Value chain for woody biomass

Romanian case

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1. Wood Energy Production and Use in Romania

- Status of RES and biomass for energy

- Biomass potential

- Biomass market
The majority of the Romania RES quota in 2020 is left finally to be fulfilled by biomass.

Biomass for energy is mainly used for heat, with a large consumption of woody biomass and agricultural waste in rural households, but in low efficiency (c.a.17%) traditional stoves. E.g. in 2011:

- biomass final consumption 143.3 PJ representing c.a. 15% of the total final consumption

- biomass residential consumption 131.7 PJ
Biomass use for electricity is lower than expected.

Evolution of installed electrical capacity of units producing E-RES in Romania, compared to NREAP

<table>
<thead>
<tr>
<th>Technology</th>
<th>Installed accredited power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>822</td>
</tr>
<tr>
<td>Hydro (less than 10 MW)</td>
<td>378</td>
</tr>
<tr>
<td>Biomass, biogas, landfill gas</td>
<td>25</td>
</tr>
<tr>
<td>Solar</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1226</td>
</tr>
</tbody>
</table>

• Today only 8 operational cogeneration, biomass based plants in Romania

<table>
<thead>
<tr>
<th>Technology</th>
<th>NREAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>1250</td>
</tr>
<tr>
<td>Hydro (less than 10 MW)</td>
<td>437</td>
</tr>
<tr>
<td>Biomass, biogas, landfill gas</td>
<td>90</td>
</tr>
<tr>
<td>Solar</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1785</td>
</tr>
</tbody>
</table>

Source: ANRE, March 2016
Electricity delivered in the network (2015)

**Reference:** Project RES4LESS, 2013

**The sustainable 2020 - 2025 biomass energy potential in Romania** (Tantareanu et al, 2012)

<table>
<thead>
<tr>
<th>Resource</th>
<th>PJ/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry and wood waste</td>
<td>90</td>
</tr>
<tr>
<td>Agricultural waste</td>
<td>100</td>
</tr>
<tr>
<td>Biogas (animal waste, food industry, sewage sludge, landfill)</td>
<td>30</td>
</tr>
<tr>
<td>MSW</td>
<td>6</td>
</tr>
<tr>
<td>Dedicated energy crops</td>
<td>35</td>
</tr>
<tr>
<td>Forest land categories</td>
<td>Surface (ha)</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Forest-total, of which:</strong></td>
<td>7,046,056</td>
</tr>
<tr>
<td>Land cover with forest</td>
<td>6,900,962</td>
</tr>
<tr>
<td><strong>Bare land-total, of which:</strong></td>
<td>145,094</td>
</tr>
<tr>
<td>land for afforestation</td>
<td>78,457</td>
</tr>
<tr>
<td>other bare land</td>
<td>66,637</td>
</tr>
<tr>
<td><strong>Other wooded land</strong></td>
<td>93,588</td>
</tr>
<tr>
<td><strong>Trees outside the forest</strong></td>
<td>649,658</td>
</tr>
</tbody>
</table>

Source: National Forest Inventory
## Cut wood volume harvested (thou cubic meters)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>19081</td>
<td>19282</td>
<td>17889</td>
</tr>
<tr>
<td><strong>Fuel wood</strong></td>
<td>4755</td>
<td>5062</td>
<td>4813</td>
</tr>
<tr>
<td><strong>%</strong></td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: National Statistic Institute
## Import & Export value (thou Euro)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp</td>
<td>Imp</td>
<td>Exp</td>
<td>Imp</td>
</tr>
<tr>
<td><strong>4401</strong> Fuel wood, in logs, billets, twigs, faggots or similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms</td>
<td>91,842</td>
<td>3,851</td>
<td>84,633</td>
<td>10,418</td>
</tr>
<tr>
<td><strong>4402</strong> Wood charcoal (incl. Shell or nut charcoal), whether or not agglomerated</td>
<td>978</td>
<td>321</td>
<td>1,460</td>
<td>199</td>
</tr>
</tbody>
</table>
Pellets and briquettes production increased in Romania mostly after the country inclusion in EU. This was and still is mostly related with the new markets in Europe.

Currently, there are many pellet producers in Romania, but information about their production capacities is scarcely accessible.

In general, most of the production of large companies is sold on western European markets.

Small producers sell also on the Romanian market in the limit of their stocks (most of the production is realized from wood processing residues), based on pre-established contracts. (FOROPA Project)
2. Wood energy regulations

- RES support system

- Biomass specific regulations
Since 2005, Romania has adopted a support system with mandatory quotas combined with transactions of GCs. The number of GCs received for each 1 MWh delivered is different depending on the type of renewable sources. In 2015 the number of GCs by type of renewable sources was reduced.

