Nordic Energy Research

Baltic Energy Technology Perspectives (BENTE) 2030-2050

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What we do

- We are the platform for cooperative energy research and policy development under the **Nordic Council of Ministers** – the intergovernmental body between Denmark, Finland, Iceland, Norway and Sweden.
- We fund R&D to promote a sustainable future
- We contribute to policy-making

The Baltic- Nordic Energy Research programme

Goal: To promote energy research and analysis in the Baltic States and inspire intra-Baltic and Baltic-Nordic collaboration.

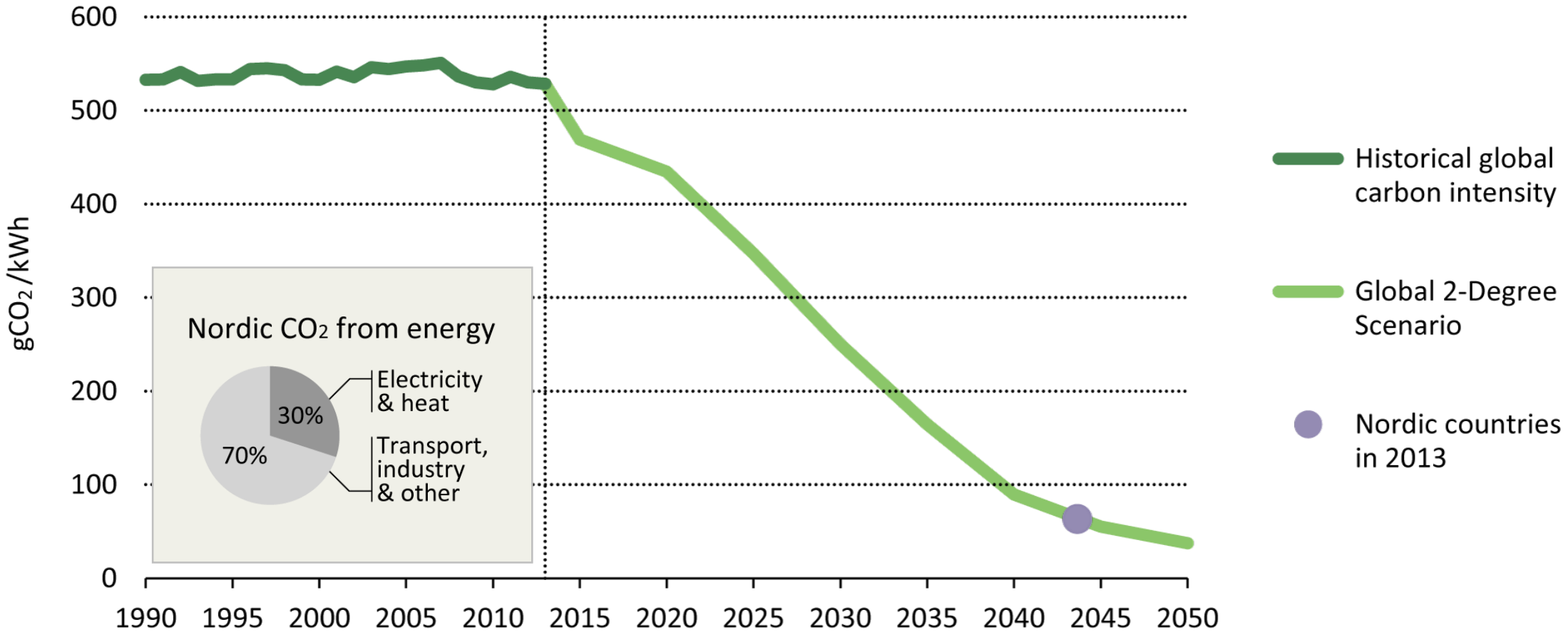
Nordic Energy Research; The Ministry of Economic Affairs and Communications, Estonia; The Ministry of Economics, Latvia; and The Ministry of Energy, Lithuania are discussing the possibility of launching a four-year long, **24 MNOK collaborative energy research programme, financed 50/50 by NER and Baltic governments.**

This goal will be translated into three central Actions:

1. The promotion of intra-Baltic and Baltic- Nordic research projects with participation of Baltic researchers
2. A Baltic- Nordic PhD collaboration
3. Exchange of energy researchers between the Baltic and Nordic countries

