

INTER RAOUES

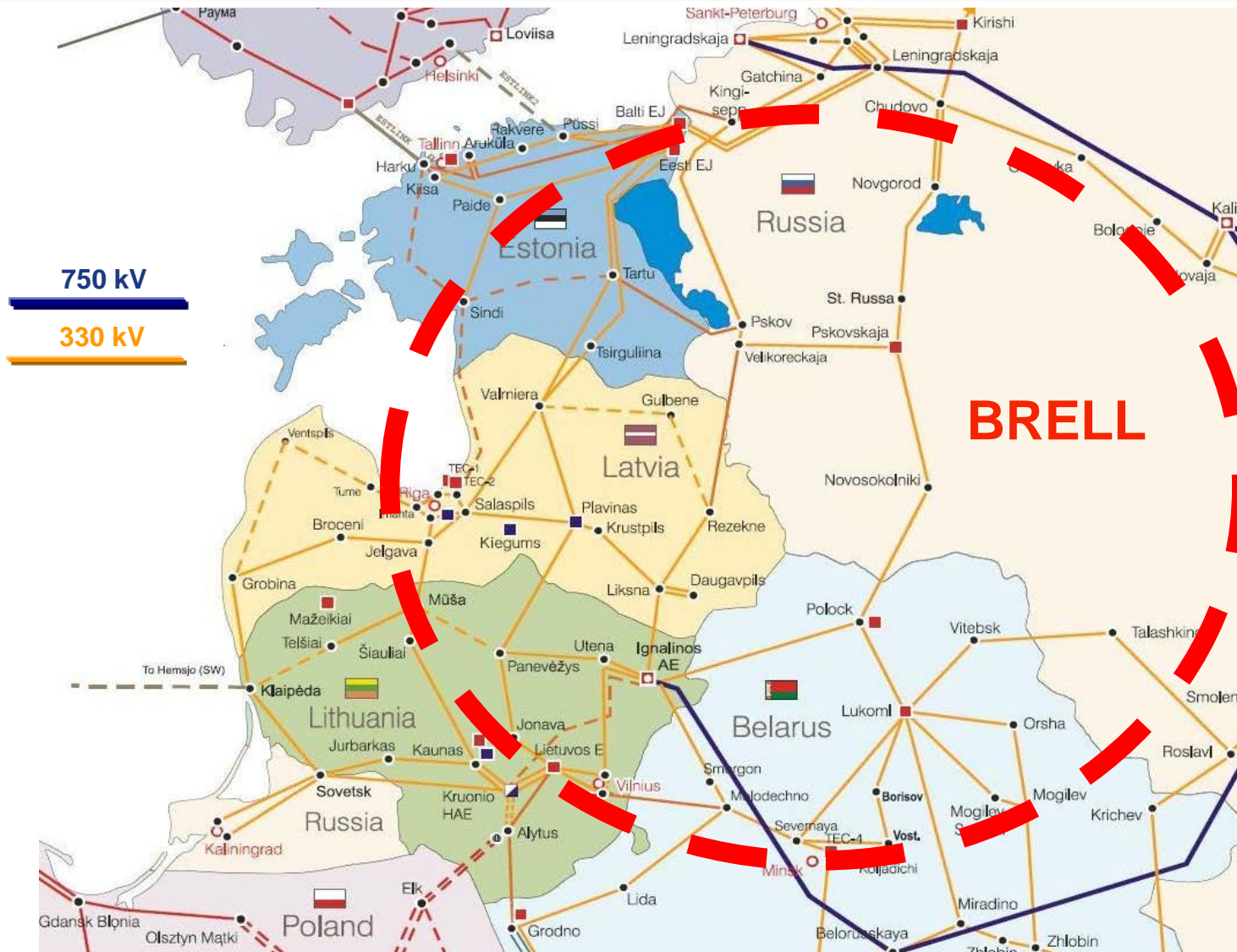


Development of the energy sector of Russian Federation in the Baltic Sea Region – new possibilities for cooperation between EU and Russian Federation

Brussels, November 2012



Main Grid of Power Ring BRELL (Belorussia–Russia–Estonia–Latvia–Lithuania)





