

The Federal Grid Company of the Unified Energy
System of Russia

Федеральная
Сетевая Компания

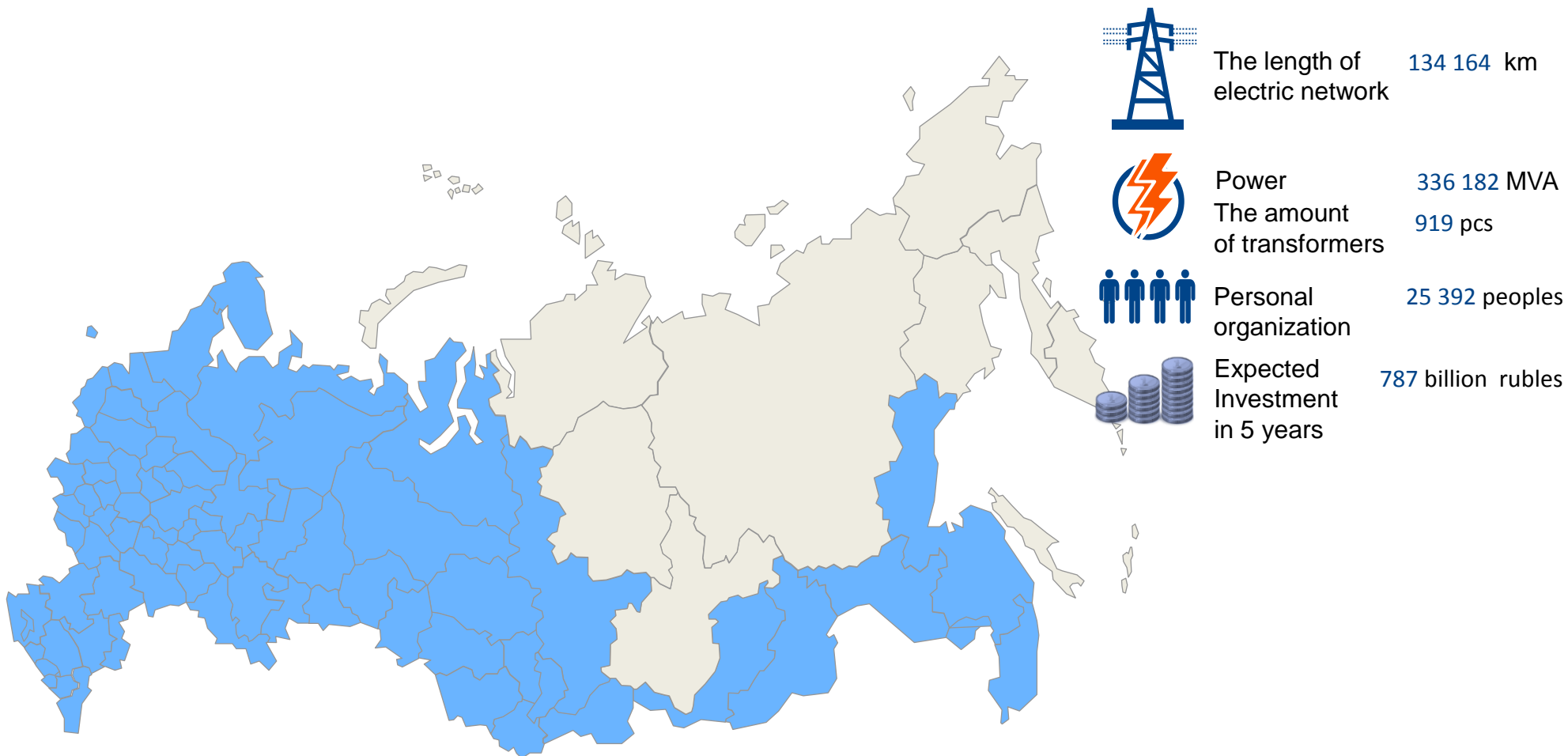


Единой
Энергетической
Системы

Prospects for the development
energy system of the North-West
during 2014-2019



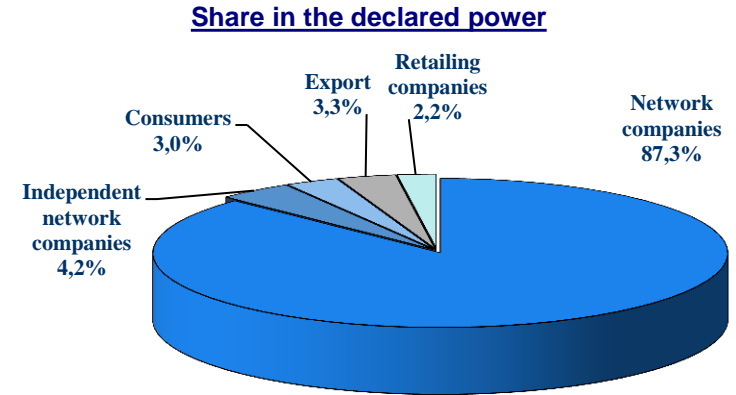
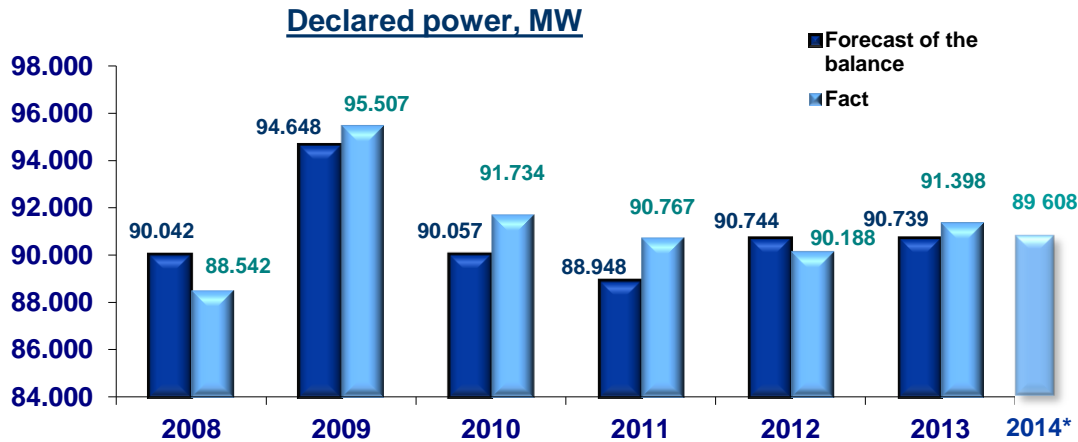
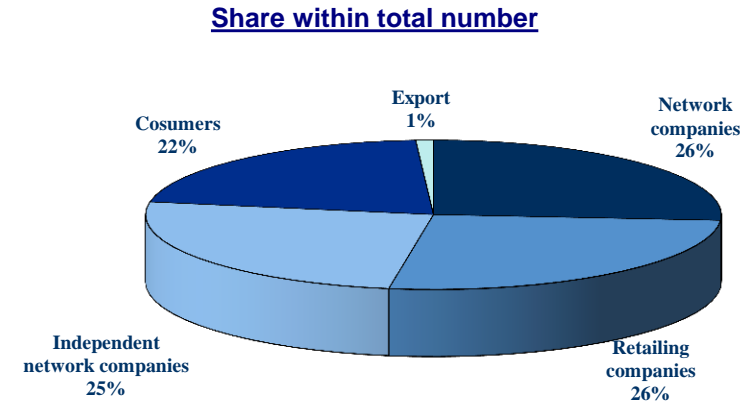
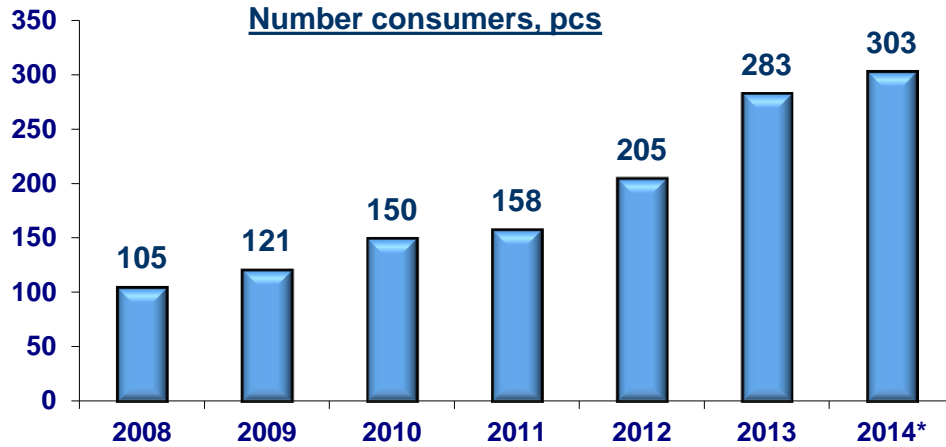
«FGC UES» JSC – the largest operating grid company of the Russian Federation



90% of all the main networks in 76 regions of the Russian Federation

 Area served by «FGC UES» JSC

The performance indicators of "FGC UES" JSC to provide transmission services



Revenue of «FGC UES» JSC in 2013 amounted to - 140 billion rubles.:

87 % - transmission of electricity through the grid companies (industry, agriculture, population);
13 % - large consumers of electricity.

