Renewable Energy status, potential and opportunities in Russia

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2nd Session of the Group of Experts on Renewable Energy
In 2014 in Russia produced 1059.0 billion kWh of electricity, including by type of generation:

- Coal 19%
- Nuclear 16.9%
- Hydro 15.7%
- Natural gas 47%
- RES 0.4%
- Oil 1%

Source: Energy forecasting agency

The structure of the power grid complex in Russia:

**Federal** - Federal Grid Company, FGC:
- JSC "Rosseti" - subsidiary company;
- Carries out activity by:
  - Power transmission by 700 - 200 kV power lines;

**Interregional** - Interregional Distribution Grid Companies (IDGC):
- Subsidiaries of JSC "Rosseti";
- Carries out activity by:
  - Power transmission by 110 - 0.4 kV power lines;
  - Grid connection of consumers

**Regional** - Regional grid companies:
- Subsidiaries of JSC "Rosseti".

Power and capacity markets in Russia:

**Wholesale power market**

- Suppliers: generating companies of the wholesale market, power importers
- Purchasers: big consumers, including market partial participants purchasing on the retail market more than 85% of planned consumption, sales companies and guaranteeing suppliers, exporters of electricity, distribution companies (in terms of purchasing power to cover transmission losses)
- Features: Power and capacity are realized separately. Each participant may act as a seller and purchaser.
- Regulatory framework: Government Decree of 27 December 2010 № 1172 Regulation of the wholesale market of power (capacity)

**Retail power market**

- Suppliers: sales companies, guaranteeing suppliers, generating companies of retail market
- Purchasers: retail customers, market partial participants, grid companies (in order to compensate power losses)
- Features: Capacity and power can be sold separately or as a single item (power plus capacity)
- Regulatory framework: Government Decree of May 4, 2012 № 442 "On the functioning of retail electricity markets, complete and (or) partial restriction mode of electricity consumption"
It is estimated that Russia has large wind potential, its gross theoretical wind energy potential is defined to be 19,747.7 billion kWh/year ($H=100\text{m}$) and gross technical wind energy potential – 21,850 billion kWh/year ($H=100\text{m}$).

The favourable zones for wind energy development include territories of South and North Caucasus federal districts (FD), territories of the North West, Ural, Siberian, Far East FD located in the Arctic Circle; coastal areas northeast of the country, as well as the Kamchatka Peninsula and Sakhalin Island. But the sources haven’t been realized to its full potential, only 13 MW are installed in Russia nowadays.
Solar Power Technical Potential in Russia

<table>
<thead>
<tr>
<th>Region</th>
<th>Power, mln. kWh</th>
<th>Thermal, mln. GCal</th>
<th>Power, tsd. кВтч/ha</th>
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![Map of Solar Power Technical Potential in Russia](image)
Animal Wastes Power Potential in Russia
Plant cultivation Wastes Power Potential in Russia
Small Rivers Power Potential in Russia
Peat Power Potential in Russia
State Support for Wind Power Development in Russia

RF Government Decree № 1839 of 04.10.2012 "On approval of a package of measures to stimulate production of power by generating facilities operating on the basis of renewable energy sources" became the legal basis for large-scale development of renewable energy sector in Russia.

Federal Law No. 35-FZ on the Electric Power Industry

**States:**
- The obligation of grid companies to buy power generated by RES to cover grid losses.

**Conditions for implementation:**
- Low tariff rate;
- Impossibility of getting the tariff for the entire payback period of the project;
- Feed-in-tariff could be calculated and approved only after commissioning and qualification of generating facility;
- Inability of entering into PPA for the entire payback period of the project;
- Lack of economic incentives for grid companies to purchase power energy generated from RES.

RF Government Decree № 1472-r dated July 28, 2015

**Defines:**
- Target volumes of generating facilities commissioning on the basis of RES till 2024;
- Target indicators of local content of the primary and/or auxiliary wind energy equipment in Russian Federation till 2020;
- The CapEx limits for construction of 1 kW installed capacity on the basis of RES, rub. /kW
- The limits for fixed OpEx costs for 1 kW of installed capacity;
- The limits for variable OpEx for generation of MWh.

Amendment to FZ-35 for power sales to cover grid loses

- Bylaws to FZ-35 are expected to be adopted by the end of 2014
  - the rules for calculating the tariff for power generation based on renewable energy;
  - the possibility for REC of establishing tariff for the entire period of payback period;
  - the rules of concluding contracts with grid companies to purchase electricity for losses on the entire payback period.

