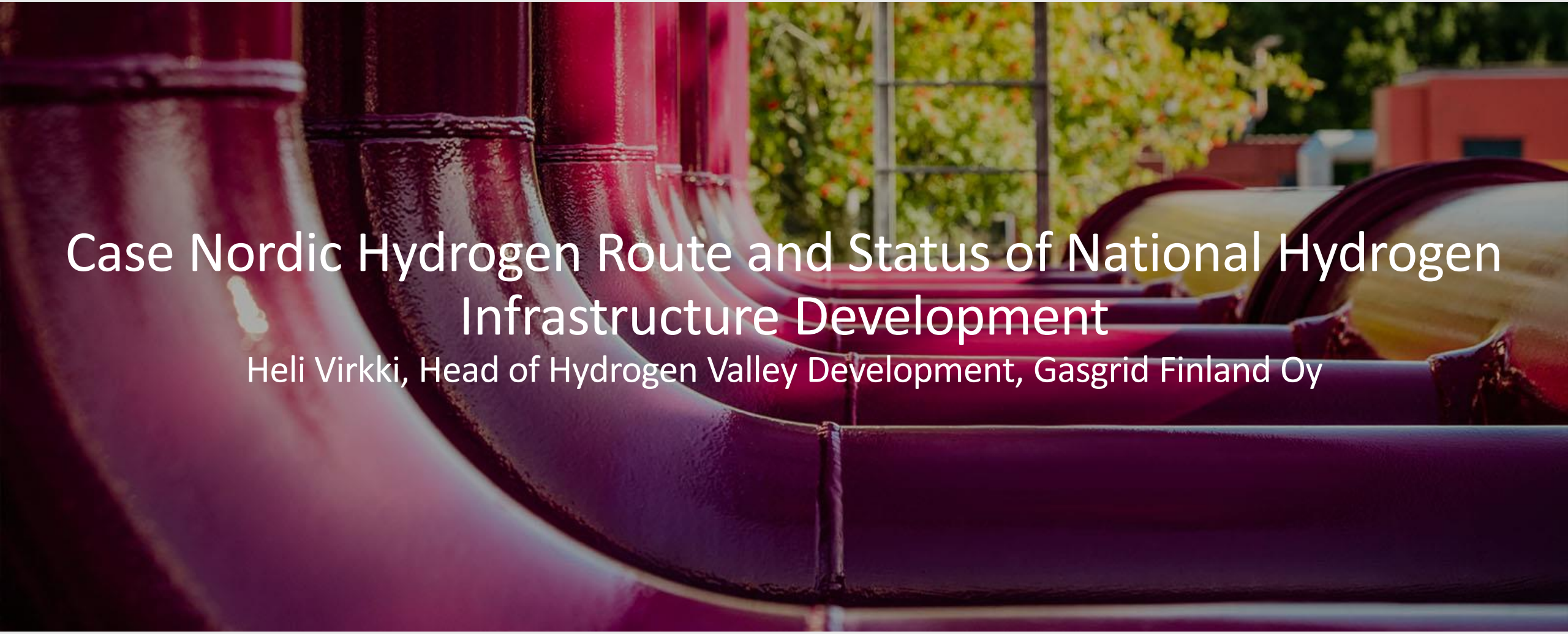
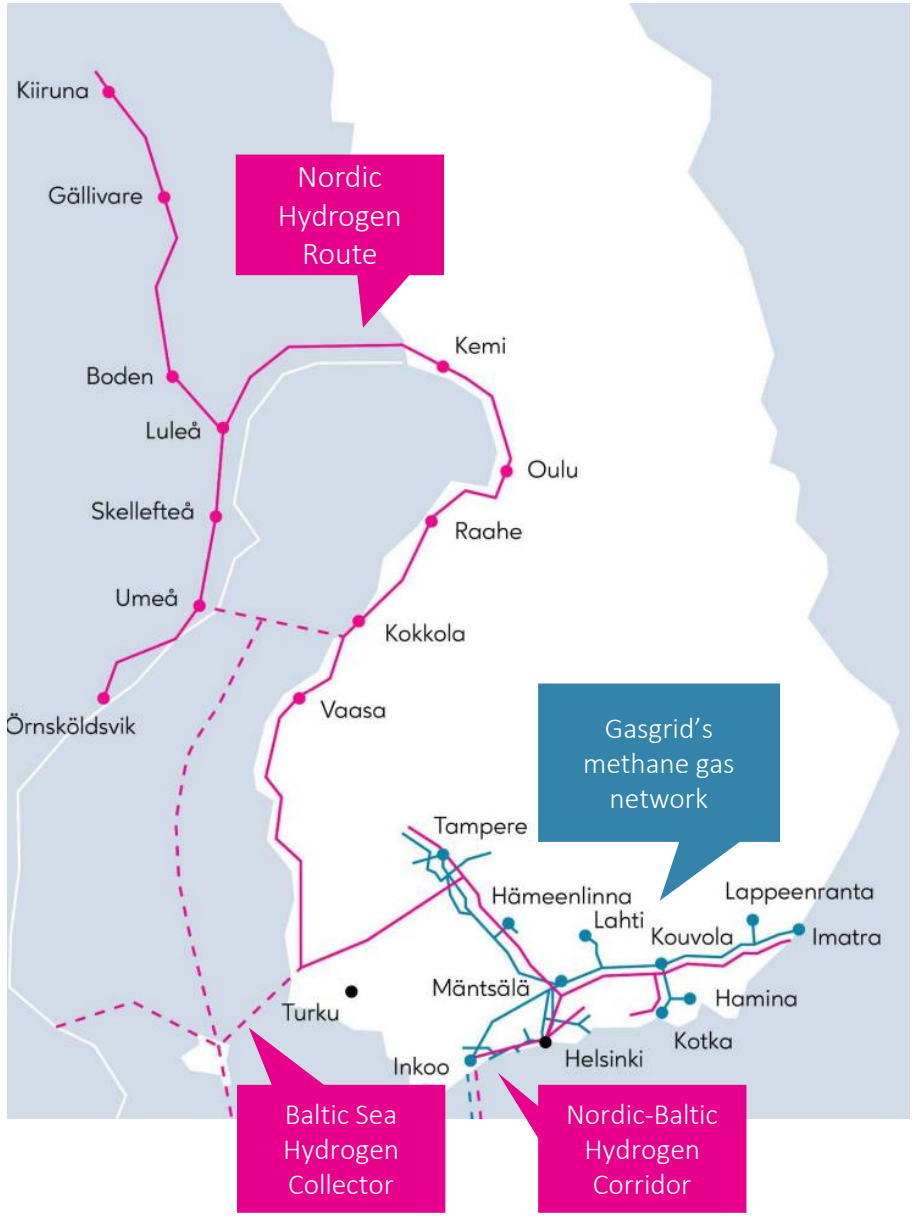