* The forecast

The unified energy system of the North-West of Russia



UES of the North-West of Russia

Energy complex UES of the North-West consists:

127 electric power station (23 386 MW),

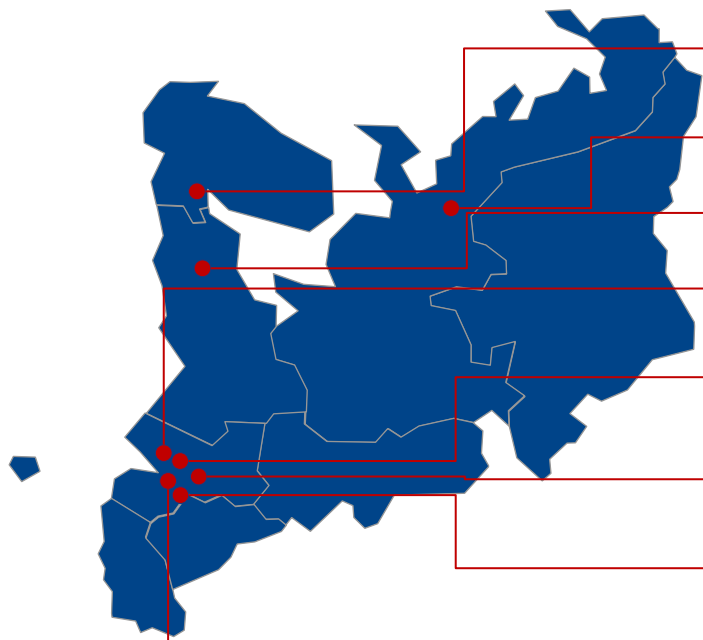
1 095 substation with voltage 110-750 kV (85 992 300 MVA),

«FGC UES» JSC - 76 substation (30 058,3 MVA)

1 395 power line 110-750 kV (43 828,26 km), «FGC UES» JSC - 10 688,54 km.

Electricity production by UES in 2013 was 101 076 million.KWh.

Electricity consumption by UES of the North-west in 2013 against the previous year decreased by 2.3% and amounted to 90.289 billion kWh.



Major projects implemented

The second parallel electrical line with voltage 330 kV NPP Kolskaya – Knyagjegubskaya – Louhy with electrical line 330 kV Knyagjegubskay & Louhy (185,4 km, 500 MVA)
Period construction: 2007-2009

The second parallel electrical line with voltage 220 kV Uhta - Mikun (253,4 km)
To commission: 2012

The second parallel electrical line with voltage 330 kV from substation 330 KV Louhy – Hydroelectricity Putkinskaya (168 km) To commission : 2013

The electrical line with voltage 330 kV Gatchinskaya - Lugskaya & substation 330 kV Lughskaya (93 km, 250 MVA) To commission: 2013

Complex reconstruction and technical re-equipment substation 220 kV Plant Ilyich in St. Petersburg
To commission: 2012

The electrical line with voltage 330 kV & substation Leningradskaya-Kolpino-Eastern with development open switchgear in the substation
To commission: 2013

Complex reconstruction and technical re-equipment substation South, St. Petersburg
To commission : 2011

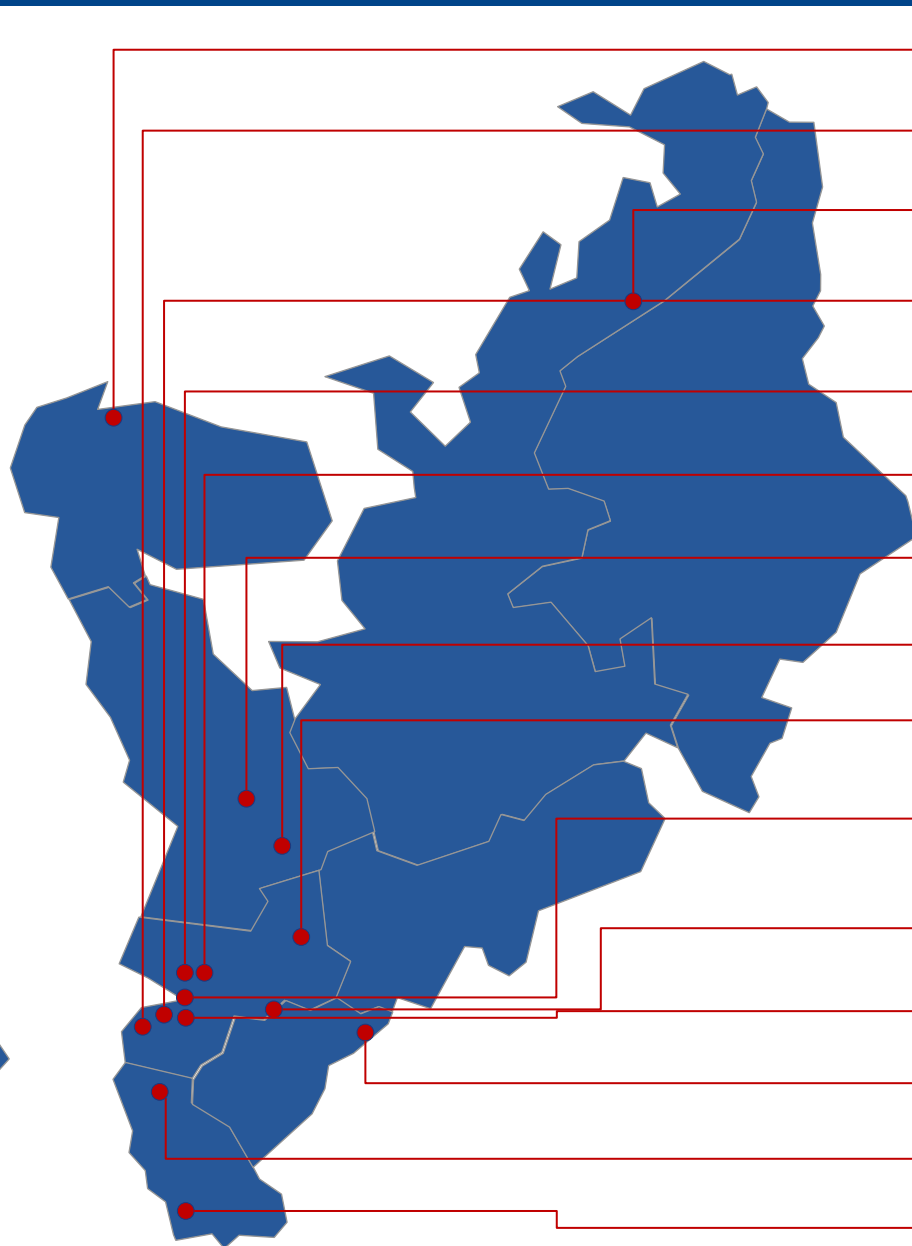
Substation 330 kV Center (400 MVA, 25 km)
To commission: 2011

