European Network of
Transmission System Operators
for Electricity

BALTIC SEA REGIONAL PROJECTS - STATUS REPORT

1.03.2011

ENTSO-E BALTIC SEA REGIONAL GROUP

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1 INTRODUCTION

This report is a continuation of a former traditional yearly report by Nordel. In Nordel times it contained the status of the Nordel strategic projects according to the common Nordic Master Plan. It has now been adopted in the regional group Baltic Sea and has been enhanced with a subset of projects from the Pilot-TYNDP. Projects presented here are decided projects suggested by earlier common studies in Nordel, Baltic Sea and Poland.
In the future the status reporting of the decided investments is planned to be continued in the Regional group Baltic Sea as part of the Regional Investment plans and ENTSO-E wide ten year network development plan (TYNDP). As these plans are due biannually a separate report might be drafted on those years when Regional Investment plan or TYNDP are not published. The format of reporting is under development.

2 MILESTONES

Status and expected milestones for carrying out the projects are shown in the table below. For connections that relate to two countries, the decisions and approvals in one country can be made ready earlier than shown.

Connection (reinforcement measure):	**Fenno-Skan 2**	**South-West Link**	**Skagerrak IV**	**Ørskog – Fardal**	**EstLink 2**	**The Arctic Region**	**NordBalt**
Connection between/in countries/country:	Finland-Sweden	Sweden – Norway and southern Sweden	Norway-Denmark	Norway	Finland - Estonia	Norway	Sweden – Lithuania
Decision[1]:	Feb. 2005	Nov. 2005 Jan 2008	Letter of Intent 2007	2006	2010	2007	2009
Public approvals:	2008	2012	2010	2011	2010	2011/2012	
Investment decision/ start construction:	2008	2011/12	2010/2011	2011	2010/2011	2012	2010/2011
Commissioning:	2011	2014[2] 2016/2017[3]	2014	2015	2014	2014-16	2015-16

[1] The decision in some countries may cover whole project implementation, whereas in other countries it is merely a decision to start the process of achieving public approval for the project.
[2] Northern and Southern parts.

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Connection (reinforcement measure):	**LitPol Link**	**GerPol Improvements**	**GerPol Power Bridge**	**Wind Integration**
Connection between/in countries/country:	Lithuania – Poland	Poland – Germany	Germany – Poland	Poland
Decision:	2008	Apr. 2010	Q1 2011	2010
Public approvals:				
Investment decision/start construction:		2010/2012		
Commissioning:	2015[4] 2020[5]	2014	2020 2025	2015[6] 2020[7]

[3] Western part.
[4] 500 MW.
[5] 1000 MW.
[6] 5000 MW wind power, [7] 8000 MW wind power.

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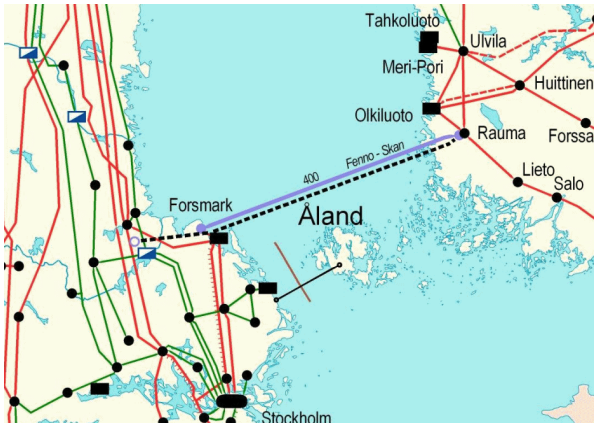
2.1 FENNO-SKAN 2



Key figures:

Type:	HVDC
Length:	300 km
Voltage level:	500 kV
Capacity:	800 MW

Description:

A new HVDC connection will be built in parallel with the existing one between the countries. On the Swedish side, a 70 km direct current overhead line will be built to a new substation Finnböle where the converter station will be placed. The planned capacity is 800 MW.

