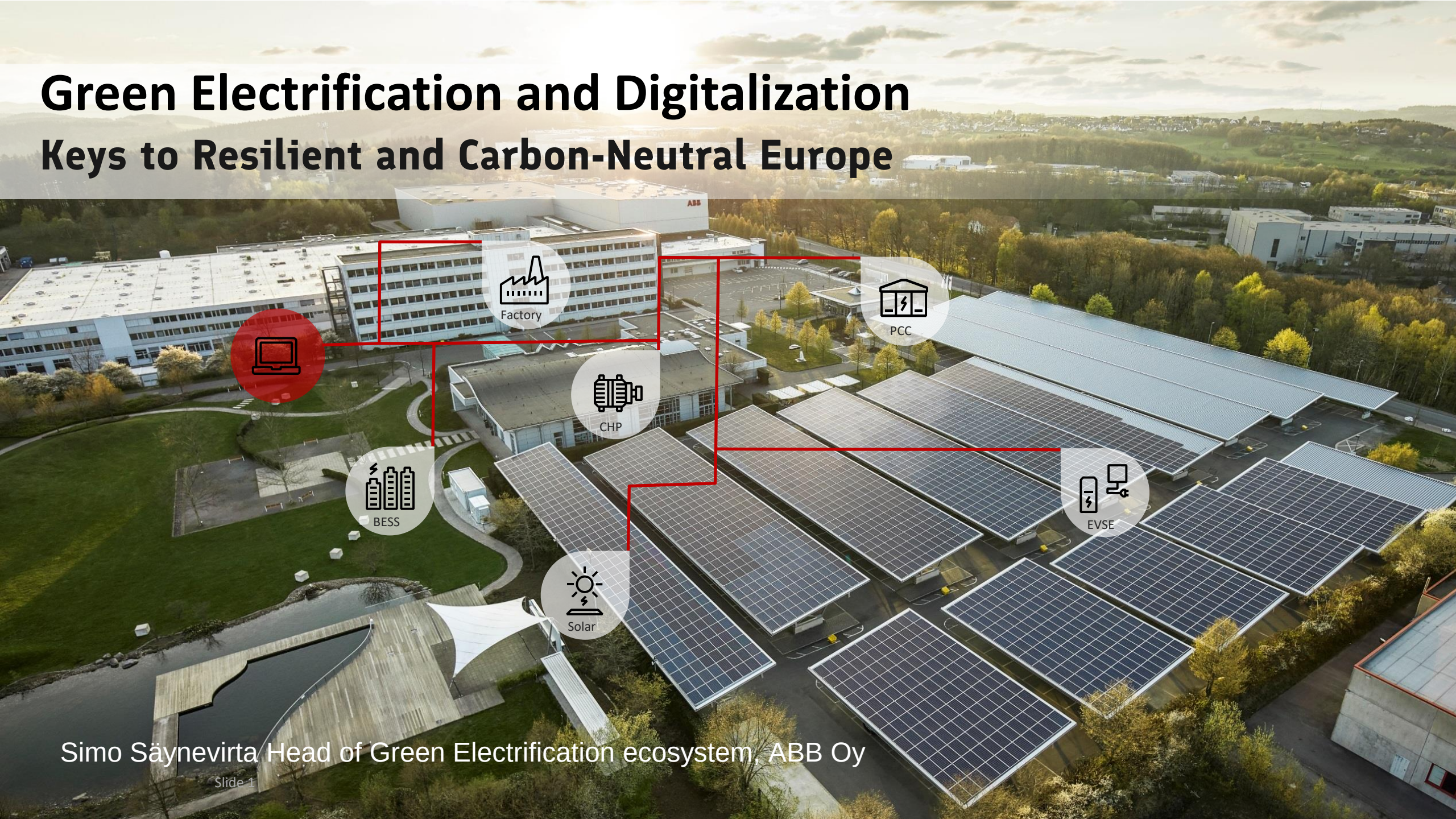
Green Electrification and Digitalization

Keys to Resilient and Carbon-Neutral Europe

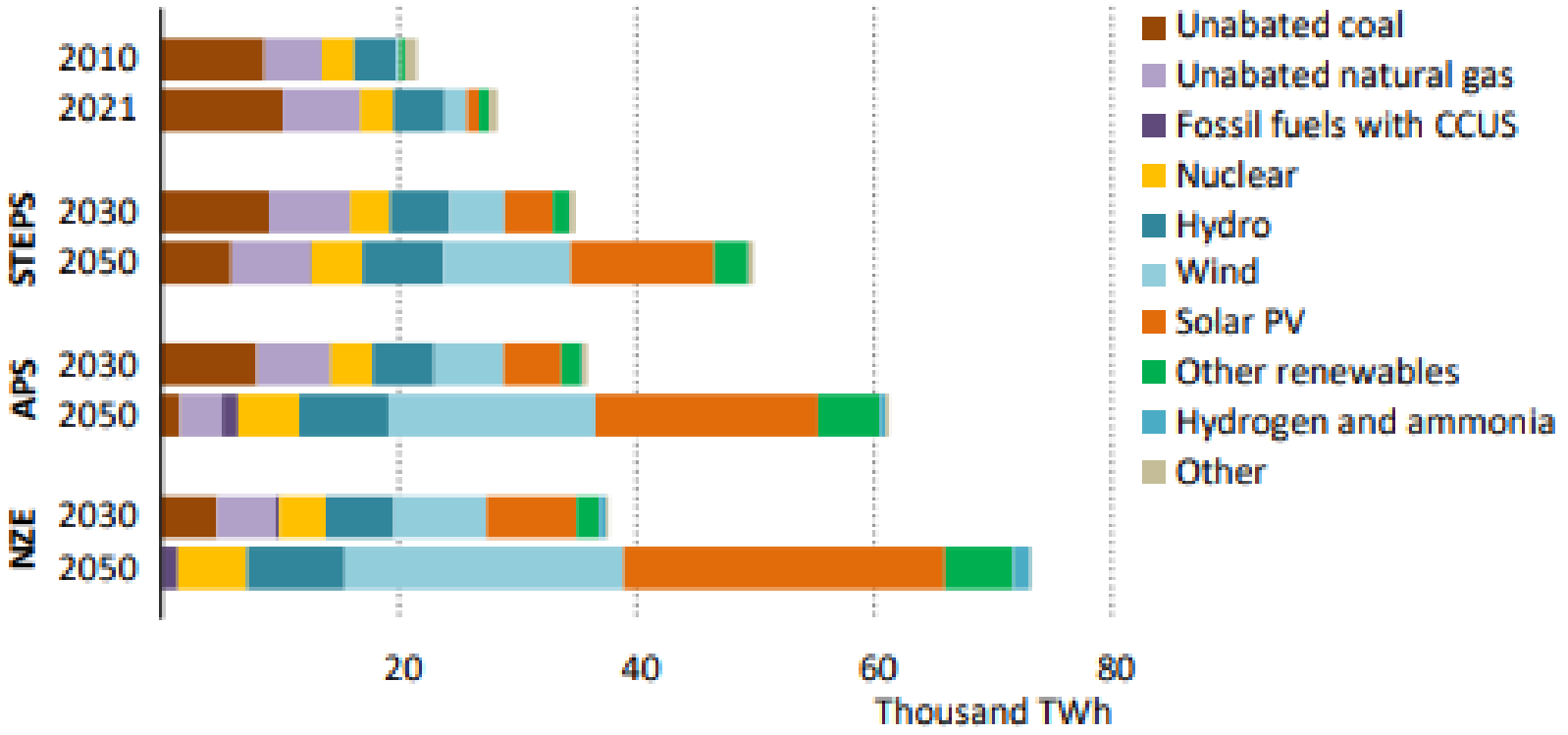


Simo Säynevirta Head of Green Electrification ecosystem, ABB Oy

World is going electric – Digitalization key to manage the transition

Electricity generation grows > 2.5 x by 2050

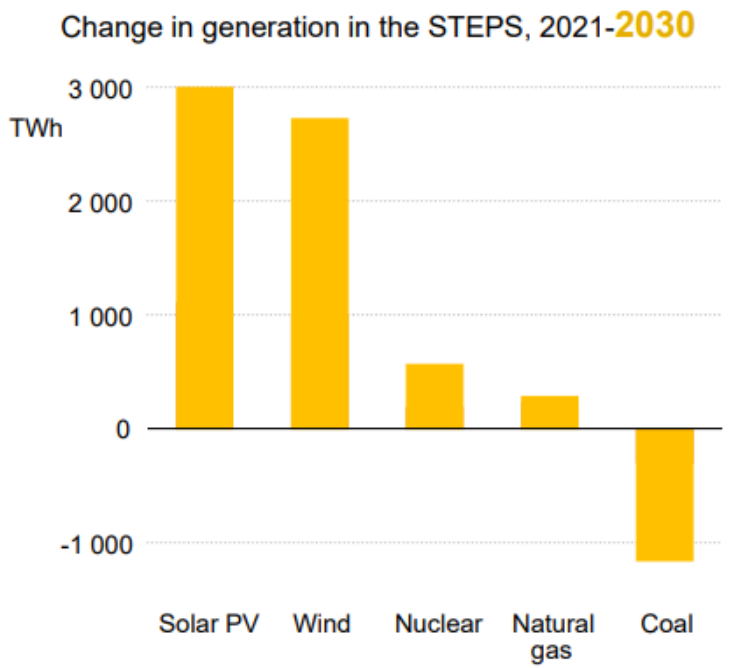
