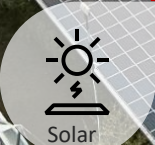
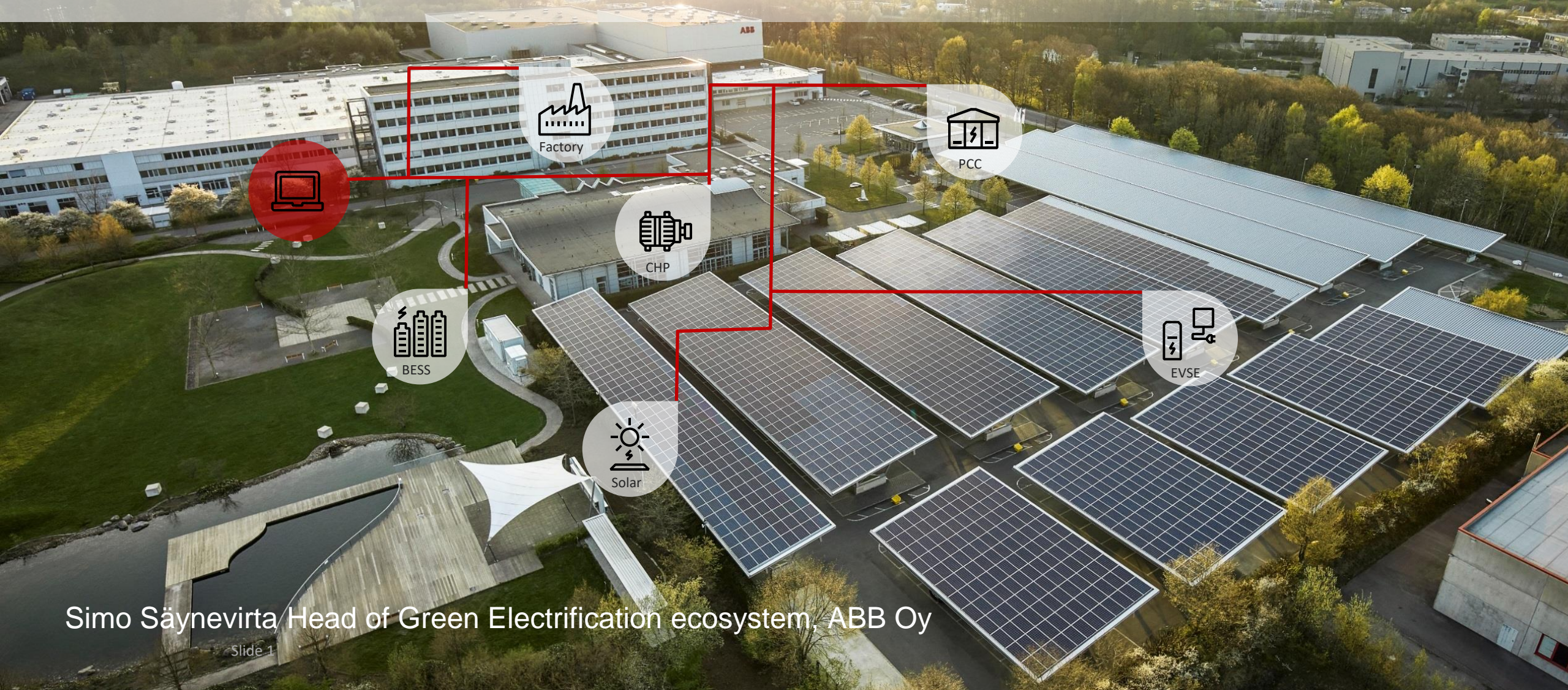


