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THE FUNDAMENTAL CHALLENGES OF ENERGY SECURITY - SYNCHRONIZATION AND DESYNCHRONIZATION

Juozas Abaravičius,
Strategy Department

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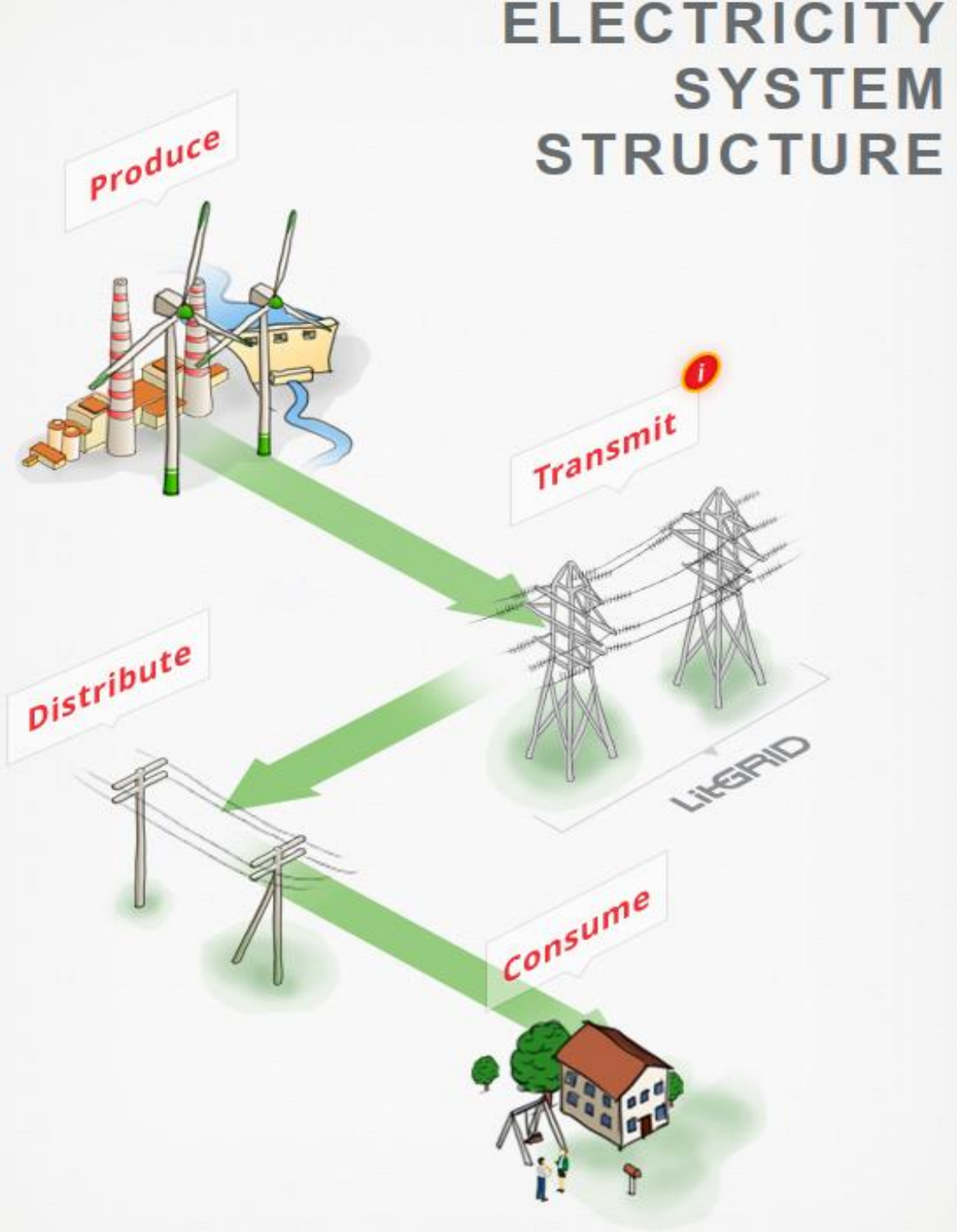
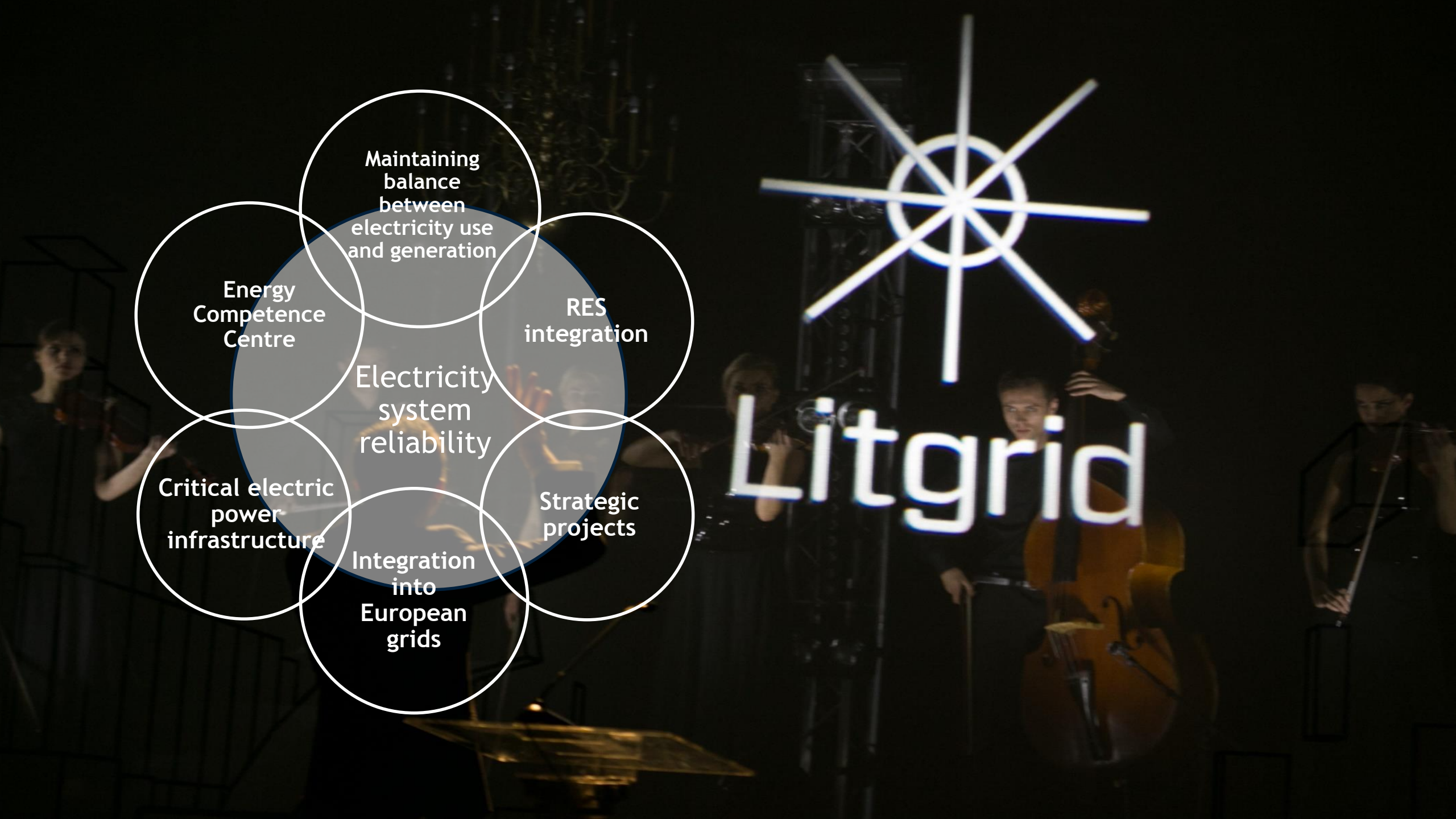
Electricity transmission system operator:

- Maintains stable operation of the national power system and controls electricity flows
- Enables competition in the open electricity market
- Implements the strategic projects integrating the national power system into the European power infrastructure and electricity market




Maintaining balance between electricity use and generation
Energy Competence Centre
RES integration
Electricity system reliability
Critical electric power infrastructure
Strategic projects
Integration into European grids
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Synchronization

European Continental Network

1951-1958

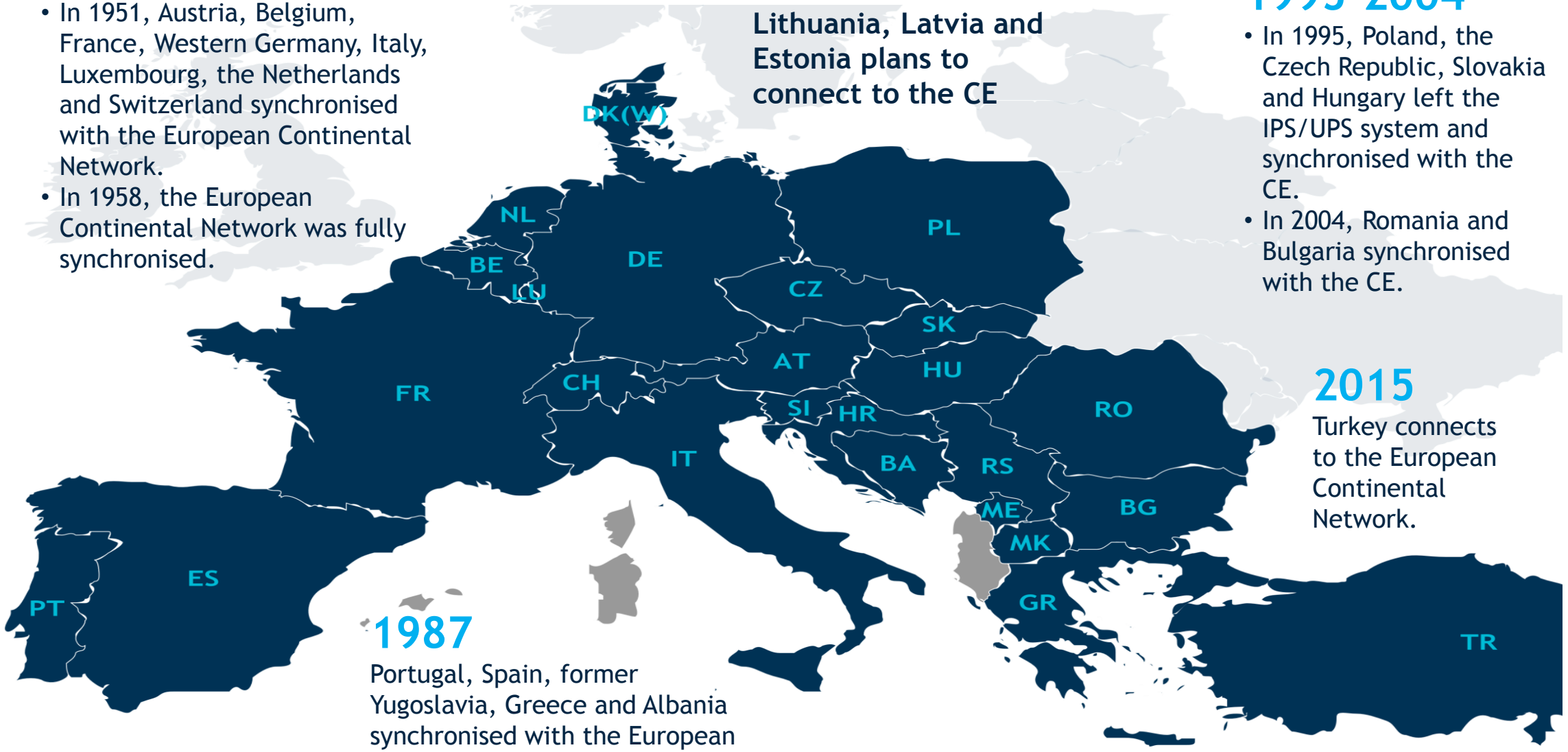
- In 1951, Austria, Belgium, France, Western Germany, Italy, Luxembourg, the Netherlands and Switzerland synchronised with the European Continental Network.
- In 1958, the European Continental Network was fully synchronised.

2025

Lithuania, Latvia and Estonia plans to connect to the CE

1995-2004

- In 1995, Poland, the Czech Republic, Slovakia and Hungary left the IPS/UPS system and synchronised with the CE.
- In 2004, Romania and Bulgaria synchronised with the CE.



2015

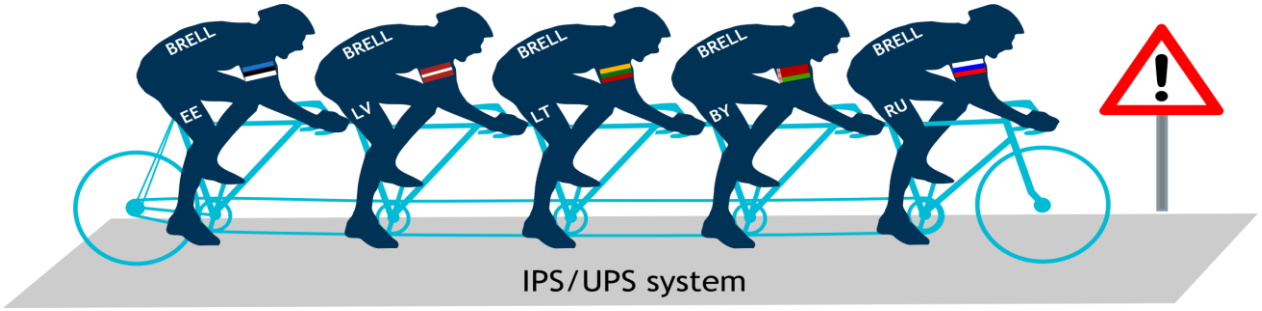
Turkey connects to the European Continental Network.

1987

Portugal, Spain, former Yugoslavia, Greece and Albania synchronised with the European Continental Network.

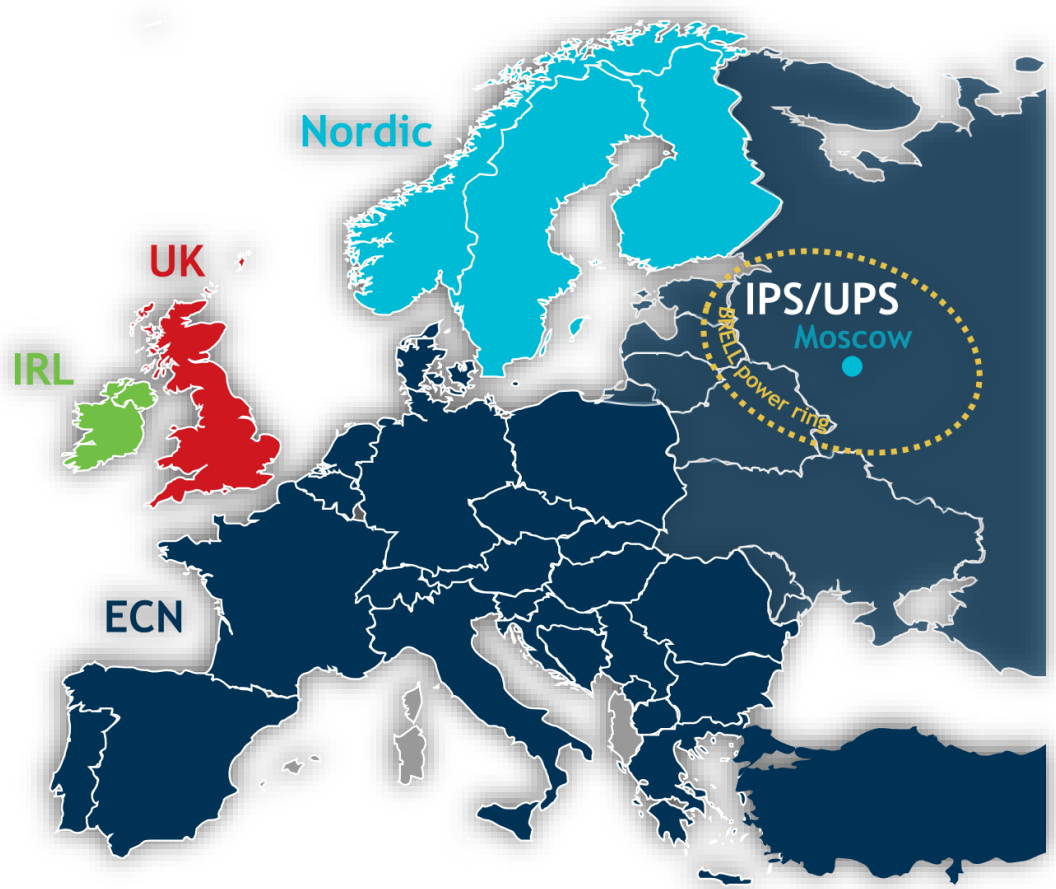
Synchronization with Continental European Network - strategic goal of the Baltic States

Working synchronously means complete interdependency, like riding a tandem bicycle



- Between 1998 and 2013 - 7 studies on Baltic and Continental grids integration:
  - grid interconnectors shall be built in the territory of EU;
  - synchronization is the European Project of Common Interest (PCI);
  - a study by EC JRC completed;
  - dynamic and frequency stability studies are implemented.

