



PROSPECTS FOR DEVELOPMENT OF RENEWABLE ENERGY IN THE EAST OF RUSSIA AND AREAS FOR RUSSIAN-JAPANESE COOPERATION

1. Role of renewable energy sources in electricity production in Russia (current status)
2. Areas of priority utilization of renewable energy sources
3. Forecasts for renewable energy development in Russia
4. Estimations of rational scale for the renewable energy development in the decentralized area in eastern Russia

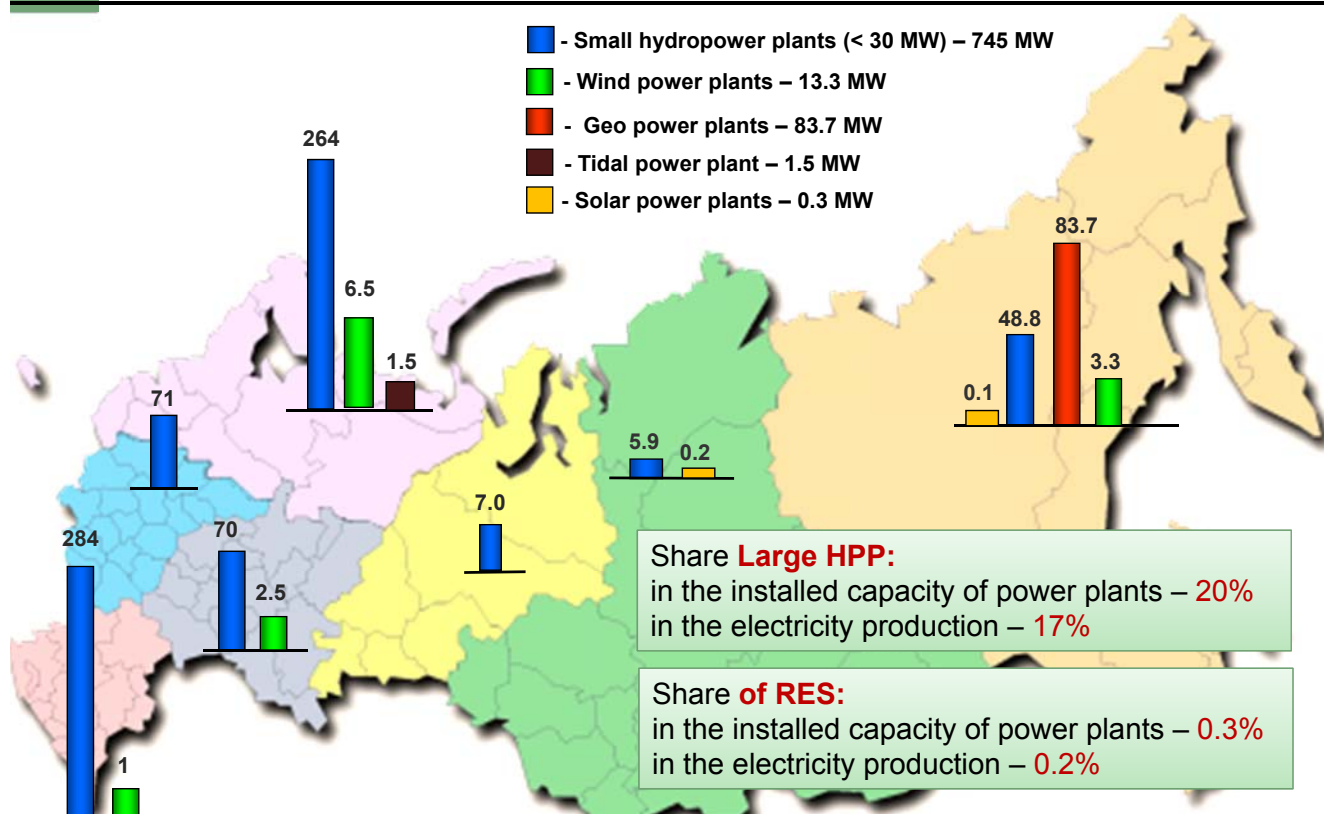
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Speech at the 7th Japan-Russia Energy and Environment Dialogue, Niigata, October 30, 2014



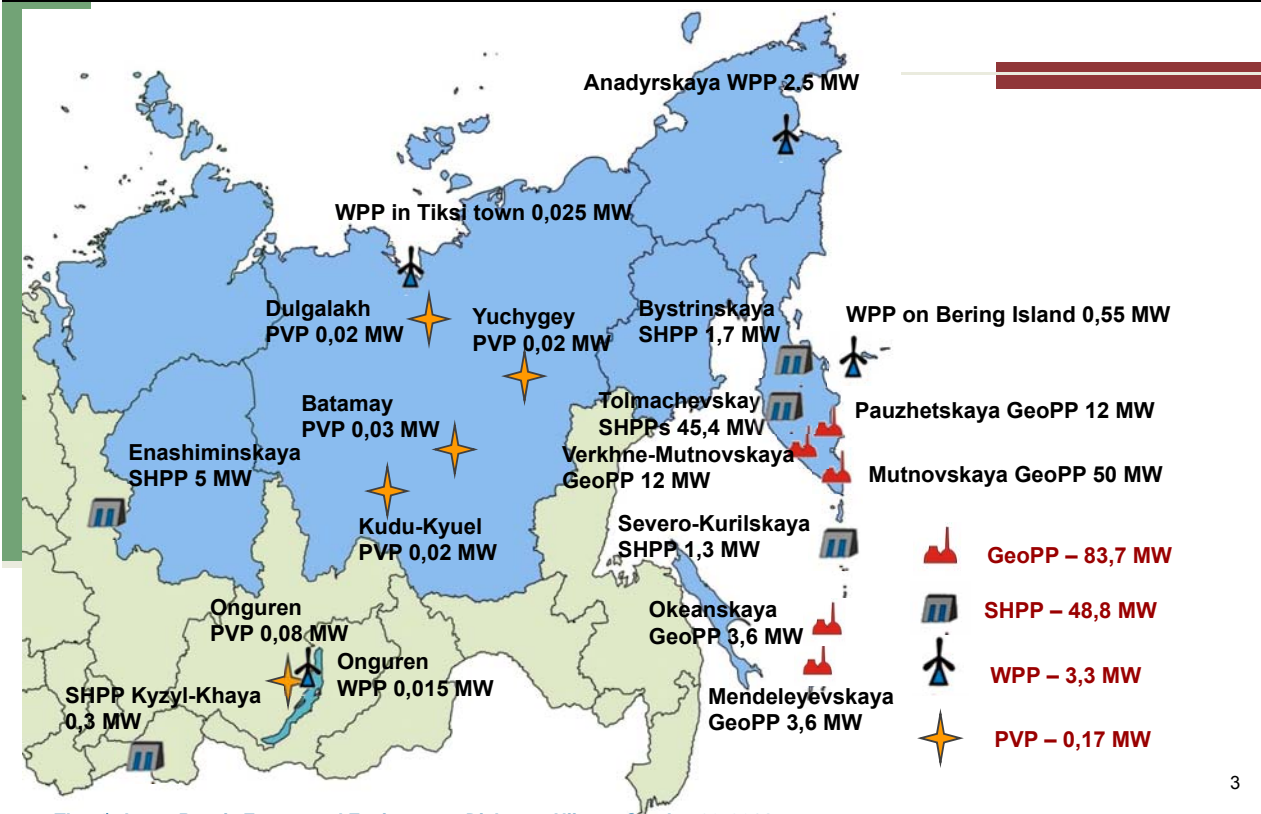
1. ROLE OF RENEWABLE ENERGY SOURCES IN ELECTRICITY PRODUCTION IN RUSSIA (CURRENT STATUS)



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LOCATION OF RENEWABLE ENERGY SOURCES IN THE EASTERN REGIONS (CURRENT STATUS)



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2. AREAS OF PRIORITY ALLOCATION OF RENEWABLE ENERGY SOURCES

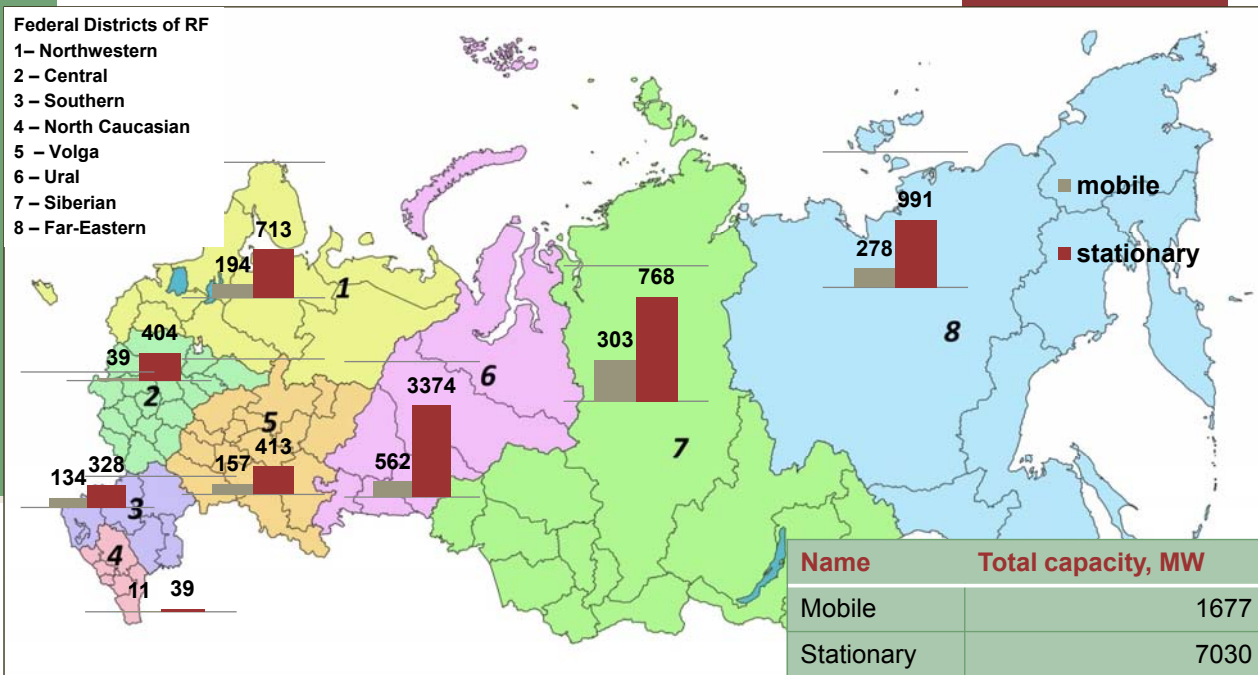
Decentralized area	<ul style="list-style-type: none"> • Dependence on fuel supply • Budget subsidies
Areas with unstable electricity supply	<ul style="list-style-type: none"> • Low reliability • High emergency rate
Specially protected natural areas	<ul style="list-style-type: none"> • Environmental requirements

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DISTRIBUTION OF SMALL-SCALE POWER PLANT CAPACITIES ACROSS THE FEDERAL DISTRICTS OF RF, MW

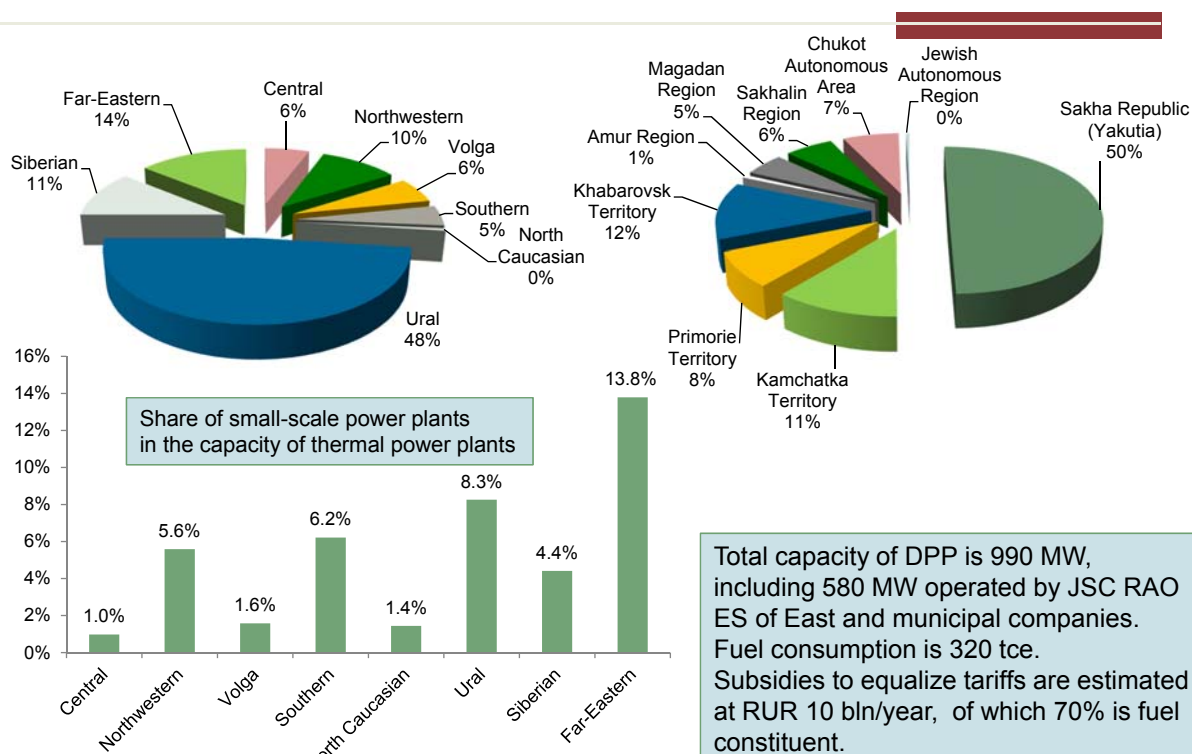


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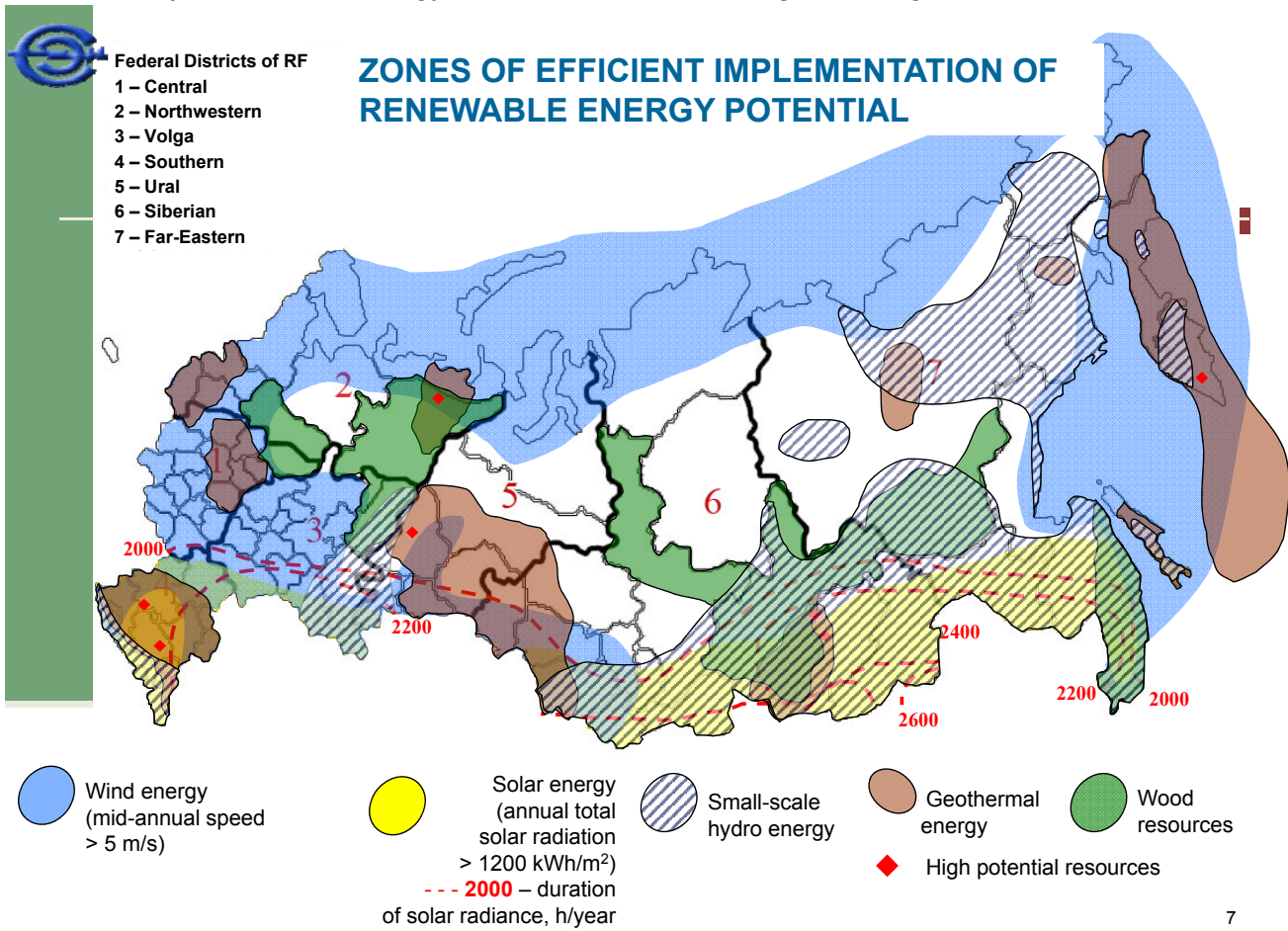
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DISTRIBUTION OF LOW-CAPACITY STATIONARY POWER PLANT CAPACITIES ACROSS THE FAR-EASTERN FEDERAL DISTRICT