» In accordance with Law 122/2015, RES-Electricity producers with power production facilities below 0.5 MW will be able to choose between the RES Support Scheme and a FiT system. The RES-Electricity producers opting for the FiT will no longer be entitled to receive GCs.

» The Government decision establishing the mechanism for the FiT has not yet been adopted, although the deadline set by Law 122/2015 has expired.

» The Ministry of Energy was in the process of drafting and finalising a new National Energy Strategy for the years 2016-2030. It is expected that the new National Strategy will provide more clarification on the future development of the RES-Electricity market in Romania. In accordance with the current draft, biomass projects have not reached their full potential and will be further encourage
<table>
<thead>
<tr>
<th>RES</th>
<th>TYPE OF POWER PLANT / GROUP</th>
<th>GC / MWH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hydro (used in power plants with installed power ≤ 10MW)</td>
<td>New (commissioned as of 1 January 2004)</td>
<td>2.3 GC</td>
</tr>
<tr>
<td></td>
<td>Upgraded / refurbished</td>
<td>2 GC</td>
</tr>
<tr>
<td></td>
<td>For each 2 MW for those power plants which do not fall in the above categories</td>
<td>1 GC</td>
</tr>
<tr>
<td>2. Wind energy</td>
<td>New / Second-hand</td>
<td>1.5 GC until 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.75 GC from 2018</td>
</tr>
<tr>
<td>2. Biomass (regardless of its aggregation form), Geothermal,</td>
<td>(new) – from all types of bio waste</td>
<td>2 GC</td>
</tr>
<tr>
<td>Bioliquids, Biogas</td>
<td>(new) – from energy crops</td>
<td>3 GC</td>
</tr>
<tr>
<td></td>
<td>High efficiency cogeneration</td>
<td>3 GC</td>
</tr>
<tr>
<td>3. Gas from waste and waste water treatment</td>
<td>(new)</td>
<td>1 GC</td>
</tr>
<tr>
<td></td>
<td>High efficiency cogeneration</td>
<td>2 GC</td>
</tr>
<tr>
<td>4. Solar energy</td>
<td>(new)</td>
<td>3 GC</td>
</tr>
</tbody>
</table>
Initially a too generous support scheme, but only for electricity

**Biomass was not enough encouraged**

Then, rules changed during the game: GCs number reduced, a share of them were postponed for transaction

Moreover, the mandatory annual quota was reduced from 12.15% for 2016 (compared to 17% as provided by Law)

Exemption of large consumers from payment of GCs

Taxation of GCs at the date of granting not upon sale (in 2015 RES investors financed the state with more than 2 Mio Euro through taxes paid in account of GCs (Source: PATRES)

Results:

1. surplus of unsold GCs on the market (assumption of RES Producers Organisation PATRES: 7 Mio at the end of 2016) – **this surplus might be used within the cooperation mechanism foreseen by RES Directive**
2. Estimated return of investment 25-30 yrs
Emergency Government Ordinance No 125/2006 approving the direct payment and complementary national direct payment schemes granted for agriculture starting from 2007

MEF Order no. 1341/2012 for approving the procedure for issuing certificates of origin for biomass from forestry and related industries
3. Sustainability of wood energy projects in Romania
Main sustainability issues on harvesting/producing woody biomass for energy:

- competition with other sectors that use the same resource
- greenhouse gas emissions
- soil quality
- biodiversity
- deforestation
- land use changes
- landscape transformation
- economic returns
- jobs and working conditions (change in labour market, impact on health of workers)
- rural development
- traditional value
Main sustainability issues on producing electricity/heat from woody biomass:

- Pollution
- Securing a stable biomass supply chain
- Raw biomass cost
- Grid integration
- Use of thermal energy during summer
- Capital costs
- Regulatory stability
In Romania:

- Woody biomass used mainly in inefficient technologies to produce heat
- Illegal logging vs. fuel poverty
- Deforestation
- Landscape transformation
For example, in 2013-2014:

- 45,509 cases of illegal loggings were identified
- total volume of timber extracted illegally 1,011,892 m³
- cca 52 Mio Euro loss

(Source: Greenpeace study)
Sustainable supply of woody biomass:
• sustainability criteria
• certification schemes
• compliance monitoring
• development of sustainable technologies

In Romania:
• No sustainability criteria adopted
• Legal provisions for getting origin certificate for woody biomass
• Support for energy crops and for high efficiency CHP
• Raising public awareness

SRC on underutilised land – a sustainable solution
A failure case: Co-generation Biomass plant in SUCEAVA

86 Mio Euro investment

Commissioning: Nov. 2013

Main characteristics:

» Biomass consumption: 158000 t_{atro}/y
» Thermal energy for DH: 265000 Gcal/y
» Thermal energy for biomass drying: 155000 Gcal/y
» Electricity injected: 165000 MWh_e/y

Big problems starting with 2014:

Biomass supply chain instable as prices and availability.
The main consumer, the local municipality, unable to pay regularly the bill.