Russia as a part of the Baltic Sea Region energy sector

Supply volumes of Russian electricity in 2011, MWh



*Total supply to the Baltic States

Cooperation areas

- Supplies to Baltic States, Finland and Byelorussia in accordance with the NordPool market rules
- Synchronous operation mode with Baltic States and Byelorussia
- Joint work for security of supplies maintenance, dispatching, balancing and regulation
- Power reserves' maintenance and usage



Kaliningrad Region at present

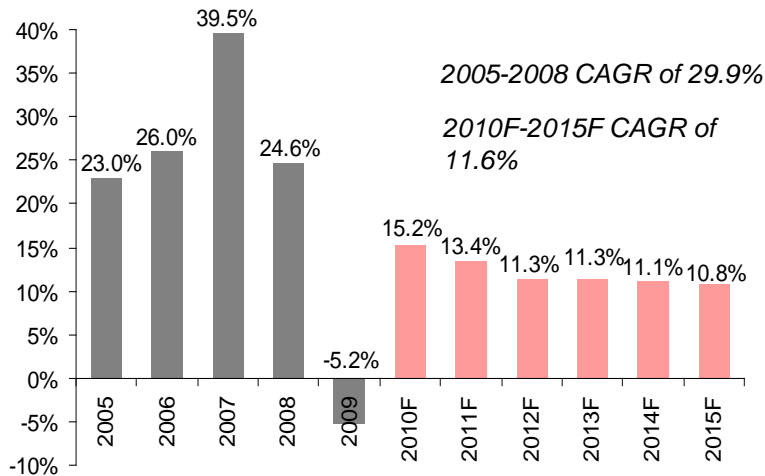
Location



General overview

- The Kaliningrad region is an exclave of Russia surrounded by Poland, Lithuania and the Baltic Sea
- One of the fastest growing regions in Russia with a forecasted gross regional product (GRP) CAGR of 11.6% in 2010-2015
- Status of a Special Economic Zone offering a preferential tax treatment (profit tax of 0% in the first 6 years of residency and 10% in years 7-12)
- One of the most attractive investment climates in Russia with investors from over 70 countries carrying out their business activities there

GRP growth⁽¹⁾



(1) Rosstat, 2010

Energy sector overview⁽²⁾

- The power system operates synchronously with the power grids of the Baltic countries and is a part of IPS/UPS
- Power consumption in the Kaliningrad Region in 2011 made 4 197 million kWh and the peak load reached 784 MW.
- The bulk of electricity in the Kaliningrad region is generated by a single power plant – Kaliningrad Central Heating Plant-2 (CHP-2). The CHP-2 (900 MW) is mono-fuel and depends on the transit of gas supplies
- In the mid-term, the Kaliningrad region will face a deficit in energy generation

(2) Ministry of Infrastructure Development, Government of the Kaliningrad Region



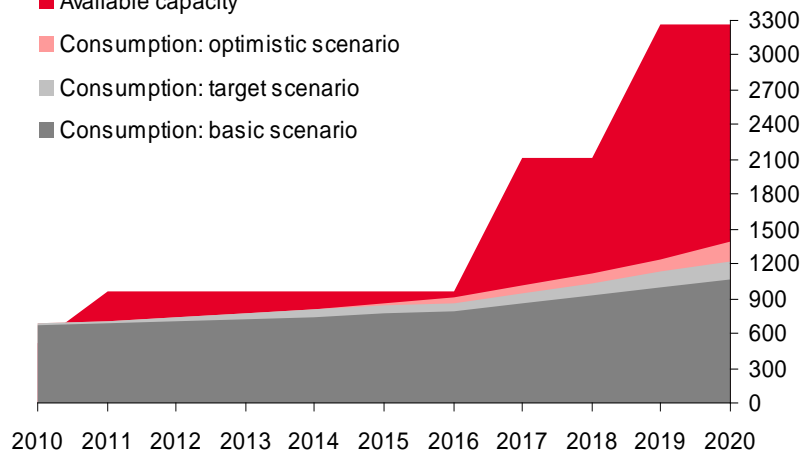
Kaliningrad Region – development projects