Europe's synchronous power systems:



Existing BRELL ring

Interdependency scenarios for the Baltic States

In EU (Baltic States):

Well developed infrastructure

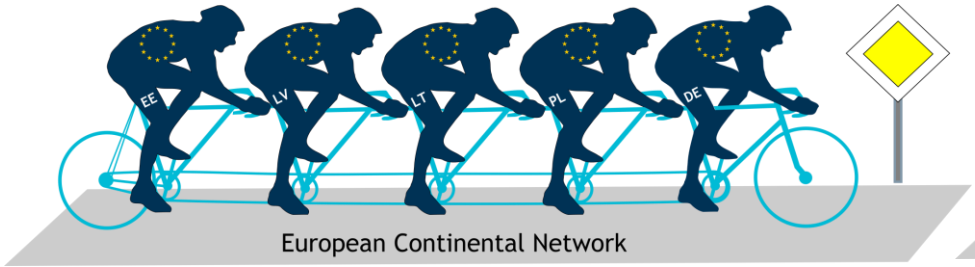
With 3rd countries:

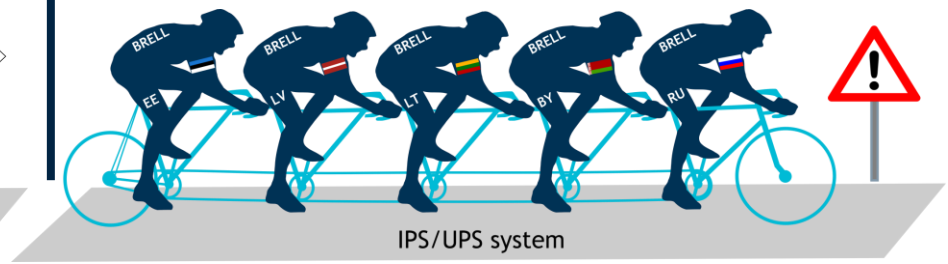
Infrastructure developement plans are not co-ordinated

In EU (Baltic States):

Effective market operation

With 3rd countries: existing loop flows, priority transit of Kaliningrad





Interdependency in the future shall be based on shared EU values and trust among neighbours