Nordics 25 years ahead on electricity decarbonisation

Global carbon intensity of electricity (gCO_2/kWh)

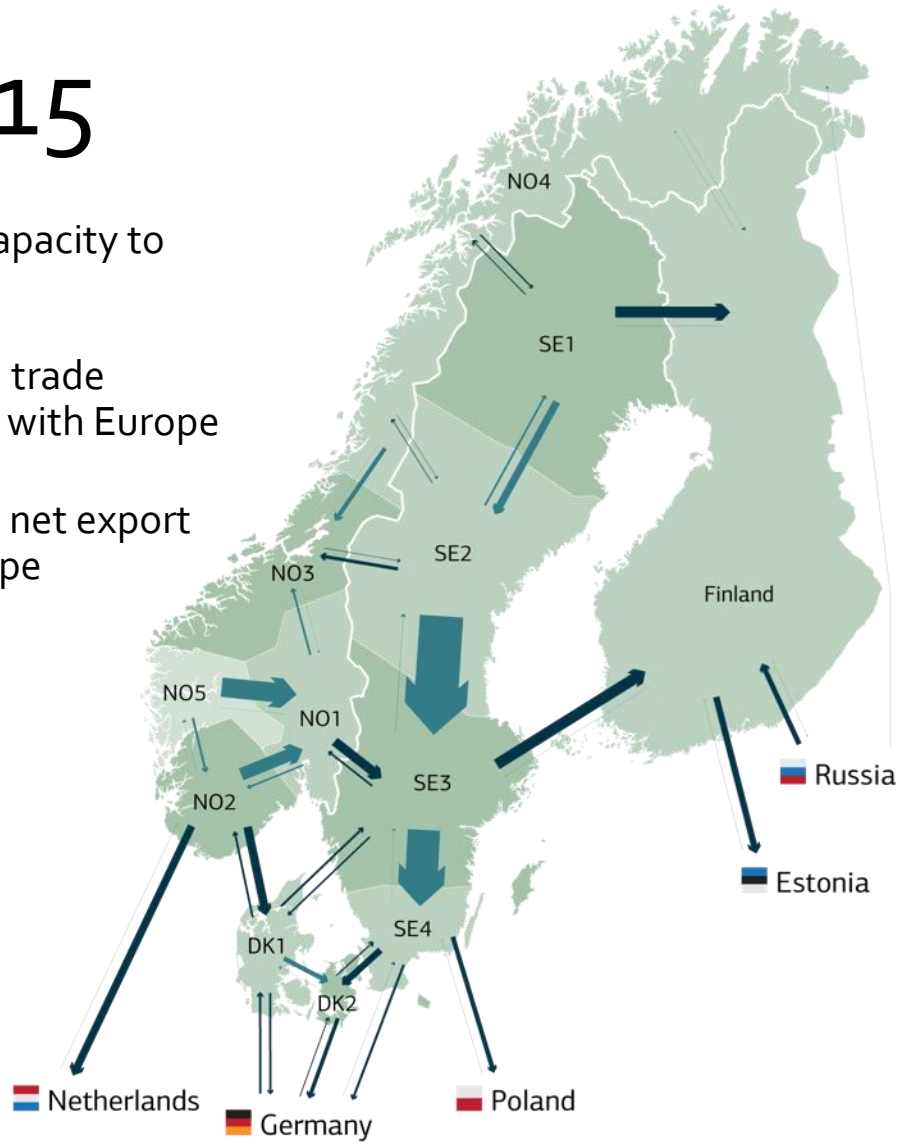


2015

5 GW capacity to Europe

28 TWh trade activity with Europe

14 TWh net export to Europe

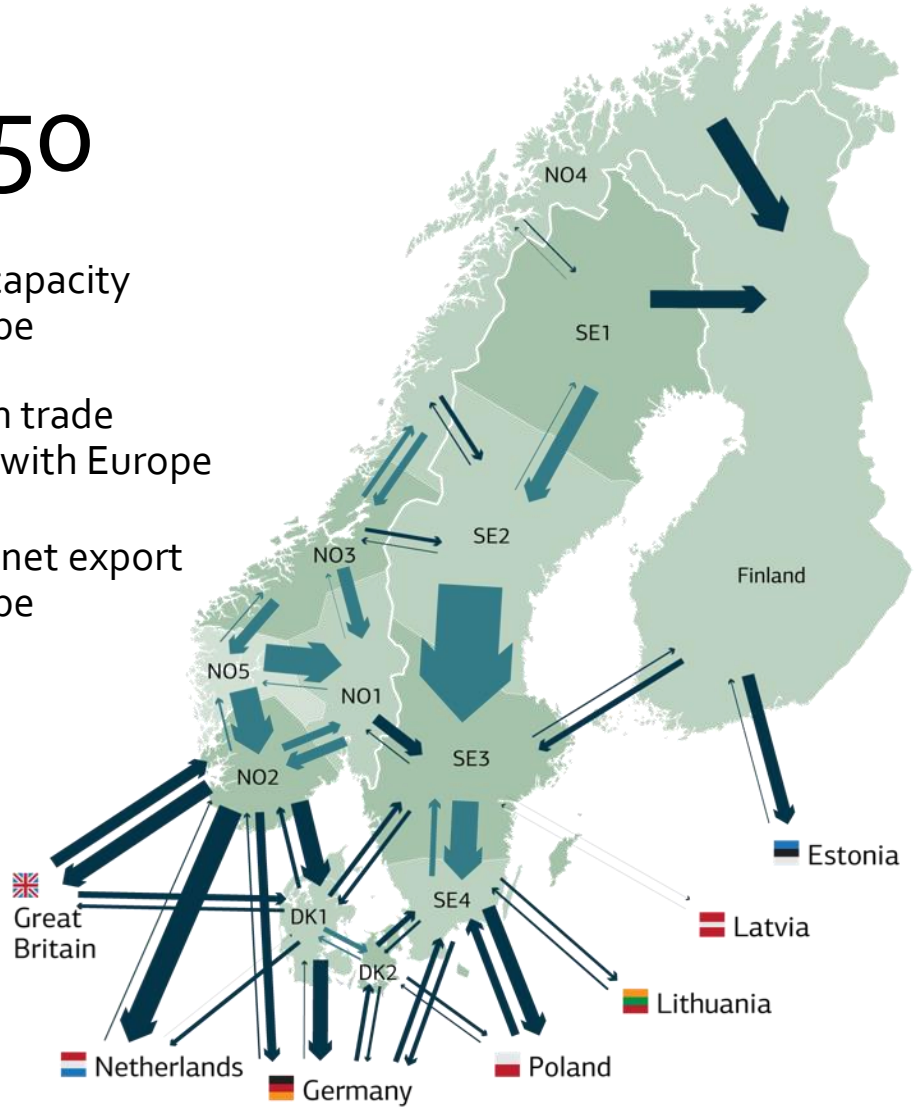


2050

23 GW capacity to Europe

125 TWh trade activity with Europe

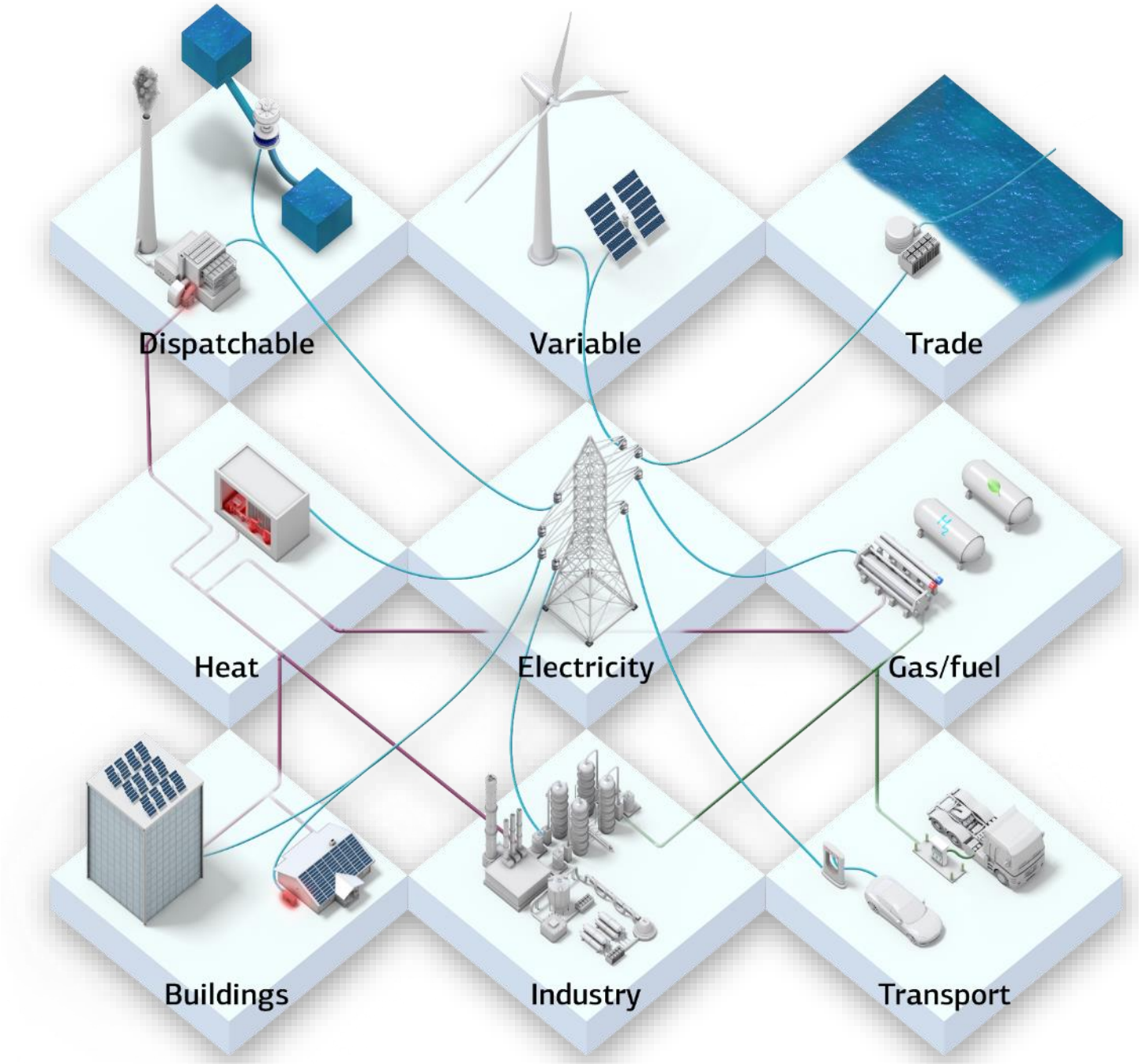
53 TWh net export to Europe



Supply

System

Demand



Baltic Energy Technology Scenarios 2018

Liepaja, Latvia.

Integration of Baltic power systems with Nordic and continental Europe

- The three Baltic countries used to be so-called "energy islands"
- This situation has changed with the establishment of Estlink 1 and 2, LitPol and and the Nordbalt interconnector linking Sweden and Lithuania.

What we wanted to do:

- Produce a coherent analysis of the energy system in all three Baltic countries
- Build on the experiences from the Nordic Energy Technology Perspectives 2016 (NETP)
- Give input to the Baltic states' reporting on the EU integrated national energy and climate plans
- Find research areas for more Baltic-Nordic cooperation

3 main scenarios

- **4 Degree Scenario (4DS):** Baltic countries achieve 2020 targets, but do not adopt 2030 targets. Other EU proceeds with 2030 targets. Only moderate global ambition after 2030.