- The guaranteed cash flow for the entire payback period of the project;
- Economic efficiency (payback period is substantially lower compared with selling power for covering grid losses by the Federal Law № 35-FZ);
- Necessity of equipment local content in RF for entering the Capacity Purchase Tender.
### Installed capacity commissioning target volumes

Installed capacity commissioning target volumes for generating units operating on the basis of wind power and the of local content indicators in Russia for the main (or) of the auxiliary generating equipment used for power generation on the basis of wind energy (RF Government Degree of July 28, 2015 № 1472-p)

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Capacity Purchase Agreement – Parties/Transactions

**CPA parties:** RES generators, purchasers, TSA, SO, NP «Market Council»

**JSC “SO UPS”**
(System Operator of the United Power System)

**JSC “FSC”**
(Financial Settling Centre)

**Minpromtorg**
(The Ministry of Industry and Trade)

**NP “Market Council”**

**Wind Farm Owner**

**Purchasers**

**JSC “TSA”**
(Trade System Administrator)

Selection of projects is carried out for next 4 years

Certification

Commercial Representation Agreement

Organization of Capacity Purchase Tender

Confirmation of the achievement of the required indicator of WF localization

Qualification
Russian Wind Energy Sector Governance Structure

**Federal level**
- The Ministry of Energy – energy policy, R&D financing;
- The Ministry of Education and Science – scientific and educational policy, R&D financing;
- The Ministry of Economic Development – economic policy, financing of state programs and projects;
- The Ministry of Industry and Trade – promoting localization of generating equipment manufacture in Russia;
- The Ministry of Regional Development – coordination the of RES projects implementation at the regional level.

**Regional level**
- Regional Ministries of power sector
- Regional and municipal administrations
- Regional centers of energy-saving and energy efficiency

**Developers**
- Wind Energy Systems
- Bright Capital
- Wind Power Generation Company
- Wentrus
- Falcon Capital
- Sowitec
- VetroSGC
- Wetroen Yug

**Russian local content partners**
- Group of companies “RUSCOMPOZIT”
- Composite Holding Company
- Galen
- Proelektrotechnika
- Atomenergomash
- Penzkhimmash
- Yesk Aircraft Engine Repair Plant

**OEM**
- Vestas
- Gamesa
- GE
- New Wind

**Technological platforms**
- Combine the efforts of government, science and business in the design and manufacture of unique products in the framework of Russia’s economic modernization.
- Smart grid of Russia
- Advanced Technologies of RES
- Small scale and decentralized power systems

**R&D Directions**
- Development of wind turbines
- Development of technologies for offshore wind farms, providing a long and reliable operation of the installations at large depths and far from the coast
- Creating the control systems of optimal automatic operation of wind power plants
- Research aimed at improving the correct assessment and forecasting of wind potential

**Research Centers**
- Joint Institute for High Temperatures of the Russian Academy of Sciences
- St. Petersburg State Polytechnical University
- International Research and Educational Foresight Centre
- The Faculty of Geography at Lomonosov Moscow State University
- National Research University "Moscow Power Engineering Institute"
- South Ural State University (National Research University)
- Platov South-Russian State Polytechnic University (NPI)
- Central Aerohydrodynamic Institute
- Research Centre "Atmograph"
- G.M. Krzhizhanovsky Power Engineering Institute
- Bauman Moscow State Technical University
- Skolkovo Innovation Centre

**Noncommercial Partnership**
- MARKET COUNCIL
- Operation of the wholesale and retail power and capacity markets.

**Power generation companies**
- Enel
- E.On
- EuroSibEnergo
- LUKOIL
- RusHydro
- INTER RAO UES

**Regional Ministries of power sector**
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**MARKET COUNCIL**
- Operation of the wholesale and retail power and capacity markets.
Solar Power Advanced Projects in Russia

"The international settlement center"
Energoholding

Volga region, Stavropol region, Republic Kalmykia
12 SPP 165 MW total

Orenburg Heat Generation Company
Orenburg Region 1 SPP

Avelar Solar Technology
Orenburg Region Bashkortostan 1
2 SPP 99MW total
Altai Republic 2 SPP 10MW total

EvroSibEnergo
Khakassia 1SPP 5.2 MW

ComplexIndustry
Astrakhan Region Volgograd Region Lipetsk region
6 SPP
### Risks of Investing in Russian Wind Power Sector

#### Capacity supply agreement

- Localization conditions, not taking into account real capabilities of the Russian industry;
- Underestimated capital costs for the construction of 1 kW installed capacity;
- Change of the Governmental Decree № 449 and the pricing formula for capacity;
- Change of localization indicators;
- Penalties for:
  - certification of less capacity amount;
  - failure to achieve capacity factor fixed number by Governmental Decree № 449;
  - delay of the WF commissioning;
  - failure to achieve the required localization indicators on results of the qualification.

#### Competitive capacity selection

- No regulations for entering CCS for generating capacities based on renewable energy;
- Failure to provide return of investments because:
  - CCS contract until 2016 is for 1 year after 2016 – for 4 years;
  - Deadline for the transition from a one-year to a four-year CCS permanently postponed;
  - The risk of being unselected for capacity payments on the next period.

#### Electricity sales for covering grid losses

- Due to lack of regulations it is impossible to:
  - enter into PPA before commissioning of the power plant;
  - enter into PPA for more than a year.

#### Electricity sales on retail market

- Installed capacity can not exceed 25 MW:
  - Increased connection cost;
  - Increased the price of electricity;
- Necessity of wind farm construction near the end user:
  - Not everywhere there is good resource;
- Instability of power supply;
- Risk of the final user refusal in the power purchase;
- The risk of non-payment for supplied power by the end user;
Thank you!

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