TENDENCIES OF WIND ENERGY SECTOR DEVELOPMENT IN UKRAINE

Investment and Trade in Renewable Energy in the Black Sea
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PRECONDITIONS FOR RENEWABLES’ DEVELOPMENT IN UKRAINE

- Increase in fuels prices, including natural gas.
- Renewable energy sources natural potential.
- Favorable legislation in the country.
- International tendencies in “green” energy business development.
- Investments in national economy.
# ELECTRICITY GENERATION FROM RES

<table>
<thead>
<tr>
<th>##</th>
<th>RES</th>
<th>Number of plants/</th>
<th>Installed capacity at the end of 2011, MW /</th>
<th>Electricity output in 2011, mln kWh /</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wind Energy /</td>
<td>11</td>
<td>151,1</td>
<td>88,984</td>
</tr>
<tr>
<td>2</td>
<td>Solar Energy /</td>
<td>18</td>
<td>188,2</td>
<td>30,042</td>
</tr>
<tr>
<td>3</td>
<td>Small Hydro /</td>
<td>73</td>
<td>70,8</td>
<td>203,463</td>
</tr>
<tr>
<td>4</td>
<td>Bioenergy /</td>
<td>2</td>
<td>4,2</td>
<td>9,602</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>104</strong></td>
<td><strong>414,3</strong></td>
<td><strong>332,091</strong></td>
</tr>
</tbody>
</table>

*All 104 renewable energy plants have a license for electricity generation with its further selling under “green” tariff*
Amendments to the Law of Ukraine “On Electrical Power Engineering” to stimulate the usage of alternative sources of energy were approved by Verkhovna Rada (Parliament) of Ukraine on April 1st, 2009, by an overwhelming majority of 415 votes, representing by all political factions of the Ukrainian Parliament.

According to the Law of Ukraine “On Amendments to the Law of Ukraine “On Electrical Power Engineering” Regarding Stimulation of Usage of Alternative Sources of Energy” № 1220/VI the rate of “Green Tariff” set for electricity generated from renewable energy sources is determined by multiplying the existing electricity retail tariff by a coefficient:

<table>
<thead>
<tr>
<th>Installed Capacity</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td></td>
</tr>
<tr>
<td>Not more than 600 kW</td>
<td>1,2</td>
</tr>
<tr>
<td>600-2000 KW</td>
<td>1,4</td>
</tr>
<tr>
<td>≥ 2000 KW</td>
<td>2,1</td>
</tr>
</tbody>
</table>

The rate of “Green Tariff” for a wind farm of more than 2 MW installed capacity, comes to 11.31 eurocents per 1 kWh.

«Green Tariff» is set up for the period till January 1, 2030, for all business entities generating electricity from renewables.
DESIGN ERRORS
In accordance with Presidential Decree №159 of March 2, 1996 “On Construction of Wind Power Plants” and Resolution of the Cabinet of Ministers of Ukraine of February 2, 1997 a Complex Programme for Wind Farm Construction was launched in the country.

Under the Complex programme commercial production of wind turbines USW56-100 was established in Ukraine.

**GOAL:** To install **1990 MW** of wind capacities in Ukraine by **2010**.

- Inconsistency of turbine model with on-site wind conditions
- Absence of maintenance and repair services
- Law production quality
- Mistakes made during preparation of financial model of the Complex programme
## WPPs Connected to the Grid within the Framework of State Complex Programme

