Country Report, SWEDEN

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1. Introduction and brief history

International trade within the bio-energy sector started early in Sweden. Several factors coincided to develop strong drivers for that development of international trade, i.e. political decisions, the structural pattern of the end users, and the traditions and networks of the Swedish industry with regard to international trade.

In the 1970íes the Swedish national energy policy started to focus on the necessary change of energy generation systems. In the first years the heavy oil dependence of that time was recognized as the main problem, later came additional aspects related to the phasing out of the nuclear energy, sustainability, and the climate change. The incentives gradually followed that trend and turned to measures to support renewable energy and in particular climate change mitigation.

Most cities in Sweden had district heating systems originally based primarily on combustion of imported oil. When the policy measures led to change to solid fuels that structure was also suitable for import of solid fuels.

Major companies in Sweden related to the bio-energy sector were and are working in international markets. That is true for enterprises e.g. in the forest industry and in the combustion technology. Therefore, both sourcing of raw material, shipping and international trade were already parts of their established businesses, and consequently it was relatively easy in the emerging bio-energy trade to mobilize competence to carry out economic analyses and to go on with practical handling.

In a comparably small scale the import of bio-energy took place in the period 1975-1990. It was mainly cheap fuels in form of waste from the food

industries, e.g. olive kernels and other similar fuels which could compete with coal in a direct price comparison.

After 1990 the import grew due to introduction of stronger incentive measures and to the development of new sources: (1) the opening of direct access to cheap biomass in the Baltic states, and (2) the stricter rules for wood waste handling and combustion in Germany and Holland which led to a flow of very cheap fuel from recovered wood ("RT-chips") to those existing plants in Sweden which already had feasible combustion technology for those fuels. In recent years, the construction of similar plants in Germany has led to a decrease and possibly a stop in that flow.

2. Biomass flows at present

The user pattern differs with the various biomass products. Imported fuel such as chips, bark, saw dust, and fuel chips from imported round-wood are utilized primarily in large and medium sized district heating utilities The typical importing utility plants are located at or near suitable ports. The map below shows the general pattern of utility plants and plants with a significant amount of imported wood fuels.

With the introduction of electricity certificates and tradable emission rights it is likely that the process industries, e.g. the forest industries will increase their use of biomass fuels and consequently also increase their use of imported wood fuels.

Imported wood pellets and wood briquettes are also used in district heating utilities. To an increasing rate these types of imported fuels are also used in small and medium scale burners in individual households, small energy heating units, schools etc. In these cases fuels are imported by middle men or distributors.

Propellant fuels, e.g. ethanol are used by the main “oil companies” either as low mix (5%) in petrol or as 85% ethanol fuel.

2.1 Quantities and types of biomass

The official statistics is a poor source of information for biomass import. Biomass is imported under different definitions and it is often mixed with other categories of products. This is especially true for wood in unrefined forms.

Round wood in form of pulp wood and saw logs is normally imported in undebarked form, and as the bark is used for energy purposes it could be classified as “imported biomass”. The same could be the case for saw dust and other residues from imported logs.

Moreover, a portion of the round wood import consists of energy wood for direct use (after comminution) for energy generation. However, the import statistics does not separate the various types of round wood.

A rough estimate may be based on the value for the total import of wood.

Total import of wood (Board of Forestry)

	2003	**2004**
Round wood million m3 solid under bark	9.1	9,5
of which		
coniferous	57 %	55 %
broad leaved	43 %	45 %
and		
saw logs	21 %	17 %
pulp wood	79 %	83 %
Chips, million m3 solid,	1.7	1.9
of which coniferous	75 %	82 %
broad leaved	25 %	18 %
Wood residues m3 solid	576 000 m3	736 000