Project of the development program of the «FGC UES» JSC on the territory of the UES North-West of Russia



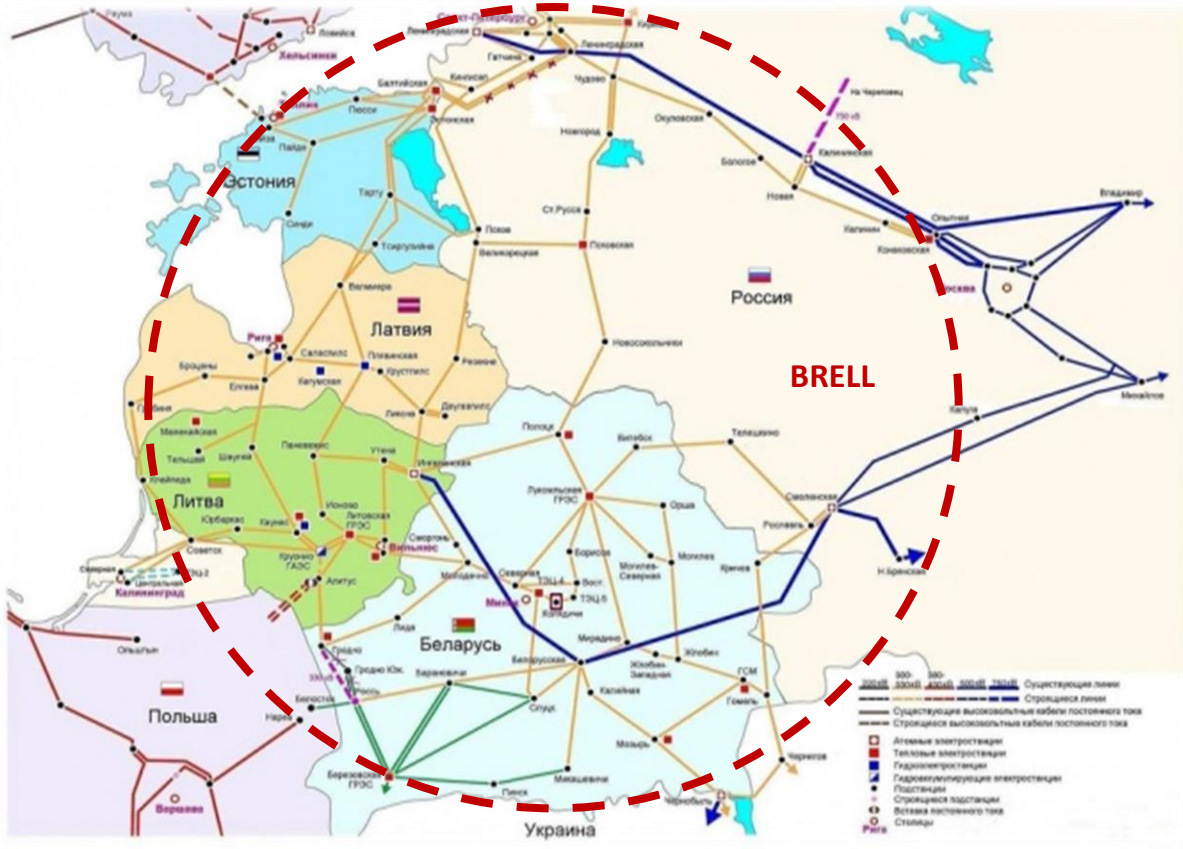
№	Investment direction	Number project	The design capacity (in accordance with the project of the development program «FGC UES» JSC for the period of 2014-2019), MVA, km	Total amount of financing in accordance with the project of the development program for the period of 2014-2019 in million rubles with VAT
In total on UES of the North-West		175	5026 MVA, 2898 km	82 115,04
1	St. Petersburg	38	2 520 MVA, 14,6 km	18 760,36
2	Leningrad region	50	1 550 MVA, 1 727,7 km	45 049,59
3	Murmansk region	8	500 MVA, 30 km	2 869,13
4	Republic of Karelia	20	206 MVA, 432,5 km	2 306,79
5	Arkhangelsk region	20		906,45
6	Komi Republic	21	541,2 km	6 253,63
7	Novgorod region	9	250 MBA, 2 km	2 120,03
8	Pskov region	6	150 km	3 690,46
9	Kaliningrad region	3		157,8
New construction		32	2 950 MVA, 2 183,1 km	56 446,94
Renovation of fixed capital		143	2 076 MVA, 714,9 km	25 667,30