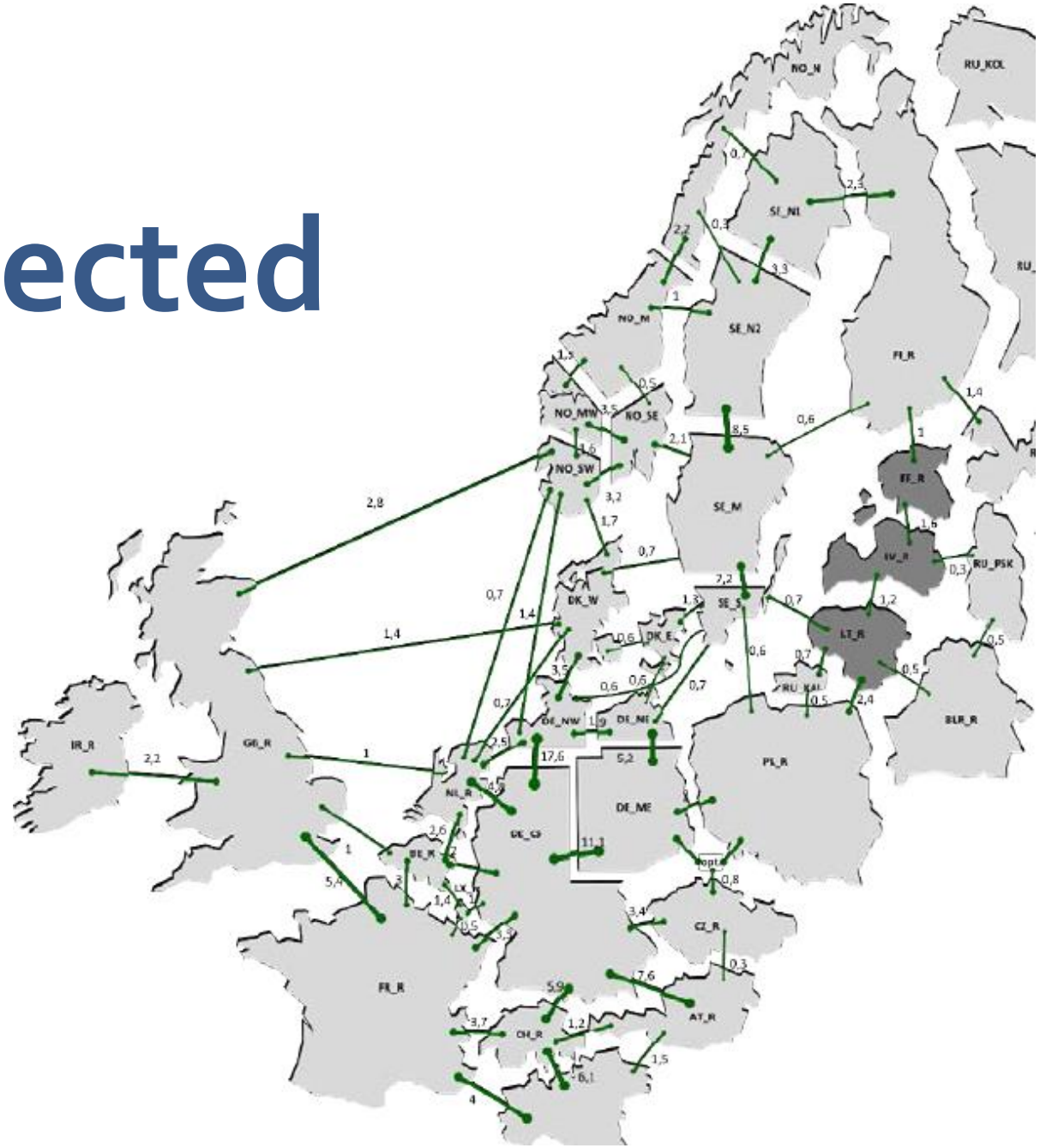
- **Baltic Policies (BPO):** As 4DS, but Baltic countries comply with proposed 2030 effort sharing and renewable energy targets.

- **2 Degree Scenario (2DS):** Models a cost-optimal pathway to achieving the global two degree target. EU -80% GHG by 2050. Baltic countries as a part of EU.

An interconnected Europe

The **Balmorel model** is applied to investigate least cost dispatch and capacity expansions of electricty and heat systems.

It all depends on the assumptions…



4 key BENTE findings:

1. GHG reductions should be led by the electricity and district heating sectors.
2. The Baltic countries could achieve proposed renewable energy targets using domestic resources.
3. Electricity consumption is projected to increase.
4. Renewable energy is becoming the cheapest option for new electricity generation.

1. GHG reductions should be led by the electricity and district heating sectors.

- **Low-cost options for fast de-carbonisation are available today.**
- **Variable renewables and district heating work well together**
- **Favourable experiences from other parts of Europe and the world.**
- **Without low-carbon fuels in district heating and electricity, other sectors will struggle to de-carbonise.**

2. The Baltic countries could achieve proposed renewable energy targets using domestic resources.

The main available domestic renewable resources are:

- **Bioenergy** – already extensively used, primarily for heat. Still significant potential for increased utilisation.
- **Wind** – In particular after 2030, the fastest-growing renewable energy source for electricity production. Potential to produce as much electricity in 2050 as is produced today from all sources (2DS 2050).
- **Solar** – Gives a significant contribution after 2030 in all scenarios.
- **Hydro** – Important contribution, but limited potential for increased production in all three scenarios.

