KORIŠĆENJE DRVNE BIOMASE U VODEĆIM ZEMLJAMA EVROPSKE UNIJE, JUGOISTOČNOG BALKANA I SRBIJI - PRIKAZ I POREĐENJENA

UTILIZATION OF WOOD BIOMASS IN LEADING EU COUNTRIES, SOUTH-EAST BALKAN REGION AND SERBIA – OVERVIEW AND COMPARISON

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In this paper the technical potential of wood biomass and it’s utilization in leading countries of European Union, South-East Balkan and Serbia was analyzed. Also, the development of electricity generation from renewable energy sources in mentioned countries was discussed. The overview of the production of wood biomass and feed in rates at South-East Balkan Region and the countries that are in Serbian surroundings was given with estimation export quantities of pellets, briquettes and wood chips. State of the art with wood biomass market in Serbia, objective and subjective problems, main limitations and obstacles for development of the wood pellets and briquettes market in Serbia were presented. At the end, in the conclusion, the measures were suggested to improve the situation with biomass in Serbia, and its utilization in energy purpose, mostly in CHP cogeneration plants in order to obtain simultaneous heat and electricity with its a higher degree of efficiency.

Key words: wood biomass, utilization, EU countries, Serbia.
1. INTRODUCTION

The total mass of plant and animal life on the planet earth is around 200 billion tones. Energetic content concentrated in this biomass is about 30,000 EJ (1EJ = 10^{18} J). This high energy potential is equivalent to the total energy potential of fossil fuels. However, only part of this potential can be used to obtain energy. This is the so-called technical potential, and it is estimated at about 150 EJ. The technical potential of biomass in energy production in some European countries is shown in the following figures (Figure 1 and Figure 2). It is obvious that the developed countries of European Union such as: France, Germany, Sweden have the great potential of biomass and its large utilization in a same time. Having all this in mind, it should be emphasized that the biomass is remarkable renewable energy source of great strategic state interest [1]. That is why the aim of this paper is to give guidelines on correct use of biomass in Serbia, and its utilization in energy purpose, bearing in mind the positive experiences of developed countries.

![Potential of biomass](image)

*Figure 1: The technical potential of biomass in Europe*

2. RENEWABLE ENERGY SOURCES AND BIOMASS IN DEVELOPING COUNTRIES OF EUROPEAN UNION

2.1. Germany

In order to regulate the market of biomass energy Government of Germany has brought programs support. The most important and most successful programs are:

1. Decree on renewable energy sources at fixed and long-term compensation guaranteed prices, which differ for renewable energy and biomass energy
2. Market program incentives to support investment in the heating sector using biomass
Germany takes special measures to use renewable energy sources in order to fulfillment of their goals. In order to achieve the set targets potential users are financially stimulated. This results in a constant and ever faster growth use of renewable energy sources.

In Figure 3 we can see rapid growth CHP plants that use the biomass. That the result of the perceived opportunities and contributions to environmental preservation. CHP and other plants on biomass have a high overall efficiency, even over 80%. Also, while in the 1990s hydropower was the only renewable energy source, wind onshore, biomass and solar now contribute all to the generation of electricity.

2.2 Finland

In Finland, 22% of total energy consumption and 20% of the required electricity covers energy from biomass. Biomass accounts for almost 80% of the energy production from renewable energy sources. In Finland in 2003 launched national action plan for renewable energy sources. The aim is to increase use of renewable energy sources to 30% of energy from biomass and 22% by 2010, or up to 45% by 2025. Also, it is planned that by 2010 31.5% of the total production of electricity is produced from biomass. Today in Finland works over 400 plants for combined heat and electricity from biomass. Energy from biomass is supported in Finland, extra-strong research and development policies.
**Figure 3: Development of electricity generation from renewable energy sources in Germany**

**Electrical Sector**

1. FIONBIO is committed to a common rate of tax and the harmonization of taxes and incentive measures in the Nordic countries, as well as the progressive growth of these half-categories at EU level, also proposes the promotion of cogeneration CHP opportunities and technologies;

**The Heating Sector**

2. Today's half of the building connected to the central heating system, but the system central heating system uses only 10% of biomass energy, and then 25% individual house are heated by wood. There is a room left for an increase share of biomass heating works through fees, taxes and public support.

**3. STATE OF THE ART WITH WOOD BIOMASS IN SERBIA AND SURROUNDING COUNTRIES**

The total consumption of woody biomass for energy and non-energy purposes in 2014 was 7.8 million m³.

