CrossBorder Bioenergy: IEE/09/933/SI2.558306

Working Group 2 on Small scale heating systems Handbook

Annalisa Paniz
AIEL – Italian Agriforestry Energy Association
Viale dell'Università, 14
I – 35020 Legnaro (PD)

Tel. +39 049 8830722
Fax +39 049 8830718

INTRODUCTION TO MARKET SECTOR

The heat production from biomass is generally defined as the primary input of the conversion process. The most important raw materials for the production of heat are wood and by-products of forestry industry. The main wood biomass heating fuels used in Europe are the following.

- **Firewood:** is the oldest form of woody biomass. In many European countries it is still the most used biomass.

- **Wood Chips**: the importance of wood chips as heating fuel is increasing rapidly due to completive prices and automatic heating systems based on wood chips. Wood chips are either produced as by products from saw mills and other wood industries or from logs coming directly from the forests. High quality wood chips can only be produced from optimal raw material with a minimum diameter of five centimetres.

- **Wood Pellets**: is a clean and convenient fuel, mostly produced from sawdust and wood shavings compressed under high pressure using no glue or other chemical additives. They are cylindrical in shape and usually 6-10 mm in diameter. The average length is about 10-30 mm. Furthermore, due to their high energy content the convenient delivery and storage feature, pellets are the ideal fuel for fully automatic small scale heating systems. With a rapidly growing share in market, they are a key technology for increasing biomass utilisation in Europe.

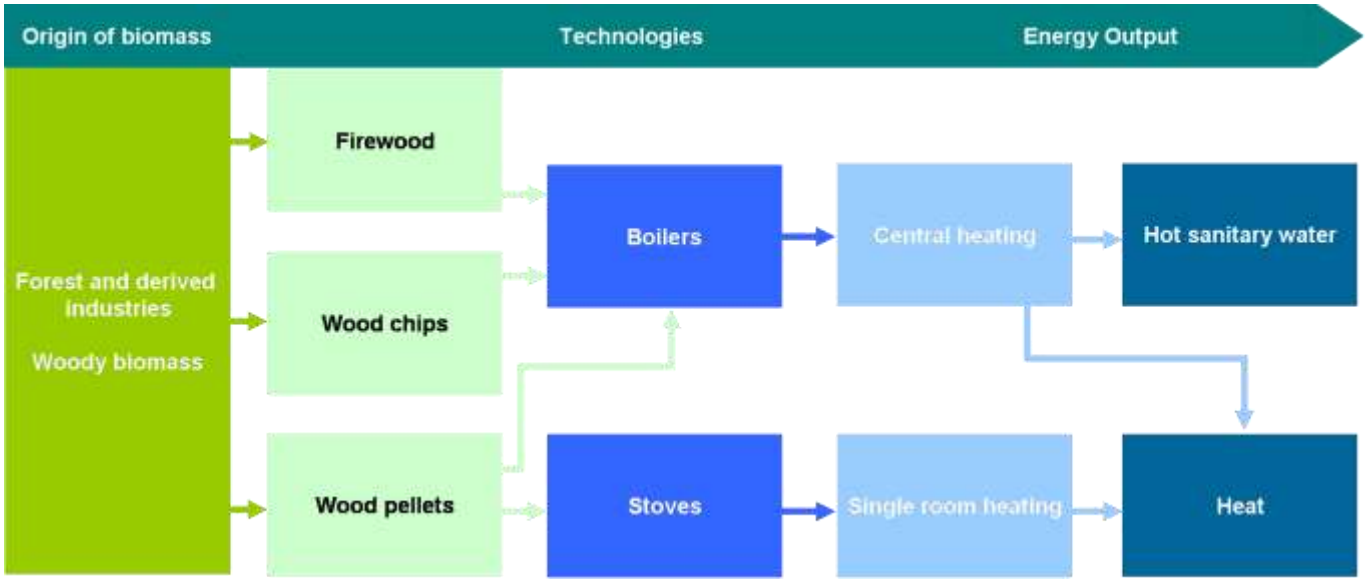
1.1 BIOMASS HEATING TECHNOLOGIES

The small scale heating systems are usually installed in single private households. Heat appliances range from small scale stoves for room heating, to boilers of a few kW to heat houses. Domestic batch-fed wood-burning appliances include ‘high-efficiency’ pellet stoves and central heating boilers. This handbook focuses on the following heating appliances (figure 1).