Local reinforcements:

Finland:

A converter transformer feeder bay at Rauma

Sweden:

New 400 kV switchyard at Finnböle. Renovation of series capacitors on two 400 kV lines and increase of cross-section of phase conductors on 400 kV overhead line (Stackbo-Hamra).

Status:

Cross border consents as well water permits have been granted. The submarine cable has been purchased from Nexans and the converter stations from ABB. AC-substation from Siemens.

The HVDC overhead line has been purchased from Vattenfall Service Nordic.

AC reinforcements are proceeding in Finland and in Sweden.

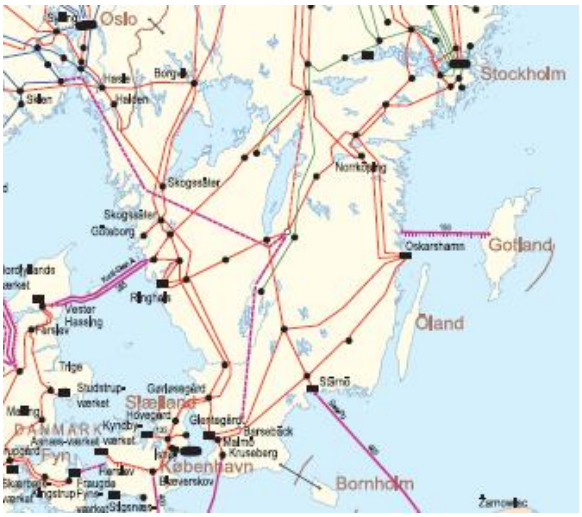
Benefits of the reinforcement:

Capacity congestion and number of hours with market division will be reduced. Redispatching of load flow between 400 kV interconnectors at North and Fenno-Skan will reduce active power losses. Cost of ancillary services can be decreased. Risk of shortage of energy will be reduced in the Nordic power system.

Milestones:

- Subsea cable manufacturing started autumn 2009
- Converter station project expected to be completed Q4 2011.
- Commissioning of Fenno-Skan 2 is expected late 2011

2.2 SOUTH-WEST LINK



Key figures:

Type:	VSC HVDC and AC overhead line
Length:	Northern and Southern parts: 436 km Western part: 380 km
Voltage level:	400 kV AC ±300 kV VSC HVDC
Capacity:	1400 MW

Description:

The transmission capacity to southern Sweden and between southern Norway and Sweden is proposed to be improved by a combined grid reinforcement. A three-terminal VSC HVDC link will connect the Oslo region in Norway to Skåne in Sweden with a terminal midway in Sweden. From that terminal a 400 kV AC line will be used to reinforce the grid to Hallsberg in Sweden, creating a strong, controllable reinforcement of the Nordic main grid in the area.

Local reinforcements:

A new substation will be established in the area of Hallsberg. New substations will also be required at the middle terminal as well as in the southern end-point.
In Norway a new substation is planned in Tveiten plus voltage upgrade of 300 kV line Rød – Tveiten to 420 kV.
All switchyards are designed as two-breaker schemes in order to achieve best reliability.

Status:

Investment decision taken by the Board of Svenska Kraftnät in November 2005. Feasibility studies describing different line routings and corresponding investment costs have been performed.
Environmental impact assessment is currently being performed. The technical solution was agreed in January 2008.

Benefits of the reinforcement:

The transmission facility will improve the reliability substantially and will furthermore give better transmission capacity in cross-section 4 in Sweden as well as between southern Norway and Sweden (The Hasle-cross section). This gives an improved Nordic market, improved security of supply as well as improved operational possibilities.

Milestones:

- Permit from authorities: Northern and southern part: 2012 Q1, Western part: 2014
- Commissioning: Northern and southern part: 2014 Q4, Western part: 2016 Q4

2.3 SKAGERRAK IV

Key figures:

Type:	HVDC
Length:	245 km
Voltage level:	DC 500 kV
Capacity:	700 MW

Description:

The existing Skagerrak interconnection with a 1000 MW capacity connects Kristiansand in Norway with Tjele in Denmark. Statnett and Energinet.dk are increasing the capacity by 700 MW by laying down a fourth cable along the existing three cables.