Figure 6.7 ▻ Global electricity generation by source and scenario, 2010-2050

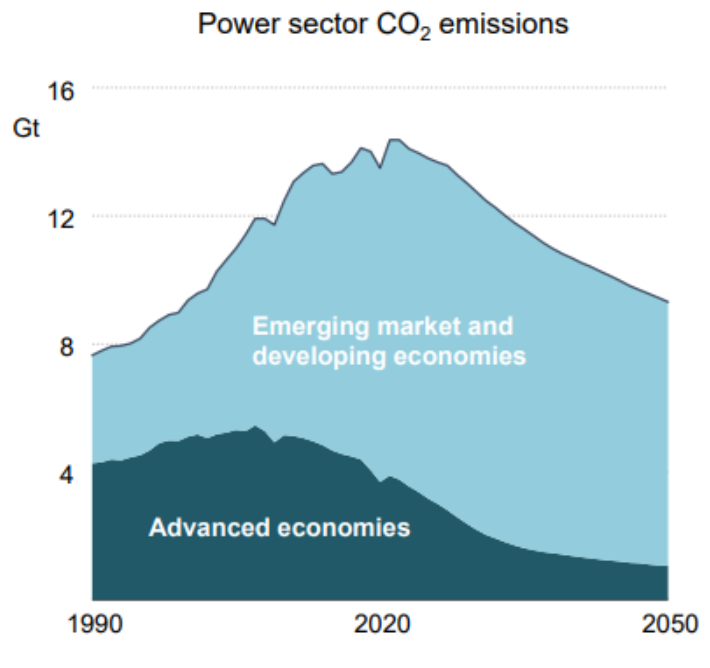


Electricity generation from unabated fossil fuels peak by 2030, as low-emissions sources ramp up and renewables dominate electricity supply in all scenarios by 2050

Clean electricity replaces fossile energy to decarbonize the world

Electricity is turning the corner



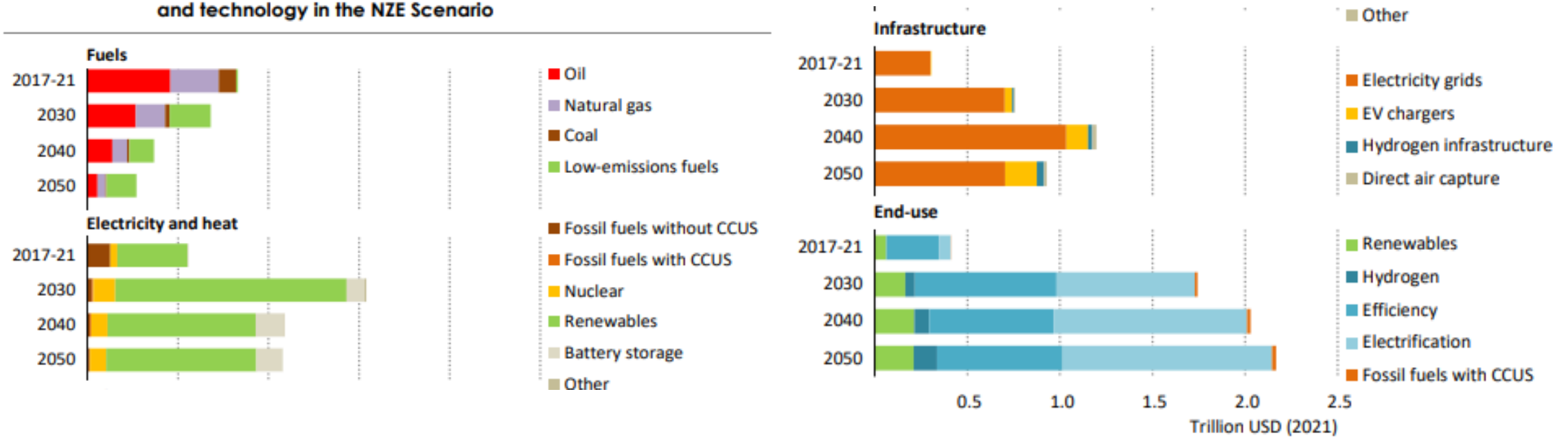


As markets rebalance, the upside for coal is temporary as renewable generation rises by 90% to 2030; the peak in power sector emissions needs to be followed by a much steeper decline to be consistent with global climate goals

Green transition leads to huge investment boom

3 -4 $ trillion (10^12) yearly investments necessary

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



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

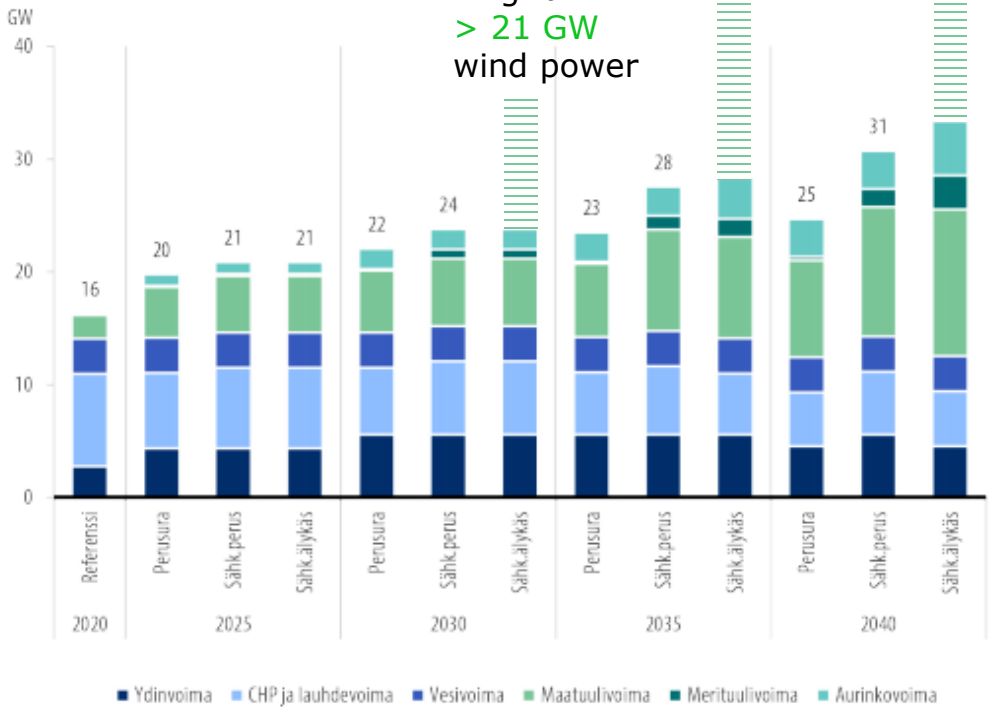
Weather dependent power generation dominates the mix in 2040 – case Finland

