# Description of services

# Bioenergy – logistics chain cost structure and development potential

2005

# 1 Purpose of the delivery

## 1.1 Introduction

- Europe
In the Green Paper on Renewables from 1996 the European Commission set the target of doubling the share of renewables in the EU gross inland energy consumption to 12 % by 2010. The subsequent Community strategy outlined a tripling of the use of biomass as a way to achieve the renewable objective.

The recent expansion of the European bioenergy sector has been partly met by increasing regional, continental and intercontinental trade. These increasing trade volumes imply more focus on the logistics chain and trade development.

The market for bioenergy outside of the traditional forestry industry is immature, with a lack of logistics, few actors and a limited capital market. On the long term industrial parties (forestry, pulp and paper, timber industries, energy, agricultural, food) will become the major players in this market.

As increased bioenergy trade can have significant influence on existing markets (interlinked markets: paper, food, timber), the impact for food production has to be managed through sustainable use of natural resources.

- Norway
The liberalization of the Nordic electricity market has led to intensified utilization of existing power generation capacity, decreasing electricity prices and eroding reserve margins. Hence, attracting investors into the new markets with increased energy efficiency and renewable energy is becoming ever more crucial. The establishment of the State enterprise Enova SF[1], operational as of January the 1st 2002, reflects a more active government policy in these respects. Enova formally acts as the manager of the State “Energy Fund”. This defines a financial basis of about EUR 80 million/year for investments in new renewable energy capacity and increased energy efficiency in Norway.

Enova’s “Heat Assessment Study 2003” has summed up the major barriers, opportunities and fundamental strategies in order to establish a well-functioning bioenergy market. It is also estimated that the amount of biomass available for energy purposes, on a close to commercially sound basis is about 10 TWh. Of this 1.5 TWh is likely to be realized by 2010. District heating systems, micro-grids and central heating systems define the major market segments. Some industrial parties have already taken strategic positions.

Without the development of a well-functioning biomass market the national ambitions concerning bioenergy may not be met. Investments in infrastructure and conversion capacity rely on minimization of the risk of supply disruptions (in terms of volume, quality as well as price). This is vital to develop stable market activities.

Existing investment support schemes address fuel supply, central heating systems and the district heating infrastructure. These schemes are backed by information, training and public relation activities.

The overall project objective is to investigate the bioenergy logistics chain cost structure, development potential and describe an optimum logistics chain to a conceptual design level.

[1] Detailed information is available at www.enova.no

## 1.2 Purpose of the delivery

The novel biomass market is characterized by small volumes and the lack of efficient logistics. However, the identified market potential is significant and activity is increasing. Several industrial parties have taken strategic positions and made initial investments in the market. This should result in significant cost efficiency gains and increased competitiveness.

Analysing the fundamental cost structure, quantifying the development potential and describing the optimum logistics chain to a conceptual design level will provide valuable information to industrial parties wanting to engage in or expand their existing activity in this market. Thus, the overall aim of this project is to support these parities in their development of existing logistics chains and the adaptation of new ones. In order to stimulate an outcome with direct relevance to industrial / market parties, the project will focus on a pilot market / region. The ambition is to initiate activities supporting short and long-term market developments.

Generating and disseminating information and advice about how to carry out subsequent phases will also strengthen the ability of governmental bodies (e.g. Enova) to develop the related framework required in order to meet the national ambitions.

The objective of this request for tender is that Enova would like to receive offers for evaluations / analyses / descriptions, in which the expected most effective scenarios are presented for the development of the logistics chain in the perspective of 5, 10 and 15 years.

The background to the request for tender is the Heat Assessment Study, revised market potentials, previously published research and reports of relevance.

### 1.2.1 Scope of Work and Objectives

The overall scope of work is defined to:

- review, consider and describe to conceptual design level highly efficient and environmentally friendly logistics chains for the transport of biomass from production sites to central storage facilities (e.g. terminals, production plants and central heating systems)
- evaluate the impact of market volume on logistics chain efficiency and cost structure
    - taking into account the realistic potential for biomass supply (e.g. volumes vs. price and transport distances) vs. the realistic market potential.
- evaluate the short and long-term impact of potentially increased biomass imports / exports on the Norwegian market
- recommend the subsequent phases of work that will indicate how the logistics chains should be organized and carried out. Indicate expected schedules and budgets.

In order to fulfil the overall scope of work the following generic objectives have been defined:

- Provide insights in the development of biomass resources and supplies in relation to market demand. This implies:
    - Stimulating and documenting the exchange of information on bioenergy experience between parties of different stages of market development and different market positions within the chain.
    - Generate an overview of available information, work and experience. Aim: improve insights in factors that will influence the supply of biomass for the short, medium and long term.
    - Synthesize existing barriers (technical, logistic, economic, organization, regulatory) hampering development of the local logistics chain.