3. Electricity consumption is projected to increase.

- The electricity demand is projected to grow
  - from 10% to 20% between 2015 and 2030
  - from 20% to 40% between 2030 and 2050
  - Depending on country and scenario

- Main reasons: **assumed growth** of transport, building areas, and industry production, and **modelled electrification** especially in transport and heat pumps

- The projected growth is similar to Estonia's national studies, higher than Latvia's, and lower than Lithuania's

4. Renewable energy is becoming the cheapest option for new electricity generation.

- In recent years, results from auctions of renewable energy around the world have indicated sharp declines in the cost of wind and solar power.
- Measured on LCOE, onshore wind and solar PV are the cheapest options by 2020
- Learning curve theory: Prices will continue to drop!

Renewable energy will dominate the future power markets

Annual electricity generation by fuel in the entire modelled area (most of EU)

=

2030: 66% RE

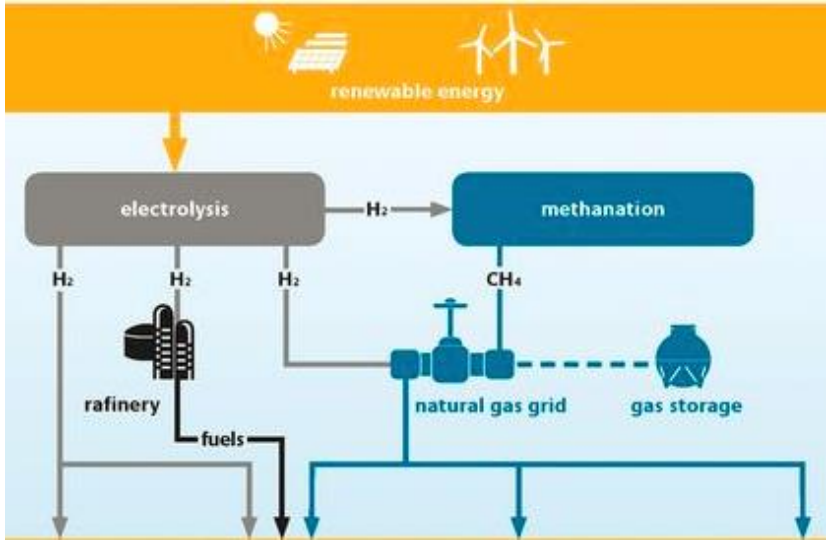
2050: 85% RE
66% wind + solar

4. Batteries

- Ancillary services and peak power

Power to gas

- Perhaps beyond 2030



Cost reflective network tariffs

-Key to sector integration

Power to heat

- Starting up now

Looking ahead

1. If the Baltics want to avoid being large-scale importers of electricity they will need **sustainable policies** to facilitate cost-effective local generation.

2. Experience from EU and world shows that modest subsidies (or price guarantees) would **incentivize renewable** electricity generation in the Baltics countries. Without political support, the deployment of new domestic generation capacity might be limited before 2030.

3. Power to heat will become more and more competitive as the share of variable renewables in the electricity system increases. Cost effective tariffs and adequate grid infrastructure are important to prepare for this transformation.

Improving energy independence

- The Baltic countries' energy independence improves in the scenarios
- In general, measures that reduce emissions, increase the RE share, or increase energy efficiency also improve energy independence.
  - The most notable exception is the use of shale oil, which is the only significant domestic fossil energy source.

Relatively small additional costs

- The additional costs compared to the 4DS range from 0% to 0.3% of GDP by 2030 and from 0.1% to 0.5% by 2050.

- The annual additional costs* are estimated to be at the level of 50- 100 million €/year for each Baltic country at 2030.

* Note: Presented costs estimate the amount of additional money required to investments and O&M. Actual investments may cost more, because this is compared to the base level of 4DS scenario. In addition, costs do not include energy taxes, CO_2 prices, or secondary effects on employment or other economy.

Download report and more at:

www.nordicenergy.org/project/bente/

Thank you for your attention!

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