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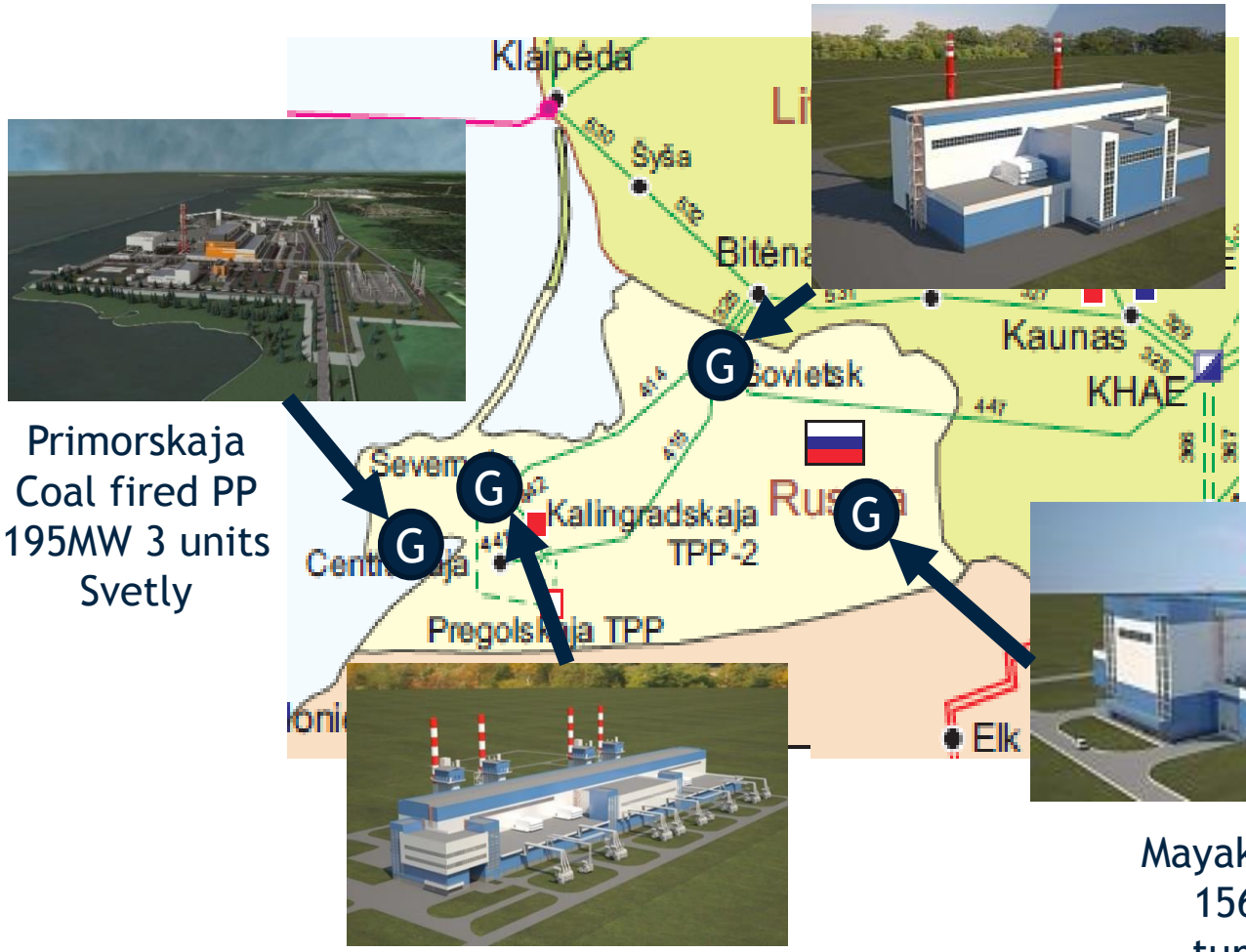
Desynchronization

New BRELL ring reinforcements

Additional generation in Kaliningrad

Additional generation will make Kaliningrad flexible enough to desynchronize from the Baltic States.



Primorskaja Coal fired PP 195MW 3 units Svetly

Talaxovskaja TEC Sovietskas 2 gas turbine units 156MW

Pregolskaja TEC 440 MW 4 gas turbine units Kaliningrad

Mayakovskaya TPP 156MW 2 gas turbine units Gusev

Risks coming from third countries

- 2 reactor blocks of 1 200 MW just 40 km off Vilnius
- Planned start of operation - 2019 (2020)
- 100 km off Astravets NPP there are 919 thousands of Lithuania's residents

Sources: MFA; Ari Beser „A Preventable Nuclear Threat You Most Likely Don't Know About", http://voices.nationalgeographic.com/2017/02/23/a-preventable-nuclear-threat-you-most-likely-dont-know-about/

How to stop electricity from Astravets NPP

Quick solution

Electricity from 3rd countries not traded at Nord Pool

Long-term solution

Power system synchronization with the Continental European Network

Timely synchronization is essential to avoid blackouts and disturbances

- In case the Baltic States will remain synchronized with IPS/UPS the blackout risks increase
- **Blackout in 2025 for Baltic States would costs from 1.3 to 2.1 billion EUR. That is almost twice more expensive than Baltic States synchronization using existing infrastructure**
- Russia and Belorussia might aim to break the BRELL ring as soon as 2021, thus desynchronizing Baltic States first.

Conclusions

Synchronization of the Baltic States' electricity network with the European system would allow to:

1. Remove infrastructure and operational interdependency with the third countries.
2. Increase market effectiveness.
3. Increase energy security by decreasing the risk of the possible blackout.