It is obvious that the householders consume 4 times more biomass than industry and other holders (Figure 4). Unfortunately, biomass for private purpose is majority cases inadequate use, mostly like raw material for combustion and heating.
Some objective and subjective problems that limited utilization of biomass in Serbia are the follows:

- In regions where enough wood biomass exists, the consumption of wood chips is low,
- The use of outdated machinery and forestry vehicles,
- In spite of several interested investors limited opportunities for biomass based on CHP plant,
- Sawmills small capacity that are in majority in Serbia can not commit on a permanent contract supply wood chips,
- Feed in tariffs for biomass are correct especially for plants up to 0,5MW, but investment and O&M costs are still high in Serbian circumstances,
- Credit lines and grants available, but it is still a risk with long-term biomass supply contract still an issue,
- Biomass boilers are limited capacity with a low degree of heat utilization in compare with CHP plants,
- The prices of biomass boiler for industry purpose are still high in compare with boilers on coal,
- Equipment for briquettes and pellets production installed only in large and medium enterprises in most cases, for small one is still expensive.
Comparison in Figure 5 shows that annual wood production in Serbia is higher than in surrounding countries (exp. Bosnia and Croatia). In addition to that, the estimation on biomass processed annually for exported wood biomass products is also great.

Figure 5: Production of woody biomass in Serbia and South-East Balkan [3]

At the other side, feed in rates for CHP production in Serbia are mostly low in compare with other surrounding countries (Figure 6). That is the main reason and obstacle for development CHP plant in Serbia, and of course, a great investment with a longer period taking into account the cost-effectiveness of such tariffs.

The state of the art and realization in 2015 and first half of 2016 are as follows:

- CHPs with energy permit – 2,
- Operational CHPs plants – 0 (for now),
- Industrial users – several,
- Pellet factories – over 50 wood biomass and over 10 agro biomass,
- Chipboard factories large consumers.

Also, it should be emphasized that most of raw woody and biomass in Serbia is not used directly for energy production, or it is used inefficiently [5÷10].

At the other side, the obstacles for development of the wood pellets and briquettes market in Serbia are in a fact that VAT rate is 2 times higher for wood pellets in compare with gas (Table 1).
Figure 6: Feed in rates for Combined Heat and Power production in Serbia and South-East Balkan [4]

4. CONCLUSION

Having all facts from above in mind, it should be concluded that:

• The utilization of biomass in Serbia is very poor and inappropriate, even potentials are high;

Table 1: Main limitations and obstacles for development of the wood pellets market in Serbia

<table>
<thead>
<tr>
<th>Country</th>
<th>Value added tax [%]</th>
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<tbody>
<tr>
<td></td>
<td>LPG</td>
</tr>
<tr>
<td>Slovenia</td>
<td>22</td>
</tr>
<tr>
<td>Croatia</td>
<td>25</td>
</tr>
<tr>
<td>Montenegro</td>
<td>19</td>
</tr>
<tr>
<td>FYR Macedonia</td>
<td>18</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>17</td>
</tr>
<tr>
<td>Albania</td>
<td>/</td>
</tr>
<tr>
<td>Serbia</td>
<td>10</td>
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</tbody>
</table>

• Agro biomass production very low compared to potentials, but also a good part must remain on the land for its re-cultivation;
• Wood biomass in Serbia in most cases used for other products (pellet, briquettes, chipboards, etc.) or if used, used inefficiently (like firewood); not
used directly like wood chips for energy production in boilers or CHP plants;
- As plenty of woody biomass already used (particleboards, OSB boards, etc.), wood biomass production is limited.

Opportunities for biomass utilization:
- Use contemporary machinery, equipment and technology [11],
- Make rigorous and reliable contracts between producers (forest harvesting and sawmill companies) and consumers of biomass (district heating and power plants),
- On large surfaces with good irrigation develop energy short rotation plantations (willow, poplar, birch and acacia or even Miscanthus - Giganteus),
- For small companies and individual house-keepers in rural areas development serious wood pellet and briquettes production if market is secured,
- Near large sawmills and in industrial zones: CHPs, steam or heat energy production (combination of wood and agro biomass). In that way, emission of sulfur dioxide is reduced to almost zero, while ash emissions compared with coal reduces about ten times and no additional carbon dioxide emission in atmosphere.

REFERENCES:


