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Recommended citation:


4 Europe

4.1 Eastern Europe

4.1.8 Russian Federation

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Key facts

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Population</td>
<td>141,750,000</td>
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<tr>
<td>Area</td>
<td>17,098,242 km²</td>
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<tr>
<td>Climate</td>
<td>Russia is located within four climatic zones: Arctic, sub-Arctic, moderate, and subtropical.</td>
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<tr>
<td>Topography</td>
<td>Broad plain with low hills west of Urals; vast coniferous forest and tundra in Siberia; uplands and mountains along southern border regions</td>
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<tr>
<td>Rain pattern</td>
<td>Annual precipitation decreases from the west to the east, although this trend is complicated by a relief influence. In the European part annual precipitation exceeds 700 mm, reaching 800 mm and more on the highlands. In West Siberia, the amount ranges between 550 mm and 700 mm. To the north, the precipitation decreases to 550 mm to 600 mm on the Baltic Seashore, and to 400 mm to 500 mm on the Kara Seashore. To its south, the precipitation decreases to 500 mm near the Sea of Azov, and to 300 mm on the Low Volga River.</td>
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Electricity sector overview

The Ministry of Energy of the Russian Federation (hereafter Russia) reported that the country has about 600 power plants with unit capacities over 5 MW. The total installed capacity of power plants in Russia on 1 January 2012 was 218,145.8 MW, an increase of 4,817.3 MW compared to 2011 through the construction of new energy facilities and upgrading of existing facilities. The installed capacity of the existing fleet of power plants by type of generation is as follows: 68.4 per cent thermal power plants, 20.3 per cent hydropower, and about 11.1 per cent nuclear power. Annual production of electricity in 2011 was 1,019,400 GWh (figure 1).

Hydropower plants provide system services (e.g. frequency, power) and are a key element in ensuring the system reliability of the country’s Unified Energy System, having more than 90 per cent power reserve adjustment and are able to rapidly increase production to cover peak loads. A programme is being implemented to construct pumped storage plants that are needed for daily regulation of grid systems.

RusHydro has three design institutes and two research institutes, consolidating all of Russia’s existing research and design organizations in the hydropower sector. It is developing many renewable energy projects to utilize tidal energy, geothermal energy and small hydropower.

Small hydropower sector overview and potential

Russia’s first hydropower plant was built in Altai on River Berezovka in 1882. The four-turbine plant had a capacity of 180 kW, generating electricity for the bilge pumps at a mine. The development of small hydropower in Russia occurred in two different stages: from 1919 to 1945, about 950 small hydropower plants.
were built, with an average capacity of 35 kW and a total installed capacity of 32 MW, serving one or several collective farms. From 1945 to 1969, hundreds of larger, state-owned hydropower plants were built, operating in local power systems, with capacities ranging from 1 kW to 10 MW. 

Technically feasible potential for hydro plants of up to 30 MW has been assessed and determined to be 350,000 GWh/year.

As more and more rural residents got connected to the main electricity grid, construction of small hydropower plants stopped and many were shut down, mainly because they could not compete with the low electricity prices, due to, among other reasons, poor design and the lack of skilled workers. In 2010, Russia had only about 300 small hydropower plants left, with a capacity of 1,300 MW, although the rising electricity prices make their construction and operation more and more attractive. About the same amount of small hydropower is realistically developable in the medium term, exact figures are not available at the moment (figure 2).

![SHP installed capacity](image)

Figure 2  Small hydropower capacities in Russian Federation

Source: Enov

Russia accounts for about nine per cent of the world’s water resources so the availability of hydropower resources in Russia ranked second highest in the world, surpassing the United States, Brazil and Canada. To date, the total theoretical hydropower potential is 2,900,000 GWh of annual electricity, but the country now only utilizes 20 per cent of this potential. One of the barriers to the developing hydropower is the remote locations of potential sites and distance from the main electricity consumers, which are concentrated in central and eastern Siberia and the Far East.

Renewable energy policy

The Russian Government has published a decree called ‘On the Main Trends of National Energy Policy aimed at Increasing the Energy Efficiency of Electric Power Generation through the Use of Renewable Energy Sources during the Period up to 2020’. Renewable energy sources include small hydropower, wind, tidal, geothermal and thermal power using biomass with an aggregate installation of 25 GW until 2020. The aim is to increase the share in electricity generation from renewable energy from 1-4.5 per cent in 2020 with 80 per cent of electricity stemming from small hydropower. Including large hydro (above 25 MW) the target is 19 – 20 per cent. For this purpose, a Small Hydropower Association was created with the approval of the Ministry of Energy, uniting different institutions and aiming for the involvement of Russian and foreign investors as well as specialists.

Barriers to small hydropower development

The main obstacle to small hydropower development in Russia is the lack of long-term financing for construction projects, partly due to the long payback time, but also because of the long process of land allocation and the difficulty in obtaining approvals. In addition, Russia remains dependent on its traditional and still relatively cheap energy sources (oil and gas) and incentives schemes such as subsidies are scarce.

References
