WIND ENERGY CONTRIBUTION TO THE FULFILLMENT OF RENEWABLE ENERGY TARGETS IN ROMANIA

Cristian Tantareanu
Center for Promotion of Clean and Efficient Energy in Romania- ENERO
The Center for Promotion of Clean and Efficient Energy in Romania ENERO is a non profit independent consultancy and research centre active in the energy field since 1999.

ENERO is licensed for research activities by the Ministry of Education and Research.

ENERO goal is the sustainable development of the energy sector, by promoting in Romania the European energy policy and innovative and efficient energy technologies. Beside a (small) full time experts core, ENERO may gather other highly experienced experts working on projects.

From the beginning of its activity, ENERO has been member of numerous consortia, concerning research and development projects at national and European/international level as the 5th, 6th and 7th Framework Programmes for research and development, CIP - Intelligent Energy Programme.
WIND MEASUREMENTS

WIND POTENTIAL AND WIND FARM ASSESSMENT, BASED ON MEASURED WIND DATA

DD ON WIND PROJECTS

GENERAL ANALYSES AND SCENARIOS ON RENEWABLES DEVELOPMENT AND POLICY

Bucharest 9th July 2011
Relevant projects

- RES4LESS, Cost-Efficient and sustainable deployment of renewable energy sources towards the 20% target by 2020, and beyond, European Commission-EC, IEE, 2011-2012

- M 2 RES - From marginal, to renewable energy sources sites, South East Europe Transnational Cooperation Programme, 2011-2013.


- BMP, Biomass Romania Studies and Master Plan, NL Agency, 2008-2010

- SUSPLAN, Development of regional and Pan-European guidelines for more efficient integration of renewable energy into future infrastructure, European Commission-EC, FP7, 2008-2011

- CEUBIOM, Classification of European Biomass Potential for Bioenergy using Terrestrial and Earth Observations, European Commission, FP7, 2008-2010

- PROMES, Romanian contribution to the European targets regarding the development of renewable energy sources, National Research Program, 2007-2010.

- Romanian Energy Efficiency and renewable energy schemes, JASPER, 2007

- GREENET, Promoting grid-related incentives for large-scale RES-E integration into the European electricity systems, EC, IEE, 2006-2009

- RES2020, Monitoring and Evaluation of the RES directives implementation in EU27 and policy recommendations, European Commission, IEE, 2006-2009

- Studies and measurements for WIND FARMS, commercial projects, 2003-2011

Bucharest 9th July 2011
Content

Present status

Premises on wind energy development to 2020

Scenarios
Present RES development-2010

<table>
<thead>
<tr>
<th>POWER, TWh</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WIND (on shore)</td>
<td>0.2</td>
</tr>
<tr>
<td>WASTE</td>
<td>0.00</td>
</tr>
<tr>
<td>BIOGAS</td>
<td>0.06</td>
</tr>
<tr>
<td>BIOMASS</td>
<td>0.10</td>
</tr>
<tr>
<td>GEOTHERMAL</td>
<td>0.00</td>
</tr>
<tr>
<td>PV</td>
<td>0.00</td>
</tr>
<tr>
<td>All hydro</td>
<td>17.80</td>
</tr>
<tr>
<td>hydro large</td>
<td>16.8</td>
</tr>
<tr>
<td>hydro small</td>
<td>1.00</td>
</tr>
<tr>
<td>Total, TWh</td>
<td>18.16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HEAT&amp;BIOFUELS, PJ</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLID BIOMASS</td>
<td>135</td>
</tr>
<tr>
<td>BIOGAS etc</td>
<td>0.04</td>
</tr>
<tr>
<td>SOLAR</td>
<td>0.06</td>
</tr>
<tr>
<td>GEOTHERMAL</td>
<td>0.08</td>
</tr>
<tr>
<td>BIOFUELS</td>
<td>9</td>
</tr>
<tr>
<td>Total heat and biofuels, PJ</td>
<td>144.2</td>
</tr>
<tr>
<td>Gross final consumption, PJ</td>
<td>1083</td>
</tr>
<tr>
<td>TOTAL POWER, HEAT, BIOFUELS, PJ</td>
<td>222</td>
</tr>
<tr>
<td>Quote RES of gross final consumption</td>
<td>20.5%</td>
</tr>
</tbody>
</table>

Bucharest 9th July 2011
## RES development in Romania-NREAP

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating &amp; Cooling (%)</td>
<td>18,72</td>
<td>17,86</td>
<td>17,51</td>
<td>18,15</td>
<td>17,63</td>
<td>17,00</td>
<td>17,07</td>
<td>17,27</td>
<td>18,07</td>
<td>18,86</td>
<td>20,44</td>
<td>22,05</td>
</tr>
<tr>
<td>Electricity (%)</td>
<td>30,08</td>
<td>27,48</td>
<td>30,83</td>
<td>33,84</td>
<td>36,66</td>
<td>40,04</td>
<td>41,86</td>
<td>42,84</td>
<td>42,57</td>
<td>42,63</td>
<td>42,70</td>
<td>42,62</td>
</tr>
<tr>
<td>Transport (%)</td>
<td>1,39</td>
<td>5,82</td>
<td>6,37</td>
<td>6,90</td>
<td>7,32</td>
<td>7,72</td>
<td>8,11</td>
<td>8,43</td>
<td>8,80</td>
<td>9,23</td>
<td>9,69</td>
<td>10,00</td>
</tr>
<tr>
<td>Overall energy (%)</td>
<td>17,90</td>
<td>17,50</td>
<td>18,00</td>
<td>19,04</td>
<td>19,35</td>
<td>19,66</td>
<td>20,13</td>
<td>20,59</td>
<td>21,21</td>
<td>21,83</td>
<td>22,92</td>
<td>24,00</td>
</tr>
<tr>
<td>Deficit to be covered from stat. transfers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Surplus to be valorified as statistical transfers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
## RES development in Romania-NREAP