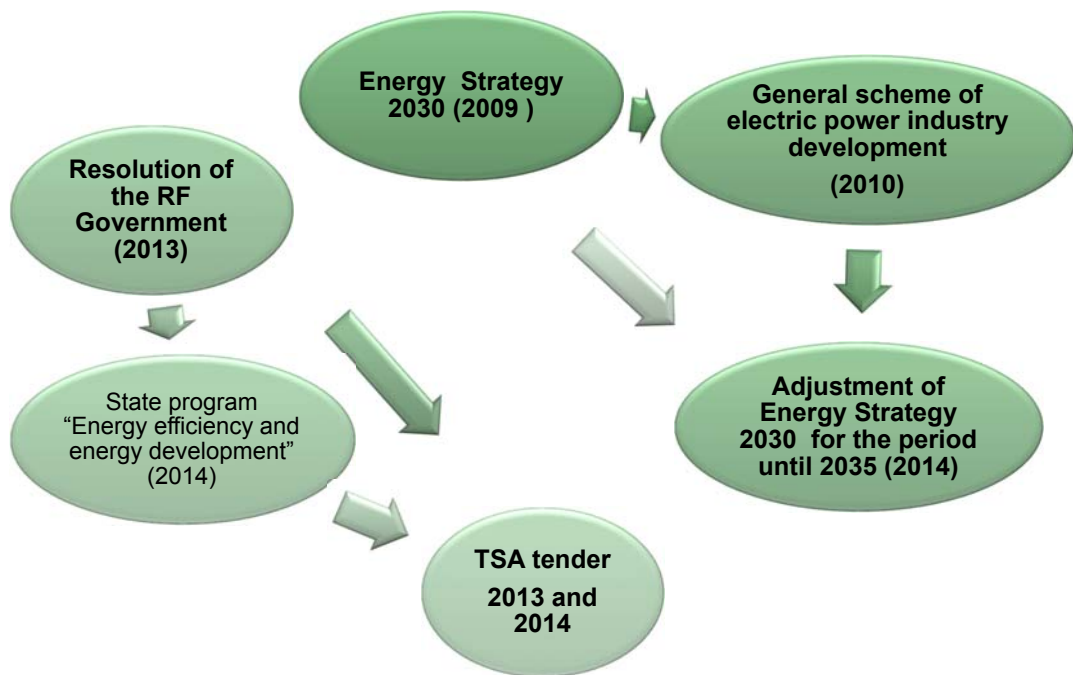


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3. FORECASTS FOR RENEWABLE ENERGY DEVELOPMENT IN RUSSIA



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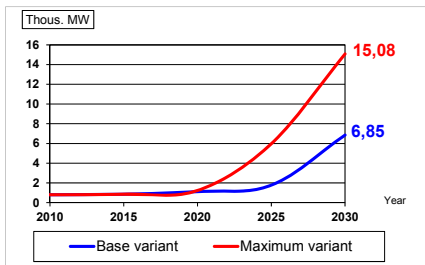


An aim of the **Russian Energy Strategy until 2030 (in 2009)**:

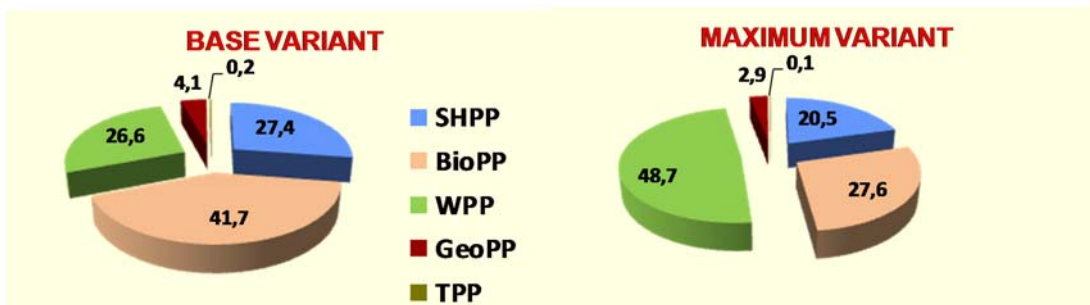
- by 2020, an increase in RES share in total electricity production **from 0.5% to 4.5%**
- total capacity to be commissioned – **25 thousand MW**

An indicator of the **General Scheme for Placement of Electric Power Industry Facilities in Russia until 2020 with prospects until 2030 (in 2010)**:

- total renewable generating capacities to be commissioned - **6-14 thousand MW**
- in the eastern regions - **2 - 3.5 thousand MW**



Structure of capacities to be commissioned in Russia in 2030 by RES type, %



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State program **Energy efficiency and energy development (in 2014)**

Share of RES in electricity production by 2020 – **2,5%**

Total RES capacities to be commissioned **by 2020**
in the zone of electricity wholesale market – **5871 MW**

Resolution of the Government of RF No 449 of May 28, 2013 «A mechanism to stimulate the use of renewable energy sources in the wholesale electricity and capacity market»

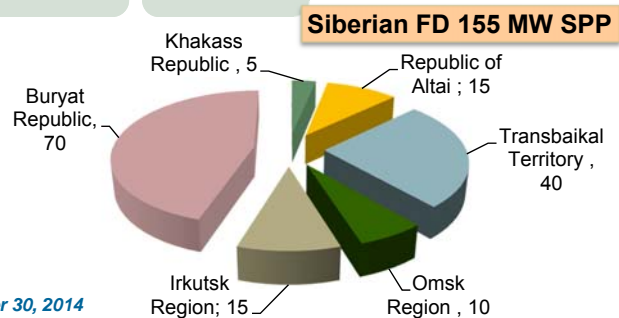
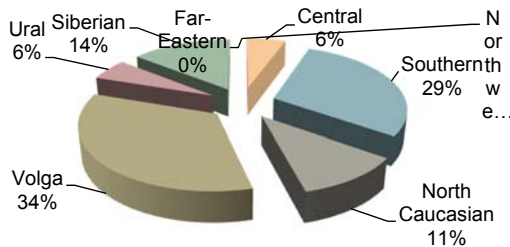
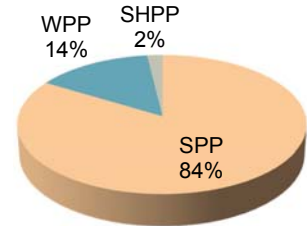
INDICES	Small-scale HPPs < 25 MW	Wind power plants > 5 MW	Solar power plants > 5MW
Capacity to be commissioned by 2020, MW	751	3600	1520
Capacity factor, %	30	25	13
Share of equipment production in the Russian Federation in 2015, %	20	55	50
Marginal capital costs, USD thousand/kW	4,9	2,2	3,9