    - Special effort is to be put into generating an inventory of opportunities for developing working biomass and bioenergy markets and advice about how to overcome related barriers.
- Explore the possibilities for starting trajectories towards demonstrating how improved biomass logistics can contribute to stimulate market growth.
    - Use concrete case studies of chains and transport systems (incl. sea transport) to identify possibilities for pilot- and demonstration projects and aim to support their development. Special attention is to be put upon the performance and further development/optimisation potential of these supply chains.
- Evaluate the competitiveness of Norwegian / international biomass resources for international markets and the local/national Norwegian market.

### 1.2.2 Constraints and requirements

The following constraints are to be fulfilled:
- The project concerns biomass for energy purposes. The term biomass is defined as forest wood, bi-products from traditional forestry industry and pellets.
- The pilot market / region is defined as:
    - The primary geographical region of concern is defined as being within a transport distance of 150 km from Oslo Airport Gardermoen (just north of Oslo). Illustrated in Figure 1.
    - The market sectors to be taken into account are district heating, micro-grids, central heating systems[2] and end-use (household).
- The results of the project are open, public and are to be actively disseminated.
- All documentation is to be provided in the English language.

The assumptions used in order to develop the different scenarios are to be described and their motivation outlined, the use of public means and other important requirements for the development of the logistics chain are included.

The construction of the required scenarios shall be based upon realistic expectations concerning biomass availability, market volume and future market growth. This includes granted concessions, existing plans for new district heating plants/networks and the development of the market for local central heating systems, as well as the end-user / household market.

Assumptions applied concerning the future development of the biomass price level must be well documented. This includes the prices for the raw material and the final product quality as delivered to the end-user. The same requirements are put on the corresponding development in the price level for alternative energy carriers and the related end-user prices, as well as other externalities of importance.

### 1.2.3 Deliverables

The final presentation package will be produced by Enova’s existing contacts and is not part of the deliverables. However, the basic structure of the presentation must be delivered together with tables, figures, maps and adequate descriptive text.

Dissemination activities are considered highly important. The derived scenarios chosen have to be described with fuel volume, time, place and execution in a way that allows the subsequent generation of maps and other illustrations showing the identified characteristics of the

[2] The term ”central heating systems” is defined as to include micro grids and biomass boilers with a minimum installed thermal effect of 100 kW.

predicted logistics chains and the related bioenergy market. The expected infrastructure costs relative to the energy profit (e.g. NOK/kWh and NOK/m3, in the form of a supported budget estimation) for the different cases are to be described and quantified. The main deliverables include:

- process information gathered on the logistics chain cost structure and development potential
- advice to Enova and relevant industrial / market parties on how to develop and support development of efficient logistics chains
- compact written reports / papers on appropriate level (non-technical, *policy oriented* character).
- Dissemination activities
    - o Documents should be actively distributed to dedicated audiences, etc.
    - o Core results are to be published and disseminated through national and international seminars/conferences and journals. Presentation at one of the IEA Bioenergy Task 40 events (www.fairbiotrade.org) is considered as a minimum.

