverty and loss of land. Yet, if managed correctly, with a systems perspective, biofuels can provide more positive benefits than just their renewable energy: see for example Pål Börjesson’s discussion of biodiversity impacts (Börjesson et al. 2009, p61-62) and the suggestion of combined short-rotation willow plantation-waste water treatment plants (Börjesson and Berndes 2006). Therefore, I shall approach this study with a latent scientific realism, remodelled with my new sustainability perspective.

To structure my sustainability perspective, I shall draw upon a framework for sustainability proposed by Martin O’Connor (2006), based on four spheres of sustainability, instead of just three: where politics acts as a connector and regulator between the three conventional spheres of economic, social and environmental sustainability. Particularly in this study of the governance of the biofuel industry, it is important to acknowledge and analyse the ‘system regulation’ of the three aspects of sustainability (see Figure 1): to discuss how RED will interact with and govern the stakeholders embodying each aspect of sustainability, such as trade associations (social), companies (economic) and environmental organisations (environmental). This framework will therefore be used as a theoretical starting point for the research, to help maintain a holistic perspective.

To guide and enhance the discussion of governance, and its relationship and interaction with the affected stakeholders, I shall refer to Delmas and Young’s edited book “Governance for the Environment: New perspectives” (2009). Governance of environmental challenges requires more than state governance alone (i.e. from governments), due to their characteristics, such as the trans-boundary nature of air-pollution, and the long time scales involved (Delmas and Young 2009). Biofuels provide a similar challenge to state governance, in that they are currently produced in a few places and traded globally. Likewise, uncertainty of accounting for indirect land-use change (ILUC) makes regulating for ILUC using state instruments and resources alone very difficult. Therefore, national governments and the EU are limited in their ability to govern international biofuel production.
However, a range of governance mechanisms have arisen specifically for environmental problems, which are introduced and discussed in “Governance for the Environment: New perspectives” (2009). An overview (see Figure 2) highlights the interactions and position of governance forms with respect to the public sector (government), civil society (private individuals) and the private sector (industry).

There are some points in the diagram that are slightly different or not applicable for my study. The Public sector in my study comprises EU and nation state government. In this case ‘Intergovernmental organisations’ could incorporate the complex network of European Parliament-European Commission-nation state relationships. I will not be discussing ‘Negotiated agreements’ or ‘Public voluntary programs’ as they do not appear in my study. It is to be noted that ‘Public voluntary programs’ described by Thomas Lyon in “Governance for the Environment: New perspectives” (Lyon 2009, p60) are not the same as the ‘voluntary schemes’ referred to in RED. RED uses the term ‘voluntary schemes’ to refer to certification schemes such the Forest Stewardship Council (FSC) certification for forestry and others described for biomass in Chapter 5.3. Voluntary certification schemes are closer to the ‘Non-state market driven’ governance shown in Figure 2.

2.2 Research Strategy
This research project is a qualitative study of stakeholder perceptions on the implementation of a body of legislation that has only just begun to be implemented. As such, no assessment or evaluation of the impacts of the legislation could be carried out, but preliminary responses could be gathered. The project is therefore an exploratory study that could provide the basis for on-going research, or a follow-up study of the impacts of RED, once it has been implemented for some years.
2.3 Methods
The project is an analysis of the role of governance in shaping, encouraging or hindering growth of the biofuels technological system, using the Swedish biofuel industry as an example. To achieve this, I have:

- Collected data in order to map out the Swedish biofuel industry, and assess preliminary effects of the introduction and implementation of RED on the biofuel industry from the stakeholders’ perspectives
- Processed data using text analysis (content analysis)
- Assessed environmental governance mechanisms used in the biofuel industry, using Delmas and Young’s introduction to environmental governance mechanisms

2.3.1 Data collection
I used several data sources, including different types of texts and semi-structured interviews. I also attended an information session and a conference session, both organised by the Swedish Energy Agency (SEA, Energimyndigheten), on implementing the Sustainability Criteria Law (Hållbarhetskriterierlag).

The literature review:– furnished an overview of the policy setting in Sweden and the EU, and drew upon peer-reviewed literature and other published reports located through Lund University’s online journal database ELIN/LibHub, policy documents from the EU/EC website and Swedish government websites.

Public consultation comments (Remissvar):– I also used public consultation comment letters (remissvar) submitted to the SEA in response to the proposed HBK Law to assemble data on: i) interests, opinions and responses of stakeholders in the biofuel industry; and ii) governance tools used to guide the development of the system. The comments on the Sustainability Criteria policy guidelines (föreskrifter) are available from the registrar at the SEA. Comments on the proposal of the law itself and on the statutory instrument guiding implementation of the law (HBK förordning) are available from the Ministry of Enterprise, Energy and Communications (Näringsdepartementet). I chose to limit my study to comments on the final document, the policy guidelines: these guidelines are the most detailed and are more likely to affect the everyday activities of stakeholders. A range of actors connected to the biofuel and biomass industry in Sweden responded, including the Swedish Bioenergy Association (Svebio), the Swedish Board of Agriculture (Jordbruksverket), the Swedish Petroleum Institute and the Federation of Swedish Farmers (Lantbrukarnas Riksförbund) to name a few3. However, a useful addition to my analysis of comment letters is the summary of comments submitted to the proposed law, in the Ministry of Enterprise, Energy and Communications’ Proposition 2009/10:164 on the sustainability criteria for biofuels and bioliquids.

Interviews:– I complemented data from comment letters with semi-structured interviews with Swedish liquid biofuels producers, to determine in more detail how RED has affected/will affect their production of biofuels. Internet research revealed five major liquid biofuel producers in Sweden, a list confirmed by the US Department of Agriculture’s GAIN report on Biofuels in Sweden, published in 2008 (Dahlbacka 2008). I contacted the companies by email, with a summary of my research idea, and usually a copy of the interview guide, to provide them with more information. I then followed

3 A full list of actors that commented can be found in Appendix 1
up by telephone if I had no immediate response. Only three of the five companies responded positively, and I held one telephone interview with each of the three during February and March. All interviews were 50 – 60 minutes, informal and semi-structured, to allow the discussion to be tailored to the circumstances of the interviewee. None were recorded. However, I did take as many notes as possible during interviews and typed these directly afterwards to capture as much information as possible. I then emailed these to the interviewees for comments and verification, and in a few cases received back some minor clarifications of details.

Table 1: Characteristics of interviews held

<table>
<thead>
<tr>
<th>Interviewee #</th>
<th>Interview respondent</th>
<th>Selection of interviewee</th>
<th>Where interviewed</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biodiesel producer 1</td>
<td>Targeted</td>
<td>By phone</td>
<td>3 Feb 2011</td>
</tr>
<tr>
<td>2</td>
<td>Biodiesel producer 2</td>
<td>Targeted</td>
<td>By phone</td>
<td>17 March 2011</td>
</tr>
<tr>
<td>3</td>
<td>Ethanol producer</td>
<td>Targeted</td>
<td>By phone</td>
<td>1 March 2011</td>
</tr>
</tbody>
</table>

Information meeting and conference: Further information was gathered at an Information meeting organised by the SEA and promoted on their webpage (Informationsträff om nya regelverket, in Malmö on Wednesday 23rd February). This was a presentation introducing the new Swedish regulations corresponding to RED, summarising both what affected actors need to report, and how to go about reporting their biofuels to the SEA. It was also a chance for affected actors to put questions to the SEA and ask for clarification. The Energiutblick 2011 conference, was held in Göteborg from the 15th – 17th March 2011. I attended a session there, on the implementation of the Sustainability Criteria in Sweden, with several international speakers (and therefore in English). I took notes for the first half and recorded the second half, transcribing from the recording later.

2.3.2 Data processing of interviews and comment letters

Data processing followed guidelines from grounded theory, emphasising that analysis is a continuous process that happens throughout the data collection process, so that the extraction of data becomes refined by feedback from the data already collected (Corbin and Strauss 1990).

Drawing out information: The interview notes and comment letters (remissvar) were processed to draw out common themes, using a number of the simpler techniques outlined in Ryan & Bernard’s article “Techniques to find themes” as a guideline (2003). I highlighted phrases/comments that seemed important to the speaker/writer. From the first reading, all points brought up in the texts were written out as individual notes on flash cards (with the author on the back to be able to identify the comment later), mixed together and then collected into piles of common ‘themes’. A number of themes addressed a similar idea, with slight variations, and some themes could be applied to several ideas. Therefore, some themes could be grouped into a few larger categories. All points were then transferred into a table by theme and by author (the organisation writing the comment).

Some points I did not extract, as they related more to proof-editing the text than challenging the content of the text. Some points suggested a different wording of a sentence, or challenged the grammar used. I have given some examples of left-out points (freely translated from Swedish into English by the author):

4 The interview notes/reports can also be found in Appendix 1
- "change the place of ‘technical’ and ‘economic’ competency so that the wording corresponds to the wording in the following two paragraphs” (Swedish Board of Agriculture, comment letter)
- "Kap 4, §b) should be changed to ‘to be grounded in the examiner’s judgement of the reporter’s risk analysis’. This is the normal auditing structure.” (Lantmännen’s comment letter 2011, p4)
- "‘Vegetable-based rapeseed oil’ – There is only vegetable-based rapeseed oil. So it is unnecessary to write out ‘vegetable-based’. Likewise for writing out ethanol from vegetable-based wheat or vegetable-based sugarcane.” (Lantmännen comment letter, 2011, p7)
Part 2: Biofuels in the Swedish Transport Sector

A brief description of the biofuels used in the Swedish transport sector, their Governance and Sustainability

3 Energy use in Swedish Transport

Road transport in Sweden accounts for 91% of energy used in the domestic transport sector (Energimyndigheten 2010b, p13). Figure 3 shows the increase of biofuels in this sector over the past 10 years. ‘Low-admixtures’ refer to ethanol and biodiesel that is used to blend into fossil petrol and diesel to create low-blends, currently 5% biofuel to 95% fossil fuel. Most of the fossil petrol and diesel sold in Sweden is a low-blend (95% of petrol and 81% of diesel, Energimyndigheten 2010b, p14-15).

![Figure 3: Use of energy in road transport, by fuel type (compiled from data in Energimyndigheten, 2010 energy in transport) *NOTE: logarithmic scale used on the vertical axis](image)

Table 2 shows higher blends of ethanol and biodiesel currently in use. In 2009, about 40% of ethanol was used in these purer forms rather than for low-blends (Energimyndigheten 2010b, p15). Compared to ethanol, however, in 2009 only 6% of biodiesel was used for purposes other than low-blending (Energimyndigheten 2010b, p16).
Table 2: Description of higher level biofuel blends

<table>
<thead>
<tr>
<th>Blend</th>
<th>Composition</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>E85</td>
<td>85% ethanol, 15% petrol (Note: in winter the petrol content is increased to 25%)</td>
<td>In flexi-fuel cars</td>
</tr>
<tr>
<td>ED95</td>
<td>95% ethanol, 5% anti-knock additive</td>
<td>As a replacement for diesel in busses</td>
</tr>
<tr>
<td>B100</td>
<td>100% biodiesel</td>
<td>Heavy trucks – or for heating</td>
</tr>
</tbody>
</table>

4 Biofuel Production in Sweden

Liquid biofuels are commonly classified into first and second generation. The majority of biofuel produced in Sweden is first generation (Börjesson et al. 2009). Many feedstocks can be used and there are several different production pathways. Figure 4, gives an overview of current pathways as well as those being tested (from Börjesson et al. 2009, p20).

The majority of biofuel produced is sold as a low-admixture to fuel companies for blending with fossil fuel in a 5% biofuel to 95% fossil fuel ratio (currently). A significant amount of low-admixture ethanol is also imported from Brazil (about 80% in 2009, Börjesson et al. 2009, p16).

5 Governance System for Liquid Biofuels

State governance is more complex in Europe than for an individual nation state. ‘State’ in this context refers to both the nation state, and to the European ‘state’, i.e. the European Parliament. Whereas most laws at nation state level are legally binding, the European Parliament accepts non-legally binding Directives, which nation states are then required to transpose (transfer) into national law, which then becomes legally-binding, by a certain time after the Directive was adopted. Another
difference in EU governance is that, in order to protect nation sovereignty, it is common for the European Parliament to lay down the desired outcome in the Directive, but leave it to each nation state to decide on what governance mechanisms are used to achieve the outcome (Kronsell and Di Lucia 2007).

Table 3 gives a timeline summarising the development of governance for liquid biofuels, followed by a description of the state governance at EU and Swedish levels.