Energy sector strategy

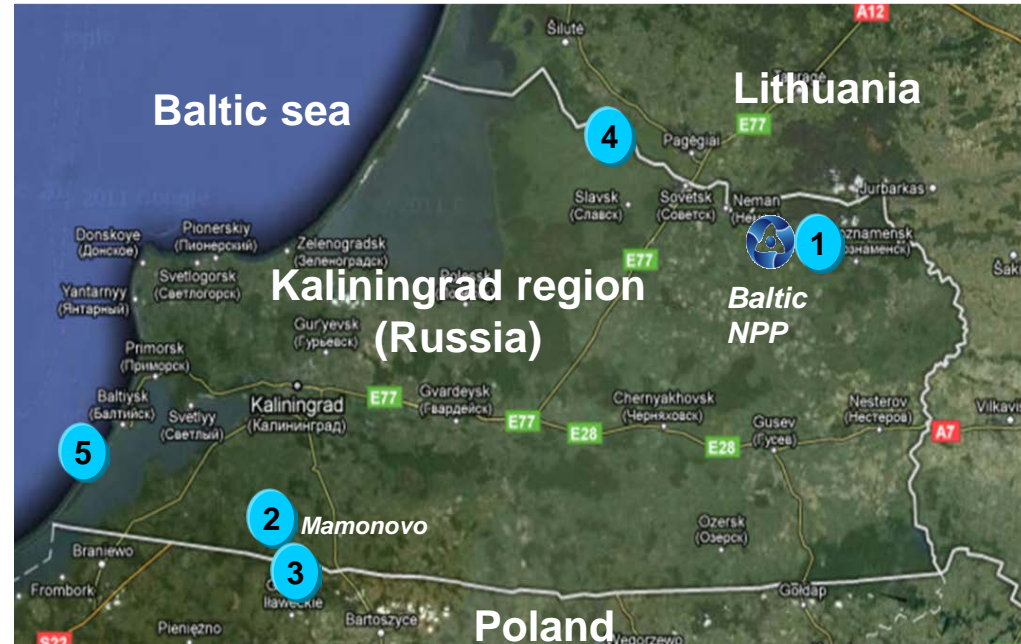
- Modernization of the existing grid assets and construction of the new generation;
- Development of the public infrastructure facilities;
- Establishment of the market-driven relations in the privatized areas of the energy sector;
- Increasing the energy efficiency;
- Start-up of the Baltic NPP 2300 MW (commercial operation of the 1st unit in 2017, 2nd unit – 2019);
- Development of interconnections with the power systems of the European Union.

Power balance forecast

- Available capacity
- Consumption: optimistic scenario
- Consumption: target scenario
- Consumption: basic scenario