# Green Electrification and Digitalization

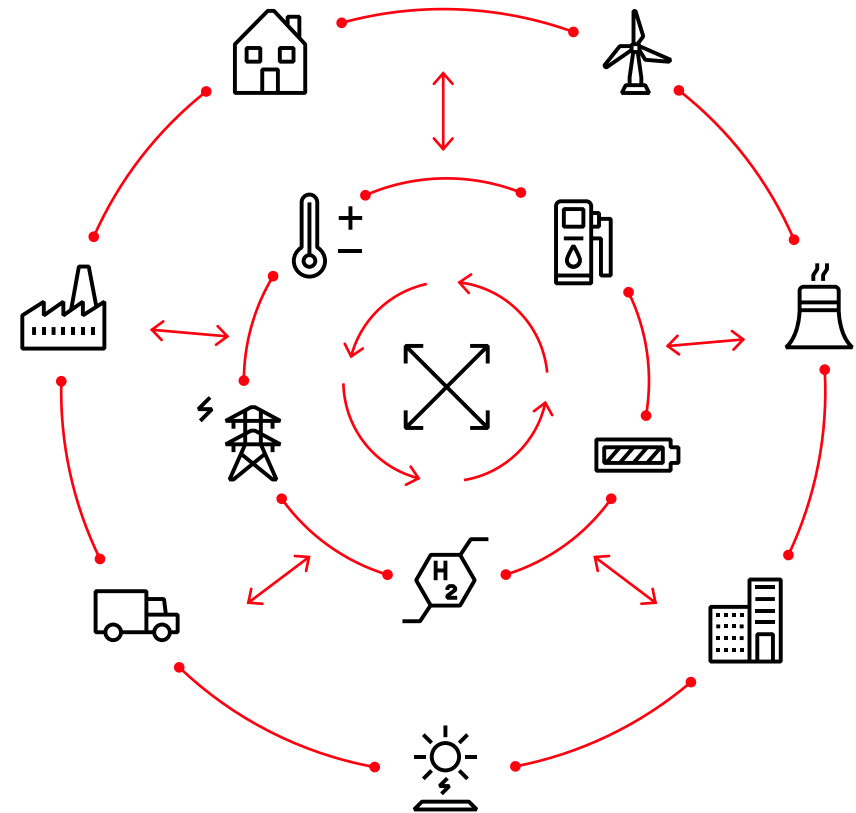
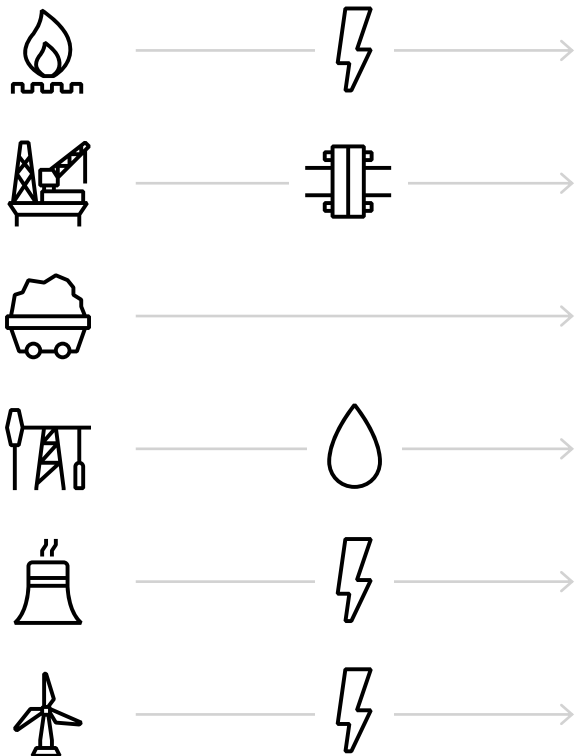
## Keys to Resilient and Carbon-Neutral Europe