**Table 3: Timeline of policy development in biofuels governance/regulation**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 May 2003</td>
<td>Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport – non-mandatory</td>
<td>European Commission</td>
</tr>
<tr>
<td>27 October 2003</td>
<td>Directive 2003/96/EC on the taxation of energy products</td>
<td>European Commission</td>
</tr>
<tr>
<td>8 February 2006</td>
<td>An EU Strategy for Biofuels (Communication)</td>
<td>European Commission</td>
</tr>
<tr>
<td>2008</td>
<td>Report from Riksdag 2007/08:RFK14 Förnybara drivmedels roll för att minska transportsektorns klimatpåverkan – Renewable fuels’ role in reducing the transport sector’s climate impact</td>
<td>Riksdag</td>
</tr>
<tr>
<td>2008</td>
<td>SOU 2008:24 Svensk klimatpolitik</td>
<td>Statens offentliga utredningar</td>
</tr>
<tr>
<td>6 April 2009</td>
<td>SÖ 2009:3 Samförståndsavtal med Brasilien om bioenergisamarbete inklusiv biobränslen – Stockholm den 11 September 2007 - Memorandum of Understanding with Brazil on bioenergy collaboration</td>
<td>Utrikesdepartement</td>
</tr>
<tr>
<td>10 June 2010</td>
<td>HBK Lag (2010:598) om hållbarhetskriterier för biodrivmedel och flytande biobränslen – Law on sustainability criteria for biofuels and bioliquids</td>
<td>Näringsdepartement</td>
</tr>
<tr>
<td>2 December 2010</td>
<td>Förordning (2010:1532) om hållbarhetskriterier för biodrivmedel och flytande biobränslen - Statutory instrument supporting the HBK law</td>
<td>Näringsdepartement</td>
</tr>
<tr>
<td>25 February 2011</td>
<td>Föreskrifter om hållbarhetskriterier för biodrivmedel och flytande biobränslen – Policy guidelines supporting the HBK law and statutory instrument</td>
<td>Energimyndigheten</td>
</tr>
<tr>
<td>8 March 2011</td>
<td>A Roadmap for moving to a competitive low-carbon economy in 2050 (Communication)</td>
<td>European Commission (Climate Action)</td>
</tr>
</tbody>
</table>

5 see [http://www.sweden.gov.se/sb/d/108/a/139364](http://www.sweden.gov.se/sb/d/108/a/139364)
5.1 Governance at the EU level

Current EU governance of biofuels takes the form of RED and the Fuel Quality Directive, both part of the Climate and Energy Package, complemented by the latest revisions of the Common Agricultural Policy (CAP), all of which are summarised below.

A quick note here on governance- and legal terminology:

‘legislation’ is a collective term referring to a body of different regulatory documents pertaining to one topic, so for example, the Sustainability Criteria/ HBK law (see below under ‘Governance in Sweden’) is the main document; then there are documents supporting the law that provide more detail and guidelines. Together the law and supporting documents can be referred to as the Sustainability Criteria legislation.

5.1.1 The Renewable Energy Directive (RED)


- 20% of total national energy consumption (differs by country, depending on resources and existing renewable energy share – Sweden’s target is 49%)
- 10% of total transport energy (fixed for all countries)

National Renewable Energy Action Plans are required from each Member State, detailing how they plan to meet the targets, and these are published on the European Commission’s Transparency Platform. The second half regards transport and contains sustainability criteria for biofuels and bioliquids, instructions for verification of the sustainability criteria and calculation of the GHG impact of biofuels and bioliquids (Articles 17 - 19). Annex V contains rules for calculating the GHG impact of biofuels, bioliquids and their fossil fuel comparators, with typical, default and disaggregated default values for all biofuels and their production chains. All Member States were required to have brought into force the legislation required to comply with the Directive by 5 December 2010 – Member States are free to choose the specific measures used to comply.

In brief, RED requires that, in order to be eligible to count towards the mandatory targets and to receive any financial support available for renewable energy, all biofuels and bioliquids must fulfil certain sustainability criteria (detailed below in Table 4). Economic operators responsible for reporting on the sustainability criteria (to demonstrate that their biofuel fulfils the criteria) may do so in one of three ways:

i) the national reporting mechanism (each member state should have one);
ii) a voluntary scheme that has been accredited by the EU/EC; or
iii) bilateral or multilateral agreements that have been acknowledged by the EU/EC.

An important clarification here is that by ‘voluntary schemes’ in ii) above RED refers to schemes that set standards for the production of biomass and meet “adequate standards of reliability, transparency and independent auditing” (European Parliament 2009b, p39). These are more commonly referred to by the generic term ‘certification schemes’: these are voluntary third-party

certified schemes, comprising a standard with principles that must be complied with, a system detailing how to comply, and audited by an external certifying body. RED has also been called a ‘certification scheme’ (Europa 2010), but it is a mandatory scheme as opposed to a voluntary scheme. I will therefore use ‘voluntary scheme’ in my report, to differentiate between the (so-far) private-civil schemes for certification (such as ISCC, or the more well-known FSC for forestry) and mandatory schemes such as RED, which are usually public schemes.

As of mid-March, no voluntary scheme had yet been accredited by the EC, although several have applied for recognition. Likewise, as of mid-March, no applications for bilateral or multilateral agreements had been made.

Table 4: Sustainability requirements in RED

<table>
<thead>
<tr>
<th>GHG emission reduction</th>
<th>Protect biodiversity</th>
<th>Protect carbon stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofuels must show a reduction in GHG emissions over their entire production chain, relative to the fossil fuel they replace, of 35%.</td>
<td>Feedstock may not originate from land that was categorised as having high biodiversity in or after January 2008: o Primary forest* o Legal nature protection areas o Protected areas, e.g. for endangered species o Highly biodiverse grasslands**</td>
<td>Feedstock to be grown or harvested for bioenergy uses may not originate from land with high soil carbon stocks o Wetlands according to Ramsar Convention, o Continuously forested land (&gt;30% canopy cover) o Land with 10-30% canopy cover o Peatland</td>
</tr>
</tbody>
</table>

* as defined by FAO and its Global Forest Resource Assessment
** the Commission must draw up definitions and geographical boundaries for these

Within the EU, bioenergy feedstock cultivation must also comply with the Environmental and Social requirements for agriculture, including ground and surface water quality control regulated in CAP. As production outside of the EU cannot be regulated by CAP, the Directive encourages multi- and bilateral agreements that include these criteria.

The Directive provides incentive mechanisms for ‘better’ first generation biofuels—producers get a carbon emissions bonus if using degraded or contaminated land (although degraded land is not defined yet).

5.1.2 The EU Common Agricultural Policy (CAP)

RED requires that all feedstock grown in the EU is grown according to the ‘Environment’ section in CAP, which lays out minimum requirements for good agricultural practices and environmental conditions, and which must be adhered to in order to receive financial support for agriculture. These requirements pertain, for example, to restricting soil and water degradation and pollution. CAP also encourages renewable energy production, for example by offering extra support to farmers growing energy crops on set-aside land (Schlegel and Kaphengst 2007).

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7 “Günther Oettinger, Commissioner responsible for Energy, said: ‘… Our certification scheme is the most stringent in the world. . .’.‘” – quoted from the press release IP/10/711 from the European Commission (Europa, 2010)
5.1.3 Fuel Quality Directive (FQD)
The Fuel Quality Directive (2009/30/EC) (European Parliament 2009a) is an update of the fuel quality directive (98/70/EC), and provides specifications for petrol and diesel regulating emissions of atmospheric pollutants (including carbon), as well as ensuring that the fuels are safe to use. The new FQD changes the specifications to allow blending of ethanol into petrol of up to 10%, from 5%, and diesel may now contain up to 7% biodiesel (Energimyndigheten 2010b, p15-16).

5.2 Governance in Sweden
The transposition of RED into Swedish national law is the Law on Sustainability Criteria for Biofuels and Bioliquids (Hållbarhetskriterier lag, 2010:598, henceforth HBK, (Näringsdepartement 2010)). Other laws affecting biofuels for transport in Sweden include the Swedish tax law on energy (Lag om skatt på energi, 1994:1776, amended by 2011:321, (Finansdepartement S6 1994)) and the new Fuel law corresponding to the FQD (Drivsmedels lag, 2011:319, coming into effect from 1 May 2011).

5.2.1 The Hållbarhetskriterier lag (implementation of RED)
The HBK law (2010:598) came into effect on the 26 May 20108. The law is supported by: i) a statutory instrument (Förordning, 2010:1532), which establishes Energimyndigheten (the Swedish Energy Agency) as the responsible department (tillsynsmyndighet), and expands on the guidelines for reporting, the control system for traceability, the independent examination and the mass-balance system to track carbon emission; and ii) policy guidelines (Föreskriften, 2011:1), which give further details and clarification on the competencies required of the independent examiner, reporting, what must be independently examined, and calculating greenhouse gas (GHG) emissions. The law and its supporting legislation form the Swedish national reporting mechanism or ‘national system’ – the first of the three options economic operators have for reporting, according to RED. The application of the HBK law includes:

- **Reporting** to the SEA by the responsible economic actors, i.e. those who:
  - professionally deliver biofuels to their own or another filling station;
  - use biofuel professionally, without buying it from a filling station;
  - use bioliquids (oil for heating, usually); or
  - deliver bioliquids to professional consumers.

- **Traceability**: the responsible economic actors must collect information proving the sustainability of the biofuel at all stages of production, right back to farm-level cultivation. To organise all this information, the use of a control system such as a chain-of-custody or mass-balance system is suggested, which tracks specific volumes of feedstock/fuel, so that no more sustainable biofuel leaves the system than entered it.

- **Verification**: in order to ensure transparency and avoid fraud, the economic actors must have their system and report examined by an independent reviewer, who then should issue a certificate verifying that the biofuel does indeed meet the requirements. This certificate is what is submitted to the Swedish Energy Agency, who then submit all Swedish certificates to the European Commission.

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8 The text can be found on the government website: http://www.riksdagen.se/webbnav/?nid=3911&bet=2010:598
### 5.2.2 Taxes affecting the transport sector

A tax on fossil oil was first introduced in the 1970s, to encourage the use of renewable energy sources rather than oil, after the oil crisis (Johansson et al. 2002). In 1991, a carbon dioxide tax was introduced, which started at 0.25 SEK/kg, slowly increased to 0.76 SEK/kg in 2003 and is now just over 1 SEK/kg (Nilsson et al. 2004, Regeringskansliet 2010). After Sweden joined the EU, the tax laws were gradually aligned with EU Energy Taxation Directive\(^9\) (Energimyndigheten 2010a, p28). There is currently a parallel system of energy taxes – a general energy tax, levied on most fuels based on energy content and other characteristics; and other ‘environmental’ taxes (levied for environmental reasons). The carbon dioxide tax mentioned earlier is one such environmental tax. The other environmental taxes are on sulphur and nitrogen dioxide emissions from burning the taxable fuel. Ethanol, biodiesel and biogas are exempt from both energy and carbon dioxide tax. Since 2006, vehicle tax has been calculated according to how much carbon dioxide the car emits, rather than the car’s weight, and charges increase from 2011 (Energimyndigheten 2010a, p41).

### 5.3 Non-state governance

The second option that economic operators have for reporting their sustainable volumes of biofuels is via voluntary schemes which have been accredited by the European Commission. There are several voluntary schemes related to biomass and bioenergy, in various stages of development. However, at the time of writing (May, 2011), no schemes had yet been accredited by the EU. All the voluntary schemes described here have applied to the EC for accreditation.

**ISCC (International Sustainability and Carbon Certification System for Biomass and Bioenergy):** is based in Germany but with a world-wide membership and certification impact. It was officially registered in March 2010, and is accredited to show compliance with the German Biofuel Sustainability Ordinance\(^10\). The scheme not only offers assurance of sustainability, but also includes a calculation of greenhouse gas emissions. Certificates are only valid for one year. It is widely used across the world, with 263 certificates having been issued since March 2010. From Sweden, Perstorp BioProducts AB and SEKAB BioFuels and Chemicals have certificates valid until the end of 2011. The ISCC certifies all types of biomass and bioenergy. ([http://www.iscc-system.org/index_eng.html](http://www.iscc-system.org/index_eng.html))

**REDcert:** is also based in Germany, founded in February 2010. It was accredited by the Biomass Sustainability Ordinance in July 2010, and has issued over 800 certificates so far, mostly to German organisations. REDcert certifies all steps in the production of biofuels. ([http://www.redcert.org/](http://www.redcert.org/))

**NEN NTA 8080 – Sustainably Produced Biomass (Netherlands):** was launched in January 2011, and is owned by NEN (the Netherlands Standards Institute). It is partly an interim solution for the present, while ISO develops a standard

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\(^10\) the German transposition of RED, which requires that all biofuel must be certified by an accepted voluntary scheme to demonstrate sustainability
(according to the scheme’s website this could take up to three years). The scheme builds on the EU criteria and the Cramer report ‘Testing Framework for sustainable biomass’ to create verifiable requirements. [http://www.sustainable-biomass.org/]

**Roundtable on Sustainable Biofuels**: launched on 23 March 2011. It is hosted by the EPFL in Switzerland (Ecole Polytechnique Fédérale de Lausanne). Earlier in March the scheme also received preliminary recognition by the Biomass Sustainability Ordinance. The scheme offers an online tool that allows actors to complete a self-evaluation, check their fulfilment of the criteria and calculate their own GHG emissions (this part is still under development). [http://rsb.epfl.ch/]

**Bonsucro Standard – Better Sugarcane Initiative**: was finalised in March 2011. Bonsucro is a member of the International Social and Environmental Accreditation and Labeling Alliance, and the Bonsucro Standard was developed in line with ISEAL’s Code of Good Practice. The member base includes large international corporations, civil society groups and trade associations, representing all parts of the production chain, although perhaps more heavily weighted towards end users. [http://bonsucro.com/welcome.html]

## 6 Sustainability Aspects of the Biofuel Industry

### 6.1 The Debates around Biofuels

Biofuels have many advantages that have fuelled their rapid development: they are renewable; biomass is available anywhere in the world; the technology is simple; and uniquely for renewable energy sources, biofuels can be solid, liquid or gas, and therefore provide a variety of storage and transport options (Demirbas 2008). However, there are some serious challenges that biofuels globally must overcome before they can become truly useful as a renewable alternative to fossil fuels:

**Food or Fuel?**: Large quantities of crops are used to produce commercial biofuels, and these are currently all food or crops (sugarcane, maize, cereals, soy etc.), because the technology is not yet fully developed that can utilise cellulose rather than starch or sugar. Cultivation for biofuel production uses about 1.6% of agricultural land globally (2007 data, Fischer et al. 2009, p66), and biofuels satisfy almost 2% of global transport fuel needs (estimated from Fischer et al. 2009, p41: biofuel production in 2008 compared to global transport sector fuel use in 2005). Although this data is not up-to-date, it still shows clearly that using current conversion techniques with food crops as a base is not feasible in large quantities.