Project map

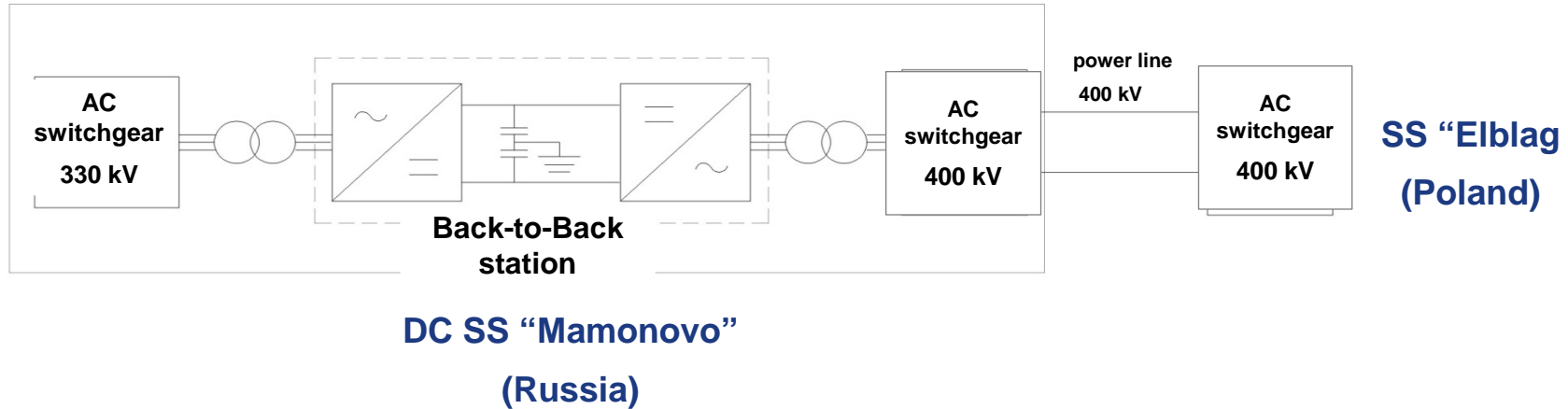


1. Baltic NPP 2 x 1150 MW
2. Back-to-Back station in Mamonovo
3. New interconnection with Poland
4. Development of interconnection with Lithuania
5. Submarine cable to Germany



Technical solutions: cross-border link to Poland

Diagram of cross-border electric power transmission to Poland

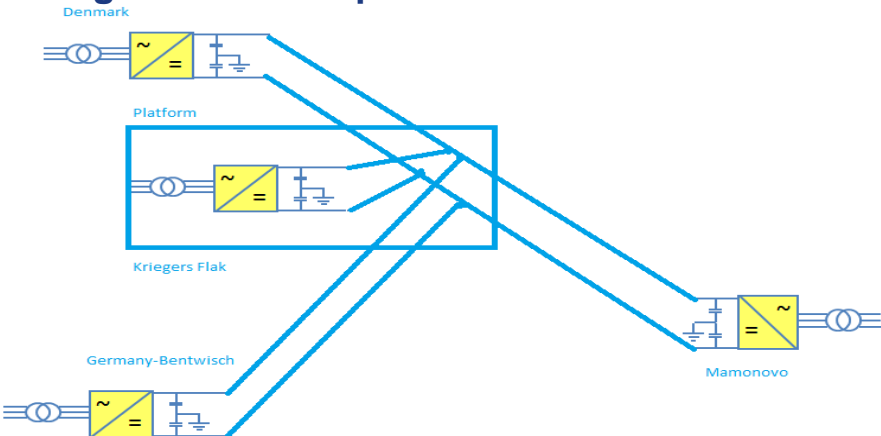


- Analysis of power flows in normal mode of operation showed no overloads of the network in Poland.
- Analysis of power flows in maintenance/one element fault modes showed overloads which do not effect significantly the project implementation.
- The power grid of Poland has low sensitivity to power transmission from the Kaliningrad's power system → increase of transmitted power **from 500 MW to 1000 MW** can be considered.



Technical solutions: cross-border link to Germany

Diagram of HVDC power transmission from the Kaliningrad region to Germany



- Transmission of up to 1000 MW DC power from the Kaliningrad Region will provide a reasonable support to unpredictable wind generation.
- The offshore platform Kriegers Flak (SS Bentwisch on the shore) should be an input point for power transmission. DC Transmission Facility – SS Lubmin makes another option of interconnection point
- The limit of static stability of the power grid of Germany in the area of Bentwisch in case of low or moderate generation by wind farms exceeds 1000 MW to be imported.



Technical solutions: upgrade of the AC link to Lithuania



Power interconnection capacities with Lithuanian power system, in normal mode, can reach up to 1000 MW*.

Proposed solutions are to ensure higher power supply stability and better security for the consumers and to provide additional possibilities for energy exchanges.

Development of Russian-Lithuanian interconnections proposed:

- OHL 330 kV SS Sovetsk – SS Klaipeda;
- OHL 330 kV Baltic NPP – SS Bitenai;
- OHL 330 kV Baltic NPP – SS Jurbarkas.

* According to the Power Output Scheme study, made by JSC "Institute 'Energosetproekt'" July 2012.