Simo Säynevirta Head of Green Electrification ecosystem, ABB Oy

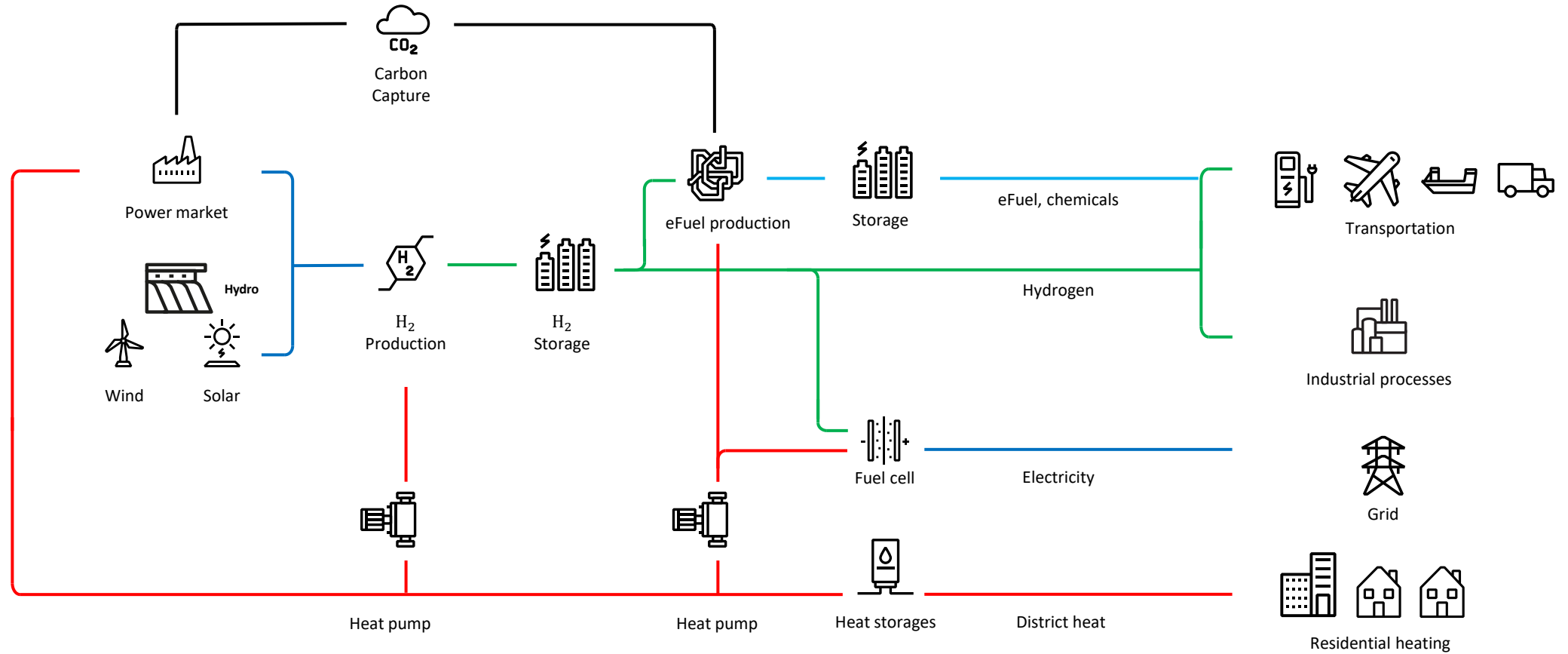
# Energy landscape will change with the need of decarbonization

Transforming from linear, wasteful to integrated and circular



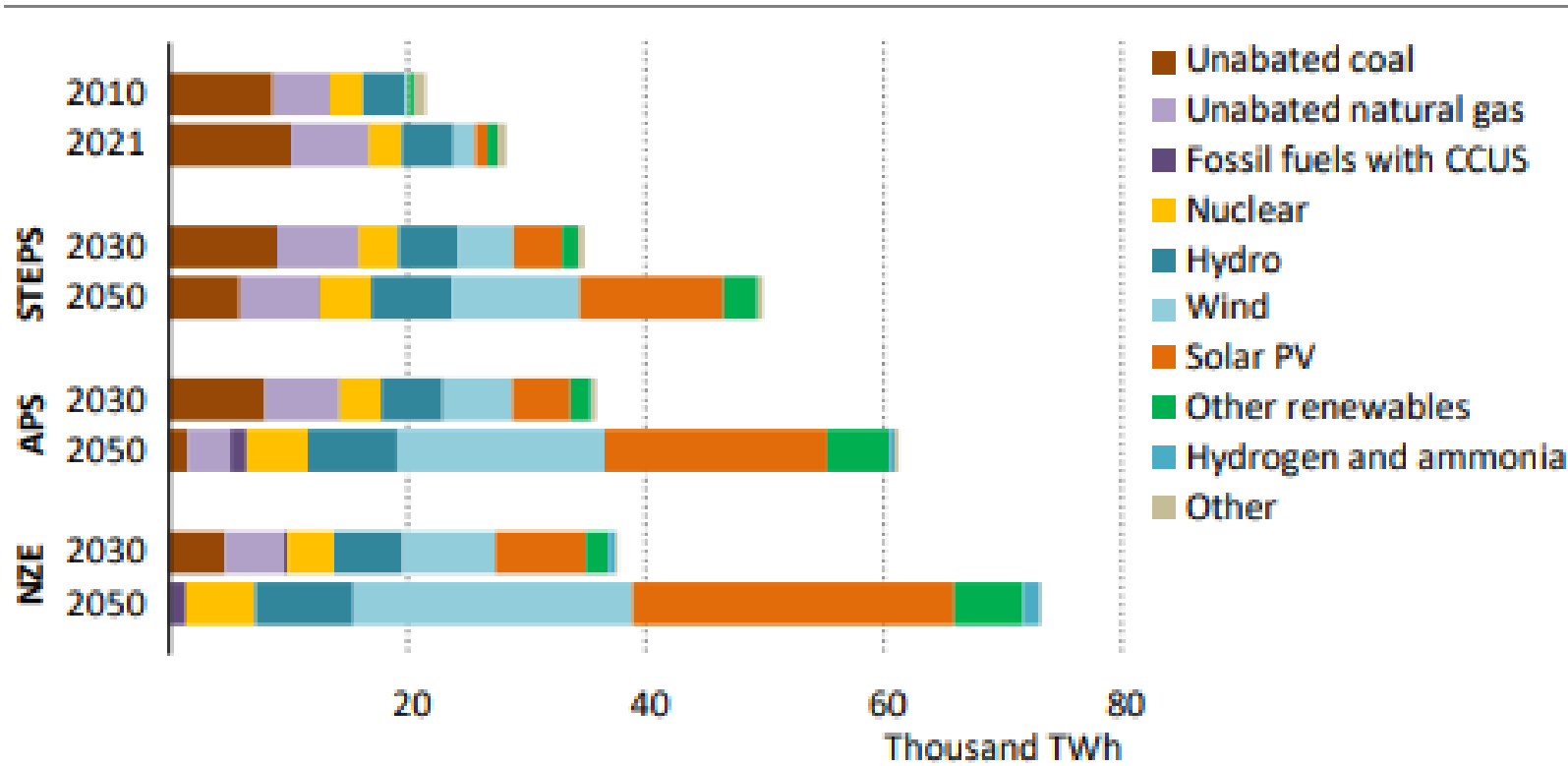
Maximize the value of used energy through high efficiency and synergies

