

Energy Sector Coupling

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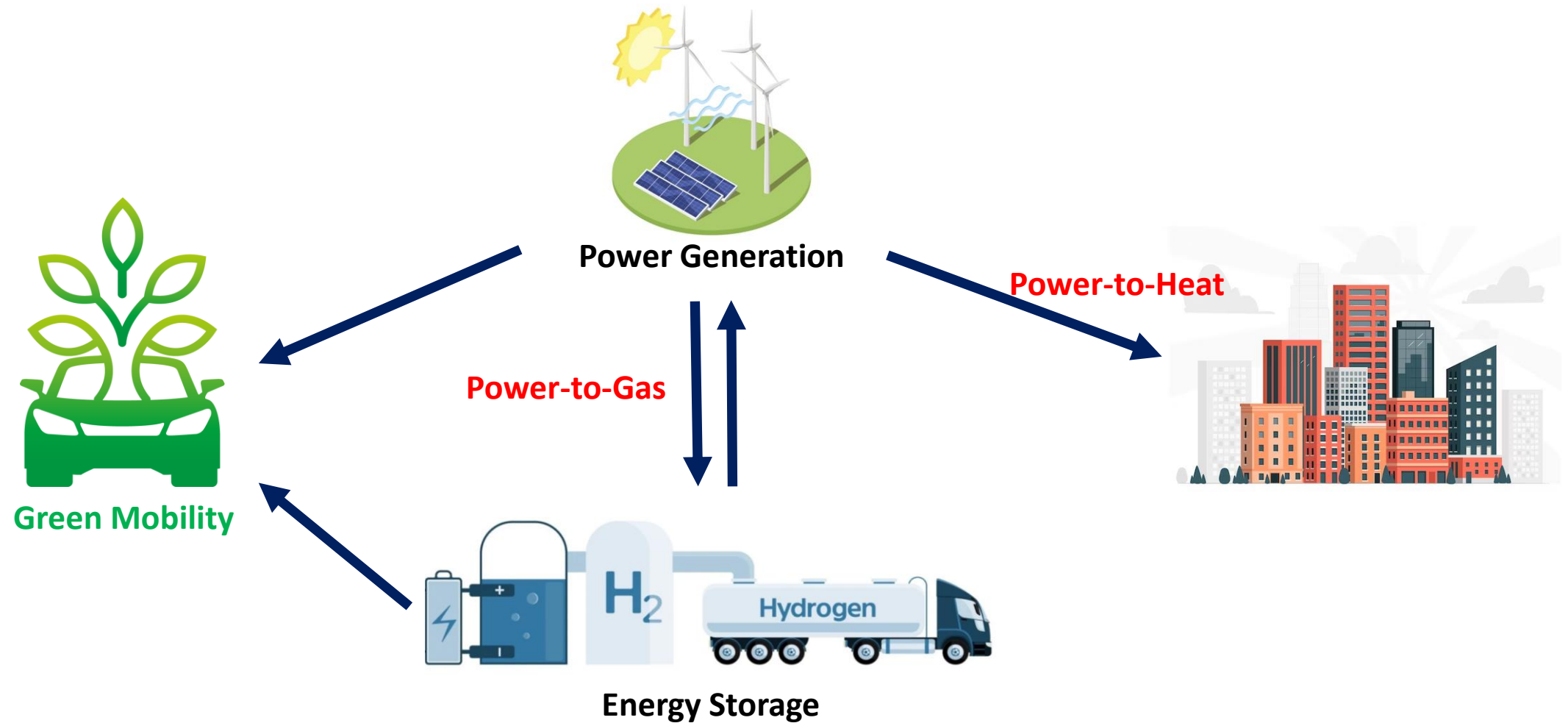
Outline

- Definition
- Integrated Approach
- Key Technologies
- Challenges

Definition

- Holistic approach to integrate energy consumption sectors to eliminate the use of fossil fuels in,
 - Power generation,
 - Heating,
 - Industry,
 - Transport.

Integrated Approach



Key Technologies

- Power Generation: **Storage**, flexibility
- Heating: **Heat pumps**, geothermal, biomass
- Transport: **E-mobility**, H₂-mobility, synthetic fuels, biofuels
- Industry: Electrification, power-to-x (hardest to abate)

Heating

- End-use sector coupling through heat pumps and renewable electricity
- Cross-vector integration through district heating and renewable energy sources (geothermal, biomass)

Transport

- Electrification for decarbonization
 - Challenges and solutions for grid balance
- Combination of technologies for road freight
 - H₂, e-trucks, LNG, CNG
- Bio and synthetic fuels for aviation and shipping

Industry

✓ Applied at industrial scale sites
✓ Technology (to be applied) in pilot site
✓ (Applied) research phase

		Electrifi- cation of heat	Hydrogen as a feedstock	Biomass as fuel or feedstock	CCS ²	Other innovations ³
Feedstock and fuel	Cement	✓		✓	✓	<ul style="list-style-type: none"> ✓ Alternative feedstocks⁴ ✓ ✓
	Iron and steel		✓	✓	✓	<ul style="list-style-type: none"> ▪ Electrolysis for iron reduction
	Ammonia		✓	✓	✓	<ul style="list-style-type: none"> ▪ Methane pyrolysis for hydrogen production
	Ethylene	✓		✓	✓	<ul style="list-style-type: none"> ▪ Electrochemical processes for monomer production
Fuel	Other industry ¹ (heat)	✓		✓	✓	<ul style="list-style-type: none"> ▪ Medium temperature heat pumps

Source: European Parliament Study «Sector coupling: how can it be enhanced in the EU to foster grid stability and decarbonise?» with reference to EURELECTRIC

Challenges

- Need for integrated planning
- Need for investment
 - Network upgrade
 - Digitalization
- Regulatory framework
 - Rights and liabilities, market design
 - Financial incentives, tariffs, externalities



**THANK YOU
FOR YOUR ATTENTION!**

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