*(100% state property)*

<table>
<thead>
<tr>
<th>Name of WPP</th>
<th>Region of Ukraine</th>
<th>Beginning of construction</th>
<th>Design capacity, MW</th>
<th>Installed capacity at the end of 2011 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novoazovskaya WPP</td>
<td>Donetsk region</td>
<td>1998</td>
<td>50</td>
<td>21,8</td>
</tr>
<tr>
<td>State Enterprise “Donuzlavskaya WPP”</td>
<td>AR Crimea</td>
<td>1993</td>
<td>100</td>
<td>18,3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>45</td>
<td>10,9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>6,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>1,2*</td>
</tr>
<tr>
<td>State Enterprise “Vostochno-Krymskaya WPP”</td>
<td>AR Crimea</td>
<td>1996</td>
<td>42</td>
<td>26,0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>20,0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>6,0</td>
</tr>
<tr>
<td>Tarkhankutskaya WPP</td>
<td>AR Crimea</td>
<td>2001</td>
<td>70</td>
<td>16,7</td>
</tr>
<tr>
<td>State Enterprise “Vostochno-Krymskaya WPP”</td>
<td>AR Crimea</td>
<td>2008</td>
<td>9,6</td>
<td>2,8</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td></td>
<td></td>
<td>271,6</td>
<td>85,6</td>
</tr>
</tbody>
</table>

* 0.6 MW added in 2011
WIND ENERGY SECTOR OF UKRAINE

1997-2011

- Installed capacity as of December 31, 2011, MW
- New capacities added in 2011, MW
**NEW WPP COMMISSIONED in 2011**

(100% private capital)

<table>
<thead>
<tr>
<th>Name of WPP</th>
<th>Region of Ukraine</th>
<th>Beginning of construction</th>
<th>Design capacity, MW</th>
<th>Installed capacity at the end of 2011, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Park Novoazovskiy</td>
<td>Donetsk region</td>
<td>2010</td>
<td>57,5</td>
<td>37,5</td>
</tr>
<tr>
<td>Wind Park Ochakovskiy</td>
<td>Nikolayev region</td>
<td>2011</td>
<td>125,0</td>
<td>25,0</td>
</tr>
<tr>
<td>Novorossiyskaya WPP</td>
<td>Kherson region</td>
<td>2011</td>
<td>24,0</td>
<td>3,0</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td></td>
<td></td>
<td><strong>206,5</strong></td>
<td><strong>65,5</strong></td>
</tr>
</tbody>
</table>

88,984 MWh electricity were generated in 2011 by all wind power plants of Ukraine.
NEW TENDENCIES OF INDUSTRY DEVELOPMENT

- Experience gained from construction of commercial wind farms
- Analysis of bad technical solutions
- Interest in national production development based on licensed technologies
- Revision of technical requirements for wind energy projects implementation based on international experience
- Private sector involvement into new projects with MW-class wind turbines
- New energy policy in renewable sector
- Obligatory purchase of electricity generated at facilities using renewable energy sources at a fixed "green tariff" guaranteed by the law
- Involvement of international partners who have positive reputation with international banking institutions, into wind energy projects
# WIND ENERGY PROJECTS in UKRAINE. LICENCING SYSTEM

## 1. Preparatory Works
- Identification of the territory available for wind farm construction
- Agreement with RSA on design and survey works
- Meteorological data received from neighboring weather station over the past 10 years
- Assessment of the possibility to connect wind farm to the Unified Energy System of Ukraine

## 2. Wind Measurements, EIA
- Annual Wind Measurement Campaign
- EIA, Ornithological, Herpetological, Flora, Vegetation, Mammals (with focus on bats) Studies
- On-site Archeological Survey
- Public Hearings

## 3. Land Lease
- Land Allocation Project
- Land Allocation Project Approval
- Normative Monetary Value of Land Plot
- Normative Monetary Value Expertise
- Land Lease Agreement
- Land Lease Agreement Registration

## 4. Grid Interconnection
- Terms of Reference
- Technical design Scheme of Power Distribution
- Technical Conditions for interconnection of a wind farm to the Unified Energy System of Ukraine
- Contract for Grid interconnection

## 5. Project Documentation
- Contract with General Designer
- Statement on Intent for Area Development
- Basic Data
- Set of Technical conditions and requirements for wind farm engineering
- Project Documentations
- Complex State Enterprise (for objects of IV-V categories of complexity)
- Working Documentations
- Agreement on Technical supervision
- Contract with General Contractor
- Registration of Declaration on Commencement of building works with GASK (for objects of I-III categories of complexity)
- Building Permit (for objects of IV-V categories of complexity)