# Sector integration – P2X - is key to the circular energy system



# Electricity generation grows > 2.5 x by 2050

**Figure 6.7** ▶ Global electricity generation by source and scenario, 2010-2050



IEA. CC BY 4.0.

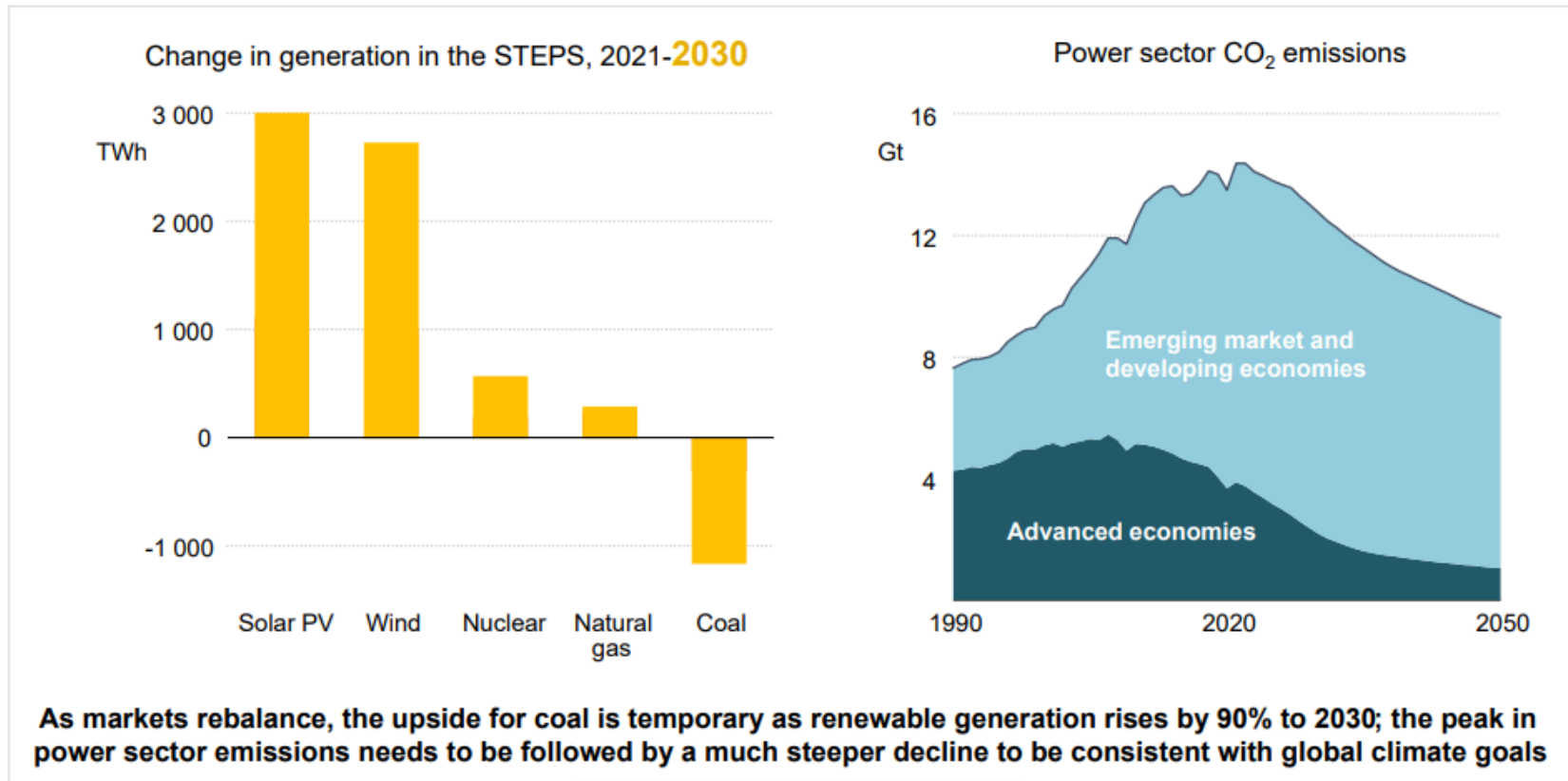
*Electricity generation from unabated fossil fuels peak by 2030, as low-emissions sources*

