



Electric Storage and Conversion Technologies and the Role of Hydrogen

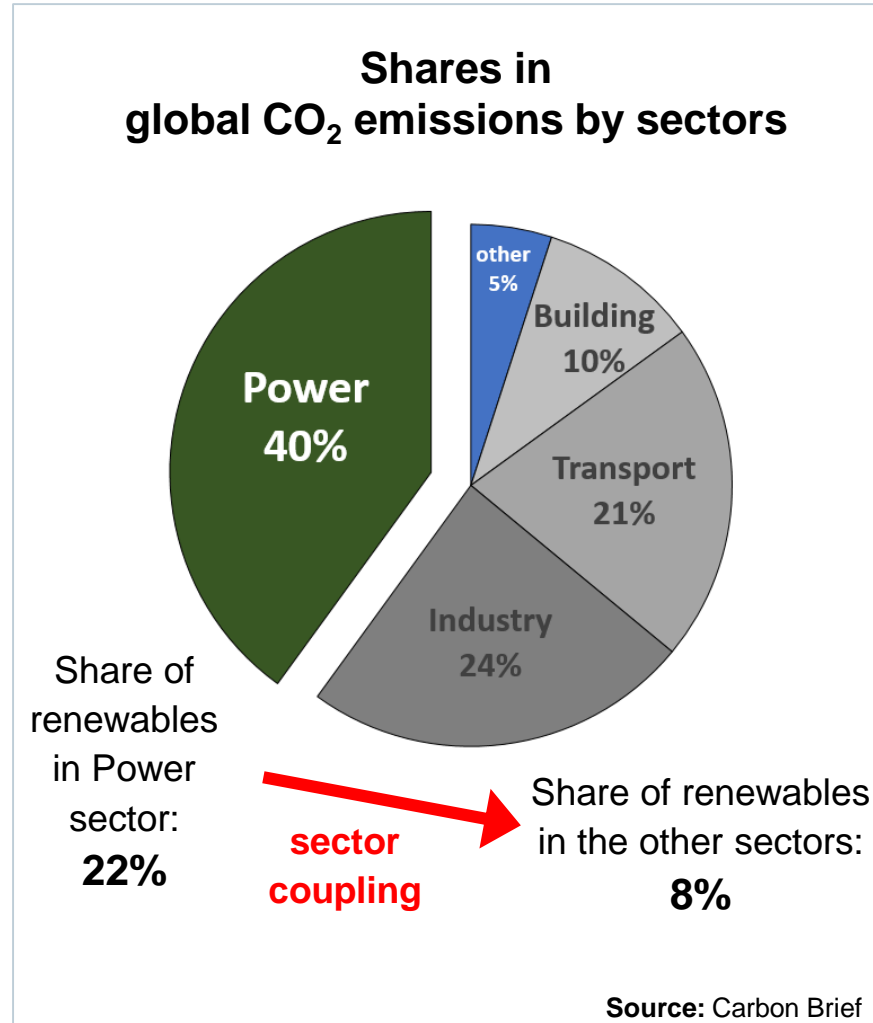
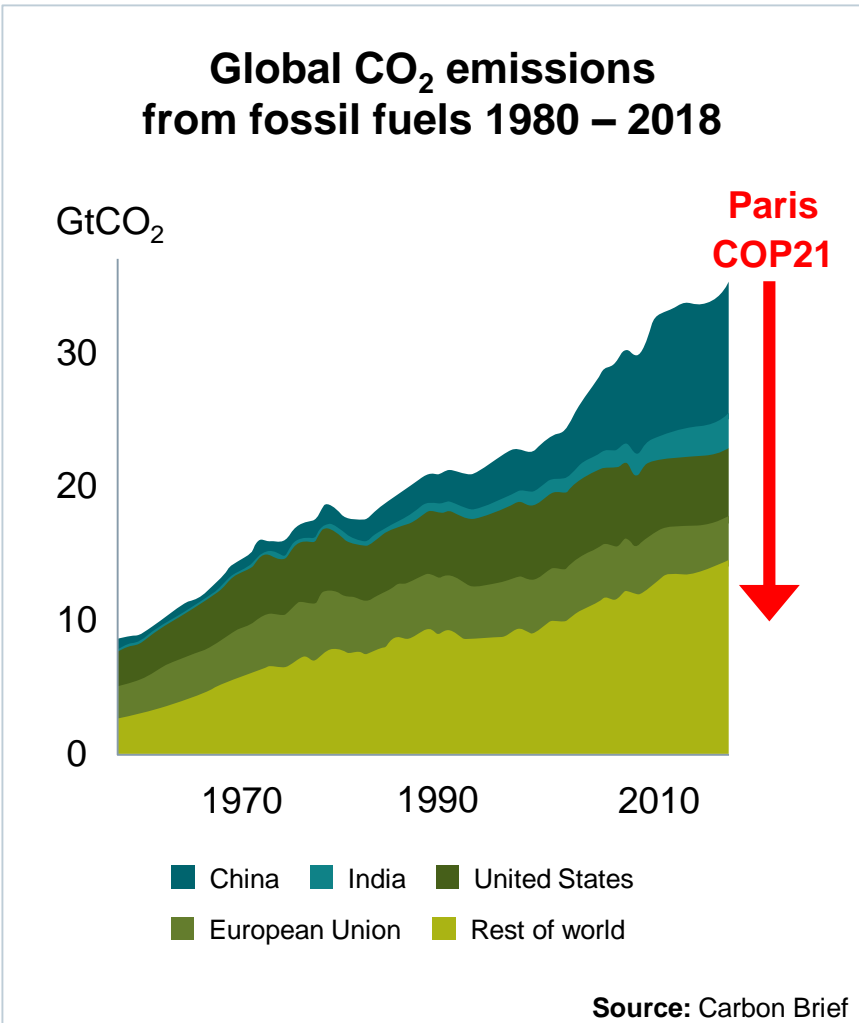
Dr. Boris Rigault, June 2020