Intelligent sector coupling and real-time optimization keys to resilience

Power generation in Finland
2020 -2040

> 30 GW
wind power

Fingrid:
> 21 GW
wind power



Wind power
growth potential 2040
> 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**

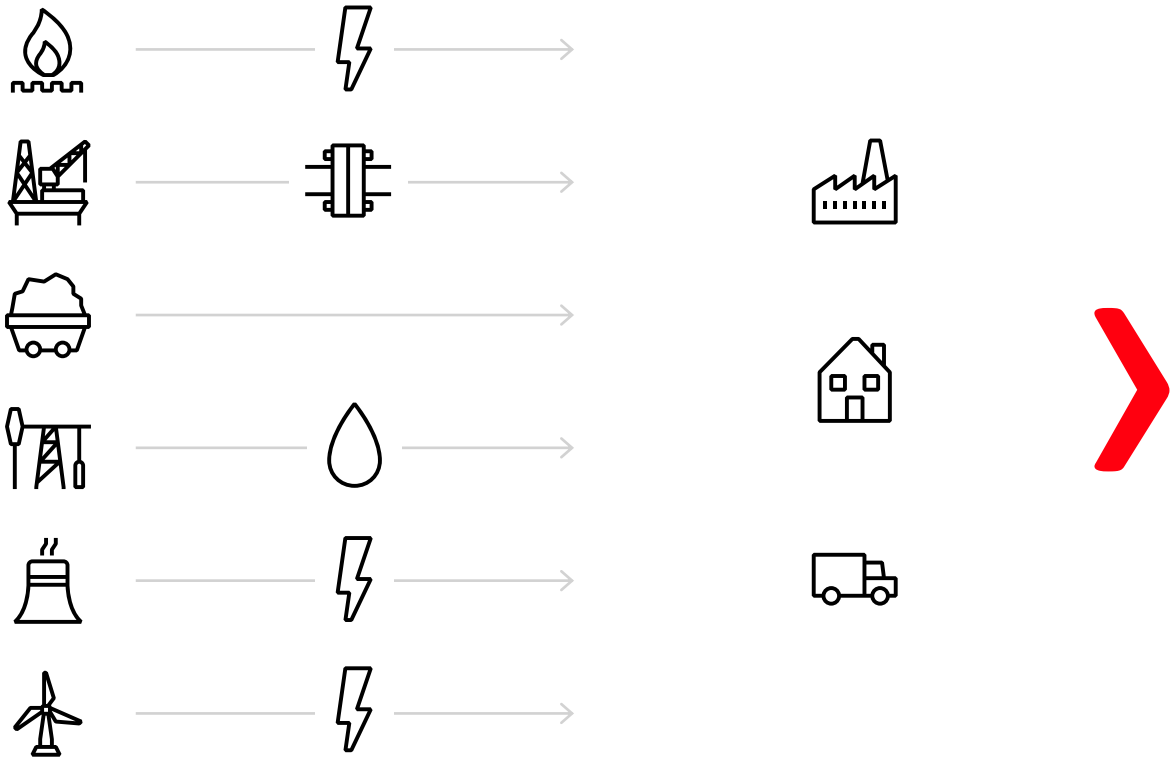
Source: Hiilineutraalisuustavoitteen vaikutukset sähköjärjestelmään (http://urn.fi/URN:ISBN:978-952-383-029-5)