- Wood biomass boilers (firewood, wood chips and wood pellets) up to 500 kW typically can both heat sanitary water and the whole house heating system.

- Wood pellet stoves typically can be air appliance (single room heating) or water heating (heating system).

Figure 1: wood energy chain



1.1.1 Wood biomass boilers

Modern biomass boilers utilize a two-stage combustion process in order to combust fuel as completely as possible, thereby achieving high efficiencies and low emissions. There are three main types of burners, differing on the fuel feeds.

- Underfeed burners: the fuel in fed into the bottom of the combustion chamber. These burners are best suited for fuels with high quality and low ash content (wood chips and wood pellets).

- Horizontal feed burners: the fuel in introduced horizontally into the combustion chamber that is either fitted with a grate or a burner plate. These burners can burn wood chips and wood pellets.

- Top feed burners: developed for pellet combustion in small scale units. The pellets fall through a shaft onto a fire bed.

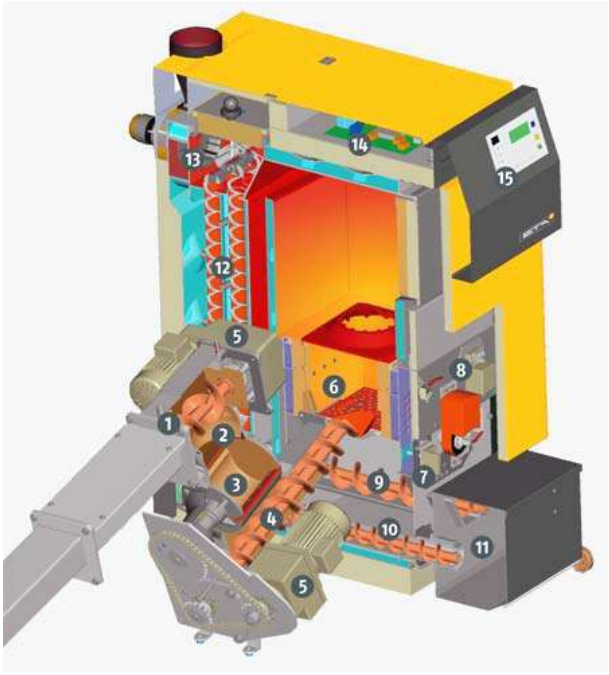
Firewood boilers

Firewood heating systems are very popular in rural and mountain areas. In several European countries are still the most common type of wood biomass boilers. There have been significant technological advances in firewood heating systems during the past years, including:

- two-stage combustion with automatic ignition and fan;
- improved control systems;
- reduced heat losses.

Users convenience can be enhanced by large fuel hoppers and an appropriately sized accumulator tank, that is required. It allows the boiler to operate at nominal load and to avoid frequent ignition and shut-down.

Wood chips boilers



Wood chips heating systems are more common in rural and mountain areas, heating larger houses and farms. Advantages of using woodchips instead of firewood are automatic operation and much lower emissions because of the use of feed rate rather than air supply to control heat release rate. Wood chips boilers are often sited in basements, in free-standing heating containers (that combine boiler and storage) or in their own separate buildings (figure 2). Wood chips can be stored inside the building in a room close to the boiler or in storage facilities outside the building (e.g. silos, barns). The wood chips are transported to the boiler, often using a screw feed system. The size of the storage depends on the specific situation and should be correctly sized on the basis of energy demand.