Local reinforcements:

Reinforcements in Denmark are not assigned solely to Skagerrak IV.

Status:

By end of 2010 Energinet.dk and Statnett had received all major approvals from authorities, and the construction phase started 01.01.2011. The cable contracts were signed first week of January 2011, and the signing of the converter contract is planned for mid February.

Benefits of the reinforcement:

Increased capacity between Norway and Jutland will

- reduce the occurrence of bottlenecks and thus strengthen the common Nordic power market
- save costs relating to trade in reserve power and ancillary services
- increase competition in the markets
- increase security of supply

Milestones:

- Construction work is expected to start in Denmark in the beginning of 2011
- In Norway construction work is expected to begin late 2011
- Commissioning end of 2014

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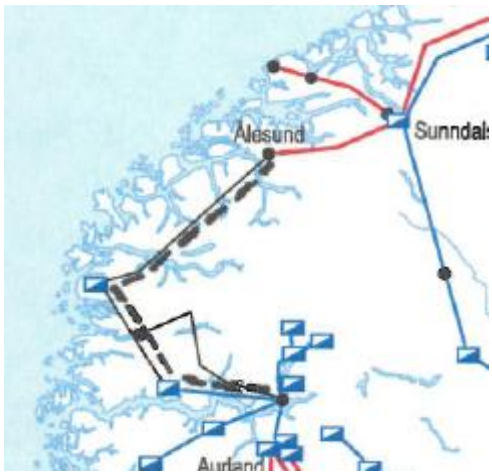
2.4 ØRSKOG – FARDAL/SOGNDAL



Key figures:

Type:	HVAC
Length:	285 km
Voltage level:	420 kV
Capacity:	400-800 MW [8]

Description:

The project comprises a new 420 kV transmission line between Ørskog and Sogndal in Norway. The length of the transmission line will be appr. 280 km

Local reinforcements:

The project includes 5 new substations (Ørsta, Ålfoten, Moskog, Høyanger and Sogndal).

Status:

Concession was applied in February 2007.

Benefits of the reinforcement:

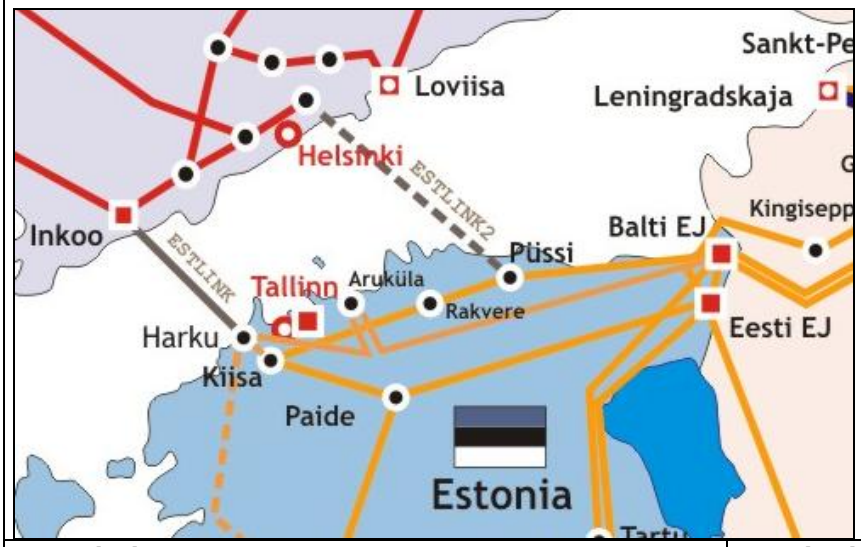
The new transmission line will contribute to the improvement of the trading capacities and robustness of the Nordic transmission grid. It will be an important part of the reinforcements to improve the security of supply of Mid-Norway. It will also enable the integration of new renewable energy production.