June 6, 2023

*ramp up and renewables dominate electricity supply in all scenarios by 2050*

# Clean electricity replaces fossile energy to decarbonize the world

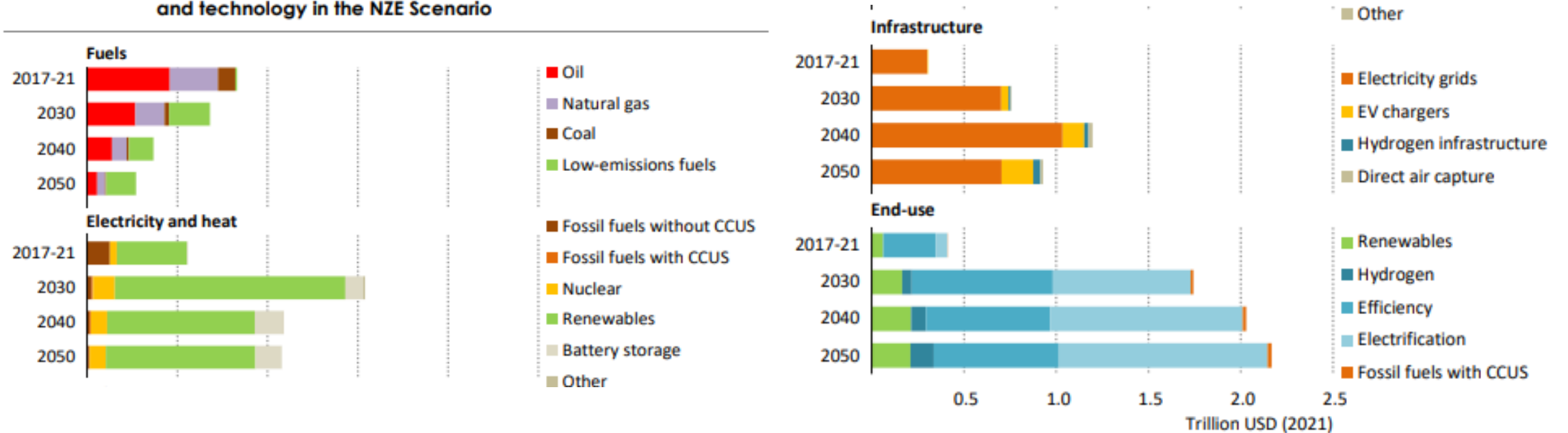
## Electricity is turning the corner



# Green transition leads to huge investment boom

3 -4 \$ trillion (10<sup>12</sup>) yearly investments necessary

**Figure 3.22** ▶ Global average annual energy investment by sector and technology in the NZE Scenario



IEA. CC BY 4.0.