Figure 2: examples for wood chip fuel storage solutions

Pellet boilers

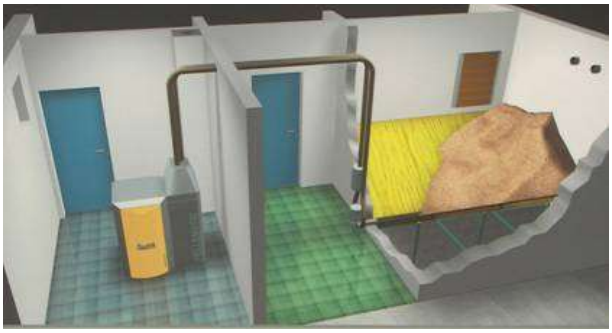
Pellet heating systems are installed primarily in urban and surrounding areas. Pellet boilers are usually sited in special boiler rooms, in the basement or in dedicated containers outside the house. The loose pellets are delivered in bulk by a pressurized tank truck and transferred into storage through a filler pipe. The pellet storage should be located not more than 30 meters from where the delivery truck will be operating. The walls and the ceilings of the store room and boiler room must be fire proof. Four main types of fuel storages are in the market:

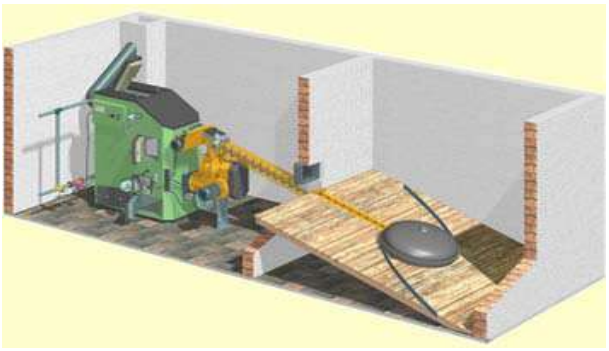
- Storage rooms next/close to the boiler room (inside the building);
- Textile or steel tanks (inside or outside the building);
- Storage integrated into dedicated heating system containers (outside the buildings);
- Underground tanks (outside the buildings).

There are two types of fully automatic delivery systems that transfer pellets from storage into the boiler (figure 3):

- Screw systems: suitable if boiler and storage rooms/tanks are located next to each other;
- Suction pump system: the solution if the storage and boiler room are separated.

Figure 3: Types of fully automatic fuel delivery systems that transfer pellets into the boiler





1.1.2 Wood pellet stoves

Special kinds of stoves have been constructed to combust only pelletized material. Pellet stoves are very popular and installed both in urban and rural areas. The stove components are much more sophisticated then the firewood stoves. An electric fan controls the combustion process by varying the supply of combustion air. This results in low CO and C_xH_y emissions.

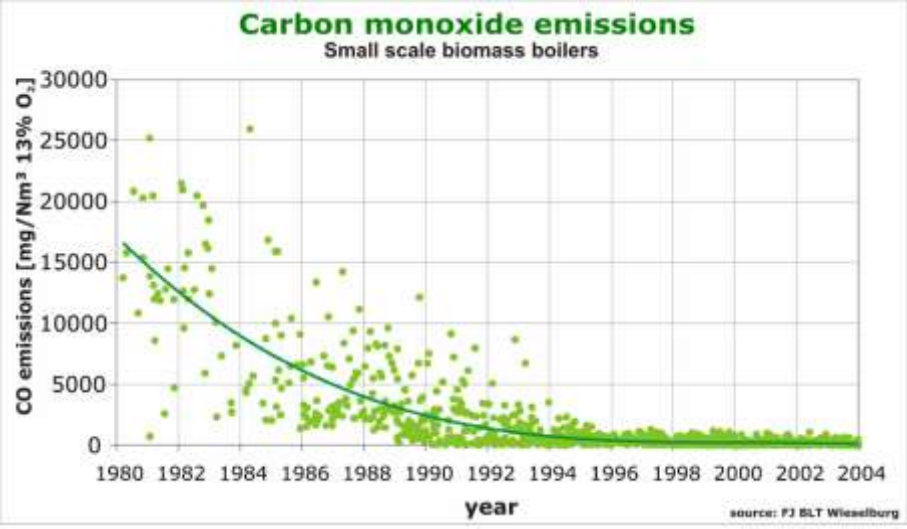
Pellet stoves are typically provided with small fuel storage, fuel feeder, combustion air blower, burner shell and a flue gas discharge system. They are equipped with a rather extensive control system. The fuel hopper is filled from the top and a device transfer the pellets from the hopper to the heating chamber on a controlled and automatic system using an internal thermostat to gauge the heat and when more pellets are needed to be added. Then, air from the room is sucked in from a built in fan which is then transferred through the heating chamber. The hot air is then distributed back into the room or through your vent system of your house.