Milestones:

- Statnett aims for final concession by OED in 2011
- Earliest date of commissioning is 2015

[8] The capacity to Mid-Norway will increase with 400 to 800 MW depending on how the production is distributed

2.5 ESTLINK 2



Key figures:

Type:	HVDC
Length:	170 km
Voltage level:	450 kV
Capacity:	650 MW

Description:

Fingrid and Elering have decided to construct and take into operation EstLink 2, a LCC monopole HVDC interconnection with insulated metallic return between Finland and Estonia. The rated voltage of the EstLink 2 is planned to be 450 kV and transmission capacity 650 MW. The new interconnection will increase the electricity transmission capacity between the two countries from the present 350 MW up to 1000 MW.

Local reinforcements:

- Püssi 330 kV switchgear (bay and bus bars).
- Eesti-Püssi 330 kV overhead line (third conductor) – completed in 2009.
- Balti-Püssi 330 kV overhead line (reconstruction) – completed in 2010.
- Anttila 400 kV switchgear (reconstruction and extension).
- 400 kV OHL-s in Finland (lead-in of 4 lines).

Status:

Project is currently at the beginning of construction/manufacturing phase. All main components' contracts for the HVDC part were signed at the end of 2010 and design works for manufacturing the EstLink 2 cable and converter stations have started at the beginning of 2011. Overhead line reinforcement works in Estonia have been finalized. Reinforcement works in substations of Püssi and Anttila are ongoing.

Benefits of the reinforcement:

Socio-economic benefit and increased security of supply for the Baltic countries.

Milestones:

- Commissioning in the beginning of 2014.

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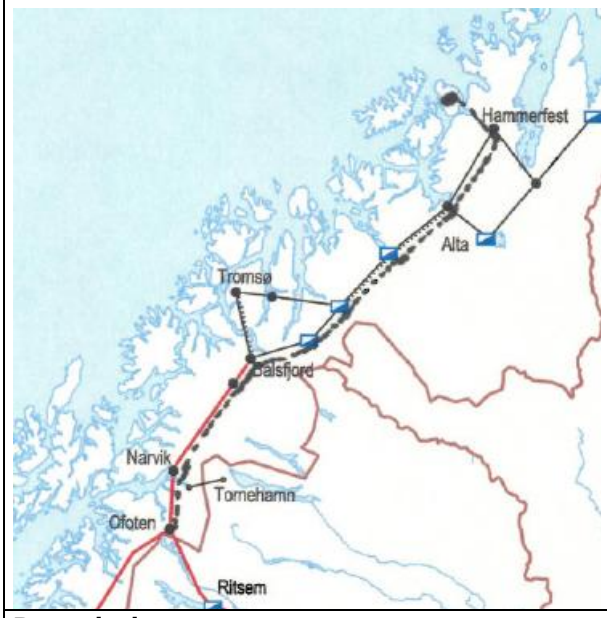
2.6 THE ARCTIC REGION (OFOTEN – HAMMERFEST)



Key figures:

Type:	HVAC
Length:	Appr. 520 km
Voltage level:	420 kV
Capacity:	
Ofoten-Balsfjord:	1000 MW
Balsfjord-Hammerfest:	300 MW

Description:

The new line will double the capacity between Ofoten and Balsfjord (present bottleneck), and will be the first 420 kV-transmission line in Norway to go further north than Balsfjord. The increased capacity is necessary to meet the needs from both common use and development of the petroleum industry in Northern Norway.

Local reinforcements:

Several substations have to be expanded, and there will also be some new substations.

Status:

The application for concession for the section between Balsfjord and Hammerfest was sent to NVE in May 2009.

The application for concession for the section between Ofoten and Balsfjord was sent to NVE in May 2010

Benefits of the reinforcement:

Increased security of supply.