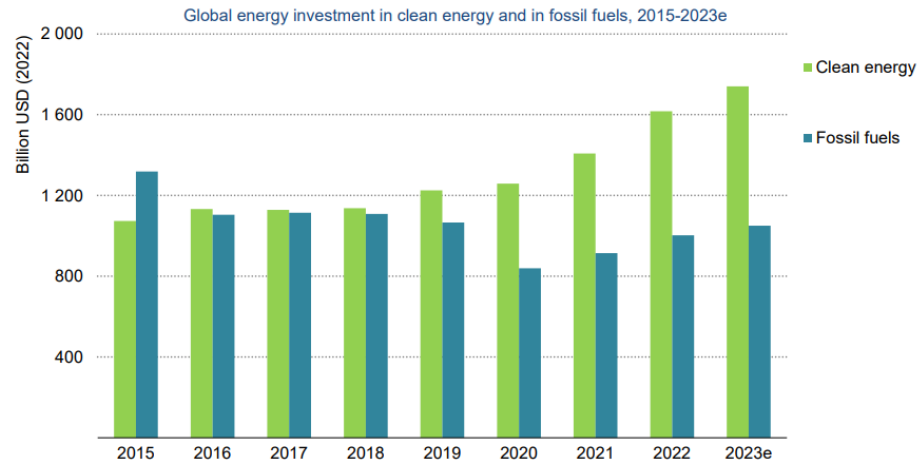
*Investment increases rapidly in electricity, infrastructure and end-use sectors; fossil fuel investments decrease and low-emissions fuel investments increase*

# Clean energy is accelerating – while much more is still needed

World Energy Investment 2023

Overview and key findings

The recovery from the Covid-19 pandemic and the response to the global energy crisis have provided a major boost to global clean energy investment



Note: 2023e = estimated values for 2023.

IEA. CC BY 4.0.

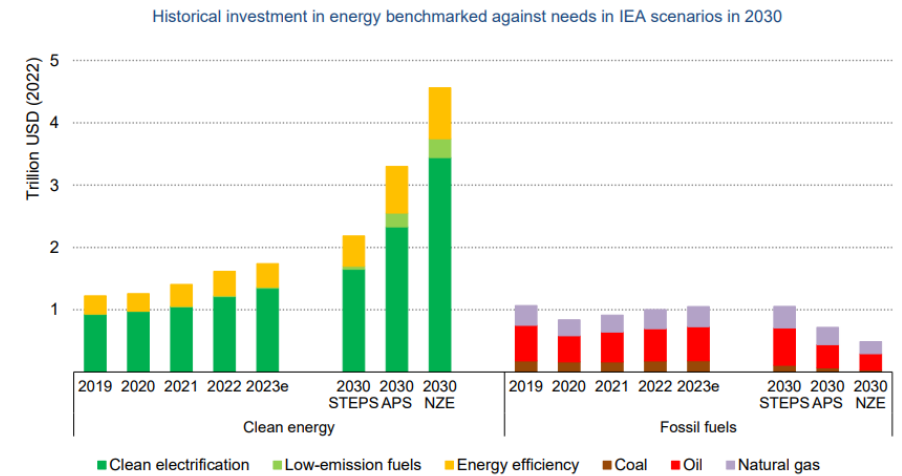
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World Energy Investment 2023

Overview and key findings

Scaling up clean investment is the key task for the sustainable and secure transformation of the energy sector



Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario. 2023e = estimated values for 2023.