Pellet stoves could be air or water heating systems, mainly bought to produce only heat in a single room or in a integrated heating system.

1.2 EFFICIENCY AND EMISSIONS

The state of the art of small-scale biomass combustion system show improvements in biomass boiler technologies using firewood, wood chips and wood pellets. Over last years the average efficiencies of biomass boilers have increased from approximately 55% to more than 90% and the average carbon monoxide emissions have decreased from 15.000 mg/m^3 to less than 50 mg/m^3 (at 13% of O_2). These data derive from more than 1.000 boiler certification tests carried out by the Austrian Federal Institute of Agricultural Engineering, the FJ-BLT (figure 4 – figure 5).

Figure 4 - Figure 5: Efficiency and carbon monoxide emissions of firewood, wood chips and wood pellets boilers from 1980 to 2004 (source: FJ BLT Wieselburg)



1.2.1 Certification and testing standards for bringing boilers and stoves to the market

An important tool to facilitate the improvement of appliance performance is the existence of a generally accepted test protocol. These have allowed developers to better understand and quantify the impact of different performance-improvement strategies, and led to significant reductions in appliance emissions.

For solid fuel-fired boilers up to 500 kW heat output, the standard EN 303-5 gives constructions and performance requirements and instructions to measure power, efficiency and emissions. For pellet stoves: the reference standard is the EN 14785.

The above standards cover the needs of quality assurance of small biomass fuel-fired appliances, boilers and stoves.

1.3 WHAT ARE THE EUROPEAN MARKET SHARES? WHY IS IT SEEN TO HAVE A HIGH POTENTIAL FOR EXPORT?

The final energy consumption in the EU27 in 2007 was 1157.65 Mtoe and the share cover by the 'households' sector was about 457.5 Mtoe (39,5%). The average contribution of heat to final energy consumption in EU27 (2007), considering all the energy sectors, was about 48% but is higher in the 'households' sector other and approximately the 86%.

Europe is using about 90 Mtoe of oil and more than 170 Mteo of natural gas for heating purposes every year for households and services (Eurostat, 2009). The rapid conversions of existing fossil fuel heating systems by wood fuels heating systems can play a significant role in reducing the dependence of Europe on oil and gas imports.

Biomass heating plays an important role in the renewable energy mix of Europe and is by far the most important source of RES energy in Europe. As more than half of renewable sources is biomass for heat applications and as heat covers more than half of the final energy consumption in Europe, biomass is obviously a key sector to meet the 2020 targets. The biomass used for heat production in 2007 was 61.5 Mtoe and the large part was woody biomass. Wood energy plays a dominant role in terms of renewable heating.

Nowadays there are around 203 Millions[1] of households in Europe (Eurostat, 2009), in the majority provided with a single heating system (boiler and/or stove). The large part of heating systems in Europe are clearly obsolete and should be exchanged immediately on account of their bad energetic performance. Only a small share of heating system installed in Europe today are state-of-the-art. The replacement of the heating system offer an opportunity to reach the RES targets, and it is labelled as "sleeping giant".

There is a massive gap between the reality of the heat market and the government's climate protection targets. Climate targets are becoming more and more unrealistic. With each year in which there is non change in the heat market, the target for 2020 becomes less likely.

Wood fuels utilisation in small scale heating systems in Europe is currently focussed on a small numbers of member states including Austria and Germany at first, Italy, Finland Belgium and France. In this market wood fuels are predominately use for heating in residential or commercial buildings. However, within this

[1] Excluding Sweden

sector pellet stove markets can be distinguished from markets where pellets are used also in boilers or commercial applications. Typical stove markets are Italy and France.

In other European countries the use of wood fuels combines large scale and small and medium use – this is the case in Sweden and Denmark where the districts heating are predominately.

The sale of new heating system is well documented for some countries but reliable data on the existing stock of biomass fired boilers and stoves is especially hard to come by. There are slight contradictions between different data sources and the scenario brings out the fact that the global dimension of the market is really uncertain.