Milestones:

- Start of construction in 2012/2013
- Commissioning Ofoten-Balsfjord 2014/2015
- Commissioning Balsfjord-Hammerfest 2016.

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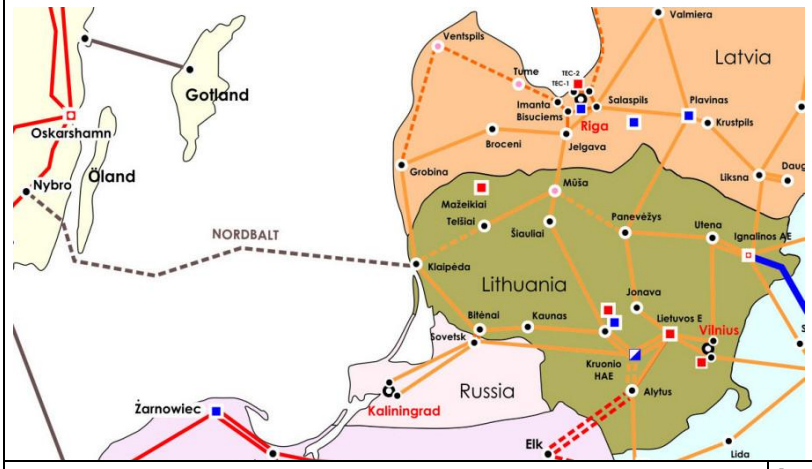
2.7 NORDBALT



Key figures:

Type:	HVDC/VSC
Length:	450 km
Voltage level:	300 kV
Capacity:	700 MW
Kurzeme Ring:	
Type:	AC
Length:	380km
Voltage level:	330kV
Capacity:	600MW

Description:

The NordBalt project comprises the interconnection of the Swedish and Lithuanian electricity transmission systems by means of a High Voltage Direct Current (HVDC) submarine/land cable with a capacity of 700 MW. The general outline of the project is to allow power to be transmitted between the Swedish and Lithuanian electricity transmission systems. The interconnection is dedicated to facilitate the long-term goal to integrate the common Nordic electricity market with the common Baltic electricity market in order to develop a common Nordic-Baltic electricity market with sufficient transmission capacity.

Local reinforcements (not included in the project):

Kurzeme Ring: New 330 kV transmission lines Grobina-Venstpils-Dundaga- Tume-Riga(Imanta), with new 330/110 autotransformers substations in Ventspils and Tume. Additional capacity of 600 MW.

Two new 330 kV lines in Lithuania.

Status:

- Organisation of the tender for procurement of the cable with engineering and installation services completed – turnkey contract signed with ABB AB the 17th of December 2010.
- Organisation of the tender for procurement of converter with engineering and installation (construction) services completed – turnkey contract signed with ABB AB the 20th of December 2010.
- The application for concession for the Swedish part has been sent to EI in Dec 2010
- Territory planning documents under preparation.

Milestones:

- Contracts for the submarine cable and converters are expected has been signed.
- Commissioning expected 2015-16
- Kurzeme Ring expected commissioning in 2018

Benefits of the reinforcement:

Isolated systems will be connected. Baltic states will have possibility to trade with ex-Nordel countries. Increase security of supply. Possibility to connect offshore wind farms. Future possibility to develop multi terminal HVDC system (in conjunction with 300 kV HVDC South West Link in Sweden).

Kurzeme Ring:
- provide the most efficient use of the proposed interconnection between Sweden and Lithuania;
- development of power generation, in particular wind generation capacity;
- improving of security of supply in the region;
- amount of reserve capacity may be reduced while maintaining the same level of security of supply.