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating &amp; Cooling</td>
<td>3516</td>
<td>2819</td>
<td>2834</td>
<td>3000</td>
<td>2969</td>
<td>2925</td>
<td>3000</td>
<td>3058</td>
<td>3220</td>
<td>3390</td>
<td>3707</td>
<td>4038</td>
</tr>
<tr>
<td>Electricity</td>
<td>1347</td>
<td>1435</td>
<td>1624</td>
<td>1802</td>
<td>1991</td>
<td>2195</td>
<td>2333</td>
<td>2448</td>
<td>2511</td>
<td>2566</td>
<td>2621</td>
<td>2666</td>
</tr>
<tr>
<td>Transport</td>
<td>58</td>
<td>275</td>
<td>310</td>
<td>345</td>
<td>375</td>
<td>405</td>
<td>436</td>
<td>458</td>
<td>483</td>
<td>511</td>
<td>542</td>
<td>564</td>
</tr>
<tr>
<td>Overall energy</td>
<td>4921</td>
<td>4529</td>
<td>4768</td>
<td>5147</td>
<td>5335</td>
<td>5525</td>
<td>5769</td>
<td>5964</td>
<td>6214</td>
<td>6467</td>
<td>6870</td>
<td>7267</td>
</tr>
</tbody>
</table>

- **Heating & Cooling**: 8%
- **Electricity**: 37%
- **Transport**: 55%
Wind energy development- status beginning May 2011

- requests for 31,000 MW installed power
- more than 5,300 MW have the technical grid connection permit
- other 4,336 MW are in a more advanced stage, with grid connection contracts.
- projects in construction 1,150 MW.
- some 550 MW operational
Electricity production-April 2011

Raw data source: TRANSELECTRICA

Bucharest 9th July 2011
Wind energy penetration, April 2011
Wind energy output versus wind speed in Dobrogea, April 2011
Wind energy penetration, April 2011
Relevant factors for wind energy scenarios

- Life time, availability
- Wind potential
- Environmental restrictions
- Licensing procedure
- Energy bill
- Economic development, PIB
- Grid integration
- Policy commitment
- Market incentives

- Technical factors
- Market factors
- Policy factors

Bucharest 9th July 2011
Conditions (risks):

- policy
- market
- grid

**Policy risks**

Nuclear energy policy, no need for electricity

The policy and the targets asked to Romania regard RES, not electricity from RES or electricity from wind.

RES competitors in Romania to wind energy:
- Heat: biomass
- Transportation fuels: biomass
- Electricity: CHP biomass, hydro
**Grid integration risks**

Grid integration as transport capacity and balance management remain capital

*Today’s grid was not built for liberalized & integrated markets.*
*Grid investments take much longer time than market changes and wind energy development.*

(EURELECTRIC, 2010)

The analyze of the power production structure shows that the acceptable wind power capacity is about 2500-3000 MW, while a large hydro pumping storage plant is installed. In 2019, 3500 MW considered

(TRANSELECTRICA grid development plan up to 2019)

Already Black Sea offshore connections should be addressed.

Grid reinforcement and expansion should lead/precede the wind energy projects, not vice-versus.

ENTSO-E policy is important.
Proiecte de dezvoltare a RET asociate necesitărilor de dezvoltare

Bucharest 9th July 2011
I ADVANCED ENERGY TECHNOLOGIES, including wind/RES PRIORITY

TRADITIONAL RES, limited wind

Policy commitment

2005

2020

2040-2050

Grid integration

TRADITIONAL ENERGY

ADVANCED ENERGY TECHNOLOGIES, including wind

Bucharest 9th July 2011
The RES-E quota in the gross power demand, large hydro included

Source: SUSPLAN
The RES-all quota in the gross energy demand

Source: SUSPLAN

Bucharest 9th July 2011
Wind energy development - SUSPLAN scenarios
Wind energy development - SUSPLAN scenarios

Bucharest 9th July 2011
Bucharest 9th July 2011

The offshore platform is quite extended in the North of the coast, as the 20 m isobathic line is sited at 8 km to 12 km far from the coast line. In South, the offshore platform is getting progressively shorter (20 m isobath is sited at 3.5 km from coast).

Focus on offshore Black Sea

Good wind potential - Drilling oil platform Gloria meteo point - 5 years standard measurements 30m 7.4 m/s

The offshore platform is quite extended in the North of the coast, as the 20 m isobathic line is sited at 8 km to 12 km far from the coast line. In South, the offshore platform is getting progressively shorter (20 m isobath is sited at 3.5 km from coast).
Potential for RES cooperation - according to the RES Directive

Romania is preparing the regulatory framework for cooperation mechanisms, as a Governmental Decision draft is posted on the Ministry of Economy web site

Thank you!

www.enero.ro