As a rough estimate, it is probably safe to say that at least 8,2 Million stock (2007) of wood biomass boilers up to 500 kW are installed in Europe, over 90% of which are boilers up to 50 kW (AEBIOM – Bio Intelligent Service, 2009). As above mentioned these are mainly installed in Austria and Germany. In Baltic States and East Europe countries fossil fuel heating systems are still the mostly used. In some countries, e.g. Poland, the use of coal-boilers is still frequent.

At the moment (2011) more then 1,5 Million pellet stoves are installed for heating purposes in Europe. The biggest European market for this segment is Italy, where over 1.100.000 units are installed. The other part is present in France and Austria.

One of the important advantages of woody biomass is that it can easily be stored, transported and used with flexible load and applications at the place and time of energy need. In addition, consumers traditionally value the enhanced level of comfort and well-being that comes together with certain types of small-scale appliances (e.g. pellet stoves and wood fuel boilers). Moreover, pellet stoves also offer fairly low investment costs while producing quite significant amounts of renewable heat and they could be acquired by families with lower incomes.

Heating with wood fuels is much cheaper than heating with fuel oil. It seems that the high potential for wood fuels heating appliances to penetrate existing markets it is possible in East Europe Countries and Baltic States. In addition, these markets should be stimulated in those countries that belong to the Mediterranean area.

2. CHARACTERISATION OF MARKET SECTOR

2.1 WHAT FEEDSTOCK IS USED?

Raw material consists of virgin wood originated from forest and plantation (SRC – MRC) and by-products of wood processing industries. The sector covers a wide range of different biofuels with different characteristics: wood logs, wood chips, bark, sawdust and pellets. It should be better that the raw material comes from regional area to guarantee a sustainable energy supply chain. This is possible mainly for firewood and wood chips.

There are 178 million hectares of forests and other wooded land in the EU, about 42 % of its land area. Over the past 20 years, forests have increased by 5% - approximately 0.3 % per year - although the rate varies substantially between countries (Eurostat, 2009).

Ecologically, the EU's forests belong to many different biogeographical regions and have adapted to a variety of natural conditions, ranging from bogs to steppes and from lowland to alpine forests. Socioeconomically, they vary from small family holdings to state forests to large estates owned by companies, many as part of industrial wood supply chains.

2.2 HOW DO THE MARKET WORKS?

Firewood

Firewood derived exclusively from forest utilisations and in most cases, the homeowners either own forest land themselves. This ensures a very short fuel chain.

Wood chips

Wood chips derived from forest utilisations using a portion of residues from harvesting operations, and from plantations. If a local supply chain can be established, wood chips can crate new income for local farmers and forestry owners. For example, numerous service providers – farmers, forest owners or cooperatives – offer both forest thinning services and chipping services using mobile chippers. In the most advanced forest areas (e.g. Austria) local farmers or forest owners have become “heat sellers”.

In same cases wood chips are either sourced from wood processing industries, using wood that not could suitable for lumber.

Usually, wood chips are blown from the chipper in to a tractor trailer or trucks and then stored for natural seasoning before the delivery. In some case wood chips are artificial dried.

The fuel is fed into the storage area either by a pipe or, if possible poured form a dump truck. In some cases, special delivery trucks are available that blow wood chips into the storage area in similar way to wood pellet trucks.

Wood pellets

Up to now the raw material for pellets production was mainly sawdust and wood shavings of sawmills and wood processing industries. In some countries in which domestic demand exceeded the domestic production it is necessary to open other feedstock resources for pellet production. The potential for that is high and it ranges from wood residues, wood from forest trimmings, round wood and SRC (short rotation coppice).

Wood pellets are produced in pellet machine. Particle size and moisture content of raw material are two crucial points. This is the reason why the raw material first pass through a hammer mill and then through a dryer to provide the uniform size and the moisture content around 12%. This mass is fed into a pelletizer where is extruded through a die with holes of the required size.

After the production the delivery of pellet fuels could be by trucks for bulk delivery (e.g. in Austria and Germany) or in small bags (e.g. Italy).

2.3 Which economic operators should feel addressed by this project and why?

We target companies working in the field of small scale heating, especially SMEs needing support and information in finding new markets abroad. The stakeholders (target group) for our working group, representing the sector are:

- Manufacturers of firewood, woodchips and woodpellets boilers up to 500 kW;
- Manufacturers of woodpellet stoves.