Case Nordic Hydrogen Route and Status of National Hydrogen Infrastructure Development

Heli Virkki, Head of Hydrogen Valley Development, Gasgrid Finland Oy

Northern Power Business Forum, Oulu, 14/2/2024



Gasgrid is developing the national hydrogen infrastructure

- The Finnish Government has given Gasgrid a task to promote the development of the national hydrogen infrastructure, international infrastructure cooperation and the hydrogen market in the Baltic Sea Region as soon as possible
  - The aim is to attract new investments and jobs to Finland and to support Finland's energy security and self-sufficiency
  - Hydrogen networks create new business opportunities for different actors through the development of new value chains, products and services.
- Gasgrid Vetyverkot Oy was established in 2022

Increasing renewable electricity production enables significant hydrogen production

Good resources enable a new export industry

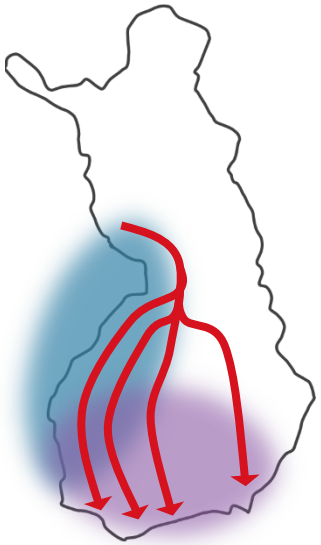
Finland has an excellent starting point for hydrogen economy