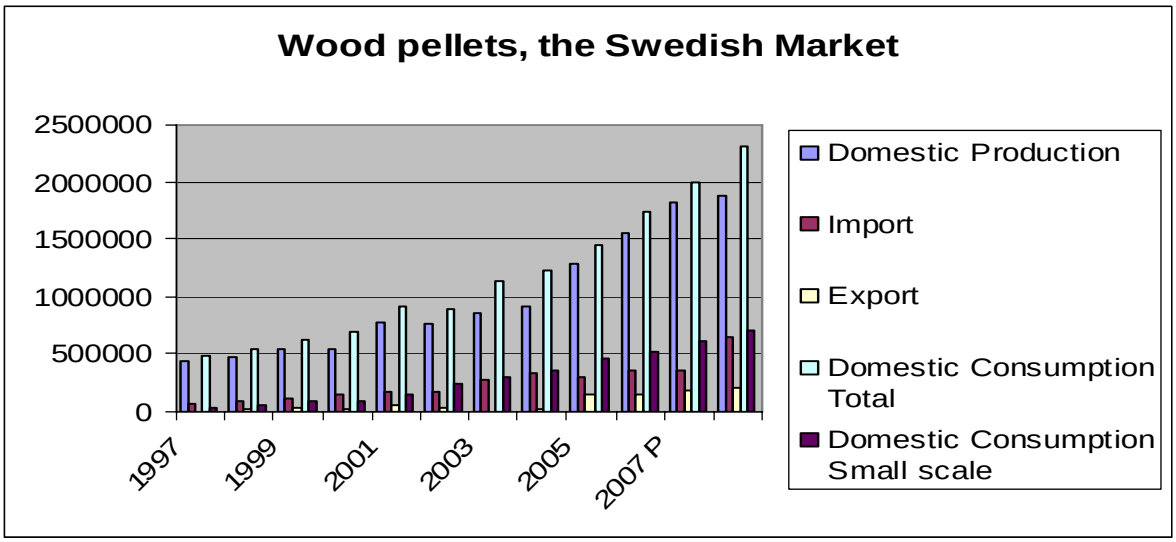
The bioenergy portion of the wood import can roughly be assumed as follows: “Direct” refers to the portion that directly is used for fuel, “indirect” to secondary fuels like bark, saw dust, black liquor, etc. from the portion that is used in industrial processes. (2003)

	Indirect	Direct
Round wood	20 PJ	55 PJ
Chips	1.5 PJ	4 PJ
Wood residues	4.3 PJ	-
Total	**26 PJ**	**59 PJ**

The production and trade of pellets are recorded by the Swedish Pellet Association (PIR) and the published values for 2004 are.

	ton	PJ
Import	265 500	1.3
Export	5 800	0.03

The trends and prognoses are shown in the diagram below.



The import of propellant biofuel, mainly ethanol for 2004 was about 200 000 m3. Due to changes in the duty regulations effective 2006-01-01, the quantity for 2006 would be considerably reduced.

Other biofuels, such as talloil and residues from the food industry were imported in 2003 to an amount of about 6 PJ.

2.2 Origin

The main part of the imported round wood and the chips has its origin in the Baltic states and in Russia. To a large extent it is integrated in the harvesting and in the flow of wood to the Swedish forest industries.

A few years ago, wood residues, especially recovered wood fuels (RT) came from Germany and Holland. Now the major part of the flow of residues to Sweden emanates from the Baltic states.

Pellets are imported mainly from Estonia and Latvia, but also from Canada.

Import of wood pellets to Sweden 2005

Origin	**Ton**
Canada	112612
Latvia	87229
Finland	81897
Estonia	23549
Norway	4000
Russia and others	2000
Tolal	**311287**

Propellant biofuels, mainly ethanol have their origins in southern Europe and in Brazil. The ethanol from southern Europe is based on the wine industry while the Brazilian supply emanates from the sugar industry.

2.3 Trade structure

The trade is organized and carried out in a variety of forms and patterns. There are several examples of long term contracts. Seasonal contracts are also common and so are spot contracts.

As mentioned above, some of the trade in round wood, chips and wood residues is captive, meaning that the entire chain is controlled by the end user or the national distributor. But other portions are performed in form of fob or cif contracts, etc. either directly between producer and end user or involving one or several agents or other middle men.

Two different trends of emerging patterns could be noticed, namely (1) that the major users of imported biomass fuels tend to prefer buying biomass fuels in the same manner as they buy other types of fuel i.e. from established trade channels and based on well defined quality norms and classifications and (2) major producers and large end users sign contracts for biomass fuels that are suitable for the specific requirements of that particular end user. When the resource base for raw material widens due to increased general demand of biomass fuels, the latter trend would be further explored.

3. Drivers and barriers for and against trade

A number of coincident drivers have created favourable condition for trade of biomass for energy i.e.