These are the main actors of the sector. Other market operators, interlinked with these main actors, e.g. silos producers, free-standing heating containers producers, screws producers, etc. can get benefit from the market assessments and be interested on invest abroad.

3. THE BIOHEAT SECTOR HAS A GREAT POTENTIAL

In Europe the bioheat sector has still a great developing potential.

- The availability of woody biomass is very high, particularly in those areas where the number of modern boilers and CHP are quite rare yet.

- The prices of primary energy produced with fossil fuels is very high related to those based on wood fuels.

- Currently and in the next medium-term period the subsidies framework offers both for privates and public bodies interesting opportunities to support investments in this sector.

- During last years the awareness of potential investors is grown up thanks to several successful show cases already running, which may act as reference models to be replaced in those regions at the moment with a less developed bioheat market.

4. CRITERIA AND INDICATORS

Within the working groups 2, the key aspects, which have definitely to be considered when assessing the attractiveness of foreign markets, were identified and summarized into 6 main categories.

1. Policy and planning

The political framework conditions have to be reliable and steady. If the support scheme or its conditions changes frequently and doesn't provide the required planning security along a minimum period of time, it is likely that investors won't take this risk. Steady and reliable support schemes are of utmost importance to evaluate and accept the risk. This aspect it is also important to set up both a long term policy and fix short-term objectives and adapt the planning according to the surrounding conditions, being open minded to the environmental changes. It is important a company could take into account the commercial risk: it arises from the possibility of a firm loss or failure from poorly developed or executed business strategies, tactics and procedures. In order to strengthen and support the strategy a support and flexible scheme is to be adopted according to the markets needs.

Generally speaking country risk refers to potentially adverse effects on company operations and profitability caused by developments in the political, legal and economical environment. Political instability could negatively affect business.

2. Geography/Climate - Population rate - Government - Logistic System

Climatic conditions are mandatory to understand the possibility to invest in other countries. Population rate and density are also important because the concentration of population can make it easier to satisfy the demand and reach the potential users. Moreover, the geographic proximity is important to facilitate transportation of products.

Ageing population: detecting the successful target cluster – active/working population. A demographic downfall is an indicator of economic disease.

GDP growth rate, unemployment, poverty line and the population willingness to pay for targeted technologies are important indicators for economic development in order to ensure a successful launch of products. To guarantee a successful business it is also important that the bio-energy technologies are well know and national and local initiatives (NIMBY effect) against wood biomass systems are quite rare.

3. ***Fuel prices***

Price stability is when your money retains its value over time. This is important if you want to save your money to buy something later, for example.

Prices may increase for different reasons. For example, suppose there is only one CD left in the shop and you and all your friends want to buy it. The shopkeeper will probably increase the price of the CD because he knows that demand is high and he can get more money for it.

4. ***Feedstock market / wood fuels availability / wood fuels consumption***

This criteria is important in order to analyse the territorial morphology. Feedstock availability useful to stimulate product purchase.

In particular it is important to have a clear idea about the

5. ***Production and environmental criteria***

This criteria is useful to understand how much competitors invest in R&D: outdated or brand-new technologies

6. ***Small scale heating system energy markets***

This criteria is important to understand if there's a dynamic system (modern infrastructures) in order to meet the needs of a growing market and source standards are equal to target standards.

But as the defined criteria and indicators will be quite comprehensive and also listed in the end, they should be summarized and described more general in the handbook in a way of presenting just the key requirements – which are the identified criteria – and the reason behind in just a few sentences each. It is to give an overview on what basis investment decisions are made, to contribute to a better understanding of the

market sector and finally – with view on potential investors – what criteria have been considered within the project (and therewith, what not). You should not list and explain them in detail one by one.