Major projects carried by the «FGC UES» JSC at the UES of the North-West in 2014-2019



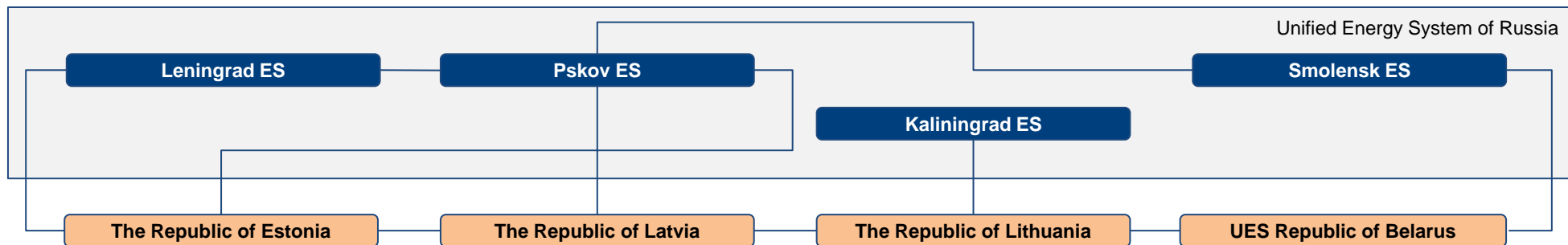
- The electrical line with voltage 330 KV Murmfnskaya with line approaches 330 KV HPP Serbraynskaya-1 – substation Vihodnoy (30 km, 500 MVA)**
To be commissioned: 2016, 2019.
- The scheme of NPP Leningradskaya-2 (6 pieces: 550,7 km)**
To be commissioned: 2014.
- The second parallel electrical line with voltage 220 KV condensing power plant Pecherskaya - Mikun (253,4 km).**
To be commissioned: 2015.
- The substation 330 kV Lomonosovskaya with line approaches electrical cable line 330 kV NPP Leningradskaya – substation Eastern (12,6 km, 400 MVA)**
To be commissioned : 2017.
- The substation 330 KV near SDP Northern-21 substation 330 kV Novodevaytkino with line approaches (400 MVA)**
To be commissioned: 2019.
- The substation 330 KV Parnas with line approaches (2 km, 400 MVA)**
To be commissioned: 2014.
- The second parallel electrical line with voltage 330 kV HPP Putkinskaya – HPP Ondskaya (129,5 km)**
To be commissioned: 2015.
- The electrical line with voltage 330 kV HPP Ondskaya – Petrozavodsk (278 km)**
To be commissioned: 2019.
- The electrical line with voltage 330 kV Petrozavodsk - Tikhvin (280 км)**
To be commissioned: 2017.
- The substation 330 kV Vasileostrovskaya with cable line approaches 330 kV Vasileostrovskaya – Northern & cable line 330 kV Vasileostrovskaya – Plant Ilyich (22,41 km, 400 MVA)**
To be commissioned: 2014 год
- The substation 330 kV Ruchey with line approaches 330 kV Leningradskaya – Chudovo (2 km, 250 MVA)**
To be commissioned: 2019.
- The substation 330 kV Pulkovskaya with line approaches 330 kV (600 MVA)**
To be commissioned: 2014.
- The substation 750 kV Leningradskaya – Belozerskaya (450 km)**
To be commissioned: 2019.
- The electrical line 330 kV Lughskaya - Pskov (150 km)**
To be commissioned: 2018.
- The electrical line 330 kV Novovsokolniki – Talashkino (230 km)**
To be commissioned: 2016.

Parallel operation of power systems of Russia, Byelorussia and Baltic countries (BRELL)

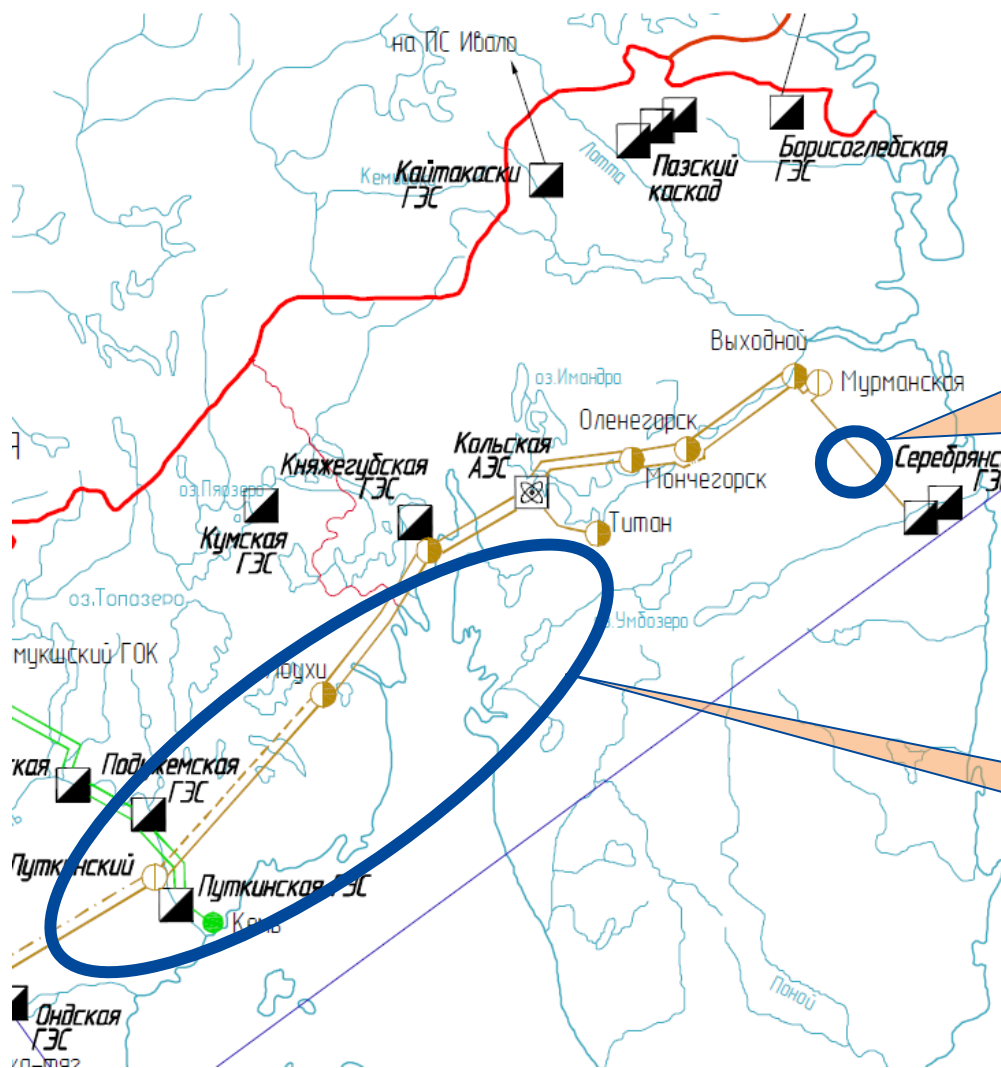


Parallel operation of power systems of Russia, Belarus and Baltic countries is carried out in accordance with the intergovernmental Agreement on parallel operation of power in Belarus, Russia, Estonia, Latvia, Lithuania (BRELL) of 7 February 2001 on the principles of:

- maintain a balanced regime of power systems;
- maintain mutually voltage levels at border substations;
- ensure operation of power systems with a single frequency;
- maintain mutually operational reserve capacity;
- prevent violations of the normal operation of power systems.



Major projects carried by the «FGC UES» JSC at the Murmansk region and the Republic of Karelia



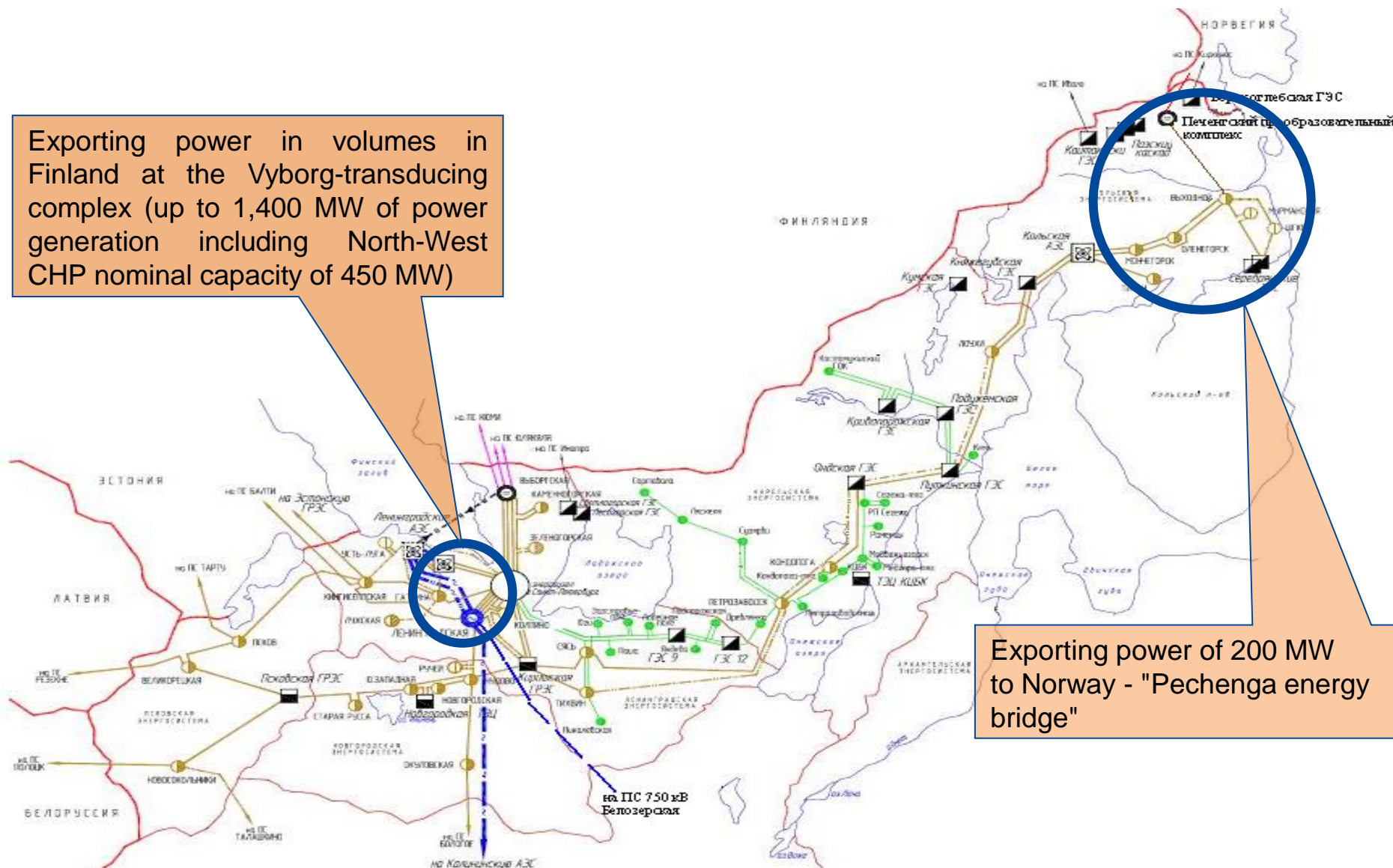
Substation 330 kV Murmanskaya with line approaches 330 kV Hydroelectricity Serbrayaynskaya-1 – Vikhodnoy Construction the project «The integrated development the Murmansk Transport Hub»

Construction the electrical line with voltage 300 kV Nuclear power station Kolskaya – Knyagjegubskaya – Louhy with electric power substation 330/110/10 Louhy – open switchgear in the substation 330 kV Hydroelectricity Putkinskaya – open switchgear in the substation 330 kV Hydroelectricity Ondskaya

