AEBIOM
EUROPEAN BIOMASS ASSOCIATION

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Heating and Cooling Strategy Consultation

AEBIOM inputs

Introductory remarks:

The European Biomass Association welcomes the European Commission decision to analyse and tackle the heating and cooling sector with the upcoming *Heating and Cooling Strategy*.

The below (technical) inputs are a summary of AEBIOM's members contributions, as well as the contribution of the World Bioenergy Association (WBA) which AEBIOM is member of.

AEBIOM welcomes the focus on decarbonising the heating and cooling sector. Renewable energies are to play an important role in this decarbonisation.
The last IPPC report highlighted that if mankind wants to keep the temperature rise in this century below 2°C, the total quantity of CO_2 emissions must not exceed a given limit in this century. Broken down, this limit can be estimated with around 1,6 tons of CO_2 per capita, for each year from now to 2100 worldwide. In 2013 the CO_2 emissions of the EU 28 were 3740 tons in total (7,9 tons per capita), more than three times as high as they should be following the budget approach[1]. It is therefore more than urgent to act and address the heating and cooling sector that accounts for almost half of our energy consumption and 944 Mio tons of CO_2 emitted in 2012[2].

In addition, it is important to highlight that the *Heating and Cooling Strategy* is also an important tool to address the issues of energy security, energy poverty and industry competitiveness, for which renewables can also play an important role.

[1] IEA, Energy and Climate Change. Paris. June 2015

2 In Europe, in 2012 the total GHG emissions were 4824 Mio tons, the CO2 emission from the combustion of fossil fuels were 3495 Mio tons. They occurred in the transport sector, in power plants using fossil fuels and for heating and cooling in industry and buildings. The CO2 emissions for heating and cooling in the residential and service sector are calculated with 944 Mio tons of CO2.

Policy Recommendations

Prior to the Commission consultation, AEBIOM published common policy recommendations together with EGEC (geothermal sector) and ESTIF (solar thermal sector). They can be found HERE.

AEBIOM remarks – European Commission Consultation Forum

In addition to its policy recommendations and to its technical inputs in answer to Commission issue papers (below), AEBIOM emphasized the following points during the European Commission Consultation Forum on 9 September:

- ✓ **The Heating and Cooling Strategy should be in line with the EU 2050 Roadmap** three 'no regrets' options (deployment of renewables, improvement of energy efficiency and development of smart infrastructure). The objective of decarbonising the heating sector should be done through renewable energy sources to guarantee consistency throughout EU legislations and ensure legislative stability for investors.

- ✓ Although progress has been made to collect data related to the H&C sector, data and information are still missing to have a clear and holistic view of the sector. Questions remain also on the modeling used by the European Commission and some of the parameters. **Data collection and modeling parameters should be improved.**

- ✓ There are today no real technical limitations to the deployment of biomass in buildings and industry. The limitations are rather economic and political. **A strong political signal is needed to support the development of renewables, which is a 'no regret' option.**

Technical input from members – Answers to Commission questions

A. BUILDING SECTOR

1. **What is the cost-optimal balance between energy efficiency measures and renewable energy supply in buildings? How to assess this?**
   This is rather complex to assess. For a proper assessment, one would need to develop an optimized full cost scenario. Markets will define the appropriate balance on a case-by-case basis. The outcome also depends on the public intervention, eg. building taxes and building codes.

A **study** of the Energy Institute of **Johan Kepler University**[3] of Linz investigated the cost reduction resulting from the thermal insulation of a building. The study assumed a comprehensive refurbishment (renewal of windows and doors, insulation of the building envelope) which led to a reduction of heat demand by 54-65% and compared it to the cost reduction achieved by installing a renewable heating system (wood heating systems and heat pumps were investigated).
The result of the study was that in a full cost calculation the replacement of the heating system by a modern heating system based on renewable energy performed considerably better.
While the comprehensive refurbishment led to an overall reduction of costs between 10-12%, independent of the size of the building, the replacement of the old heating system created savings between 15-35% in the case of a single family house and between 26% and 44% in the case of a multi-family house with 6 flats.
The replacement of the heating system also resulted in a significantly higher reduction of GHG emissions. For a single family house thermal insulation resulted in a reduction of CO2 emissions of 54%. The replacement of the heating system by a wood heating system or a heat pump led to an emission reduction of 80-88%. The advantage of RES heat systems was even more pronounced for the multi-family house: while RES heating reduced CO2 emissions by 84-90% the CO2, reduction by thermal insulation was only 54%.
As building envelopes have significantly longer reinvestment periods than heating equipments, the opportunities for speeding up decarbonization by the replacement of existing heating systems are clearly better than by mainly relying on better insulation of buildings. This should be reflected in the priorities of the EU heat strategy.