A biomass for energy project is viable if the whole chain, from fuel supply to consumption, is secured for the project life.

Successful biomass projects are now in operation to large wood processing industrial companies
4. Lessons learned from Romania case study
Opportunities

- **Projects within European programs** (HORIZON, IEE, SEE) – important role for promoting sustainable use of woody biomass. E.g.: FORBIO Project continues and capitalizes the results of previous projects (RESS4LESS, M2RES, FOROPA, a.o.). Many times these projects provide strategic guidance as national financed studies and strategies are missing.

- Biomass is a **specific commodity-like renewable resource**: it can be produced, transported, stored, and priced at market value. Therefore, biomass mobilisation should cover the entire, complex value chains, from feedstock production to trade, logistics and energy conversion, to end-users consumption and demand.

- On the power market, the ability of the biomass electricity to be a **controllable generation** and not a fluctuant generation may answer to the issues accompanying the wind and PV grid integration and balance of consume.

- Since 2011, energy crops non-farm, non-food, are eligible to get **support for the from the state**.
Opportunities

• Biomass is a ‘local fuel’. Biomass supply chain logistics, advanced harvest, storage and transportation systems bring economic activity and new jobs in rural or less developed territories.

• RES in Romania are generally well accepted by the public, while biomass for fuel concept, is even better accepted and known by the Romanian farmers in rural communities.

• Many of the technological chains to produce power from biomass are mature, and it is up to investors anyhow to select competitive and viable technologies. Automation of biomass to power projects is high, required qualified personnel is minimal, most being involved in preparatory operations. So the implementation of power from biomass technologies in Romania may not be considered a problem.

• Local energy self sustainable

• As any other power technology, the installations making up a biomass power plant are complex and diverse. In order to accelerate the technology deployment, successful pilot projects should be promoted as best practices and become subject of replication.
Opportunities

• European Grants for Biomass Projects (2014-2020):
  » Operational Programme Large Infrastructure
  » Regional Operational Programme
  » Operational Programme Competitiveness
  » National Rural Development Programme

Source: Ganes Report
Barriers:

• In light of some unsustainable and aggressive use of the forests wood in the last period in Romania, the forestry and wood use for power production become a sensitive issue for public opinion and policy makers perception.

• Also security of supply of forestry resources is questionable in the medium and long term, given the alternative uses as new materials in furniture and construction industries (wood and cellulose-reinforced composites etc).

• Moreover, the wood resources are the preferred raw materials for pellets production and export.
Barriers:

- **Lack of developed and constant demand (market)**, meaning that there are very few industrial operators which are actively buying wood for producing energy;

- **Infrastructure**: especially in the forest, there is a lack of roads and storage facilities, which impede the collection of wood in general, and of the small and residual wood in particular;

- Current forestry legislation and norms which are not supporting commercial thinning. Intensity of thinning in Romania is rather low, thus making this sort of forestry operations unattractive for the logging companies;

- Forest **privatization and restitution** process, which was complicated and long, determining opposite effects than estimated. Thus, under normal conditions, privatization of forests should reduce illegal logging, but in Romania it only increased it;

*Source: FOROPA Project*
Barriers:

- **Changing legal framework**, complicated authorization procedure

- **Environmental concerns**: Emissions, odour, traffic, visual impact may create a local resistance to some biomass projects. The involvement of local authorities, local businesses and local communities is required to build consensus on the most appropriate local solutions, including collection of fuels.

- Once more biomass projects will be developed, **cost** increases can be expected for biomass, as well as for the collection and transport. Such increases introduce uncertainty in exploiting unused biomass resources in terms of volatility of biomass prices.

- Biomass projects ask for relatively **high investments** costs (E.g. up to 4,000 Euro/kW for power production).

- Weak support from **bank sector**

- No specific **support scheme** for biomass for heat production.

- The transit from woody biomass used today in inefficient rural stoves to local DH biomass fuelled systems is costly and requires a national programme.
Thank you!

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