Strong energy infrastructure enables harnessing the potential

Opportunity for creation of new export business

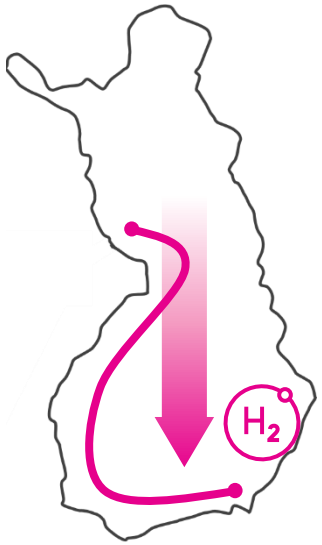
Competitive wind power

Solar power & biogenic CO2

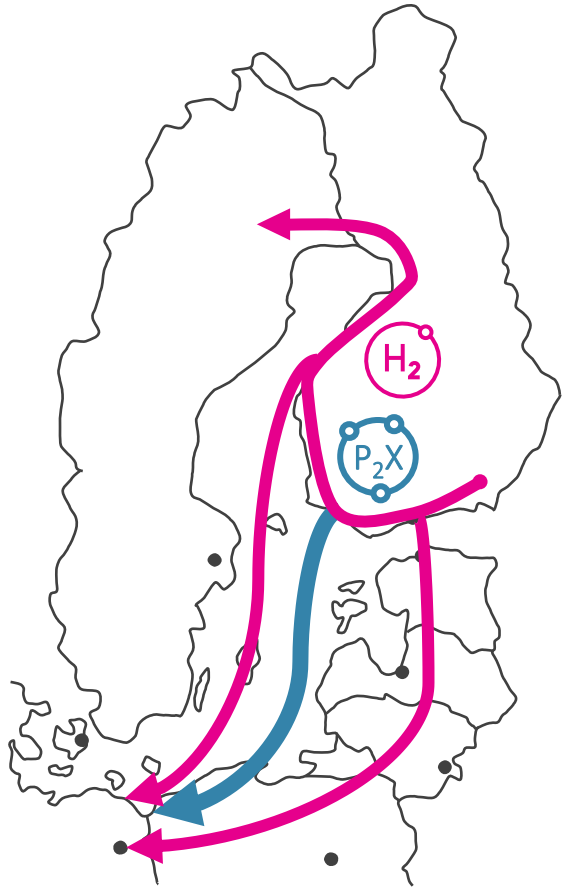


Strong electricity grid and functioning electricity markets

Transporting energy as hydrogen between the production and consumption and balancing with storage



Strengthening electricity transportation, especially in North-South direction



Source: Gasgrid & Fingrid. (2023). Energian siirtoverkot vetytalouden ja puhtaan energiajärjestelmän mahdollistajina.
Available at: Energian siirtoverkot vetytalouden ja puhtaan energiajarjestelman mahdollistajina - Loppuraportti

Hydrogen infrastructure enables market expansion, flexibility for operation and storage

- Establishes connection between H_2 producers, refiners and end-users
- Enables open market mechanism for hydrogen
- De-risks of investments through storage function
- Allows for more economical upscaling of own business without the need to invest in local storage
- Brings flexibility in the operation of refining processes through storage (availability of European cavern storages through pipeline)