Case studies could also be developed with representative types of buildings and provide a conclusion for each different type. Public tools for assessment could also be developed, at national level, to take local and geographical characteristics into account. For instance there are some Finnish examples which compare efficiency improvements and RE-solutions:
https://www.talopeli.fi/renovating/remonttilaskuri.xhtml# or
http://lammitysvertailu.eneuvonta.fi/

Energy efficiency and renewable energy supply measures have synergies that might lead to more attractive and economic conditions.

[3] Sanierungsstrategien, Okonomische, energetische und okologische effekte verschiedener sanierungsstrategien. Energie Institut an der Johannes Kepler Universitat Linz.

2. **What is needed to accelerate the deployment of biomass technologies in buildings?**
    - Economic incentives such as a carbon tax on fossil fuels, attractive public funding and loans, incentives or direct support such as investment or switch (from fossil to RES) support.
    - Information and awareness campaigns, training courses for installers, architects, planers, etc.
    - Fuel supply need to be guaranteed. Additional local feedstock production should be supported. Reliable markets for pellets should be established in all countries.
    - Solve the landlord-tenant issue to incentivize landlords' investments in RES
    - Implement government obligations to use renewables in new buildings and buildings going through major renovation. And accelerate building refurbishment rate.
    - Promote construction of efficient and renewable district heating and cooling grids where possible.
    - Stable and predictable market and legislative framework

3. **What are the best practices of an enabling framework which facilitates the uptake of biomass/renewables solutions in heating and cooling in buildings? (if you have national/local examples)**
    - The **Bioenergy Village Beuchte** in Lower Saxony (Germany) is a successful example for the effective implementation of a municipal heating system, fueled with wood chips from nearby short rotation coppice (SRC) plantations, which secure a long-term raw material supply at predictable prices.
    - In Finland, small/medium CHP plants co-firing biomass (forest residues, forest by-products, peat, waste- RDF/SRF (refused derived fuel/solid recovered fuel)): e.g. Järvenpää http://www.fortum.com/en/energy-production/combined-heat-and-power/finland/pages/default.aspx
    - In Finland, large scale multifuel CHP plants co-firing biomass, waste-RDF,SRF and fossil (coal), e.g. Naantali http://www.tset.fi/en/na4-chp-project
    - In Finland, small/medium heating plants burning biomass (Wood chips - e.g. Hervanta // Pellets - NG/Oil back-up - e.g. Sarankulma)
    - The Swedish **carbon tax** is another good example of best practice/enabling framework. The tax was introduced in 1991, and has been raised several times since then. Before 1990 Sweden mainly worked with direct investment support schemes to convert oil boilers to other fuels (the driving force was security of supply, not climate policy). Around 1990, oil heating dominated in single homes. Today, there is almost no oil heating in this sector. It has been substituted with biomass, district heating and heat pumps. The use of fossil fuels in district

heating has also decreased, to a few percent, and biomass and waste now supplies more than 75 percent of district heating. The share of fossil fuels in Swedish district heating was 91 % in 1980, and had decreased to 8 % last year.

- In the UK, the **Renewable Heat Incentive Scheme** (RHI) led to a rapidly increasing utilization of bioenergy in residential and non-residential applications over the past years. The RHI offers direct payments for the use of renewable heat as a compensation for the related CO2-reduction benefits. This has allowed kicking start bioenergy market in the UK for heat.

B. INDUSTRY and TERTIARY SECTOR

1. **What are the most important barriers for companies to deploy existing biomass solutions?**
    - Many companies lack knowledge about biomass as a viable and well-functioning and competitive alternative, also in industry. ”Conventional wisdom” is still that oil and gas are the industrial fuels. In addition, the energy costs sometimes represent a low % of the total turnover in certain industrial sectors, which does not encourage industries to work on changing their energy systems
    - Companies also demand very short pay-back times for these kinds of investment because they want to be flexible to react to market changes, while bioenergy has longer pay-back times due to higher investment cost.
    - The carbon emission cost is too low for industries in ETS, and in most countries non-existent for industries outside ETS. In Sweden, the CO2 tax is now raised for these industries, which has led to many investments in conversion from oil to biomass.
    - Insufficient long-term and stable support for the utilization of renewables
    - Specific conditions need to be fulfilled for the industrial operator to use in a most cost-effective manner its biomass installation (need of external experts to set up and operate cost-effectively biomass power plants).
    - Fear of insufficient supply of biomass fuel, fuel price fluctuation and price stability.
    - Lack of space, building requirements

2. **How can the deployment of biomass technologies in industry be facilitated?**
    - Have a sectoral approach - Conduct several studies by industrial sector (eg: food industry ; laundry industry etc…) to look particularly at potential and barriers for specific type of industry.
    - Information and awareness campaigns for planners of industrial premises
    - Integration of process steam, electricity and district heating customers into customer partnership to combine their needs.