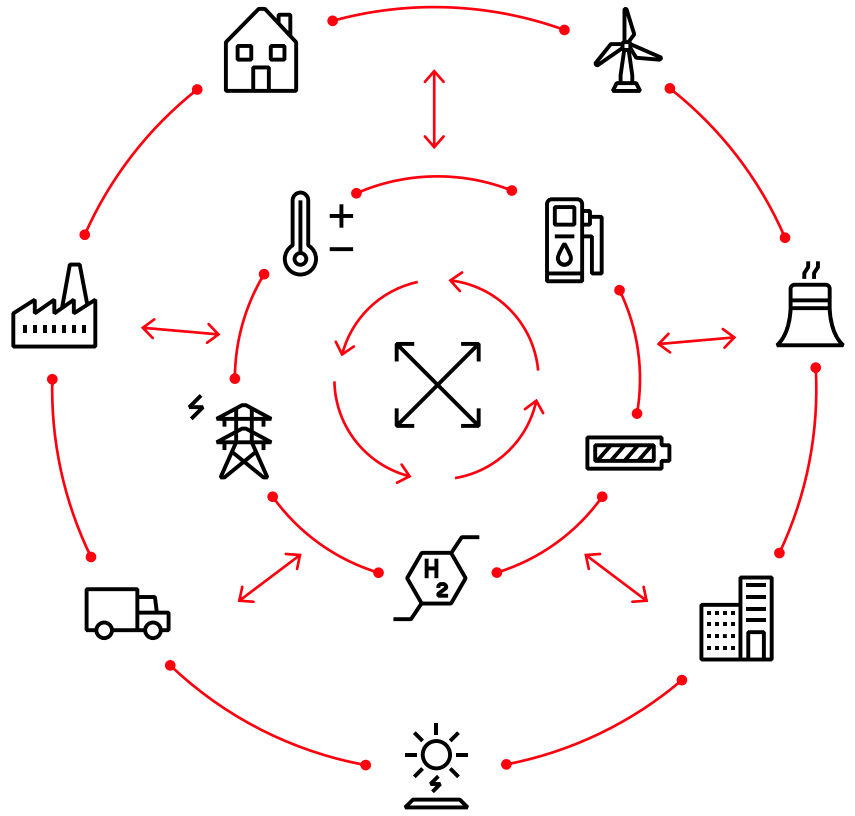
Green Electrification transition

Great opportunities, with some challenges to address

Energy landscape will change with the need of decarbonization

Transforming from linear, wasteful to integrated

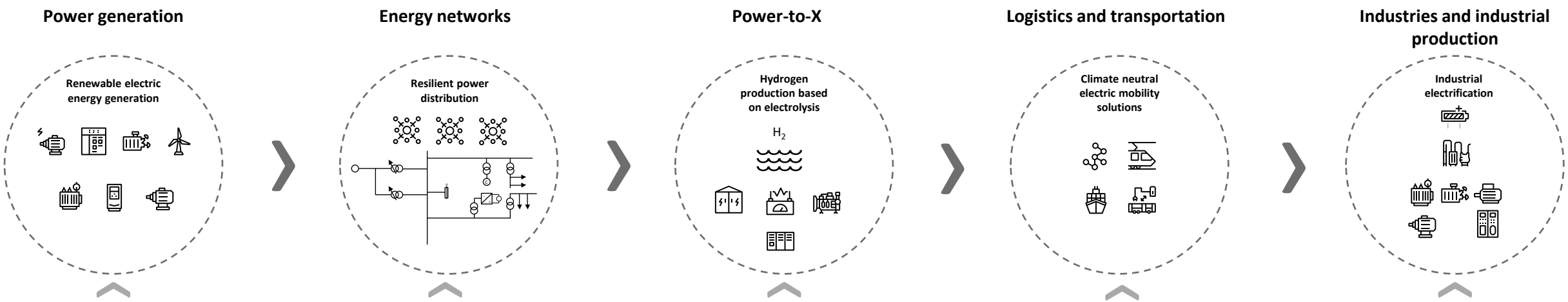




Maximize the value of used energy through high efficiency and synergies

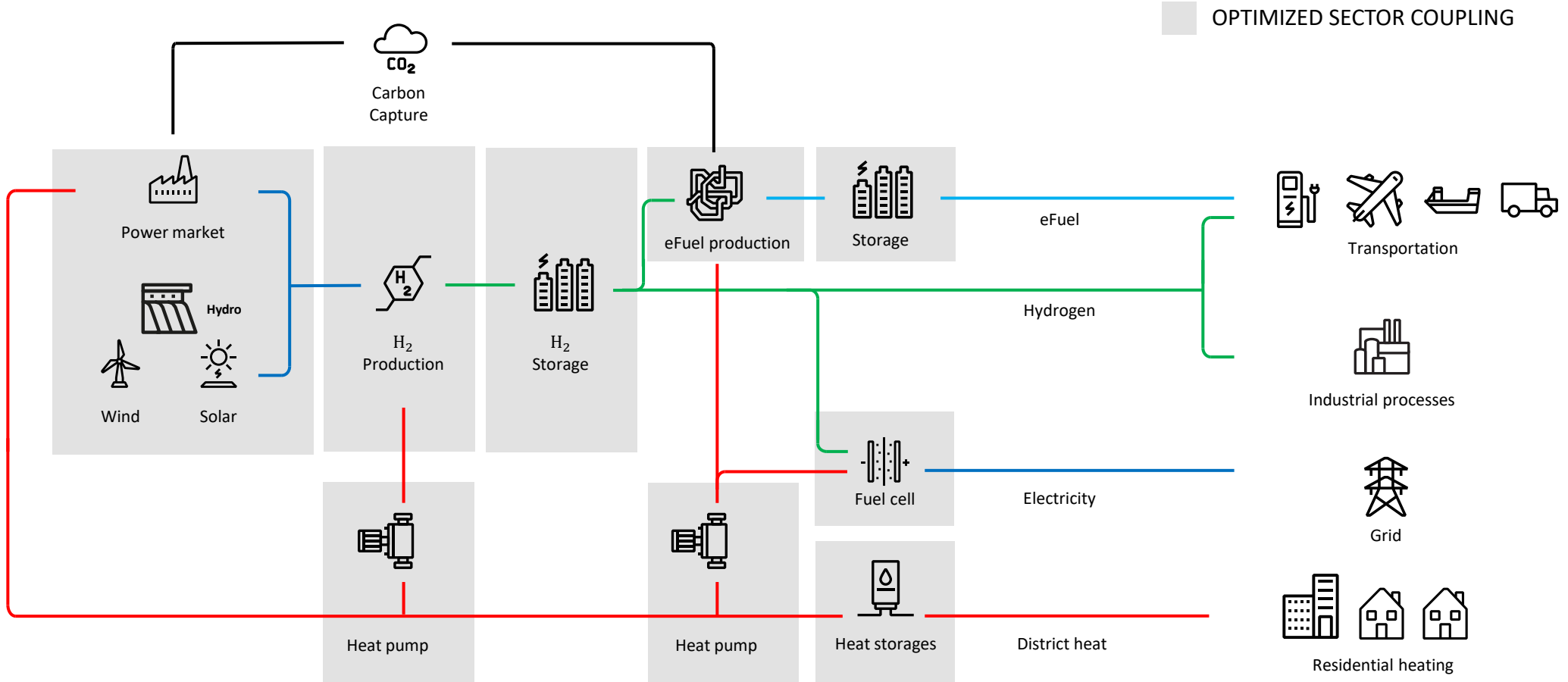
ABB Green Electrification 2035

Optimizing system-level energy efficiency and reliability



Optimization of sector coupling over the energy system – case P2X

Manage the entire value chain from production to distribution to end-use



Virtualized electrical network protection & control

Manage the increased dynamics and complexity to enable the green transition


ABB