7. Total list of considered criteria and indicators for Small Scale Heating with wood biomass

1. Country profile (country risks, characteristics of population, logistics, etc.)

1.1 Geography / Climate

1.1.1. What is the average winter temperature across regions in target country over the last 10 years?

1.2 Population

1.2.1Total number of households in the country

1.3 Work and wealth/Economic status of population

1.3.1 What is the average GDP real growth rate between 2008 - 2010?

1.3.2 GDP per capita for 2010

1.4 Logistics - road network - rail network

1.4.1 What is the density of rail-network? (for goods/biomass transportation)

1.4.2 What is the density of road-network? (for goods/biomass transportation)

1.4.3 What is the density of water ways-network? (for goods/biomass transportation)

1.4.4 What is the length of the electricity transmission and distribution networks?

1.4.5 What is the length of the gas transmission and distribution networks?

Extra information

2. Policy aspects (political will, nREAP, etc.)

2.1 The nREAP is ambitious and proposes appropriate measures

2.1.1 There are high-volume targets for RES

2.1.2 There are high-volume targets for heat consumed in households

2.1.3 Proposed measures for small scale heat in nREAP are appropriate and convincing

Extra information

2.2 A political will to develop the RES-sector is clearly recognisable and stable

2.2.1 Does the government provide an appropriate budget for the targeted market growth?

2.2.2 Have the support schemes/framework condition for investments changed within the last 2-4 years?

2.2.3 Is a revision of the framework conditions announced, which could affect the market development?

3. Feedstocks

3.1.The solid biomass potential is sufficient to realise small scale heat/CHP/DH projects?

3.1.1 To what extent will the domestic availability of wooden biomass of forestry change by 2020?

3.1.2 How large is the wood for energy potential from forests today?

3.1.3 How big is the wood for energy potential from industrial residues today?

3.1.4 What is the total forest wood potential (irrespective of use)?

3.1.5 What is the % of forest area owned by public bodies?

3.1.6 What is the difference between fellings and increment?

3.1.7 How much is the % of fellings destinated to energy purposes?

3.1.8 How much of the wood for energy potential from forests is already utilised?

3.1.9 How much of the wood for energy potential from industrial residues is already utilised?

3.1.10 What is the amount of solid biomass feedstock used in competing sectors (e.g. fiber board industry) today?

3.1.11 What is the estimated future forest wood demand of the non-energy sectors in 2020?

3.1.12 Share of the total yearly wood demand fulfilled by imports on latest available year

3.2 Feedstock are available for biofuels

Extra information

Extra information

4. Economic (prices, support schemes/guarantee, subsidies, etc.)

4.1 Financial support schemes can be claimed for investments

4.1.1 What proportion of the investment can be claimed in subsidies (cumulative, including tax advantages)?

4.1.2 When does the scheme end granting funding?

4.2 Financial support schemes can be claimed for operation

4.2.1 How high is the legally guaranteed price for heat?

4.2.2 How long is the guaranteed duration of the scheme?

4.2.3 Is the support schemes threatened by a maximum public spending budget?

Extra information

Extra information

4.5 Prices of biomass fuels/raw material are reasonable and stable

4.5.1 What is the price of wood logs

4.5.2 What is the price for pellets sold in bulk

4.5.3 What is the price for a pellets sold in retail by bag

4.5.4 What was the price volatility of wood logs over 1 year period (calculated as difference between highest and lowest, divided by lowest price)

4.5.5 What was the price volatility of pellets sold by tonne over 1 year period (calculated as difference between highest and lowest, divided by lowest price)

4.5.6 What was the price volatility of pellets sold by bag over 1 year period (calculated as difference between highest and lowest, divided by lowest price)

Extra information

4.5.7 What is the price volatility of competing fossil fuel prices for the last year (possibly 2010)?

4.6 Prices of fossil fuels are high and heavily taxed

4.6.1 What was the average price of coal for households over the last year (possibly 2010)?

4.6.2 What is the price per kWh of gas for households (average over the last year)?

4.6.3 What is the price of oil for small scale consumers (average over the last year)?

4.6.4 What is the price development of heating oil of the last 4 years?

4.6.5 What is the tax on oil (CO2, energy, excluding VAT or 'normal' taxes)?

4.6.6 What is VAT on biomass?

4.6.7 What is VAT on gas?

4.6.8 What is VAT on oil?

4.6.9 What is VAT on coal?

4.6.10 Is there any application/technology-driven support for the use of oil/gas e.g. Public subsidy or support by oil/gas companies