Large infrastructure projects within Finland

Baltic Sea Region – Globally the Most Efficient Hydrogen Market by 2030

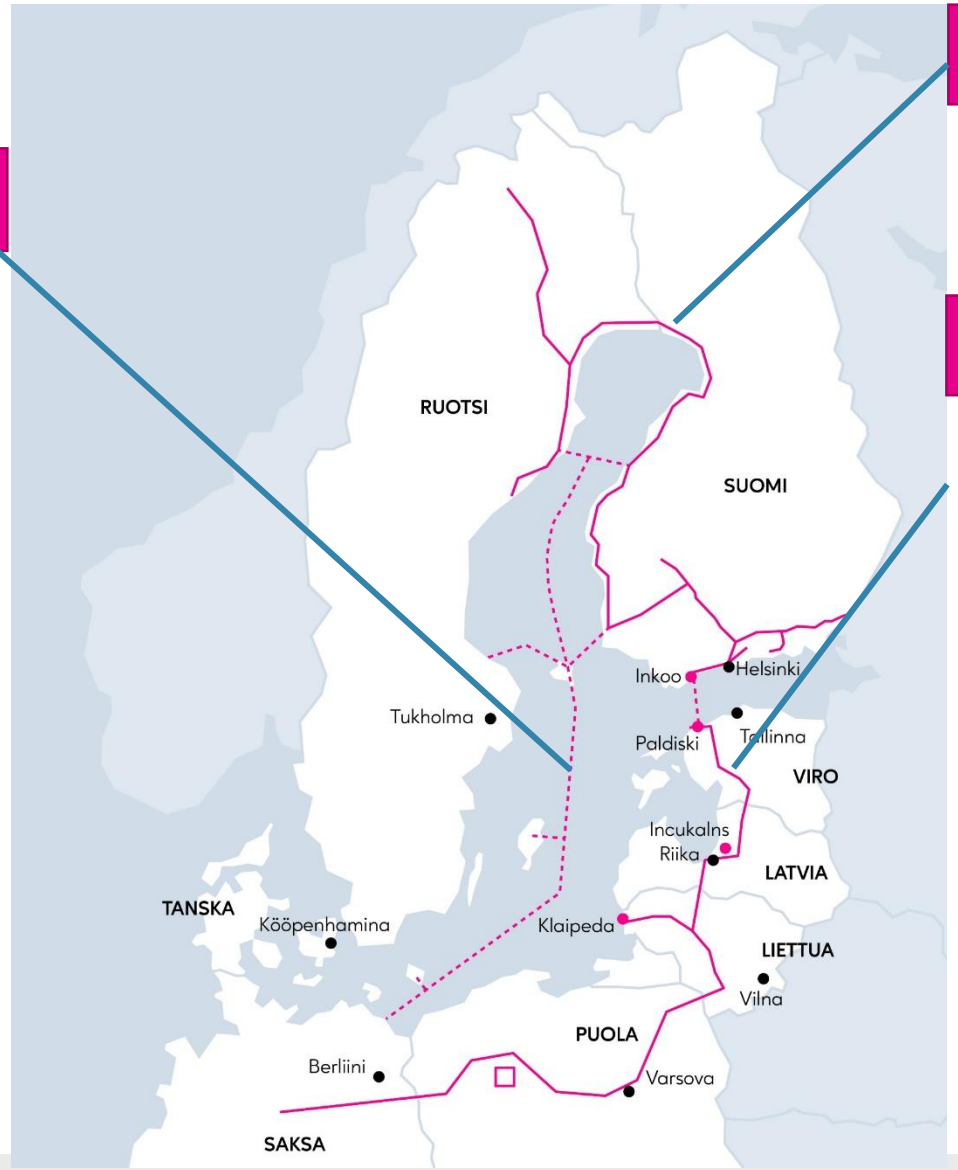
Baltic Sea Hydrogen Collector (BHC)

GASGRID

NORDION ENERGI

CIP
Copenhagen Infrastructure Partners

OX2



Nordic Hydrogen Route (NHR)

GASGRID

NORDION ENERGI

Nordic-Baltic Hydrogen Corridor

GASGRID

elering

Amber Grid

conexus BALTIC GRID

GAZ system

ONTRAS

Nordic Hydrogen Route

The Nordic Hydrogen Route (NHR) is an initiative between Gasgrid Finland and Nordion Energi to drive decarbonization, support regional green industrialization, economic development, and European energy independence.

- Connects all the H_2 projects in the Bothnian Bay, which has potential to be a major green hub.
- Support creation of an efficient and harmonized cross-border hydrogen market to enable price competition and security of supply.
- Accelerate new renewable energy investments to support Europe's energy transition, regional economic development, and European energy independence.
- Create investments and jobs through new value chains within hydrogen economy.

NHR: ACHIEVEMENTS AND NEXT STEPS (1/3)

NORDIC HYDROGEN ROUTE
BOTHNIAN BAY

Market Consultation

- The market consultation process enables market players to provide the project positive investments signals.
- Preliminary analyses have been made.
- The market consultation has confirmed that **there is strong interest from market parties in SE1, SE2 and Finland:** all expected to produce and use hydrogen from 2030 onwards.

Supply and Demand

- For Finland:
  - 50 responses collected
  - Demand: >20 TWh/year
  - Supply: >80 TWh/year
  - Early projects starting from year 2027
- For Sweden
  - Response for 30 companies and 50 projects
  - Demand: 56 TWh/year
  - Supply: 85 TWh/year
  - Early projects starting from year 2028

NHR: ACHIEVEMENTS AND NEXT STEPS (2/3)

NORDIC HYDROGEN ROUTE

BOTHNIAN BAY

Engineering

- Preliminary onshore pipeline routing completed
- Alternative offshore pipeline routing developed
- Cost estimates completed
- Basis of design developed

Engagement and Awareness

- Activities targeting increased public awareness as well as social acceptance from regional communities ongoing
  - Communication plan, stakeholder register and mapping analysis established
  - Regional and local officials along the planned route contacted, discussions started

NHR: ACHIEVEMENTS AND NEXT STEPS (3/3)

NORDIC HYDROGEN ROUTE

BOTHNIAN BAY

Projects of Common Interest (PCI)

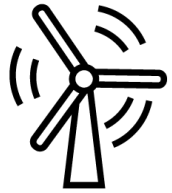
- Projects with PCI status are given priority at a national level to ensure rapid administrative and judicial treatment procedures.
- PCI status is a pre-requisite to apply for Connecting Europe Facility (CEF) funding.
- In November 2023 NHR has been proposed for PCI status. The status is expected to be confirmed in Q1 2024.