- Differences in policy incentives
- Cost structure
- Incentive from a procurement perspective
- Incentive from a sourcing perspective

<u>Differences in policy incentives and cost structure</u>
Policy incentives have been and are a lot more favourable in Sweden then in the exporting countries (in the Swedish case, trade has up until now been the same as import) making it attractive to move biomass from none or low bioenergy incentive countries to Sweden with high incentives. These positive policy incentives have been paired with a favourable cost level in the Baltic countries as well as in Russia. This and changed regulation in Holland and Germany has turned the focus of biomass sourcing toward east.

<u>Incentives from a procurement perspective</u>
From a procurement perspective there are a number of factors that are positive with import:

- Competitive fuel costs
- Risk distribution
- Negotiation power

Incentives from a sourcing perspective

There are also aspects of import that are positive from a sourcing perspective:

- Synergies with the import of timber and pulp logs
- Fulfilling sourcing agreements in an efficient way

In the Swedish perspective three main types of barriers related to bioenergy trade are identified

- Technical barriers
- Transport, mainly shipping barriers
- Quotas

Technical barriers have their roots in difficulties to describe and measure quality and energy content in adequate and efficient ways. As uses and applications for biomass fuels has widened and become more diversified more technical issues have been included, e.g. regarding contamination, durability, storability, and health risks.

There are a number of cost driving aspects of shipping biomass for energy. The harbour facilities are often not equipped in fashion that enables cost efficient handling of the products. In addition to that, there are only few units of the shipping fleet, which are specially designed for efficient shipping of biomass for energy.

Bio-energy trade is generally carried out within unrestricted and free trade principles. One exemption from that policy is the import of fuel ethanol to Sweden which is regulated in form of quotas which of course limit the possible import volumes. Recently, the rules regarding import duties on fuel ethanol import have been changed to be more protective. The difference in approach could be explained by the assumption that ethanol is regarded primarily to be an agricultural product.

4. Trends and development

Three major trends are identified, namely:

- From local to regional and now more international
- Demand in Sweden to demand in other parts of Europe
- Increasing quality concern

From local to regional and now more international

The bioenergy sector in Sweden started as a local demand and supply in the late 70-ies and 80-ies. In the 90-ies energy facilities started a regional market for biomass by import of cheap recycled demolished wood from Holland and Germany and there after wood chips from the Baltics. Now steps are taken to an international market in which prices of biomass for energy are set in competition with products from sources far away, e.g. from south of Europe as well as from North and South America.

Demand in Sweden to demand in other parts of Europe

Some years ago Sweden was pretty much alone when it came to demand for import of biomass for energy. This created a favourable situation with low prices and reliable sourcing. Now, as the demand in other parts of Europe are emerging and the cost structure in the Baltics is rising the cost argument for imports are diminishing. The imported biomass is often a more expensive material compared with domestic ditto.

Increasing quality concern

The process of increased application of bioenergy in various applications and a simultaneous process of widening the resource base to other types of biomass have led to an intensification of the quality issues. This is generally appearing in all applications. For example, the number of user of wood pellets for small scale domestic heat generation is increasing rather fast. In the early stages of that application most users were enthusiasts and hence prepared to handle minor disturbances themselves and to identify adequate pellet quality to suit their equipment. However, now new users are expecting to get similar technical performance from their pellet burning equipment than from oil or electricity heaters. They also want cheap fuels, which sometimes means that the chosen pellets are unsuitable for their application.

5. General policy towards biomass trade

The policy towards import of biomass for energy is trade liberal. There are very little of quotas and other limitations to imports. In addition to a trade liberal policy the general energy policy is very much pro-bioenergy. This has enhanced the competitiveness of biomass for energy compared to competing energy sources and other energy generation technologies. Especially the CO2 taxation has had a decisive impact.

Pro-trade and pro-bioenergy policies have created the needed framework for a biomass for energy trade. So far the flows have predominantly been inwards but with increasing demand in the rest of Europe and higher costs emerging in the Baltics and Russia the trade is on the edge to shift the direction of the trade.

6. Key issues for further development

Five key elements are identified that need to be in place in order to facilitate increasing international trade of biomass for energy, namely:

- Demand for biomass for energy
- Trade liberal policy
- Efficient total logistic systems
- Existence of the needed infrastructure for large scale transport of biomass i.e. harbor facilities e.g. storage and loading possibilities
- A value chain in which all actors have a profit to make of the trade