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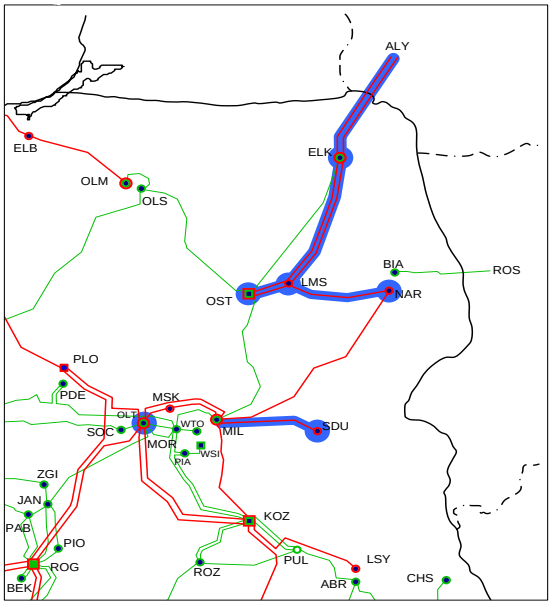
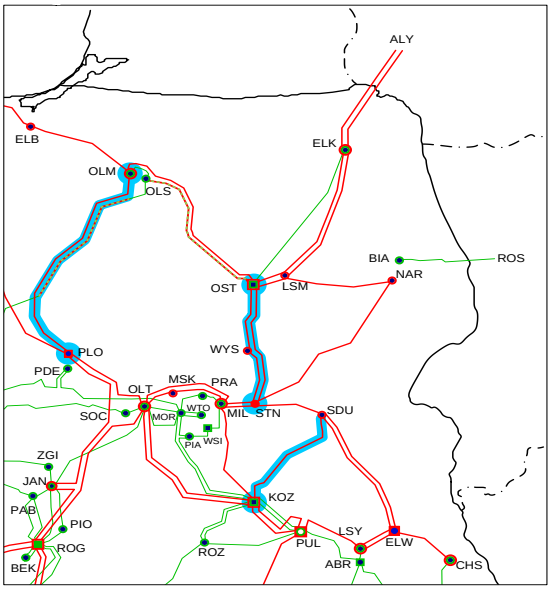
2.8 LITPOL LINK



Year 2015



Year 2020

Key figures:

Type: Back-to-back
Length: 154 km (direct double circuit line)
Voltage level: 330 kV (LT)
400 kV (PL)
Capacity: 2x500 MW

Description:

Interconnection of Lithuania and Polish transmission grids, by building new double circuit 400kV interconnection line Ełk – Alytus with 2x500MW back-to-back convertor station and strengthening internal high voltage transmission grids in Poland and Lithuania.

Local reinforcements:

Internal grid strengthening in Lithuania involves new double circuit 330 kV overhead line, in Poland additional ~6 overhead single and double circuit 400 kV lines, seven new 400 kV substations, new reactive power controlling equipment. Internal Polish transmission grid reinforcements to make possible power import capacity of 500MW from Lithuania to Poland.

Additional PL transmission grid reinforcements to make possible power transfer capacity of 1000MW.

Status:

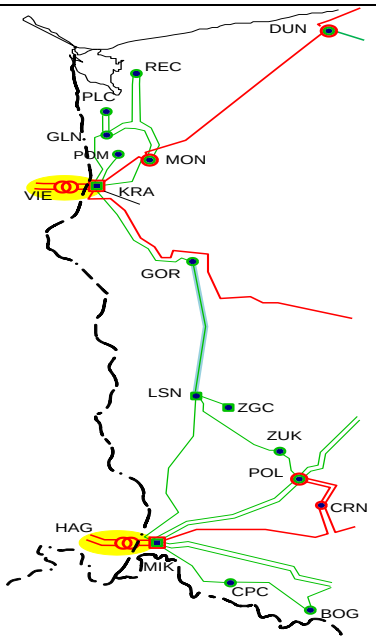
Investigation of environmental impact assessment in Lithuania and Poland. Study for choosing route for building overhead lines in Poland under preparation. Study for necessary reconstructions in 330 kV Alytus substation to construct BtB under preparation.