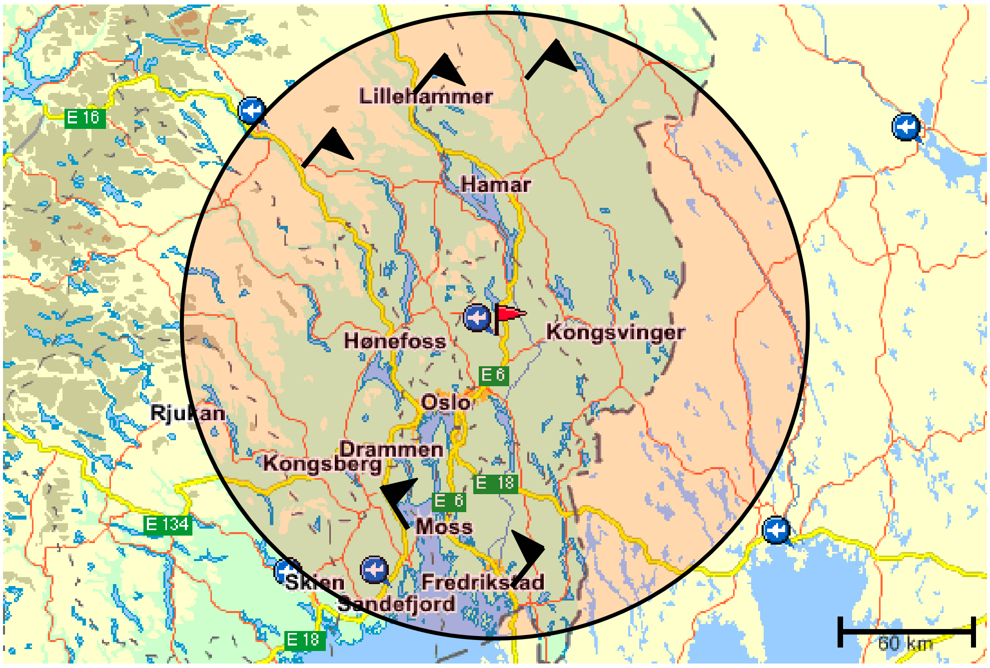


Figure 1: Geographical area of interest. The red flag indicates the location of Oslo Airport Gardermoen. The black flags indicate 150 km transport distance by road, away from the Airport. The radius of the circle is 150 km.

## 1.3 Organizing

Cost efficient trading and logistics will incorporate improved utilization of existing solutions as well as the development of new and innovative solutions. Optimisation is likely to imply that a series of actions has to be taken, cross-cutting boundaries between partly competing markets and market parties. It is vital to be aware of the several development stages of these markets and act in close cooperation with key stakeholders. These elements are carefully reflected in the project organization. Hence, dedicated personnel from Enova (an internal project group) will be teamed up with an external project group. The external project group includes a reference group as defined in chapter 1.3.1 and the successful bidder. Enova is responsible for defining the reference group and its mandate.

The formal project owner and funder is Enova. Håvar Risnes and Viggo Iversen represent Enova. This internal project team is responsible for including other relevant employees of Enova where appropriate and necessary. Håvar Risnes is assigned to be responsible for the project and acts as the project manager.

The formal position of the reference group is to act as an advisor to the successful bidder and Enova. It is expected that there will be a total of four meetings with the reference group. Enova is responsible for arranging these meetings.

### 1.3.1 The reference group and its mandate

The main responsibility of the reference group is to maximize the project outcome, i.e. fulfilling the following mandate:

- To be actively engaged and involved in supporting and stimulating the external project group to successfully fulfil the specified task objective and deliveries, with focus upon activities of special relevance to Enova SF.
- To provide insight in the Norwegian heat market, hence being a forum for discussions, the exchange of ideas, experience and know-how.
- To make contacts / networks of special relevance to the project outcome available for the project group.
- Identify primary challenges for the market parties. Hence, identify and keep focus upon the critical barriers[3] hampering their effort to stimulate market growth, on the short to medium term.
- To validate project deliveries (the final report).

The reference group represents interlinked businesses that are all significant stakeholders within the regional bioenergy market. This includes Norway's largest cooperative of forest owners, Europe's fourth largest producer of sawn timber, Norway's largest district heating utility, Norway's leading developer of new biomass based district heating systems, the Norwegian Agricultural Purchasing and Marketing Co-operation (FK) and one biomass trader.

The following experts have accepted an invitation to participate in the reference group for this project:

- Knut Mikalsen, Project manager, Viken Fjernvarme
- Erik Nilssen, Project manager, BioVarme
- Knut Lundem Hougsrud, manager the Norwegian Agricultural Purchasing and Marketing Co-operation (FK) / FK Maskin AB
- Berit Rødseth, Project director, Moelven Timber
- Ellef Grimsrud, Viken Skogeierforening
- Roar Paulsrud, NOR-EST.WOOD

Associated member:
- Alakangas, VTT Wood Energy Technology, Finland

### 1.3.2 The Bidder

The Bidder reports to Enova's internal project team (as described previously in chapter 1.3).

Within the scope of work, the Bidder must take into account that the developed scenarios and the related data collection, processing and relevant discussions shall be examined by Enova before the final project report is accepted. Enova intends to organize weekly progress meetings where the successive results of work will be analysed.

The Bidder is required to participate in all meetings with the reference group. The Bidder is to actively be engaged in and stimulate the dialog with and among the members of the reference group, thereby utilize its know-how and network of relevance – in the best possible manner.

[3] Which can be effectively reduced / eliminated within a relevant time frame

The successful bidder is expected to actively engage Norwegian as well as international competence throughout the project. The project and its deliveries are to strengthen Enova's activity dedicated to introduce bioenergy as a renewable, environmentally friendly, industrially driven, as well as an integrated part of the Norwegian and international energy market.

The bidder's success in incorporating both national and international expertise (e.g. relevant academic, industrial and market parties) is put as one of the qualification requirements.

### 1.3.3 The Bidders involvement of sub-contractors

Sub-contractors engaged by the successful bidder, in executing the contract, are to be described in a short résumé, including references and a contact person.