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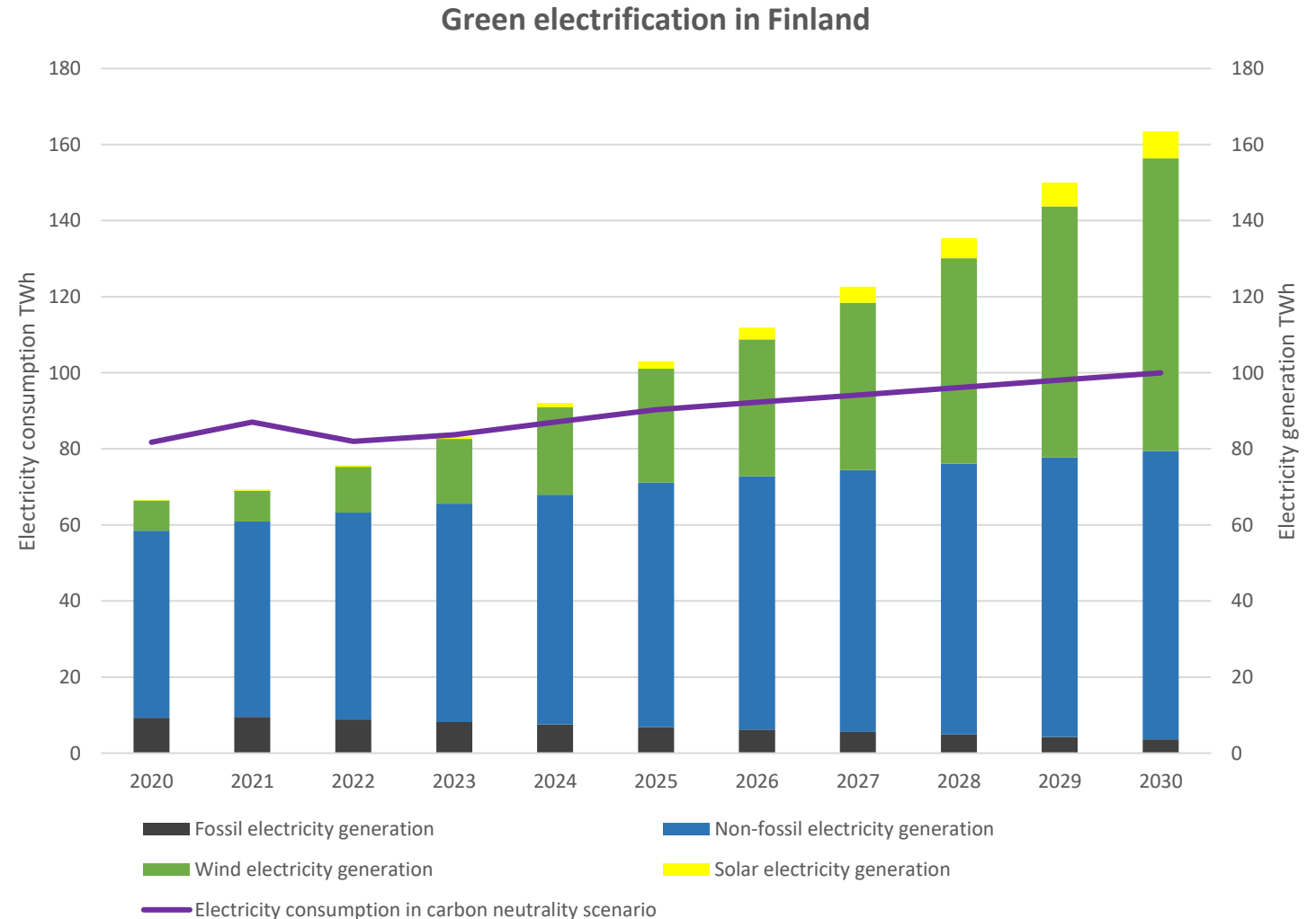
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**How about Finland?**



# The production potential of clean hydrogen in Finland is significant – and competitive

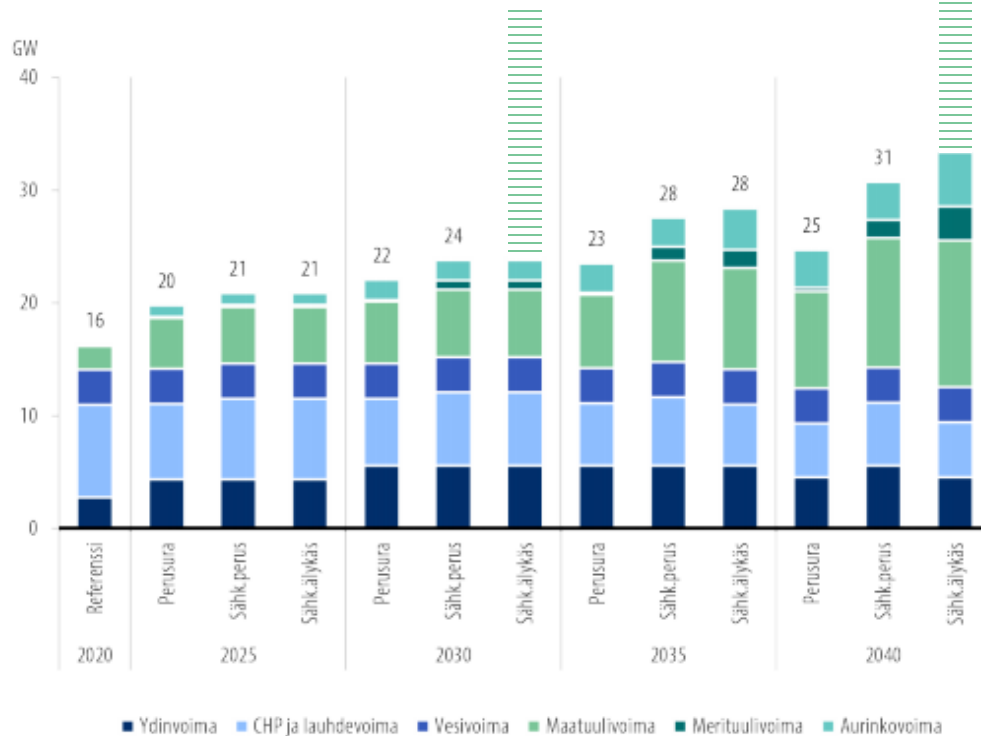
- Climate-neutral Finland by 2035. The world's first fossil-free welfare society
  - Electricity production will be carbon neutral already 2030
  - Electrification with high energy efficiency
- In 2020, 86% of electricity produced in Finland was produced carbon-dioxide neutrally and 52% with renewable energy sources
- 04/2023 Finland produced the cheapest electricity in Europe - Finland is the most attractive place to invest for the energy intensive industry