- Russian power system and power systems of Continental Europe has an experience of synchronous work within the united power system “MIR” of Council for Mutual Economic Assistance members with dispatching centre in Prague.
- The grid infrastructure topography, developed during “MIR” system, still can facilitate development of new interconnections between asynchronous power systems of IPS/UPS and power systems of Continental Europe.
- The general conclusion of Feasibility Study “Synchronous Interconnection of the IPS/UPS with the UCTE”, carried out during 36 months (2006-2008) by the joint working group of 19 TSOs from 17 countries, was that a synchronous coupling between the UCTE and the IPS/UPS is feasible. This can be achieved only in a long perspective by implementing a number of technical, operational and organisational measures, as well as by establishing the essential legal framework. So, at present, the most economically and technically feasible solution of power trade development between IPS/UPS and Continental Europe power systems is construction of new **asynchronous interconnections**.
- Existing and planned interconnections of Baltic IPS with Continental Europe and Scandinavian power systems imply connection via Back-to-Back station or HVDC cable.
- Russian projects of asynchronous interconnections in Kaliningrad Region are within the track.



Power Balance in the Baltic Sea region, 2020

Scenario B or “Best Estimate Scenario”

GW

GW

	January	July
RC	8	17.90
ARM	1.80	0.90
RC-ARM	6.20	17.00

RC	5.50	12.70
ARM	4.90	4.60
RC-ARM	0.60	8.10

RC	-0.80	0
ARM	0.30	1.40
RC-ARM	-1.10	-1.40

RC	2.80	17.40
ARM	4.60	4.60
RC-ARM	-1.80	12.80

NO – Norway

SE – Sweden

DK – Denmark

DE – Germany

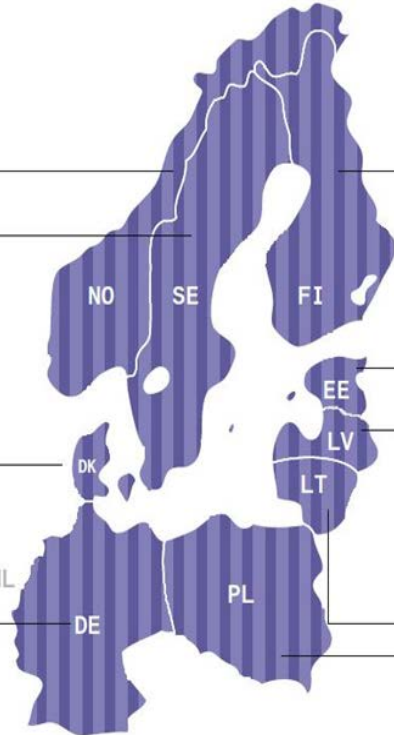
FI – Finland

EE – Estonia

LV – Latvia

LT – Lithuania

PL – Poland



	January	July
RC	0.80	3.50
ARM	1.10	2.10
RC-ARM	-0.30	1.40

RC	0.90	0.70
ARM	0.40	0.30
RC-ARM	0.50	0.40

RC	0.10	0
ARM	0	0
RC-ARM	0.10	0.00

RC	3.20	1.40
ARM	1.50	0.50
RC-ARM	1.70	0.90

RC	1.40	-0.80
ARM	3.50	2.80
RC-ARM	-2.10	-3.60

- Balance positive in both reference points
- Balance negative or zero in one reference point
- Balance negative in both reference points

*Source: ENTSO-E: Scenario Outlook & Adequacy Forecast 2012-2030



New HVDC cross-border projects



Included into TYNDP and BEMIP

1. Estonian-Finnish power link **EstLink 1** via HVDC submarine power cable 350 MW – in operation. Estonian-Finnish power link **EstLink 2** via HVDC submarine power cable 650 MW – 2014.
2. Lithuanian-Swedish power link **NordBalt** via HVDC submarine power cable 700 MW - by the end of 2015.
3. Lithuanian-Polish power link **LitPol Link** via B2B station in Alitus: in Phase I, a 500 MW link - 2015, and in Phase II, 1000 MW - by 2020.