The energy bridges Russia - Norway, Russia – Finland

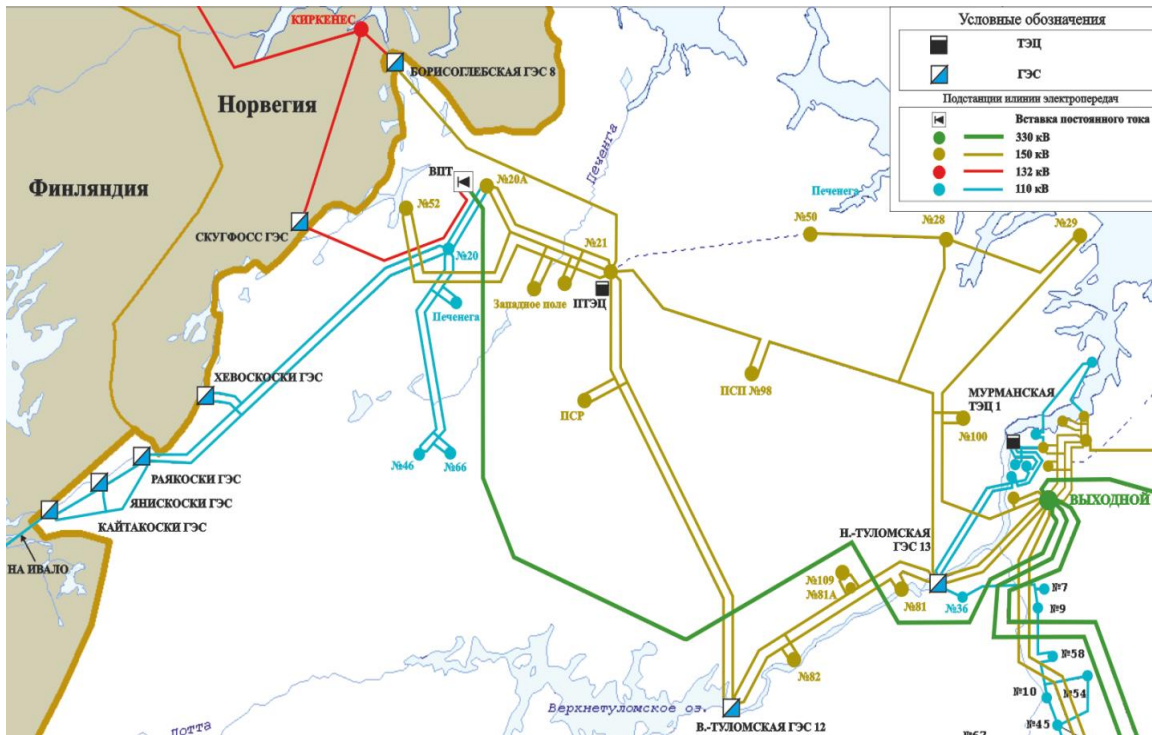


Exporting power in volumes in Finland at the Vyborg-transducing complex (up to 1,400 MW of power generation including North-West CHP nominal capacity of 450 MW)



Exporting power of 200 MW to Norway - "Pechenga energy bridge"

Project «Pechenga energy bridge»



Description of project:

- ✓ Construction of a new power line between Norway and Russia by launching the HVDC 200 MW
- ✓ Transmission of electricity between Norway and Russia in both directions in volumes up to 1.5 billion kWh per year.
- ✓ The opportunity of expanding "Pechenga energy bridge" after 2020.

- ✓ The entire volume of capital construction takes place in Russia and includes the construction of a substation Nickel HVDC, 132 kV transmission line and an autotransformer 330/150 kV substation Nickel.

Project implementation will strengthen the relationship between Norway and Russia, will enable large-scale exchange of electricity between the two countries and improve the reliability of the electricity supply in the northern Norway and Murmansk region

The promising project «Development of pre-project documentation for «Pechenga energy bridge»»



Objective of the project:	The choice of optimal amplification for power grid electricity exports from Russia to Norway in a volume of 200 MW through a DC link.
The accommodation Pechenga transducing complex	<p>Option provides grid construction at Substation 150 kV Nickel :</p> <ul style="list-style-type: none"> - the electrical line with voltage 132 kV electric line Nickel - Skogfoss (22 km); - the electrical line with voltage 150 kV replaced by 330 kV (substation Nickel (A-403)) 205 km; - switchgear 330 kV construction; - switchgear 150 kV and 132 kV construction; - construction on the existing link switchgear 150 kV 150 kV Substation Nickel (SS 20 A); - installation of two communication units 330/150 kV 250 MVA; - construction of reactive power sources 70 Mvar at 150 kV substation Nickel (SS 20 A) or a 150 kV substation Polar (SS 21).
Recommendations	<p>Analysis of the calculations showed the necessity of perform the following activities to strengthen the power grid .</p> <ul style="list-style-type: none"> - construction of two 132 kV Connection electric line 330 kV Monchegorsk-Vihodnoy (A-406) and commissioning 330 kV Substation Murmansk starting complex than a single AT 250 MVA; - reconstruction of SS 150/110 kV Dolina Uyuta (№ 53) including installation a second AT 150/110 kV power of 90 MVA and other construction of electricline 110 kV Dolina Uyuta (SS number 53) - Murmansk (SS number 5), 4.5 km
The expected effect	Improving the reliability of the UES Northwest and electricity exports from Russia to Norway in the amount of 200 MW
Cost of the project	<p>Total cost of the project taking into account regional coefficients is 9 480,09 million rubles:</p> <ul style="list-style-type: none"> - HVDC – 5 171,79 million rubles.; - Basic equipment, relaying and automation, ACS of TC, AIMS CEPA, Information Acquisition & Transmission system – 4 308,30 million rubles.
Customer	JSC "INTER RAO UES" (under contract artist of "STC UES" (JSC "HVDC PTRI"))

Thanking you for your time and attention!

«FGC UES» JSC

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