Future shall be based on shared EU values and trust among neighbors

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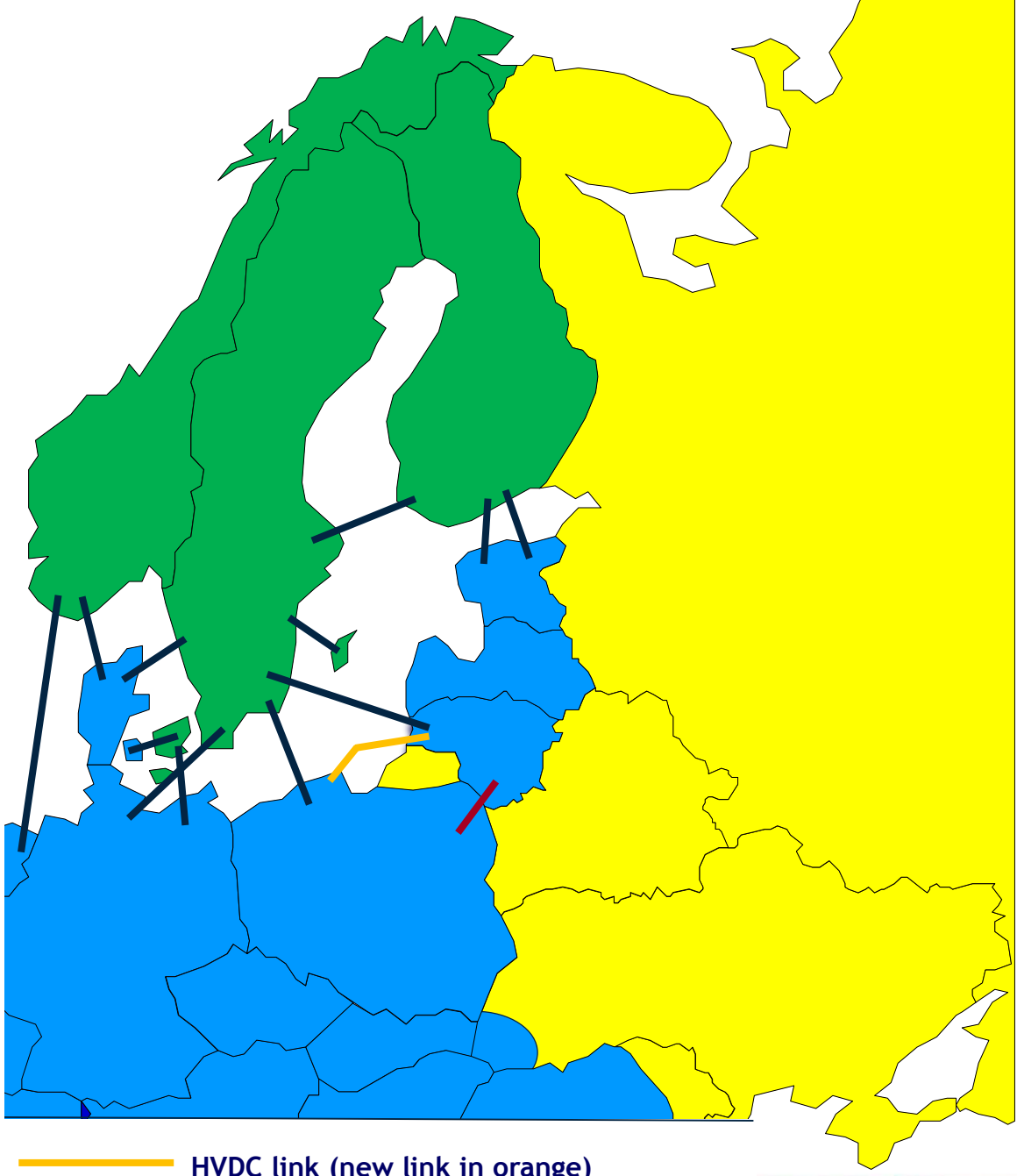
SYNCHRONISATION - LATEST ACTIONS AND NEXT STEPS

Latest actions

- 2018 06 28 Political Roadmap on synchronisation – decision on scenario and timeline
- 2018 09 14 BEMIP HLG confirmation of selected scenario
- 2018 09 21 TSO's application submitted for synchronisation – Start of formal extension procedure of the Continental Europe synchronous zone

Interconnection scenario selected:

- Synchronous interface on existing double circuit 400 kV AC line between Poland and Lithuania
- New submarine HVDC link between Poland and Lithuania



Next steps

- ENTSO-E Connection Agreement with catalogue of measures
- Negotiations with third countries
- Implementation of technical measures and tests
- Expected synhronization date 2025


Thank you!
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