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Investment projects for RES construction that won the tender held by the JSC "Trading System Administrator of Wholesale Electricity Market" in 2013-2014, in pursuance of the Resolution No 449 of the RF Government

CAPACITY TO BE COMMISSIONED, MW	Small-scale HPPs < 25 MW	Wind power plants > 5 MW	Solar power plants > 5 MW	TOTAL
2014			35,2	35,2
2015		51	140	191
2016		15	189	204
2017	20,6	90	255	365,6
2018			285	285
TOTAL	20,6	156	904	1080,6



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Adjustment of Energy Strategy of Russia-2030 for the period until 2035 (in 2014):

The main target index by 2035: the share of renewable energy in the total capacities to be commissioned – **3,7%** in electricity production – **2,2%**

Total RES capacities to be commissioned – **18 thousand MW**
Electricity production from RES – **34-35 billion kWh**

The main lines of innovative energy development:

- Development of units and equipment for low-head **small-scale hydropower plants**;
- Creation of technologies for construction and operation of large on-grid **wind power plants**;
- Adoption of technologies for construction and operation of **wind-diesel systems**;
- Creation of an industry for production of large- and medium-capacity **wind power plants**;
- Modernization of the existing industrial facilities for production of **geothermal power plants**;
- Development of an industry for production of equipment for **photovoltaic plants**;
- Development of technologies for **binary cycle units**, thermal pumps, etc.
- Development and implementation of technologies for electricity production on the basis of **wood waste gasification**;
- Improvement in the equipment for **biogas plants**.

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4. ESTIMATIONS OF RATIONAL SCALE FOR THE RENEWABLE ENERGY DEVELOPMENT IN THE DECENTRALIZED AREA IN EASTERN RUSSIA (ESI SB RAS)

In the framework of the Energy Strategy of Russia 2030 and its adjustment for the period until 2035

- Strategy for energy development in **East Siberia and the Far East** until 2030
- Research into the prospects of the electric power industry development in Russia for the period until 2030.