# Weather dependent power generation dominates the mix in 2030's

Intelligent sector coupling and real-time optimization keys to resilience

Power generation in Finland  
2020 -2040



Fingrid best estimate:  
> 30 GW  
renewables

Growth potential 2040's  
> 150 GW

- Utilizing renewable generation fully requires balancing with other sectors – incl. heat, industries and **hydrogen**
- Optimizing **sector integration** requires collaboration and solving of **real-time**, complex system models
- Autonomous **AI** driven systems and **5G/6G** ICT networks basis for this automation
- Energy sector links to ICT and **cyber security**

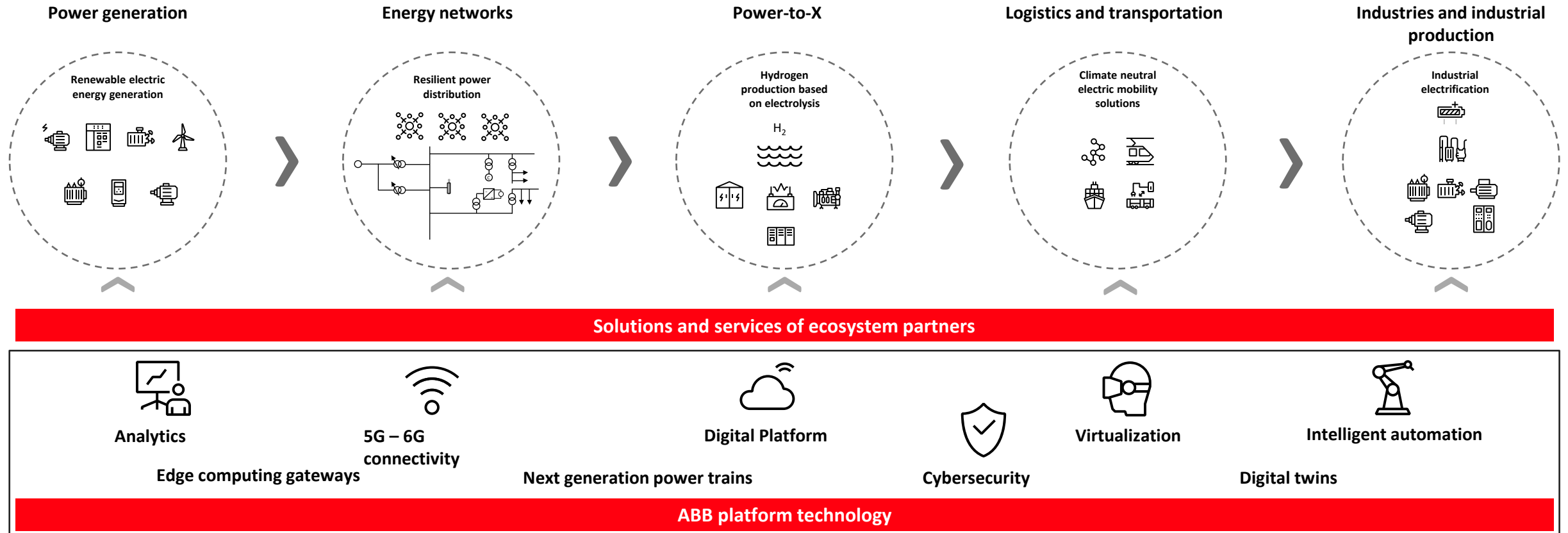


# Green Electrification transition

Great opportunities, with some challenges to address

# ABB Green Electrification 2035

Optimizing system-level energy efficiency and reliability



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# ABB Mission to Zero

Carbon neutral industrial operations



# **Mission to Zero<sup>®</sup>**

## **ABB Porvoo – Finland**



# Virtualized electrical network protection & control

Manage the increased dynamics and complexity to enable the green transition





**ABB**