**Greenhouse gas emissions reductions (GHGs)**: in 2008, Searchinger et al. (2008) showed that when accounting for emissions released from fertilisers, harvesting operations, transport and processing, some biofuels have an end balance of greenhouse gas emissions that is equivalent to or sometimes worse than the fossil fuels they are replacing (i.e. emit more GHGs overall). Fargione et al. (2008) show that the one-time release of carbon stored in the soil after ploughing up natural forest, wetland
or natural grassland creates a ‘carbon debt’ that would take up to decades to repay – also questioning the validity of biofuels’ ability to reduce GHGs. These two reports are the most-cited scientific evidence used in a range of civil society and private sector reports arguing for or against biofuels (Michalopoulos et al. 2011); however, life cycle assessments of biofuel production still contain large degrees of uncertainty, and have been shown to produce very different results depending on what parameters are used (e.g. Gnansounou et al. 2009).

Biodiversity impacts:- Concern for negative biodiversity arises from the risk expanding agricultural land into natural forest or grassland, so as not to come into conflict with food production. Of greater concern are the potential indirect impacts, where it is not the biofuel production itself that causes deforestation, but that at some point biofuel displaces crop production perhaps to natural ecosystems. While second generation lignocellulosic biofuel feedstock (various grasses and short-rotation coppice crops) can be grown on degraded land and therefore avoid competition with food, a biodiversity concern is that these species have invasive qualities. (FAO 2008, Fischer et al. 2009, p77)

Competition for land:- Not only are biofuels in competition with arable land for food crops, or high biodiversity, but also for other energy uses. Another disadvantage of using biomass to produce liquid biofuels for transport is that the energy conversion efficiency is very low – for example, corn ethanol may only provide 1.2 times as much energy as was used to produce the ethanol (Börjesson et al. 2009). The conversion efficiency of using biomass to produce electricity or heat or even biogas is much higher, so that until alternative transport fuels are developed, it is complex to decide what is the best economic and environmental use of biomass.

Social impacts:- As ethanol accounts for approximately 80% of global production, and apart from USA corn ethanol most of this production takes place in tropical countries, there is concern about bad labour conditions on plantations, and uncertainty surrounding the impacts of large-scale purchases of land in tropical countries for biofuel production on resident landowners. Also, increased hunger linked to reduced access of the poor to food could be an indirect impact of biofuel production. (Fischer et al. 2009)

Many of these challenges have a positive side too, if biofuel production is managed well, i.e. if a governance system can be built to effectively find a balance between negative and positive impacts of biofuel production. This shall be further discussed in Chapter 8.
Part 3: Results and Analysis

Describing and analysing the implementation of the Renewable Energy Directive in Sweden

7 The biofuel industry in Sweden

7.1 Actors, Networks and Agents in the Swedish Biofuel Industry
To describe the biofuel industry and relevant stakeholders I have adopted Carlsson & Stankiewicz’s definition of a technological system (1991, p94):

a network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure and involved in the generation, diffusion, and utilisation of technology.

From interviews with producers, and comment letters from a wider spread of actors, I identified dominant stakeholders in the Swedish biofuel industry, and mapped a structure of relationships between stakeholders (see Figure 5 below). (Note: I have not incorporated car manufacturers in this description of the industry, although they are crucial actors particularly for individual consumers, as they not only have power over whether cars are available that can use biofuels, they also are large influential actors in the policy-making arena.)

Figure 5: Network of actors, and agents of governance, in the biofuel industry in Sweden

Producers
Five companies currently provide most of the liquid biofuel in Sweden. Table 5 shows their product, feedstock, production capacity and main customers.
Table 5: Actor group – Liquid biofuel producers

<table>
<thead>
<tr>
<th>Biofuel Producer-Actor</th>
<th>Biofuel</th>
<th>Feedstock</th>
<th>Capacity (m³/year)</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>LantmännenAgroetanol</td>
<td>Ethanol</td>
<td>Wheat, other cereals</td>
<td>210 000</td>
<td>Fuel companies</td>
</tr>
<tr>
<td>*SEKAB/Domsjö Fabriker AB, Örnsköldsvik</td>
<td>Paper pulp, ethanol, steam</td>
<td>Wood raw material (sulphite)</td>
<td>~18 000</td>
<td>Fuel companies; redistributors, bus companies as higher blends</td>
</tr>
<tr>
<td>*SEKAB E-Technology, Örnsköldsvik</td>
<td>Research/pilot plant</td>
<td>Wood raw material</td>
<td>~2 000</td>
<td>90% to Fuel Companies; rest to redistributors, private companies</td>
</tr>
<tr>
<td>PerstorpBioProducts AB</td>
<td>Biodiesel</td>
<td>Rapeseed oil</td>
<td>180 000</td>
<td>Own filling stations, private companies</td>
</tr>
<tr>
<td>Ecobränsle</td>
<td>Biodiesel</td>
<td>Rapeseed oil</td>
<td>50 000 (can expand to 110 000)</td>
<td>Own filling stations, private companies</td>
</tr>
<tr>
<td>SunPine AB</td>
<td>Biodiesel</td>
<td>Pine oil (by-product from pulp &amp; paper mill)</td>
<td>50 000 (from 100 000 m³ raw tall oil)</td>
<td>Fuel companies</td>
</tr>
</tbody>
</table>

* Information from the 2008 GAIN report on biofuels in Sweden (Dahlbacka 2008) – I was unable to confirm whether this information is still valid or not

The biggest threat to biodiesel production, according to Interviewee #2, is the volatile price of rapeseed. Whereas fossil fuel prices change slowly, rapeseed “doubled in price in six months”. As a result smaller production plants closed down in 2008, due to unprofitability (Börjesson et al. 2009, p16). Interviewees were of the opinion that new production is unlikely to start again unless conditions change – i.e. if there is a more certain market for biofuels, and if biofuels become more competitive with fossil fuels (Interviewee #1, #2).

Consumers

All customers are key actors, as they have power to place demands on producers, in terms of quality or sustainability criteria. Table 6 describes more clearly the linkages between producers and consumers, explaining who buys what fuel from whom.

Government bodies, particularly local government, play an especially large role as customers, as they have a mandate to ensure that public vehicles are clean vehicles – with low emissions or good energy efficiency; for tax exemption, the vehicle must be at least partly fuelled by renewable fuel (Energimyndigheten 2010a, p41-42). For example, Interviewee #2 had a municipality approach them for a quote to change the entire fleet of waste-collection vehicles to renewable fuel, which would mean replacing 8 million litres of fossil diesel annually (8 000 m³, compared to a capacity of 50 – 160 000 m³ for an individual plant in Sweden). This would be a significant and stable growth in demand, and important for the future survival of the production company.
Table 6: Actor group - Customers and consumers

<table>
<thead>
<tr>
<th>Actor</th>
<th>Product used</th>
<th>Supplied by</th>
<th>Use/ Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Companies</td>
<td>Ethanol</td>
<td>Ethanol producers</td>
<td>Produce low level blend (5% ethanol, 95% petrol), and E85 by blending 85% Ethanol with 15% petrol (25% petrol in winter).</td>
</tr>
<tr>
<td></td>
<td>Biodiesel</td>
<td>2 Biodiesel producers</td>
<td>Produce low level blend (5% biodiesel, 95% fossil diesel)</td>
</tr>
<tr>
<td>Distributors/resellers</td>
<td>all</td>
<td>Biofuel producers, fuel companies</td>
<td>Buy fuel to their private depots to sell on to large organisations (e.g. transport companies, company car fleets)</td>
</tr>
<tr>
<td>Public Sector (government)</td>
<td>E85, ED95,</td>
<td>Filling stations</td>
<td>Government/ civil servant car fleet</td>
</tr>
<tr>
<td></td>
<td>B100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Sector (municipality)</td>
<td>E85, ED95,</td>
<td>Fuel companies, Biodiesel producers 1 &amp; 2</td>
<td>Bus fleets, municipal service vehicles, e.g. waste collection, small deliveries</td>
</tr>
<tr>
<td></td>
<td>B100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private companies (e.g.</td>
<td>mainly B100</td>
<td>Biodiesel producers 1 &amp; 2, Fuel companies,</td>
<td>For own use for large company fleets (e.g. goods transport)</td>
</tr>
<tr>
<td>hauliers)</td>
<td></td>
<td>Filling stations</td>
<td></td>
</tr>
<tr>
<td>Filling Stations *</td>
<td>Low level</td>
<td>Fuel companies</td>
<td>Sell low blend and E85 and B100</td>
</tr>
<tr>
<td></td>
<td>blends, E85</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and B100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private users</td>
<td>Low level</td>
<td>Filling stations</td>
<td>For use in normal cars (all but oldest)</td>
</tr>
<tr>
<td></td>
<td>blends</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E85 and B100</td>
<td>Filling stations</td>
<td>For use in Flexi-Fuel Vehicles (FFVs)11</td>
</tr>
</tbody>
</table>

* Filling stations over a certain capacity are required to have at least 1 renewable fuel tank (Börjesson et al. 2009)

Suppliers

Feedstock for biofuel production is mainly cereals (wheat, rye and small amounts of corn) and rapeseed oil. All cereals are supplied by Swedish and European farmers. Rapeseed oil is supplied by oil crushers in Denmark and Sweden. The rapeseed is all from European farmers. Pine oil (crude tall oil) is supplied to SunPine AB by the pulp-and-paper processing mill in Piteå, northern Sweden.

Without sufficient inflow of raw material, producers cannot operate. However, the keyword ‘sufficient’ is being redefined with every development in the biofuel debate. Originally ‘sufficient’ represented just, for example, wheat with a usable starch content, in high enough quantities. Now, ‘sufficient’ also includes the wheat fulfilling sustainability criteria, and having the requisite documentation and transparency to show it. One interviewee said,

“We used to import [feedstock] from some of the Baltic countries, but we have had to stop that for now, as there are uncertainties with the countries’ reporting systems... until they have sorted out their reporting, we cannot use those sources”. (Interview #3)

11 A wide range of vehicles, available from most car manufacturers, that can run on both E85 or fossil petrol or any blend of the two.
Trade Associations and collaborations

**Trade associations** facilitate interaction and networking amongst agents in the liquid biofuel industry, providing support, expertise and collective knowledge. Table 7 gives a short description of the main trade associations connected with the liquid biofuel industry. An example of a multi-actor **collaboration** between actors is the Biofuels Group that some producers belong to, which includes Svebio, the company Scania and Lantmännen Energi (a large corporate group of energy providers). Through collaborations such as these, producers and consumers can work together to create both supply and demand that is satisfactory to all parties.