Benefits of the reinforcements:

- Isolated systems will be connected
- Baltic states will have possibility to trade with Poland
- Increased security of supply
- Incorporation of Baltic States into Internal Electricity Market (IEM) of EU. PL-LT interconnection will allow integration of the Baltic System to the IEM.

Milestones: Commissioning 2015 (500 MW) and 2020 (1000 MW).

2.9 GERPOL IMPROVEMENTS



Key figures:

Type: AC, PST

Voltage level: 400 kV

Description:

Conversion of existing 220 kV double circuit line Krajnik (PL) – Vierraden (DE) into a 400 kV line together with phase shifting transformers (PST) installation on 400 kV lines Krajnik (PL) – Vierraden (DE) and Mikułowa (PL) – Hagenverder (DE).

Local reinforcements:

Upgrading and extending Krajnik and Mikułowa substations.

Status:

Preparatory phase.

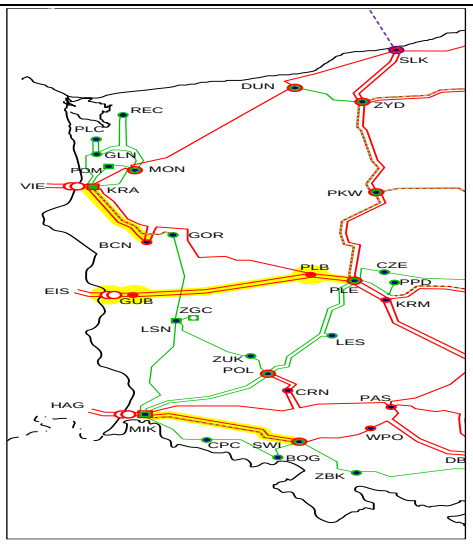
Benefits of the reinforcements:

- Decrease the loop flows from DE to PL and to CZ/SK
- Improve the security of supply
- Increase the power exchange capacity between PL and DE on PL/DE/CZ/SK synchronous profile.

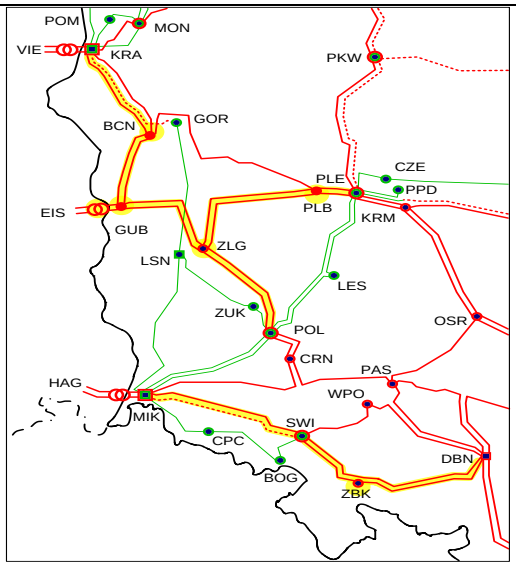
Milestones:

- Upgrading 220 kV double circuit line Krajnik – Vierraden to 400 kV, extending Krajnik substation with installation and commissioning of PSTs on the Krajnik substation – 2013
- Installation and commissioning of PSTs on the Mikułowa substation – 2014.

2.10 GERPOL POWER BRIDGE



Year 2020 – phase I
Key figures: Type: AC, Voltage level: 400 kV
Total length: 420 km



Year 2025 – phase II
Key figures: Type: AC, Voltage level: 400 Kv
Total length: 800 km

Description:

The investment project consists of:

- 3rd PL-DE interconnection defined as the sequence of transmission substations and power lines for development starting at the Polish/German border, through substations Gubin, Zielona Góra, Plewiska II and Plewiska
- Sequence of transmission substations and power lines for development between substations Krajnik, Baczyna, Gubin, Zielona Góra and Polkowice
- Sequence of transmission substations and power lines for development between substations Mikułowa, Świebodzice, Ząbkowice and Dobrzeń.