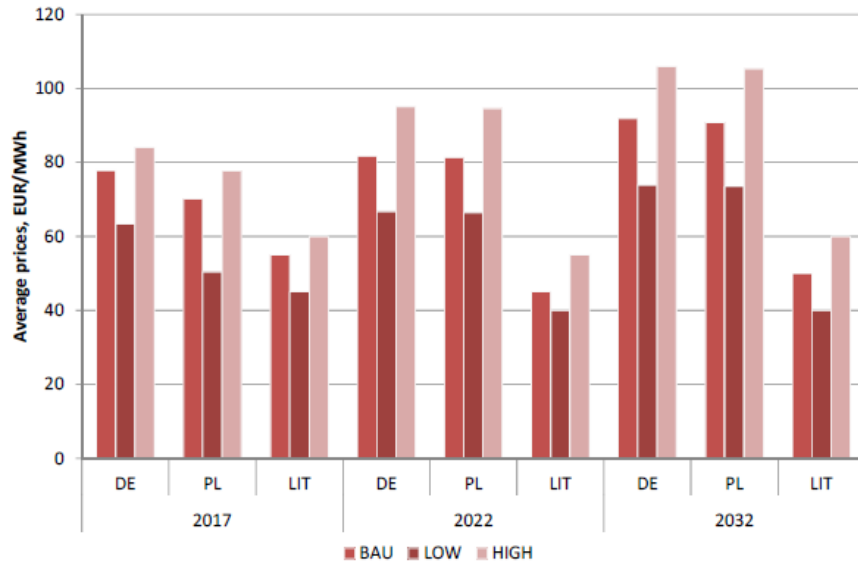
Proposed by Russia

4. Russian-Polish power link via B2B station in Mamonovo up to 1000 MW - by 2016-2018.
5. Russian-Lithuanian power interconnection capacity extension - by 2016.
6. Russian-German power link via HVDC submarine power cable - by 2020.



Additional factors for interconnections development

Market conditions



Back-up of RES

- The amount of power produced by renewable sources (mostly wind generation) is increasing in the Baltic Sea Region.
- In Germany (50 Hz control area) – more than 16000 MW of wind farms in 2017, in Poland – up to 8970 MW of wind farms in 2015.
- Volatility of wind generation is from 100% to 0%.

 **The diversification of back-up sources for RES is essential.**

Power balance

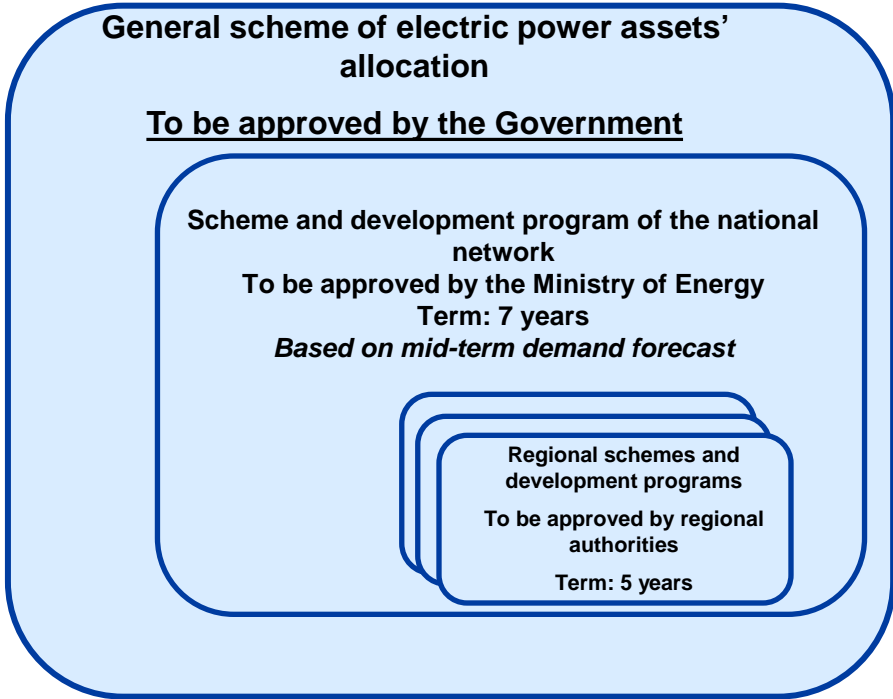
- Increase of power demand and peak loads in Germany is expected. During the next 10 years, a significant number of the generating facilities in Germany will be decommissioned. According to the plans of the German Government, the nuclear power plants of Germany will be closed before 2020.
- Total electricity demand in Poland is expected to grow from 143 in 2010 to 195-220 TWh in 2025. About 8,5 GW of existing base load capacity is expected to be decommissioned up to 2025. The power deficit is expected to be covered by construction of new installed capacity, including NPP.
- Baltic countries are together import dependent. The future balance situation will be highly dependent on the construction of NPP in Lithuania and new conventional PP. Construction of NPP will not totally cover the predicted deficit of the Region and will demand additional balancing and reserves.