**Table 7: Actor Group - Trade associations**

<table>
<thead>
<tr>
<th>Trade Association</th>
<th>English name</th>
<th>Short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lantbrukarnas</td>
<td>The Federation of Swedish Farmers</td>
<td>Represents all types of ‘green industry’ – including agriculture, forestry, market gardens and rural areas</td>
</tr>
<tr>
<td>Riksförbund (LRF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPI – Svenska</td>
<td>Swedish Petroleum Institute</td>
<td>Represents transport fuel, energy and lubricant enterprises in Sweden</td>
</tr>
<tr>
<td>Petroleum Institute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Svebio (Svenska</td>
<td>Swedish Bioenergy Association</td>
<td>Represents companies and individuals from the whole bioenergy production chain from harvesting to final energy use</td>
</tr>
<tr>
<td>Bioenergiföreningen)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Svensk Fjärrvärme</td>
<td>Swedish District Heating</td>
<td>Represents Swedish district heating companies</td>
</tr>
<tr>
<td>Association</td>
<td>Association</td>
<td></td>
</tr>
</tbody>
</table>

Regulation of the production chain

The **public sector** provides the regulatory context in which the production chain takes place, and often the enabling environment as well, until an industry matures. The incentives provided by the government (e.g. tax exemption to biofuels), and the targets set (e.g. the 10% target) often provide a major driver for growth in production. As Sweden is part of the EU, it is important to remember that the public sector includes national level government as well as European government, which are separate, and different actors have influence at each level. In the liquid biofuel industry, due to RED, voluntary certification schemes are likely to join the public sector in providing governance of the industry. Table 8 summarises the main actors influencing the biofuel industry, their governance tool, which actor/s it targets, its aim, and how it governs.
<table>
<thead>
<tr>
<th>Governance actors</th>
<th>Tool</th>
<th>Targeted Actor</th>
<th>Tool’s Aim</th>
<th>Associated governance instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public sector - EU Agencies</td>
<td>EC, DG ENER</td>
<td>RED Energy producers and users</td>
<td>To reduce carbon emissions, by promoting higher use of renewable energy sources</td>
<td>For biofuels in Sweden: tax-exemption</td>
</tr>
<tr>
<td></td>
<td>EC, DG-ENV</td>
<td>Fuel blenders, distributors</td>
<td>Ensure that fuel conforms to set standards such that all vehicles can use that fuel safely; also sets pollution emissions allowances</td>
<td>Monitoring at tax-points</td>
</tr>
<tr>
<td></td>
<td>EC, DG-AGRI</td>
<td>CAP13 Agricultural and forestry producers</td>
<td>Support farmers, maintain productivity, environmental protection</td>
<td>Regulating how much land can be used, and what it can be used for; providing subsidies to guide what is produced</td>
</tr>
<tr>
<td>Public sector - Swedish government agencies</td>
<td>Näringsdepartement, SEA</td>
<td>HBK Biofuel producers and distributors</td>
<td>To ensure that biofuel sold in Sweden is sustainable according to RED</td>
<td>Giving tax-exemptions/tax-relief to sustainable biofuel</td>
</tr>
<tr>
<td></td>
<td>Swedish Tax Agency</td>
<td>Energy Tax Law</td>
<td>Producers and distributors of all forms of energy</td>
<td>Imposing taxes on use of energy – exemption for industries, biomass energy</td>
</tr>
<tr>
<td></td>
<td>Jorbruksverket/</td>
<td>Environmental Code/Forestry Law</td>
<td>Producers of agricultural/forestry products</td>
<td>Regulates production and harvesting, using self-declaration</td>
</tr>
<tr>
<td></td>
<td>Skogstyrelsen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Sector - voluntary schemes</td>
<td>Meo Carbon Solutions GmbH</td>
<td>ISCC Producers of biomass and bioenergy</td>
<td>Verifies and certifies that the production chain and methods comply with the Scheme’s standards</td>
<td>ISCC Seal guaranteeing sustainability</td>
</tr>
<tr>
<td>Näringsdepartement *</td>
<td>Ministry of</td>
<td></td>
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<tr>
<td></td>
<td>Enterprise, Energy</td>
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<td></td>
<td>&amp; Communications;</td>
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<td>(currently used in</td>
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<td></td>
<td>Sweden)</td>
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</tbody>
</table>

12 Fuel Quality Directive
13 Common Agricultural Policy
7.2 Reactions of Biofuel Producers to Agents of Governance

From interviews with three of the five producers, and web-based information, I collected information on implementation of RED in Sweden. Table 9 presents the practical actions of biofuel producers to become compliant with the HBK law. There were three different responses: being verified, being certified and not doing anything yet. According to the national system (set up by the HBK legislation), it is enough to develop your own control system within the company that ensures traceability and calculates GHG emissions, and to have this system (and therefore your production) verified by an external, independent examiner. There are no requirements that the examiner should be accredited, however several companies provide accredited services (e.g. SGS International, DNV in Norway, TüV in Germany). Producers can also have their product certified, which entails meeting the standards set by a voluntary scheme such as those described in Chapter 4.3, having your system checked by a third-party examiner, and receiving the label of the voluntary scheme for a certain period of time, if you fulfil their criteria. The voluntary scheme label is therefore, in theory, a ‘seal of guarantee’ as such, that your product meets certain standards. *(Note: I have not indicated which producers were interviewed, as I would like to maintain as much anonymity for interviewees as possible: given the small sample, indicating which were interviewed would reveal their identity.)*

Table 9: How producers have responded, to comply with the new Sustainability Criteria law

<table>
<thead>
<tr>
<th>Company</th>
<th>Response</th>
<th>Certified?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol producer 1</td>
<td>- their ethanol has been verified by SGS (a company that provides external auditing)</td>
<td>Not yet.</td>
</tr>
<tr>
<td></td>
<td>- indicated a preference to become certified, but not until the schemes get approved by the European Commission</td>
<td></td>
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<tr>
<td>Ethanol producer 2</td>
<td>- certified by ISCC</td>
<td>Yes (ISCC)</td>
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<tr>
<td></td>
<td>- also have their own sustainability initiative together with their suppliers</td>
<td></td>
</tr>
<tr>
<td>Biodiesel producer 1</td>
<td>- ISCC certified</td>
<td>Yes (ISCC)</td>
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<tr>
<td></td>
<td>- have their own company sustainability system similar to ISCC, with which all suppliers are required to comply (2 of 3 suppliers already ISCC certified)</td>
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<tr>
<td></td>
<td>- the first report will be before April 2012, the Mass Balance System is running, since December 2010, thus the numbers are ready to submit</td>
<td></td>
</tr>
<tr>
<td>Biodiesel producer 2</td>
<td>- have not looked into it yet, as only have to report in 2012</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>- donot foresee any problems as they should be able to get all the documentation from their feedstock supplier</td>
<td></td>
</tr>
<tr>
<td>Biodiesel producer 3</td>
<td>I could not find information on what they have done for HBK specifically</td>
<td>Donot know</td>
</tr>
</tbody>
</table>

7.2.1 Gathering the stakeholder perspectives

From the interviews and comment letters from a range of stakeholders I also collected opinions and concerns voiced about the new regulations governing biofuel production (the sustainability criteria). After reading and coding comment letters, and adding these to comments and opinions expressed during interviews, I had collected almost 300 separate points, which could be divided into 30 themes, including an ‘Other’ theme for points made only by one actor (see Table 10). Upon further analysis, I organised 21 of the themes into six categories, with 2 – 5 themes each; the other 11 were separate enough to leave as individual themes. The six topics that together accounted for about 75% of comments (the categories) are: Administrative burden (Admin Burden); Aim of RED; Clarification; Competitiveness; Suggestions; Gaps/ flaws in the document.
Table 10 gives an overview of the themes expressed by at least two actors. Each ‘X’ denotes a comment made by the actor, related to that theme; blank indicates they said nothing on that theme. There are 9 public representatives, 2 public/private organisations, 5 companies, 9 member-based organisations (trade associations; two letters represent two associations each), and 2 NGOs/civil society organisations.

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<tbody>
<tr>
<td>Admin Burden</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Counter to aim of RED</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Smaller actors</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Unreasonable/ Reduce Burden</td>
<td>X</td>
<td></td>
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<td></td>
<td></td>
<td>X14</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>(Maybe)not being achieved</td>
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<td>X</td>
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<td>EU agric/prod is sustainable</td>
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<td>GHG Calc</td>
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<td>Mass balance time period</td>
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<tr>
<td>Control systems</td>
<td>xx</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>x</td>
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</tr>
</tbody>
</table>

14 According to RegelRådet’s assessment the administrative burden is acceptable
### Transport Biofuels in Sweden

**16 May 2011**

<table>
<thead>
<tr>
<th>Competitive ness</th>
<th>Profit</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overlap time</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Economic risk</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>XX</td>
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<td></td>
<td>Hinders comp</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>XX</td>
</tr>
</tbody>
</table>

| Suggestions | Existing, new systems/services | X | X | X | X | X | XXX | X | X | X |
| General | | X | | | | | | | |
| Reduce details to report | | X | | | | | | | |

| Gap/ flaw in legislation | Missing things | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Other impacts not assessed | X | XX | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Want more analysis/eval | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

| Harmonisation | xxx | X | X | XX |
| Existing legislation | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Barrier to development | | XX | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Verification/ Auditing | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Transparency/ Credibility | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Time Gap | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Certification scheme | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Biodiversity | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Far-away production | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Positive comments | xxx | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Other... | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

**Svenska Trädbränsleföreningen and LRF agree with Lantmännen’s comments**

X<sub>GHG</sub> – The comment relates to missing default values for GHG calculations

X<sub>SE</sub> – The comment relates to socio-economic impacts that have not been assessed

X<sub>ENV</sub> – The comment relates to environmental impacts that have not been assessed

---

15 Regulations such as these sustainability criteria do not exist for other agricultural land use

**SLU** – Swedish University of Agricultural Sciences

**SWEDAC** - Swedish Board for Accreditation and Conformity Assessment

Lantmännen – large corporate group covering food, energy and agriculture (owned cooperatively)
Administrative burden (Admin Burden):- highlights the concern that a high administrative burden associated with complying with the law will be counter-productive to the aim of the law; about the disproportionate burden inflicted on smaller actors that have less economic and administrative resources than larger actors; and calls to ensure that the administrative burden is reasonable. There are many references to ‘Administrative Burden’, which is not surprising as it was explicitly stated in RED that the Commission should ensure that “the provision of that information does not represent an excessive administrative burden for operators in general or for smallholder farmers, producer organisations and cooperatives in particular” (Article 18 point 3 paragraph 3, p39 of the Directive, (European Parliament 2009b)). However, I found that the catch-phrase ‘administrative burden’ was in fact used as a carrier for a number of quite different concerns, for example, excluding smaller actors and making bioenergy production unprofitable. A poignant example of this particular concern was voiced at the information meeting in Malmö: a small heating company has a choice to use either fossil oil or bio-oil for heating, and at the moment there is not much difference, so they use bio-oil. However, if they now have to do extra paperwork it just makes bio-oil that much more difficult to use compared to fossil oil, so they are likely to switch back to fossil oil.

The private sector and civil society are particularly worried about the administrative burden. It appears that trade associations are also more concerned about smaller actors than the production companies. Interestingly, the only two public actors commenting on administrative burden are the national Boards of Agriculture and Forestry – the primary production stages in the chain; as the Swedish Woodfuels Association together with the Federation of Swedish Farmers reiterate, there are tens of thousands of farmers and forestry units, often single-person companies, involved in the raw material production phase of the biofuel chain. This displays the difference in resources available to different actors. At the top of the chain – where the guidelines are focused – are a few large companies, with many staff and far greater economic and administrative resources. The public actors and the trade associations here are probably speaking for smaller companies that have not commented in their own right. It is important to highlight this difference, also between the few large liquid biofuel producers whom I interviewed, and the many smaller biogas producers. The impact of RED will be different on these two groups of actors, and it would seem from the comments that the impact on smaller actors has not been fully addressed in the national implementation of RED.

Aim of RED:– although this topic is quite similar to the Admin Burden, I separated it out because not all comments include administrative burden. Here is concern that the aim of RED (namely to promote increasing development of the biofuel industry) will not be achieved –for example, there are concerns that the sustainability criteria, implemented differently across the EU, will create varying competitiveness or even trade barriers. There were a couple of comments cautioning about the loss of energy sources to other uses, if RED is difficult to implement (The Swedish Traffic Board, Swedish Board of Agriculture and SWWA comment letters, 2011):

“It is also important to have an encompassing view, and if energy bearers that do not fulfill the criteria are instead used in another sector, the regulations have not achieved their aim.” (Swedish Transport Board, comment letter, 2011)

The other part of this topic is a few comments saying that agricultural production in Sweden and the EU is already mainly sustainable – due to the strict regulation by CAP and the national Forestry law and Environmental Code. Also:
“With the introduction of sustainability criteria in Sweden it is important to bear in mind that the criteria were primarily developed in order to prevent non-sustainable production and new production in tropical countries, not mainly already existing, environmentally-regulated, and sustainable production in the EU” (Lantmännen comment letter, 2011)

Clarification: – is the largest topic (about 25% of comments). Actors still find the guidelines too general, or unclear. There are questions about how to do the GHG calculations, requesting further definitions of terms, a variety of questions related to land use and how to ensure the control systems capture the correct data. There is also some uncertainty about the mass balance system used to calculate emissions and track a sustainable volume from field to filling station. It was stated that the entire process should be completed within 3 months – some feel this is either too short (e.g. biofuel producers who have to calculate feedstock in from previous harvests) or too long (e.g. the Tax Agency who compares it to general practice of 1 month).

Competitiveness – incorporates concerns about the marginal profitability of biofuel production – and of small producers – and administrative costs may then overwhelm profits. Uncertainty due to lack of clarification, and uncertainty in the market, threatens large economic risks – and actors are concerned about the transition period, between the law coming into force (1 Jan 2011) and guidelines coming out and into operation (beginning of March 2011, but reporting only required from Jan 2012). Fear that the sustainability criteria will hinder competitiveness comes up again here.