## 6. Wind Farm Construction
- Equipment Supply
- Foundation Construction
- Wind Turbines Assembly and Installation
- Start-up Works
- Commissioning
- Energy Production License
- Membership in the Wholesale Electricity Market of Ukraine (WEM of Ukraine)

## 7. Electricity Production and Sell
- Power Purchase Agreement concluded with SE "Energorynok"
- "Green" Tariff Approval

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BARRIERS AND REGULATORY DEFECTS

- Lack of regulatory requirements for the issuance of Technical Requirements for Grid Connection provided for the mandatory implementation of the key stages of project by the time of obtaining these Technical Requirements (rules for WPP interconnection to the grid)

- New Law "On Regulation of Urban Planning" - a lack of budget financing for developing a detailed plan for a certain region development required for to make a decision on complex development of a territory and obtain building permit.

- Land allotment procedure protracted and uncoordinated at legislative level. Non-finalized procedure of interaction of state bodies responsible for land allotment.

- Local content requirement for obtaining “green tariff ” against the background of a lack of national production of modern MW-class wind turbines.
EXISTING ECONOMIC AND TECHNICAL BARRIERS

Lack of national wind measurement campaigns to be carried out in accordance with the international standards and norms: financing of a project directly depends on the results of the wind measurement and micrositing, as investors will ask for reliable reports to hedge the loans.

Ownership of transmission lines (obligation to transfer ownership to the National Energy Company).

Lack of cost-recovery mechanism (investors’ costs for modernizations of the old transmission lines and construction of additional ones for interconnection with a grid). Lack of clear procedure for grid connection.
NEW WIND PROJECTS with MW-CLASS TURBINES

Wind Park Novoazovskiy, Donetsk region
Investment project of 57, 5 MW installed capacity envisages the installation of 43 wind turbines Fuhrländer FL-2500, 2, 5 MW in the territory of the existing Novoazovskaya WPP.
Project is scheduled for 2010-2012.
Wind Park Ochakovskiy, Nikolaev region

The first ten wind turbines Führlander FL-2500 were put into operation in December 2011. The project has been implementing by Wind Park Ochakovskiy LLC. Four more areas of Ochakovskiy Wind Park with total installed capacity of 100 MW are planned for commissioning in 2012.
Novorossiyskaya WPP, Kherson region

Vindkraft Ukraine LLC installed its first wind turbine V-112, 3 MW produced by Danish company Vestas in Skadovsk district of Kherson region.

Two more wind turbines are planned for installation in 2012.
WIND DEVELOPMENT DRIVING FORCES

- Permanent increase in conventional fuels prices.
- Reduction of energy dependence of the regions with high potential of renewable energy sources.
- Development of local economy.
- Creation of new jobs. Unemployment reduction.
- Implementation of commitments to reduce CO₂ emissions under the Kyoto Protocol and possibility of obtaining carbon credits.
Review
“WIND ENERGY IN UKRAINE 2011”

- Dynamics of wind power growth in Ukraine in 2011
- Existing barriers
- Manufacture of modern wind turbine in Ukraine
- Changes in legislation
- The Second international conference UWEA 2011
- New wind energy projects
- Staged procedure for wind energy projects implementation in Ukraine
- Forecast for 2015 and 2020
- Small wind energy
The **Ukrainian Wind Energy Association (UWEA)** is an All-Ukrainian, non-governmental, non-profit organisation whose purpose is to promote wind energy technologies and defend wind energy interests on both national and international level. Ever since its foundation in spring 2008, the association has been committed to wide-scale developing wind energy in Ukraine. UWEA popularizes wind energy as environmentally sound, CO2 neutral source of electricity for Ukrainian consumers.

**Our motto:** Wind Energy is an environmentally friendly instrument for strengthening national energy security.

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