Local reinforcement:

By 2020 phase I will be realized:

- Gubin-Plewiska II-Plewiska line with new substations Gubin, Plewiska II and necessity rebuilding of Plewiska substation,
- optional installation of PST in station Gubin,
- Krajnik-Baczyna line with station Baczyna,
- Mikułowa-Swiebodzice line.

By 2025 phase II will be realized:

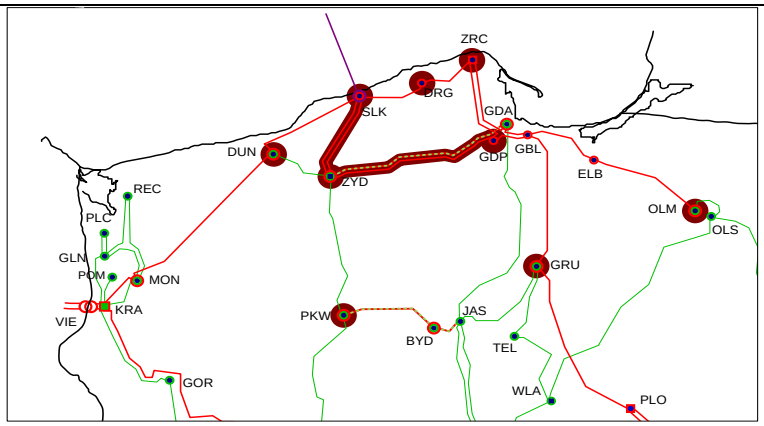
- Baczyna-Gubin, Zielona Góra-Polkowice with new substation Zielona Góra and necessary rebuilding of Polkowice substation
- Gubin-Plewiska II line put into Zielona Góra substation.

Status:
The project is currently in the pre-planning phase.

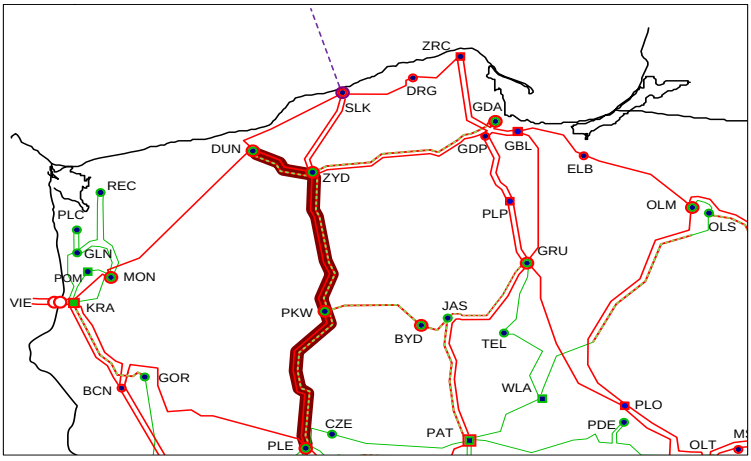
Benefits of the reinforcements:
The construction of this connection and necessary network reinforcement will increase the Polish import capability and could be the first stage of expansion of the 400 kV system in the western part of the country.

Milestones: Commissioning is expected 2020 (phase I) and 2025 (phase II).

2.11 WIND INTEGRATION



Year 2015



Year 2020

Key figures:

Type: AC

Voltage level: 400 kV

Total length: 370 km (2015)

810 km (2020)

Description:	**Local reinforcements:**
Reinforcement transmission network for power evacuation from on-shore wind farm.	Upgrading existing 220 kV lines to double circuit 400 kV and building new 400 kV substations.
Status:	**Benefits of the reinforcements:**
Preparatory and pre-investment phase.	Reinforcement of transmission network to allow connection of new wind farm and power evacuation around 5000 MW in 2015 and 8000 MW in 2020 total installed capacity.

Milestones: Up to 2015 it is planned to commission the first part of the investment projects. The second part will be commissioned from 2015 to 2020.

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