Suggestions – several of how to make it easier to report, to reduce the administrative burden, and further details that should be added to the guidelines. Suggestions include using existing control systems and institutions or expertise; also to limit the system boundaries further, so as reduce the amount of details to report, thereby decreasing administrative burden. Trade associations point out several missing things, predominantly default GHG values, but also have many suggestions for how the guidelines should be changed to make it easier for actors. Most suggestions are to use existing regulation, such as the Skogsårslagen (Forestry Law) and Miljöbalken (Environmental Code), and the control systems associated with these laws, and the CAP (e.g. Swedish Board of Agriculture, Lantmännen). The Swedish Woodfuels Association together with the Federation of Swedish Farmers say:

“The easiest way to show that we have sustainable production in Sweden (and in many other EU countries), is simply to refer to the relevant Forestry law and Environmental Code legislation, and how these regulations are followed in the field. Also CAP-regulations . . . provide an already well-established tool” (comment letters, 2011)

Gaps/ flaws in the document: – there are still missing definitions, apparently, particularly default values for GHG calculations for Swedish production chains; impacts that have not been assessed, particularly socio-economic impacts; and some actors call for further research, or continuous monitoring to ensure implementation is carried out with least negative impacts. The public sector is concerned about inadequacies in the impact assessment done in support of the guidelines – that unintended consequences have not been taken into account, or that the socio-economic impacts of who and how many will be affected, have not been fully explored or conveyed.

Individual themes include calls for aligning HBK to existing legislation, to increase harmonisation, and to ensure transparency and credibility. There are also positive comments on the hard work done by
the SEA to bring out guidelines that have been created in consultation with many different stakeholders.

Civil society organisations appear to be alone in their concern for the transparency, and therefore the validity, of the sustainability criteria, and particularly the verification of those criteria. Without due care taken to ensure credibility of the verification (particularly by voluntary schemes), they fear that complying with RED will purely be for tax purposes, and not in fact be any indication of increased sustainability.

In constructing the table I found that many comments conveyed qualified concern; as it is too early to judge what the impacts may be, they advise caution:

‘...if incentives outweigh the costs of compliance, the aim will be achieved’ (Transportstyrelsen)

Integration of new legislation with existing legislation would decrease the administrative burden, and make it clearer to understand what one must do to satisfy all the different pieces of legislation – thereby decreasing uncertainty, as actors will more clearly see whether or not they can satisfy all the legislation and lower the risk of unwitting non-compliance. Harmonisation would be more important at the EU level, playing a similar role to integration: decreasing uncertainty and confusion as it means that all actors would be following the same set of rules (rather than a different set of rules in each country, which is currently the case). Businesses, in particular, would prefer to know that all other businesses are fulfilling the same criteria (e.g. by all using the same voluntary scheme, or just one of a small set of accredited schemes) (Toop 2011).

In summary, the overtone of the comments and interviews is uncertainty about how the implementation will have an impact on the biofuels industry. As Svebio point out, there is large uncertainty in the market at the moment, making it an ‘unfortunate’ time to drive through implementation of RED (comment letter, 2011). It is difficult to judge how much of the protesting (that the guidelines impose too heavy a burden, or are too unclear) is voiced because it can be, and because it is human nature to resist change, more than because it will actually significantly impair and endanger the survivability of the biofuel industry. From the interviews with biofuel producers, it seems that the new legislation on sustainability criteria has been taken into their stride, because their production is based on European agricultural production that is already highly regulated and documented. Their main frustration with the criteria is whether or not the requirement is to trace back to individual farms, which would become very difficult, and extra work for not much gain, in all interviewees opinion. However, of far greater concern is the impact that the criteria will have in conjunction with the Energy Tax Law. Given the uncertainty in the market and the slim profit margins, the combination of administrative costs and uncertain tax measures could be to outweigh the profit margin and undermine biofuel production. On the other hand, given the right conditions, RED could provide the boost that it was intended to give, and that biofuel producers need; but it is too early to tell.
8 Governance for sustainability

8.1 Environmental Governance Mechanisms for Biofuels

I have constructed an overview depicting the environmental governance tools available and used in Sweden (see Figure 6), similar to that provided in “Governance for the Environment: New perspectives” by (Delmas and Young 2009, p8).

Environmental governance mechanisms, due to their multi-stakeholder representation, are designed to create solutions that address as many aspects as possible, by engaging relevant actors. However, each context is different, and a tailored combination of governance mechanisms works better than standard options (Delmas & Young, 2009). Figure 6 presents the Swedish mix of governance mechanisms that complement RED.

8.1.1 Public Sector

The EU Directives, as well as the HBK and tax laws have been introduced in Chapter 5 already. Other legislation that is relevant to the agricultural part of the production chain, and has been argued should be used in conjunction with the HBK legislation, are the Skogsrådslaugen (Forestry Law) and Miljöbalken (Environmental Code). All forestry and agriculture is regulated and documented according to these laws, and they could provide a body of experience and tools that could ease the implementation of RED. The Swedish Board of Agriculture, for example manages the Swedish part of the EU Integrated Administration and Control System (IACS) together with the Large Parcel Identification System (LPIS), a comprehensive digital data base of farm-level information, submitted by farmers in compliance with CAP, in order to get funding. This data base is monitored regularly, on
a random selection basis – over a thousand parcels of land are monitored annually. This system could form part of the land-use verification for reporting. (Niemi Hjulfors 2011)

Hosted in the public sector, although certainly also interacting with one or both of the other spheres (also represented in the intersection between all three sectors), are research programs, which are important for supporting the development of the biofuel industry – both new technology and improving efficiency of existing technology. For example, in Sweden is f3, a new Swedish centre of excellence for renewable fuels hosted by Chalmers University of Technology (f3 stands for Fossil-Free Fuels)16. Participants in the research group include five universities, three research institutes, Preem (oil company), Perstorp (chemicals and biofuel producer), Gothenburg Energy, E.ON Sweden, Scania, Sekab E-technology and Volvo Technology. These public research programs provide the enabling conditions for research into better biofuel technologies or other alternative technologies – given the uncertainty and youth of the biofuel market, this research is unlikely to happen without public support (based on comments in interviews 1&2), even with the RED targets as a driver for growth.

8.1.2 Private sector initiatives
The following two initiatives from biofuel producers are examples of in-house private regulation systems – not quite the same as Delmas & Young’s self-regulation industry programs (Delmas and Young 2009) as they each involve only the company that developed them and its direct supply chain. Both initiatives demonstrate the support of the private sector for the development of biofuels, and illustrate a governance mechanism that can bridge the time gap between the slower bureaucratic process and the customer demand for immediate compliance with RED.

SEKAB’s Verified Sustainable Ethanol Initiative (VSEI):-

“The Verified Sustainable Ethanol Initiative is an effort to physically guarantee Swedish consumers that they are filling up with good ethanol and to increase the offering of verified sustainable ethanol in close collaboration with the Brazilian sugar industry.” (http://www.sustainableethanolinitiative.com)

The VSEI is a system developed by SEKAB together with their Brazilian suppliers to provide verified and traceable Brazilian ethanol, so as to provide sustainable ethanol to Swedish consumers. The system is externally audited, with 7 criteria to be filled covering GHG emissions, deforestation, labour practices and ecological considerations (and the proviso that the system is in development, and more can be added at a later stage).

At a seminar launching the Initiative in Stockholm (28 November 2008), there were mixed reviews. The auditors’ report, given by Vanda Nuñes from SGS, confirmed that all environmental sustainability criteria were satisfied for all Brazilian suppliers, but minor social non-conformities were found – such as adequate safety and cleanliness of working conditions (Nuñes 2008). Peter Roberntz of the WWF, however, was more cautiously approving of the initiative: while it is a step in the right direction, the
initiative is only verified, not certified (not 3rd-party certified), that there is still a lack of transparency and social criteria (Roberntz 2008)\textsuperscript{17}.

**Perstorp’s Sustainability System:-**

The Perstorp Sustainability System (PSS) was developed on the basis that it is better to be proactive than reactive, particularly in an issue such as the biofuel debate where legislation and state governance is slow in coming. Perstorp had the advantage that their customers had strict demands to show that the fuel had been tracked and was sustainable, so they had to develop a procedure to satisfy their customers even before the EU had decided anything. Perstorp worked very closely with their buyers to ensure that the PSS was adapted to each buyers’ individual requirements, and at the same could easily apply to all buyers. The strict German ISCC voluntary scheme was used as a blueprint. However, a major difference between PSS and ISCC is the mass balance time frame: in ISSC the maximum time frame is 3 months, but Perstorp found this impractical, as the rapeseed harvest is transported to the crushers throughout the 3-month harvesting season; the seed may stay at the crushers for several months before it is crushed; then it takes time to transport the oil to Perstorp. Therefore the PSS has a longer timeframe for the mass balance.

All suppliers to Perstorp must at least be PSS compliant, if not ISCC certified. Therefore, suppliers must sign a declaration which shows that the oil is: i) from rapeseed; ii) of European origin; iii) the rapeseed has not been grown on land that was not of high carbon stock/peatland/with high biodiversity in January 2008 (i.e. compliant with Article 17 of RED); and iv) an independent audit has confirmed that i)–iii) are correct. Accompanying the declaration the suppliers must give details of country of origin of the rapeseed, the boat numbers used in shipping, the tonnages transported and other details that Perstorp feeds into their mass balance system. The declaration with supporting mass balance information is then passed on to Perstorp’s buyers, to show traceability and sustainability of their biodiesel.

8.1.3 **Cross-sector mechanisms**

**Public-private:-** As mentioned in section 8.1, the public sector is an important source of demand for biofuel producers. Public procurement provides a secure market, and is particularly important at this stage in the development of the biofuel industry, while it is “very young, very fragile market” (Interviewee #2).

**Public-civil:-** Various incentives are used by the Swedish government to promote ‘cleaner’ cars – either using renewable fuel, or with lower emissions and higher energy efficiency. For example, when purchasing ‘green’ cars, the Swedish government has previously offered a 10 000 SEK subsidy. Another example is that since 2009 customers purchasing a new ‘green’ car get a five-year exemption from vehicle tax (Energimyndigheten 2010a, p41). A different type of incentive is the congestion charge for non-clean cars in Stockholm, or the priority given to ‘clean’ taxis driving to and parking at Stockholm airport. Incentives coupled with information campaigns are vital to distributing the correct information to the public to reduce uncertainty and fear of the unknown. The introduction of E10 (petrol with 10% ethanol) in Germany without enough information is a good example of the value of keeping the public well-informed\textsuperscript{18}.

\textsuperscript{17}presentations available on the VSEI website - http://www.sustainableethanolinitiative.com/

\textsuperscript{18}For news articles on the introduction of E10, see (Cgh 2011, Hawranek and Neubacher 2011, Vierhout 2011)
Private civil: Information sharing between the private sector and civil society is also important - for example Preem’s advertising campaign for its new Evolution Diesel, with 5% pine-oil diesel from SunPine. Voluntary schemes are discussed in more detail below.

8.2 Voluntary schemes
An important aspect that has come out of assessment of the stakeholders’ perspectives is that more integration and harmonisation is required:

‘the heterogeneity of implementation [of RED] creates trade barriers in Sweden and Europe’ (Svebio, comment letter 2011)

From the interviews, literature and listening to the talks at the conference, it seems that voluntary schemes would be a desirable option, not least because they can provide a more standardised documentation and verification procedure that everyone conforms to. By comparison, the Swedish national system administered by the SEA leaves companies a lot of freedom to design the procedure themselves (building a control system, a GHG calculation model, collecting documentation and organising independent auditing). The voluntary schemes introduced earlier, in Chapter 5.3, have the potential to be very useful but are still in the early stages of implementation, and there has not been time to assess their impact. In theory, voluntary schemes have potential, apart from providing harmonisation (Toop 2011):

• They provide up-front assurance – you get certified before beginning to sell your product. In this way, there is less risk of the economic loss from unintentional non-compliance that can come with an annual report to the national system.
• They also provide greater certainty for buyers, who are likely to know about the certification scheme and exactly what standards it represents, compared to an unknown company-specific control system that is reporting to the national system.
• With certification, there is no need to report on the criteria to the SEA, theoretically, just to report your sustainable volume of biofuel sold (which is probably submitted with the tax report).