Development of new interconnections with regions with high generating and commercial potential is a solution

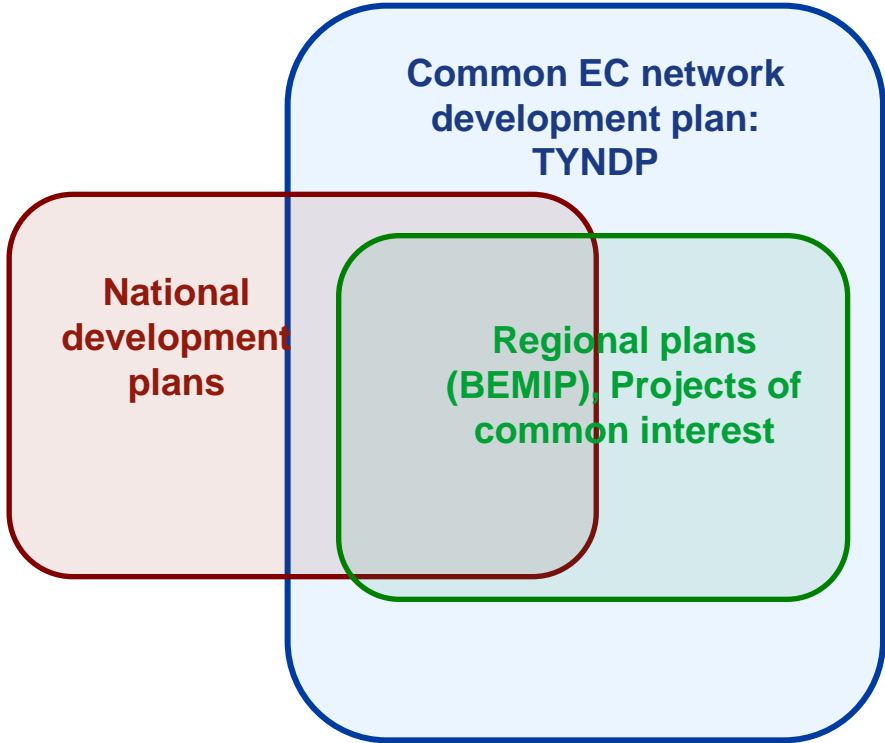


Energy sector planning in Russia and EC

3-level power sector planning in Russia



EC planning



Russian System Operator is responsible for preparation of Scheme and development program of the national network for 7 year period.



Proposals for further EU-Russia cooperation

The feasibility of joint EU-Russia projects demands the effective cooperation:

- **Active cooperation of System Operators of Russia with Poland, Germany and Baltic states**
 - Feasibility study development and approval from both sides.
 - Obtaining technical conditions for connection of the cross-border line to the main grids.
 - Execution and approval of technical design by both system operators.
 - Legal actions between system operators (System agreement; Load-flow planning rules; Operation / dispatch control rules etc.).
 - Preparation and execution of technical and organizational actions for commissioning of cross-border links (site tests, 24-hours load tests, emergency training etc.).

- **Projects support on intergovernmental level and from local regulating/permitting authorities**
 - Inclusion of the projects into the protocols of the intergovernmental commissions;
 - Preparation and conclusion of the ad hoc project agreements

- **Acknowledgment by EC entities / ENTSO-E**
 - Inclusion of the projects into the Agenda of Energy Dialogue EU-Russia;
 - Inclusion of the projects into TYNDP 2014. The Mechanism may be the following:
 - Special procedure (guidance document) for network development projects between EU and Russia;
 - Inclusion of Russian representatives into ENTSO-E System Development Committee and BSRG;
 - Analysing of Kaliningrad – PL and Kaliningrad – LT projects in BSRG for inclusion into TYNDP-2014.

- **De-politicization of the dialog between energy companies**

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