4.9.11 What was the average price of electricity for private households over the last year (2010)?

Extra information

5. Market aspects (volume, access to grid, etc.)

5.1 The energy sector is large and expected to grow

5.1.1 Amount of coal used by small scale consumers (2010)?

5.1.2 Expected growth from 2009 to 2020

5.1.3 Amount of gas used by small scale consumers (2010)?

5.1.4 Expected growth from 2009 to 2020

5.1.5 Amount of oil used by small scale consumers (2010)?

5.1.6 Expected growth from 2009 to 2020

5.1.7 What is the average age of the stock of domestic heating appliances (oil)

5.2 The heat market offers good opportunities

5.2.1 What is the amount of natural gas in the small heating sector?

5.3 The heat market in the target country provides promising growth perspectives

5.3.1 What is the rate of the additional heat demand of the region until 2020 (overall, not only RES)?

5.3.2 What is the growth rate of pellet heatings in the last 4 years ?

5.3.3 What is the cumulated amount of pellets used for small-scale heat?

5.4 The Framework conditions for fossil fuels don't impair the biogas market development

5.4.1 What is the contribution of imported oil to primary energy supply in real terms?

5.4.2 What is the percentage contribution of imported oil to primary energy supply?

5.5 How is the situation of small scale heating systems ?

5.5.1 What is the proportion of heat consumption devoted to small-heat?

5.5.2 What is the energy consumption of domestic heating sector in absoloute terms?

5.5.3 What is the proportion of the domestic heat consumption delivered through DH?

5.5.4 What is the amount of biomass used for domestic heating purposes?

5.5.5 What is the amount of coal used for domestic heating purposes?

5.5.6 What is the amount of LPG used for domestic heating purposes?

5.5.7 What is the amount of natural gas used for domestic heating purposes?

5.5.8 What is the amount of oil used for domestic heating purposes?

5.5.9 Which is the share of rate of homes heated by electricity? (%)

5.5.10 What is the share of small scale heating systems older than 15 years?

5.5.11 What is the density natural gas grid? Or What is the share of houses connected to natural gas grid ?

5.6 Bioenergy is already implemented with a strong growth

5.6.1 What is the growth rate of domestic heat from biomass in the last 4 years (CAGR)

5.6.2 An intense competition is not recognisable

5.6.3 Number of competing competitors providing (manufacture or sale) small-scale heating appliances

5.6.4 Total amount of capacity sold (by existing competitors) in the last 4 years

Extra information

Extra information

6. Regulations (laws/mandatory targets for bioenergy, permitting, emission thresholds, etc.)

6.1 Regulatory instruments to support bioenergy markets have successfully been introduced

6.1.1 How large is the quota for RES heat?

Extra information

Extra information

6.2 Are criteria for efficiency required?

6.2.1 What is the value of the minimum fuel efficiency in Small scale heating systems?

6.3 Existing emission thresholds can be fulfilled with the applied technology

6.3.1 Which are the emission limits for small heating systems based on solid biomass that have to be fulfilled for dust (in mg/Nm3)?

6.3.2 Which are the required emission limits for small heating systems based on solid biomass that have to be fulfilled for CO (in mg/Nm3).

6.3.3 Which are the required emission limits for heating systems based on solid biomass that are to be fulfilled for OCG (in mg/Nm3).

Extra information

7. Project financing (economic situation, loan, banks, etc.)

7.1 Standard and poors rating

7.2 Export friendliness

7.2.1 Euler Hermes

7.3 The banks are familiar with the biogas bioenergy technology and support its development

7.3.1 Are there credit facilities for households to install biomass boilers?

7.4 Foreign investments are supported in the target country

7.4.1 Are there any programmes implemented in the region to attract foreign investments?

Extra information

7.5 The value of the investment is stable due to a low currency exchange risk

7.5.1 Is the market part of the Euro Zone?

7.5.2 Was the inflation rate of the coutry more or less stable within the last 4 years (CAGR)?

8. Readiness for uptake (public acceptance, networks, etc.)

8.1 Efficient networks and information are existing

8.1.1 National and regional agencies are providing effective help to foreign companies wishing to invest

8.1.2 Is ther a domestic heating association, or similar corresponding body (with a minimum of 10 company members), assisting the market?

8.1.3 Public web sites/ information/market reports on bioenergy

Extra information

8.2 Public acceptance/knowledge of technology

8.2.1 Is modern wood heating for households well-known by general public?