However, the schemes are just starting so it may take some time to get certified, particularly as the EU has not yet accredited any scheme. There are also some stakeholders that advise caution, for example:

“The Swedish Society for Nature Conservation would like to stress again that the objectivity and credibility of the labels and certification that will be used will be crucial for the requirements of the directive and law to be met. . . A poorly designed certification system can be purely counterproductive in terms of e.g. reduced emissions of greenhouse gases.” (Swedish Society for Nature Conservation, comment letter 2011)

Part of this concern is related to how much certification can actually cover and control – how many criteria are adequate to ensure a high environmental standard without imposing such a high administrative burden that it becomes unfeasible. This tension between the amount of detail requirement to cover all aspects and the proportional costs is pervasive and needs to be addressed. As WWF writes:
‘Obviously economic costs will increase with more requirements from HBK . . . SEA must show how economic concerns were weighed up against the credibility of implementation. . .’ (WWF, comment letter 2011)

8.3 Sustainability and RED

Before discussing sustainability, I have to be able to define what ‘sustainability’ is. As Thomas Prugh, Robert Constanza and Herman Daly eloquently write: “sustainability is .. a Trojan horse. . . Sustainability is provisional; it is subject to multiple conceptions and continuous revision, the very stuff of politics.” (Prugh et al. 2000, p7). After all, the literal meaning of sustainability is having the ability to be maintained continuously over a long period – thus when we ask for economic or environmental sustainability, we are asking to maintain the economy or the environment, presumably as it is now, continuously over a long period of time. Yet that is not exactly what we want – we want to reduce carbon emissions, for example. So, in discussing sustainability aspects we need to ask: What do we want to sustain? Or more critically: “Sustainability of what, for whom and why?” (O’Connor 2006, p291).

I would like to ask how sustainable is RED (the what) - how long can it maintain itself as a governance mechanism, working towards carbon emissions reductions (the why)? ‘For whom?’ is a complex question. First of all, assuming that RED holds the role of ‘system regulation’ in the tetrahedral, how does it govern the three spheres roughly characterising the biofuel industry, in Figure 7?

**Environmental sustainability** – or rather to sustain a state of environment that can support us continuously for a long time - is a major part of RED’s aim; to be achieved by reducing carbon emissions and minimising negative environmental impacts. From the comment letters, civil society is certainly concerned about the environment. However, although land-use is mentioned in a large number of comments, it is usually related to clarifying the definition of land-use change or rehabilitation of land for GHG calculation purposes. Although this is an environmental concern, the driver for the comments is not necessarily for the environment’s sake but rather to avoid non-compliance and associated economic risks for actors. This could reflect the bias in responses with only two civil society organisations out of 27 (with an equal representation of public and private organisations). The brief discussions of biofuel debates and voluntary schemes reveal that the political-environmental domain is not an easy one to govern. However, Fischer et al. report that about 40% of global arable land is degraded to some extent (Fischer et al. 2009, p30). Energy crops, particularly lignocellulosic crops such as short rotation coppices (Lund University comment letter, 2011) or grasses (Smyth et al. 2010) could be cultivated, also in rotation with food crops, to rehabilitate this degraded land and therefore reduce competition with food. Another way is to make biofuels from waste products. As Tilman et al. (2009)suggest, there can be ‘good’ biofuels, if they are grown on degraded or unwanted land, if waste products are...
utilised as much as possible, and if organic inputs and ‘green’ energy are used in the cultivation and processing. Therefore, increased streamlining of state governance between government sectors (e.g. between RED and CAP), and between industry networks could improve the environmental governance by RED, particularly as this is called for already in many of the comments.

**Economic sustainability** is incorporated partly in the aim of RED – companies must survive and continue to produce biofuel in order for biofuel production to grow. Many of the voices of the comment letters are concerned to some extent about economic risks, or reduced competitiveness, or administrative costs. The biofuel producers showed particular concern about the overall economic sustainability of liquid biofuel production – but indicating that their survival depends on the economic governance of the tax laws more than RED.

“A big worry is what will happen in the coming years with the tax relief – at the moment biofuels are exempt from tax, but will it remain that way? If not, then biodiesel will struggle even more to find a market” (Interviewee #1)

“Production companies are **not** making money, they are making a loss, and have done for the past years, and will do in coming years” . . . “in Europe and certainly in Nordic countries, the market is very young and could be extinguished easily with the wrong decisions.” (Interviewee #2)

**Social sustainability** is not explicitly represented in the aim of RED, although rural development is part of the EU agenda, so it may be implicitly acknowledged. CAP is more explicit in extending support for energy crops for rural development purposes. However, RED has already been criticised for the lack of social aspects, including the food vs fuel debate (food security), land access and labour conditions in tropical countries (Scarlat and Dallemand 2011). What is particularly interesting is that social aspects have hardly come up in the comment letters – and not in the interviews because I was not specifically asking about it. Comments regarding ‘smaller actors’ are focussed on their lack of administrative and economic resources, and therefore their exclusion from the biofuel market due to inability to comply – but all comments focussed on Swedish actors. Only two comments mention far away production (i.e. outside of Europe) and those were concerned with transparency and traceability (Lantmännen and Swedish Society for Nature Conservation comment letters, 2011). However, this could be a result of sampling bias – that the policy guidelines being commented on relate to local production – and perhaps had I studied other comment letters, perspectives on social aspects would have been voiced.
Part 4: Looking Ahead

“I may not have gone where I intended to go, but I think I have ended up where I needed to be.”
Douglas Adams

This research has investigated the implementation of RED in the Swedish biofuel industry, by collecting stakeholder perspectives. The predominant message from stakeholders is a request for more clarity, increased certainty for the future, and urging speedy, though balanced delivery of regulations, given that the legislation has already been in force for almost a year in Sweden. Advice on good governance, particularly in the economic domain, is to send messages to the private and civil sector that loud, long-sighted and legal (Bomb et al. 2007, Newell 2010). Is RED loud, long and legal?

RED has a time-horizon of 2020 – relatively short-term, given that the time planning to production for a biofuel plant is several years. However, RED is a stepping stone in a longer EU strategy that extends to 2050 (Energy Roadmap 2050). RED has elements of ‘long’ in that it is flexible to alternate transport fuels: Directive encourages biofuels from waste and cellulosic material, and electricity for road vehicles, by allowing these fuels to count twice, and 2.5 times respectively, towards the 10% target. Concern about the credibility of voluntary certification schemes is a good example of the ‘legal’ criteria for success of a governance mechanism, mentioned earlier. It is very important that any certification scheme is seen as legitimate, whether voluntary or mandatory or a hybrid, before they can usefully complement/enhance RED. As the Swedish Society for Nature Conservation points out, if ‘bad’ biofuel can be certified as ‘good’ biofuel, due to a badly-formulated governance mechanism, RED has failed (comment letter, 2011).

Regarding flexibility, it is very important to acknowledge biofuels’ role in the transformation of the transport sector – even ‘good’ biofuel will not replace 100% of fossil fuels, there is simply not enough biomass to feed current demand (see discussions in FORMAS 2008). Efficiency is a very important strategy, for example, increased vehicle efficiency could reduce fuel consumption by up to 25% (Magnus Blinge, in FORMAS 2008, p108-110). Biofuels is just a stepping stone; and investments will not be wasted –biofuel production can advance into bio-refineries, move from food crops to woody crops, and waste which can all build on the system being developed now.

In the discourses of sustainability, RED governance exemplifies ecological modernisation – with the view that technology development and increased efficiency will be enough. However, one of the biggest critiques of ecological modernisation is also mirrored by RED, that it is less relevant outside industrialised countries, and does not adequately address social issues. One interviewee mentioned that it seems like RED favours EU production (Interview #2), and certainly given the existing environmental regulation, the criteria are more easily fulfilled and monitored in the EU.
9 Conclusion

Is RED a useful governance tool?

I have found that there is still a lot of uncertainty in the Swedish biofuels industry, which could have negative consequences on the future development of biofuels if not addressed appropriately. A large part of this uncertainty relates to the early stage of implementation of RED; there are still clarifications to be made both at EU level and Swedish level, and the EC is yet to accredit voluntary certification schemes. However, if stakeholder perceptions are incorporated, and there would be increased co-operation between governance instruments, for example (linking RED to existing EU environmental legislation) then RED can be useful. The link with voluntary schemes is an important step to incorporating aspects that are not easily addressed by state governance. On the other hand, caution must be taken to ensure that RED remains flexible and focused on the aim of reducing carbon emissions. Considering governance from a sustainability perspective, to incorporate environmental governance, economic governance and social governance in a balanced fashion, and formulating a loud, long message can support useful, sustained RED governance.
10 References


Appendix 1

Interview Guide

Thank you very much for this opportunity – is it ok if this is like an informal interview? So, of course, you may decline to answer any of the questions I ask. First of all, I want to make sure I do this right 😊 So I’ll start with some privacy rights questions:

- Would you like to remain anonymous, or would it be ok for me to acknowledge in my report that the information comes from you or from your company?
- Would it be ok if I record this conversation, so that I can be sure to capture everything that was said properly? It’s perfectly alright if you would rather not have it recorded.

Basic information questions:

- How much biofuel do you produce annually, on average?
- I saw on your website that your feedstock (rapeseed oil) comes mainly from . . . – do you use any Swedish feedstock as well?
- Do you import/export much, in terms of feedstock and final product? (e.g. importing feedstock, importing biodiesel, or exporting your biodiesel)
- Who do you sell your biodiesel to? Private companies, or to filling stations?
- What are your targets and plans for future development?

Regarding the sustainability criteria:

- What has your experience been, have the EU sustainability criteria influenced your production?
- Are you part of a certification scheme, to show that your fuels meet the criteria?
- Have you experienced any challenges in producing ‘sustainable’ biofuel?
- What is your opinion of the EU sustainability criteria, and the certification schemes by which they are measured? Are they necessary, effective, useful? Do you think they are the best tool to encouraging sustainable biofuel production?
- Do you think that there could be any other policy tools that could also be effective in encouraging the growth of ‘good’ biofuel production?

Regarding Sweden’s future:

- Do you think Sweden will reach EU targets of 10% renewable transport fuel by 2020?
- Do you think Sweden will reach its own goal of an oil-free car fleet by 2030?
- Have you experienced that the biofuel industry in Sweden is growing? Is the market for biofuels growing?
- Would you have any advice for new businesses trying to enter the biodiesel/biofuel market, in Sweden or in the EU?
- Is there good cooperation or interaction within the biofuel industry, for example between producers and the policy-makers and car manufacturers, and amongst producers?
- Is there any sort of network in place between producers, so that you can work together towards sustainable production? (If so would it be ok for me to contact them?)
Thank you very much for your time!! Would it be ok, if I could call you in the next months for a short follow up question, if it is necessary?

(Note: the following sections give the notes for the interviews – I have replaced the capacities with ‘xxx’ otherwise it would be easy to identify the interviewed company, and I would like to keep anonymity as much as possible. Therefore I have also removed about 3 sentences in total from the interviews which related to easily identifiable information. This was only background information, not important for results)

Interview # 1: recorded notes
Discussion of sustainability:
- The company is very much involved in sustainability, having the approach that it is better to be proactive than reactive
- They have formed a Biofuels Group together with Svebio (in charge of the group), meeting regularly, to discuss sustainability, biofuel potentials, and lobbying activities
  o participants of the Biofuels Group also include Energimyndigheten (?), E.ON, Lantmännen Energi and Scania

Regarding RED and the EU sustainability criteria (comments and assessment):
- the targets and ambitions are very good, but it could be implemented differently
  o RED is different in that the decision was made on what ought to be done, before the discussion on how to achieve it, so it has now been a very slow process of implementing the decision, with many companies only just starting to do something about it now
  o It is a long process, taking many hours of paperwork, and a number of staff involved, to keep account of the whole production chain
  o It is a big load that the reporting of land use impacts is done by the economic operators distributing the biofuel, when the actual impacts occur much further back in the production chain, on the farms. It might be better if the farmers are responsible for reporting on the land-use parts of the sustainability criteria - the distributors of biofuel naturally should still report on the emissions section of the criteria
  o Certification? Yes, maybe, (although all companies work differently, with different paperwork, so maybe difficult to coordinate?)

- With all of the discussion only happening now about implementation of the Directive, there is also an imbalance in the power structure, whereby oil companies are large and well-established lobbyists, with a lot of influence, compared with biofuel producers who (in Sweden at least) are usually much smaller companies with less influence, so the oil companies can place extra demands on what biofuel companies should be doing, while the oil companies do not much by comparison
- All operators should have a mass balance system to keep track of the production chain – this will help to begin to show compliance with sustainability criteria

Question: has RED and the sustainability criteria had any impact on the company’s production of biodiesel?
No, their production has not changed – still get feedstock (rapeseed oil) from the same suppliers
- It is likely that the suppliers may have to change their processes, what they buy and who they buy from
- However, it may also be quite easy for the suppliers (the crushers) to comply as well, as they just adjust which oil they send to the biofuel producers – send the sustainable oil to biofuel and the unsustainable to vegetable oil
- But the company is ISSC certified, and two of their suppliers are also ISSC certified, and the third is compliant with the company’s internal sustainability criteria
- As the company started production in May 2007 (i.e. before January 2008) they do not have to start reporting emission values until 2013, which is helpful as some of the countries from which they get feedstock have not published their country report and therefore do not have default values available for the company to use in their report

General information for the company:
- Have a capacity of xxx tonnes RME, sold as various products:
  - B100 (about 10% of production) to bus companies and hauliers, municipalities and cities, and some filling stations
  - Then the rest as RME to varying standards (EU, Swedish and Norwegian) for low-level blending, and special high quality biodiesel for low level blending in particularly cold regions to oil companies such as Preem
- (from webpage) the feedstock rapeseed oil comes mainly from Denmark, but there are a few other sources from other parts of Europe – but all feedstock oil is from Europe
- They sell predominantly to Sweden and Norway, a bit to Finland, and potentially starting to sell to Denmark
- Plans for future:
  - To expand B100 market – that is a stable market, municipalities and cities with large bus fleets, that have a requirement for a certain amount of green transport, and tend to sign long-term contracts
  - Would like to expand biodiesel production overall, but constrained by capacity, and capacity expansion is constrained by the lack of biodiesel market, and investment constraints as biodiesel does not make much profit. It is also not easy to get a loan or grant anymore to develop biofuel facilities, as many that got financing some years ago, when there was a boom about biofuels, have now gone bankrupt.