Concession and Permitting

- Being granted PCI status, permitting processes are expected to take shorter duration.
- Engagement with the local and national institutions on the potential pipeline routing, which might also have an affect on permitting process, has already started.

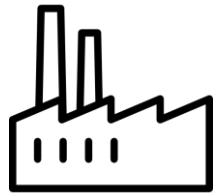

Bright future for Finnish hydrogen economy

Billion-scale investments in Finland by 2040

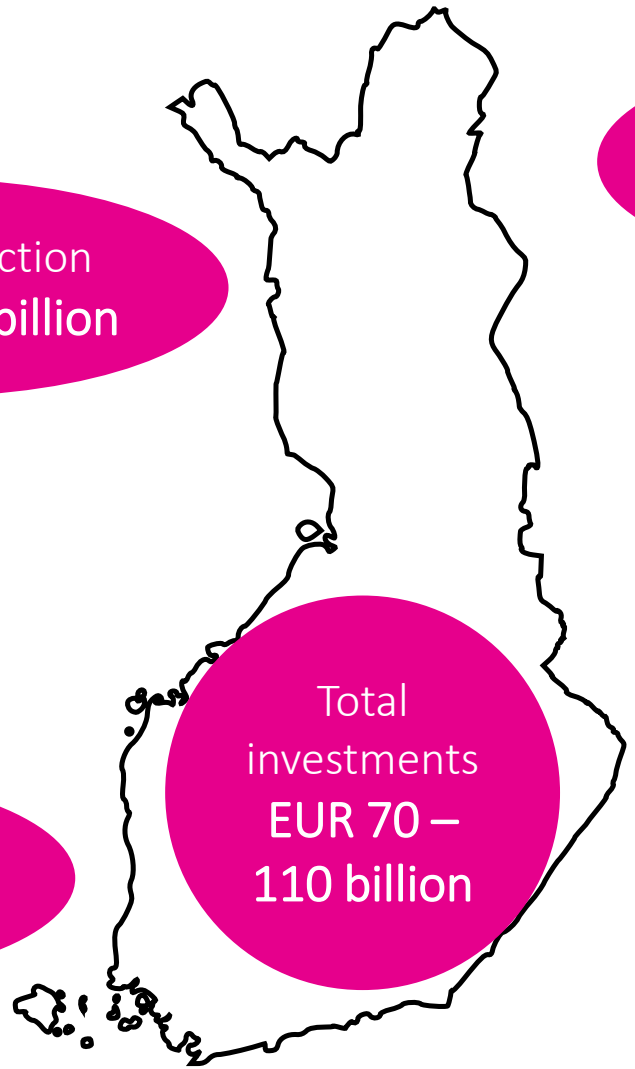


Power production
EUR 36 – 60 billion

Hydrogen production
EUR 8 – 14 billion

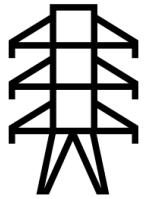


Hydrogen refining*
EUR 10 – 20 billion

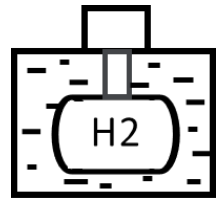


Total investments
EUR 70 – 110 billion

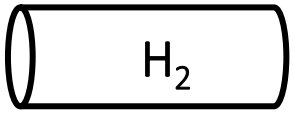
Power grid
EUR 4 – 5 billion



Hydrogen storage
EUR 2 - 5 billion



Hydrogen transport
EUR 5 billion



* Most investments will realize by 2030
Source: Confederation of Finnish Industries. Green investments in Finland. Data Dashboard.

Source: Gasgrid & Fingrid. (2023). Energian siirtoverkot vetytalouden ja puhtaan energiajärjestelmän mahdollistajina. Available at: Energian siirtoverkot vetytalouden ja puhtaan energiajarjestelman mahdollistajina - Loppuraportti


The future of gases will be created together

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