- Long-term framework conditions that can be relied on also for project planning.
- Improved economic conditions by taxing fossil fuels and supporting biomass plants
- Tightening environmental legislations to incentivize a switch to renewables.

3. **Are there technical limitations to substitute fossil fuels with biomass in industry? Are there environmental and economic limitations?**
   There are no major technical limitations. Everything that can be done with fossil fuels can also be done with biomass. New technologies like torrefaction, gasification to bio-methane, pyrolysis to bio-oil, and charcoal production can give biofuels with almost identical properties as fossil fuels like coal, oil and gas. Pellets can be used in almost all applications where heating oil is used, and in many cases woodchips and other unrefined biomass fuels is a sufficient alternative with low cost.

   Biomass is in excellent position to provide industrial heat demand - both for heating of buildings and process heat. Industrial steam boilers fired with biomass are a standard technology available for virtually any level of power requirement. The environmental impact of using biomass can be minimized with simple flue gas cleaning devices. In economic terms biomass is significantly cheaper than oil or gas. There are ample opportunities to source biomass both locally and on international markets.

   One possible technical limitation would be that a biomass based heat/cooling supply solutions requires space for production and fuel storage. So there might be technical limitations if this space at industrial site or close to the site is not available.

C. GENERAL

1. **What is needed to secure the buy-in of installers, builders and architects of the most efficient and renewables technologies?**
   - Training of installers and planners about the possibilities of using biomass, particularly emphasizing on basic requirements such as space or access by trucks. Exchange of good practices and development of after-sales services.
   - Clear political signal in favor of renewables and biomass, with corresponding actions and programs and no more support to fossil fuels. This would create a market where actors will demand renewable energy, and where biomass is competitive. When this happens, installer, builders and architect will join in.
   - A political signal is even more important due to the unfair negative image of biomass and unjustified uncertainties regarding biomass availability, price,

quality, etc. Positive reports, documentation and communication should be developed and disseminated among installers, builders and architects.

2. **How can the conditions for financing for the transition to a renewable dominated and more energy efficient heating and cooling systems be made more attractive?**
    - Develop more adapted financial instruments for renewables and energy efficiency (e.g. investments calculated through return-on-investment and not through payback time which can appear less interesting). Long-term, stable and more attractive interest rates should be proposed. Public guarantees for loans could also be an important vehicle.
    - Possibilities for enhanced conditions for leasing of renewable heating technologies could boost deployment.
    - Consistent and long-term policies needed for investors. Also, targeted communication to financial institutions regarding long term policies with respect to renewable heating may increase the willingness of these institutions to make appropriate financing available.
    - A product becomes attractive thanks to its price and image. A level-playing field should be established with fossil fuels so that biomass becomes cheaper and competitive. The environmental, as well socio-economic and political benefits of bioenergy should be highlighted.

3. **How cost-effective is thermal storage?**

    There are currently three widely available solutions to store energy on the market: batteries, hot water and biomass. Batteries are still very expensive and therefore not cost-effective. It is also not efficient to use high value energy such as electricity for heating purposes.

    Short-term storage (daily basis) in buffer tanks for hot water can be cost-effective and usually improves the efficiency of a bioenergy plant, because it can balance running times of the facility, save emissions and avoid expensive peak loads. In fact, the buffer tank allows to run the plant always at an optimal load. This should grant fewer disturbances and a longer lifetime of the heating system.

    When it comes to long-term storage (seasonal storage), water tanks become quite expensive. In this case, biomass (ex: pellets, woodchips,..) appears as a cost-effective solution.

    Indeed, the cost of storage of energy for heating in the form of pellet is 10 times cheaper than hot water boilers and 1000 times than in batteries. Biomass is also a cost-effective solution for short-term storage.

It is important to highlight that biomass is a base-load renewable source of energy that can be stored and used when necessary. It is an excellent solution to balance the variability of renewable electricity.

To be most cost-effective, fossil free heating systems should be designed to use two or three renewable energy sources: solar thermal energy and/or electricity from PV systems and biomass. In such a way, we can optimize the benefit of abundant solar energy in summer time and use biomass to avoid extreme peak demand for electricity during winter. Seasonal electricity storage is definitely not cost-effective.

Example of biomass plant with large scale efficient water storage http://www.wienenergie.at/eportal2/ep/channelView.do/pageTypeId/72164/channelId/-51599

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