Discussion about Sweden’s future:
- The biodiesel market at the moment is pretty full – with their company’s large production, other biodiesel producers struggling to make full capacity, and Statoil owning half the biodiesel plant in Lithuania – so not much opportunity for expansion of production of biodiesel
  - Big predicament, because Swedish target is 10% renewable fuel in transport sector by 2020, and the vision of a fossil-independent car-fleet by 2030, so to meet these production will have to expand, but it won’t if the market is not there . . .
- A big worry is what will happen in 2013 (?) with the tax relief – at the moment biofuels are exempt from tax, but will it remain that way? If not, then biodiesel will struggle even more to find a market
  - It also depends on the taxes on crude oil, but not so much on the base price of crude oil, as rapeseed oil tends to follow crude oil prices fairly closely
- Also, since the government decided after elections last year that the petrol/fuel prices would not go up, they are reluctant to increase the blend from 5% biodiesel up to the now-allowed 7%
  - But also, the tax exemption only applies to the first 5% of biofuel, so oil companies on their own won’t increase to 7%
- So the expansion of the biodiesel market depends on whether the level of blending is increased to 7%
  - Another potential for expansion is if the Danish markets open up
  - Also, ideally the market for B100 will expand
- So not much space for new entrants right now, but maybe in the future – maybe not a small company though, more likely a large company expanding into the Swedish market

**Interview # 2: recorded notes**

Basic information questions:
If I understood your website correctly, you press your own oilseed, and can also buy already-pressed oil from local producers. Also, most of the rapeseed comes from Skåne. Where does the rest come from? Outside Sweden? Outside Europe?

All their oil comes from AAK a Danish/Swedish company, with headquarters in Malmö, responsible for a majority of vegetable oil production and supply, dominate rapeseed oil in Sweden, have their own crushers. AAK buys 90% of the rapeseed produced in Sweden. So AAK gets the rapeseed, and crushes it, both for cooking oil (cold crush/press) and then further refined for biofuel, which the company then obtains. 70% of their seed is from Sweden, 30% is from Europe. As a major food producer, AAK are already strictly regulated by food industry regulations, also by US FDA (Food and Drug Association) rules.

To whom do you sell your biodiesel? Private companies, filling stations, etc.?

Three categories of customer: Consumers using the company’s own tank stations and their Tankkort (private and companies); to companies that use it from private filling tanks; to customers who use it for heating

Do you import or export any rapeseed oil, or any refined biodiesel?

They have been talking about it, talking of a secondary supplier, but maybe in the future; do already sell to one Danish customer, but for use in Sweden, so can’t really call it exporting.

Is it correct that you have a capacity of xxx m$^3$ per year? I don’t quite understand what it says on the website about xxx m$^3$ – is that what you could expand to?

Originally got the planning permission/environmental permission for two plants, next to each other, so that would be for xxx m$^3$, but the second plant is still in the planning stages, so current capacity is xxx m$^3$

Do you have any plans for future development or expansion?

Well, yes, for the second plant, and further expansion, but Catch-22 situation:
- Dept. of Finance is talking of introducing a tax on biofuels, but nothing definite, and until they know how much the tax will be (5, 10%) they can’t make the cost assessment, and can’t make the financing calculations for a new plant. Many projects are on hold until the Finance Dept. makes an announcement.

- But, lots of talk also from Kommuns, who are very bio-friendly, almost all want to have biofuel share in transport and in heating, so there is demand for more biodiesel; e.g. 10% of heating must come from renewable sources; in transport they often have a requirement for 100% renewable fuels (for public transport and Kommun vehicles);

- another example, had an enquiry from blue waste collection trucks (SITA), they use 8 000 m^3 diesel per year alone (that’s a lot!!) and they want to convert that all to renewable fuel – of the three options (ethanol, biogas and biodiesel) biodiesel is seen as the most reliable, but the price is too high recently compared to diesel, because the rapeseed price has been through the roof in the last 6 months

- so, if there are favourable tax conditions and a more equitable balance between fossil and biodiesel prices, then biodiesel could expand rapidly – or die quickly, if the reverse

Regarding the sustainability criteria:
Will the EU Renewable Energy Directive (RED) and the Swedish Hållbarhetskriterierlag influence your production in any way? If so, how?

RED won’t really affect biodiesel production – the tax is more important, not the sustainability criteria, because it’s all EU or Swedish feedstock, all compliant with CAP.

How will you report to Energimyndigheten, to fulfil the reporting obligations - are you taking part in a certification scheme, to show that your biodiesel meets the criteria? Or by some other means?

Energimyndigheten have given them an extra year to report, so have not worked out the details yet; but, in Ecobränsle’s case, they don’t see the need to have to report their biofuel, as it all is of European origin; they would anyway get all documents from AAK that the rapeseed comes from correct land, without social impacts, no burning forests etc.

Do you have contact with other actors (other producers, or actors from other sectors) to discuss the options for fulfilling the reporting obligations?

They are part of Svebio, and in contact with other biodiesel producers

Have you had requests for sustainability assurance from any parties or actors other than the government and EU (e.g. your customers)? Perhaps even prior to the EU directive?

Yes, from one big customer (oil company), demands for environmental and social assurances of good practice – no child labour, no harming the environment – because they are an international company, and setting the same standards as the EU

Have you faced any challenges in the process of verifying your biodiesel?

Not at the moment, but maybe in the future: in discussions with their suppliers, when it comes to stating which exact field the rapeseed comes from, and GHG emissions related to production, then problems could come in – how far down the production line must they go? Must they get exact figures for each farm? Each batch of seed comes from say 50 farms – can they just take an average? To get more detailed information would be too much work – and don’t see the purpose for it. Maybe later on, it could be useful to track trends in, say, fertiliser usage at the farm level, and say that they only want rapeseed from farms using less than certain amount of fertiliser per year.
What is your opinion of the EU RED policy, and the subsequent Swedish Hållbarhetskriterierlag, and of the measures being used to encourage sustainable biofuel production?

More protective than supporting...
- Sees sustainability directive as a way to keep non-EU feedstock out of Europe – in EU already have more than enough agricultural land, so ILUC (Indirect Land Use Change) shouldn’t have an impact in Europe, so it’s kind of hard to understand the need for the criteria
- EU is already paying farmers to not grow crops, so as not to have over-production and too low prices as a consequence, so hard to understand – but that’s a debate on politics, and for another discussion.

While there are no sustainability criteria applied to the fossil diesel industry, RED makes a distinctly uneven playing field for biodiesel, can’t compare to fossil diesel. Biodiesel industry is in a very strange position – their loudest critics are those that call themselves ‘environmentalists’, how can they be the enemy? They shouldn’t be . . . The debate is polemic – the ‘environmentalists’ are the loud minority, laying down the law, but they don’t make the market, so should not be dictating or influencing development – well-intended, but misdirected, “don’t see the forest for the trees”. Biofuel is a very young, very fragile market – except for maybe in Brazil, where they have large volumes, and many years of experience and have built a stable base – but in Europe and certainly in Nordic countries, the market is very young and could be extinguished easily with the wrong decisions. Production companies are not making money, they are making a loss, and have done for the past years, and will do in coming years – the only ones making money are the middle-men, the brokers...

There was a symposium in November, with the Departments of Finance, Energy and Industry, and a session on the tax on biofuels: the Finance Dept.’s stance is that they currently have 73 billion kr coming in from fuel taxes, if fossil fuel use goes down, then their income goes down – so need to recoup that, and their plan is to get it back by taxing biofuels... but if they tax biofuels, then biofuels will disappear . . . so they’ve backed themselves into a corner, and don’t know what to do next. Financial politics don’t go hand in hand with environmental politics at the moment.

Do you think there are any other potential policy measures or tools (alternatives to the current RED) that could be helpful and effective in encouraging the growth of biofuels while keeping it sustainable?

There has been an interesting debate about revising the tax system and taxation policies so as to tax all non-renewable resources – so look at the non-renewable content of all products and tax the product accordingly. This would address the heart of the problem, would be a sound, fair way to address universally resource scarcity – as it would also include taxing uranium. Then RED would mean something!

Regarding Sweden’s future:
Do you think Sweden will reach its target of 10% renewables share in transport fuel by 2020?

Presentation from Svebio mid-March, prognosis for transportation: 15% by 2020, updated prognosis from EM for 2030; Svebio then did calculations that exceed that, that there’ll be about 20% by 2020; with a high ethanol scenario, could be up to 30% by 2020
With your experience of the biofuel industry in Sweden, how do you think that the market for biofuels will develop in the future? Is there room in the Swedish biodiesel market for expansion of capacity?

Depends on tax laws and development in raw materials over the next years. Problem with vegetable oils – as with all agricultural products – is that prices go up and down with good and bad crops. Need to have stable prices for fuel – fossil fuel fluctuates slightly, or at least slowly, whereas rapeseed for example doubled in price in six months; need to address this before biofuels can grow significantly! Also need to address this for tax purposes – if rapeseed is cheap, then farmers use bio-diesel because it saves money, not because farmers are more ‘green’ in that year – but also, in a good year, biodiesel producers can break even, with a biofuel tax, but in a bad year, biodiesel producers won’t survive, if there’s a biofuel tax, because of such slim margins.

Thank you very much for your time!!

Interview # 3: recorded notes

Basic information questions:

I see on your website that your feedstock is wheat and rye; is it mainly from Sweden? Do you also import some wheat from other countries?

Mainly from Sweden now – before RED, used to import from Poland, Germany and Denmark, but can’t now (e.g. from Poland) because they haven’t sent in their calculations completely for the mass balance system for RED, but the company is certainly looking into importing again from the Baltic countries, once their calculations are complete for RED. When they do import feedstock again, it will have to meet their requirements, which basically means meeting the requirements for the Directive.

To whom do you sell your ethanol? Private companies, filling stations, etc.?

Oil companies, mainly for low blending, but also some for E85.

I’ve been looking at some figures – do you now produce more than half of Sweden’s ethanol?

Yes, their capacity is xxx m3, but Sweden imports a lot, and the company also exports quite a lot of their ethanol. Around 60% is sold to Swedish market, and the rest exported to Europe.

I read that you have recently expanded your capacity significantly – do you have further plans for future development?

Only to optimise the plant, and reduce bottlenecks, but no plans to invest a lot in a new plant, for example.

Regarding the sustainability criteria:

What has your experience been, how has the EU Renewable Energy Directive (RED) influenced your production? (didn’t specifically ask this)

Could you tell me more about the procedure you have recently been through to get the verification of your sustainable bioethanol?

There are the three options in the Directive, but the Swedish system so far is a bit of a hybrid (see below). In the Directive one option is to use a voluntary certification scheme, but none have so far been recognised by the EC, so they were rather obliged to use the Swedish alternative which was to get an external auditor to verify their process. So they built their own system to
As far as I know, you’re one of the first to report on your sustainability, is that right?
Yes, they saw that there could also be some advantage to being early, especially because they could, because of the situation of their plant, and their relatively simple supply chain, so it was not so difficult to get everything in motion quickly. Could be some competitive advantage in it as well.

Are you taking part in a certification scheme, to show that your ethanol meets the criteria?
No, see above

Are there other methods available, other than certification schemes, to verify your ethanol?
There are the three methods outlined in the Directive, but no voluntary schemes have been recognised by the EC yet – and then Sweden has a bit of a funny system, you just have to have your verification system checked by a third-party independent auditor. This isn’t really a voluntary scheme, or a national reporting system, something in between.

Do you have contact with other actors (other producers, or actors from other sectors) to co-ordinate the process of implementing the RED sustainability obligations? (For example, I heard about a Biofuels Group)
Yes. It is always useful to be part of such an association. They had an external consultant, and had contact with their customers when drawing up their system for verification, but often they were ahead of their customers and so they couldn’t really add much. They looked at the ISCC as well, and are pretty much in line with ISCC (so it would not be a big thing to just switch to ISCC if it were to become recognised).

Have you had requests for sustainability ‘certification’ from any parties/actors other than the government/EU (e.g. your customers)?
Yes, well of course since the first of January all their customers have required that their biofuel adheres to the Directive now, because it came into force on 1 January (2011?). So even though they only have to start reporting in April 2013, it is still a big risk not to have demonstrated compliance now already, because what if in 2013 you show that you haven’t been meeting the criteria for the whole time? Mismatch between the government timeline and the customer demands timeline. Uncertainties regarding financing, tax breaks – wonder if you then have to pay it all back to the government in the end. 2011 is apparently a ‘transition period’, but what does that mean? So safer to just be covered now, right from the beginning. (Also there is potentially some competitive advantage to being one of the first movers)

Have you faced any challenges in the process of verifying your ethanol? (forgot to ask)
Could say for this though, that they can’t import from other countries for the time being because they haven’t sorted out their calculations yet. That must be an inconvenience – but it will be sorted out in time.