Ordered by the regional authorities and energy companies

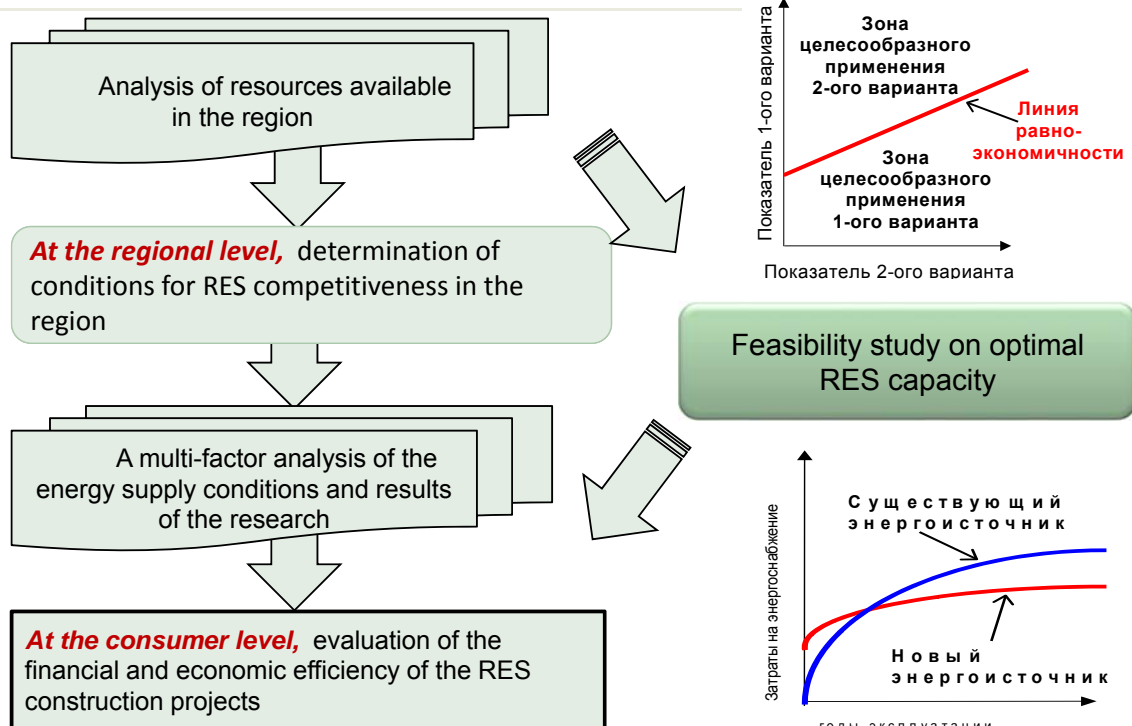
- Concept of providing stable operation of energy facilities and energy security of **Sakhalin region** until 2020
- Comprehensive analysis of the efficiency of various RES types for energy supply to the consumers on the **Kuril islands**
- Improvement in the energy efficiency of the **Sakhalin Region** in 2010-2015 and in the period until 2020
- Strategy for energy development in **Amur Region** until 2010 and for the time horizon until 2030
- Strategy for electric power industry development in **Chukot Autonomous Area** until 2020
- Strategy for energy development in **Irkutsk Region** until 2010 and for the time horizon until 2030
- Program for energy conservation and improvement in the energy efficiency in **Irkutsk Region**
- Energy strategy of **Sakha Republic (Yakutia)** until 2020 and for the time horizon until 2030
- Feasibility study on the utilization of wind and solar power plants for heat and electricity supply to the remote consumers in the Extreme North on the example of **Sakha Republic (Yakutia)**
- Scheme and program for electric power industry development in **Sakha Republic (Yakutia)** for 2015-2018 and for the period until 2020.

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METHODOLOGICAL APPROACH TO THE FEASIBILITY STUDY OF RES FOR DECENTRALIZED CONSUMERS

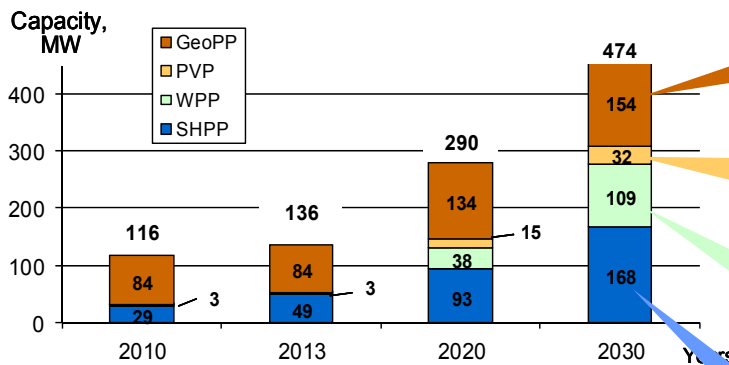


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RATIONAL UTILIZATION OF RENEWABLE ENERGY SOURCES IN THE EASTERN REGIONS

ESI FORECAST FOR EASTERN REGIONS



Geo power plants in Kamchatka Territory and on the Kuril islands **65-75 MW**

Photovoltaic plants in Buryat and Tuva Republics, Amur Region, Transbaikal Territory **75-85 MW**

Wind power plants in Primorie, Khabarovsk and Kamchatka Territories **65-70 MW**

Small hydropower plants in Buryat Republic, Kamchatka Territory and Irkutsk Region **110-126 MW**

TOTAL CAPACITY TO BE COMMISSIONED - 330-360 MW

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RATIONAL COMMISSIONING OF RENEWABLE ENERGY SOURCES IN THE EASTERN REGIONS



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DIRECTIONS IN COOPERATION BETWEEN RUSSIA AND JAPAN IN THE FIELD OF RENEWABLE ENERGY SOURCES

- *Legislative framework*
- *System of state stimulation*
- *System of preferential taxes and loans*
- *Mutually beneficial deliveries of equipment*
- *Joint investment in projects*
- *Information exchange*

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Thank you for your attention

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