What is your opinion of the EU RED policy, and the subsequent Swedish Hållbarhetskriterierlag? Of the measures being used to encourage sustainable biofuel production?
It is too early to say anything, really; lots of question-marks around the EU, with many countries not yet at the implementation stage. Too early to comment. The policy is fully justified. However, what can be commented on is the timing: the policy came into force in 2009.
Energimyndigheten only hired people to start dealing with it at the beginning of 2010. A first draft of the Swedish law came out in summer, and the law was accepted in August? And the instructions only came out from Energimyndigheten on last Friday (25 February 2011). So it seems that the government is working to a different time schedule, which could provide lots to comment on!

Do you think there are any other potential policy measures or tools (alternatives to the current RED) that could be helpful and effective in encouraging the growth of biofuels while keeping it sustainable? (didn’t ask)

Regarding Sweden’s future:

Do you think Sweden will reach its target of 10% renewables share in transport fuel by 2020?

Yes, they usually meet targets that they set – we still have 8 or 9 years; even if we only reach the target in the last year, that will be enough 😊

With your experience of the biofuel industry in Sweden, how do you think that the market for biofuels will develop in the future? Is there room in the Swedish ethanol market for expansion of capacity?

If you only take a Swedish perspective, then yes, there is certainly room for new production capacity, as Sweden imports a significant amount of ethanol. But you cannot only have a Swedish perspective, because it is a European market that you will be entering, at the very least, and you may have to export your product, and import feedstock, so you have to take the larger European market into account when doing your investment cost-benefit analysis. Also, a major factor in causing uncertainty to the ethanol price is the USA and Brazil. The EU will probably import 1.2 million m3 in 2011, mainly from the USA and Brazil – this is compared to Sweden’s consumption of almost 400 000 m3. So for the EU this is a lot, and for Sweden certainly this is a large amount – but to the USA and Brazil it is a small amount, just their excess. So they are big players, and to a large extent the global market price for ethanol depends on their decisions. So it would not make good business sense to plan a large investment such as would be needed for building a new plant, and only taking into consideration Swedish or even regional supply and demand. You have to take into account the EU and even the international market forces. So it gets a lot more complicated.

Do you have any further comments about the process of implementing this new RED policy, in what seems to be a somewhat unclear climate regarding legislation? (didn’t ask)

Do you have any questions to me?

Just to see my finished report, it is always very interesting to see what perspective I got from it (the interview with him?) and what I find from other companies.

Thank you very much for your time!! Would it be ok, if I could call you in the next months for a short follow up question or two, if it is necessary?

Of course, any time.
Notes from the Energiutblick 2011 Conference Session: ‘Sustainability Criteria for Biofuels’ (Göteborg, 16 March 2011)

Facilitator: Emmi Josza, Energimyndigheten

Speakers:

(All presentations are available on the Energiutblick website, http://www.energimyndigheten.se/sv/Foretag/hallbarhetskriterier/Presentationer/)

Per Wollin: Introduction
Energimyndigheten

- 10 minute summary in English of what was said in the Informationträffer
- Interesting (looks like EM is trying to make it as easy/smooth as possible to implement): although RED says mass balance must be carried out for one defined location, EM says for Swedish operators, all tax-registered locations in Sweden can be counted as one location
- See the presentation. . .

Lena Niemi Hjulfors: Verifying sustainability criteria for land use in Sweden

Jordbruksverket

- Jordbruksverket is now working on guidelines for implementation of the three Energimyndigheten pieces of legislation – the law, the föreskrifter and a third one
- But primary forest, legally protected areas, highly biodiverse grassland all have specific management systems regulating them, if you want to do anything in those areas, you have to notify relevant authority (and get their approval?)
- All pastures and meadows considered to have high biodiversity are registered in ‘Tuva’ (not sure of spelling) – but it’s not complete, always being updated
- Wetlands and peatlands can be used if it can be shown it doesn’t alter their functioning
- Drainage of peatland must be authorised – in many areas now you won’t get authorisation
- Most forestry areas are old forests – more than 50 years – so not likely to have a change of landuse to forestry since 2008; also all fellings must be notified, and also state if you will remove branches, etc. – so pretty easy to keep track of (Swedish) forestry products
- Looking at the problem of landuse change to arable land:
  - From forestry – not likely
  - From sparsely wooded – those areas might be old abandoned arable land that got overgrown, so may need to watch out for that, but it would then be low productivity
  - From grassland – two types of grassland, on agricultural land (pastures and meadows) and in the mountains; in the mountains it is not suitable for agriculture, so no need to worry about that being changed; agricultural grassland is heavily regulated by CAP, so probably can keep an eye on it quite easily

How to verify your landuse:
- There is a system (IACS – didn’t get the long form) which is used to administer the payments under CAP – uses a digital register (LPIS) of all agricultural land that is eligible for single farm payments; the land that is not on LPIS is probably abandoned land, or private land used for horses, or small scattered/fragmented blocks of land...
- This is a well-regulated system that you can use to pull up details about any block of land registered on it, and therefore use it to verify land use: has the block of land, ownership, status (ok, under investigation etc) what crops are on it
  - This information is supplied by the farmer when he applies for payments under CAP
- With this system and Tuva, for example, can monitor land use change
- They randomly select 1250 blocks of land to be checked every year
- Controls done by aerial photos or field visits
- Jordbruksverket planning to develop a system that economic operators can use to access information on what land was used for in 2008 for verification – plan to have it online by 2012, in the meantime organising a table of information drawn from it
- Shouldn’t only use this system, should use it in connection with aerial photos for example

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**Gemma Toop: Complying with the RED – practical challenges for the industry**

**Ecofys**

- Ecofys is a sustainable energy consultancy, deal broadly with bioenergy sustainability, based in UK but with offices in other EU countries as well; working with EC, helping to assess verification systems for approval, and working with some governments to develop the national law
- So, what are the practical challenges facing industry, in verifying the sustainability of their biofuels?
- Challenge is actually showing that they do demonstrate what they need to
- Giving a brief background of the policies:
  - Knew that biofuel from waste and lingo-cellulosic material counts 2x towards 10% target; Didn’t realise that electric cars count 2.5x towards the target!
  - Fuel Quality Directive: same sustainability requirements on biofuels; also calls for a 6% improvement in energy efficiency over whole life cycle – combustion is the process with greatest potential for improvement, other processes are almost as efficient as they can be
  - Chain of custody: every step of the chain must have a mass balance to show incoming/outgoing sustainable biofuel
  - Although Member States were supposed to have transferred the Directive into national law by 5 December 2010, not all have done so . . .
  - Land use criteria pretty much only apply to the feedstock, but GHG criteria applies at all stages! Can use default values for the whole chain, but only for areas and production chains that have been calculated, and shown in the Annex to RED
- RED suggests that the person obliged to report could be the person who pays the tax on the fuel – she wasn’t sure what Sweden ended up saying about who is rapporteringskyldig. . . (is this what they were talking about changing it to, at the Informationträffe?)
- Some uncertainties, and places where RED is still open to interpretation by Member States:
  - EC hasn’t yet properly defined what is highly biodiverse grassland, or what degraded land is – so it’s difficult to know whether or not you comply with RED yet, might think you do, and then find out later that actually you don’t, cos the definition isn’t what you to interpreted it to be . . .
  - Also haven’t defined completely what are wastes and residues – cossomething can be waste in one process/sector and residue in another, or depending on the circumstance, or . . .
  - So these are up to the Member States to define at the moment, and if they all define the terms slightly differently . . .?
  - Also, up to interpretation, how exactly the mass balance systems should work
  - Problem is that it could lead to an uneven playing field – companies interpreting it for themselves, (to suit their circumstances) could lead to unintentional non-compliance, if think they’ve interpreted it correctly, but turns out the government or EC interprets it differently
  - Companies have told Ecofys they would like to see harmonisation – everyone knows what the state of play is

Voluntary schemes:
- often limited in scope to certain part of the chain, or certain products, etc.
- implies “up-front” certification – all points in supply chain get audited, then you receive a certificate, before you sell your product as sustainable
- many schemes have applied to EC for approval
- many schemes still new, under development, not well-tested – still a lot of work to be done to get them off the ground; to get companies certified will take time
- once recognised by EC, all Member States must accept the approved scheme
- Advantages:
  - schemes offer quite a high level of assurance – all steps are audited
  - the administration cost is shared across the chain – each step organises the auditing of their step
  - gives certainty to buyers
- Disadvantages:
  - Possibly higher overall cost
  - Lower levels of auditing in some regions – lower resources, so could take some time to be truly feasible…

National systems
- Some MSs doing their own assessment of voluntary schemes
- Mainly provide data after biofuel has been supplied to the market – e.g. at year end, when it then gets verified
- Verification of data is sample-based
- Advantages:
  - Lower overall costs – because it’s sample-based rather than auditing the entire process chain
- Can cover anything and everything, and can start immediately, so feasible in the short term (unlike certification schemes, which might only be truly useful in a few years)

- Disadvantages:
  - Lower certainty to buyers – cos only sample based verification
  - Lower certainty – only verified after the product is sold, at year end; what happens if it turns out it didn’t pass?

- Challenges for Member States:
  - To put national systems in place ASAP, because the voluntary schemes can’t be used yet
  - Challenge to actually get data, to get what does or doesn’t comply, to get all the details right
  - You have to use actual values if your farm lies in a geographic region (NUTS-2) that isn’t compliant according to EC calculations (I think these areas are also explained in the Annex to 2009/28/EC)
    - Can get complicated to carry that data up the chain then

- Challenges to industry:
  - If buyers get fuels from spot market, it could be impossible to know where that fuel has come from
  - Will require much higher traceability
  - If several MSs have different requirements, difficult to comply, if you supply them, or buy from them. . .

- Example/comment: UK has been operating a reporting scheme since before RED came out, lesson learned is that verification is very difficult! They have been developing more and more detailed guidelines on implementation and for verifiers

- In conclusion:
  - there is only a short time available now in which to comply
  - many uncertainties remaining to resolve
  - risk of un-harmonised implementation – and therefore an uneven playing field
  - voluntary schemes may be a solution to non-harmony, but not in the short term

Sigrid Brynestad: Verification in practical terms

DNV

- directed at auditors – also explaining what it is that auditors will be doing
- look at what companies already have in place – much info companies already have, just not in the exact format, or not using that info yet
- some info companies won’t have
- remember: it is the verification of the system not of the product that is required
- ** Germany requires certification – Sweden doesn’t, many other MSs don’t
- many companies are already certified with a management system – ISO 14001, 9001, 22000
  - see if you can use that, adapt it to cover all the RED/HBK lag requirements
- of all the requirements (as laid out in the HBK lag), just a few things that are not already in management systems:
  - include operations and supply chains – but you should already know your supply chain anyway
  - calculating GHG – will probably need to add that
  - must be auditable – most management systems are auditable
  - must keep documents for 10 years instead of the normally required 5 years
- of the requirements just one that is not already audited:
  - sustainability – this will be easy or hard depending on your supply chain
- then showed a number of slides detailing the auditing process: DNV will do a risk analysis first, seeing what the risk is that you will be non-compliant – gave a list of things they check; that gives them a scope of the audit; then they develop a system together with the company . . . etc.
- what the report includes. . . see the presentation
- re-verification every 5 years (complete review); check-up once a year (evaluation of any changes; control of mass balance; control of traceability)
- Conclusions: if you have a management system, you may be able to add onto it, so not doing as much ground work; this won’t work in Germany though...
## A full list of actors that commented on the law and regulations

<table>
<thead>
<tr>
<th>Actor</th>
<th>Swedish name</th>
<th>English name</th>
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<tbody>
<tr>
<td>Government Agency</td>
<td>Jordbruksverket</td>
<td>Swedish Board of Agriculture</td>
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<td>Government Agency</td>
<td>Naturvårdsverket</td>
<td>Swedish Environmental Protection Agency</td>
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<td>Skatteverket</td>
<td>Swedish Tax Agency</td>
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<td>Skogsstyrelsen</td>
<td>National Board of Forestry</td>
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<td>Trafikverket</td>
<td>Swedish Transport Board</td>
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<td>Swedish Better Regulation Council</td>
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<td>Swedish Board for Accreditation and Conformity Assessment</td>
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<td>Skogforsk</td>
<td>Forestry Research Institute of Sweden</td>
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<td>Fortum – Energy company, part-owned by Stockholm municipality</td>
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<td>Company</td>
<td>Lantmännen</td>
<td>Lantmännen–Large corporate group, owned cooperatively by Swedish farmers, with branches for food, energy and agriculture</td>
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<td>Swedish Waste Association</td>
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<td>The Federation of Swedish Farmers</td>
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