Electric Storage and Conversion Technologies and the Role of Hydrogen

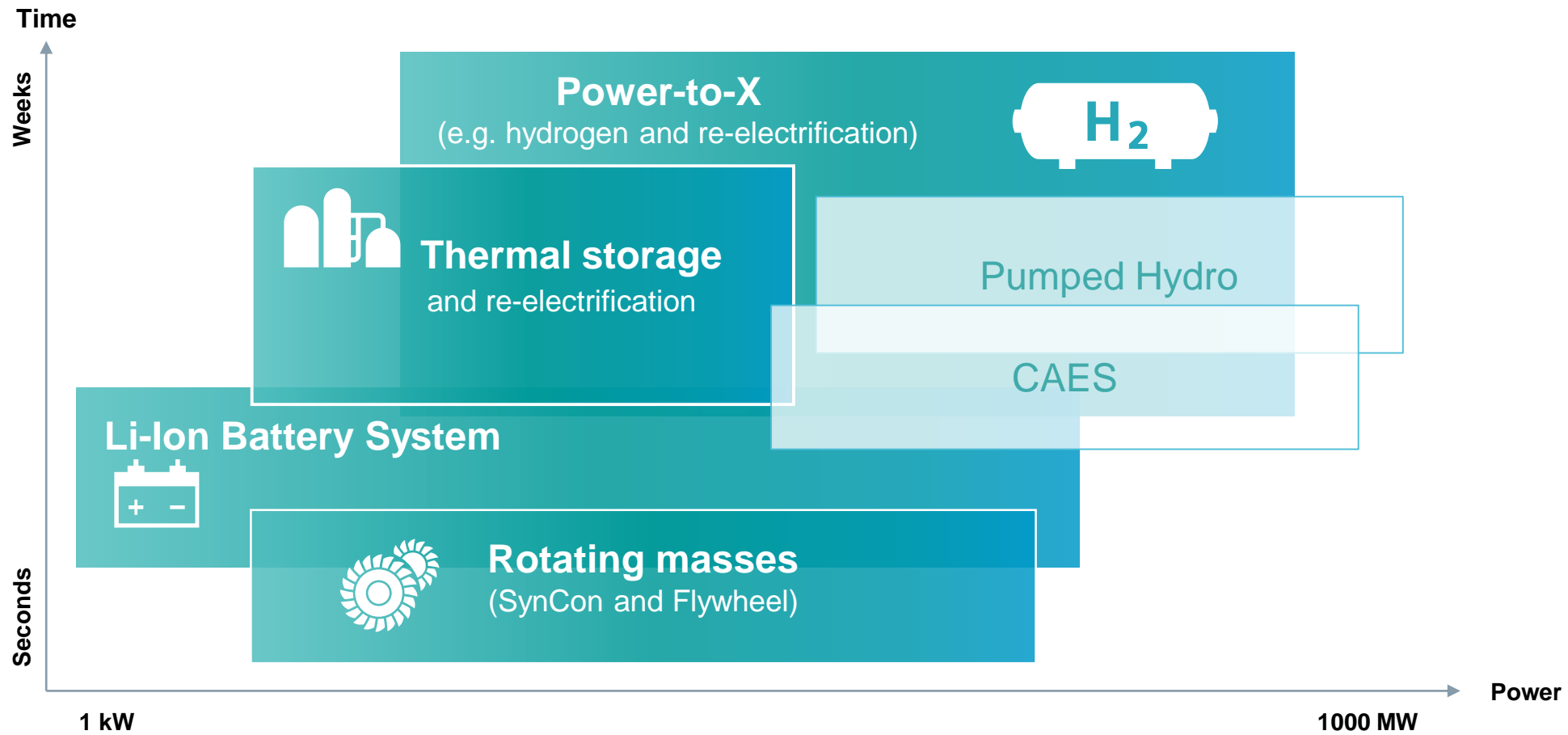
1. Decarbonization & Sector Coupling
2. Project Examples
3. Co-Creation – Project Development



CO₂ emissions reduction has so far been focused on power but all sectors in economy must contribute

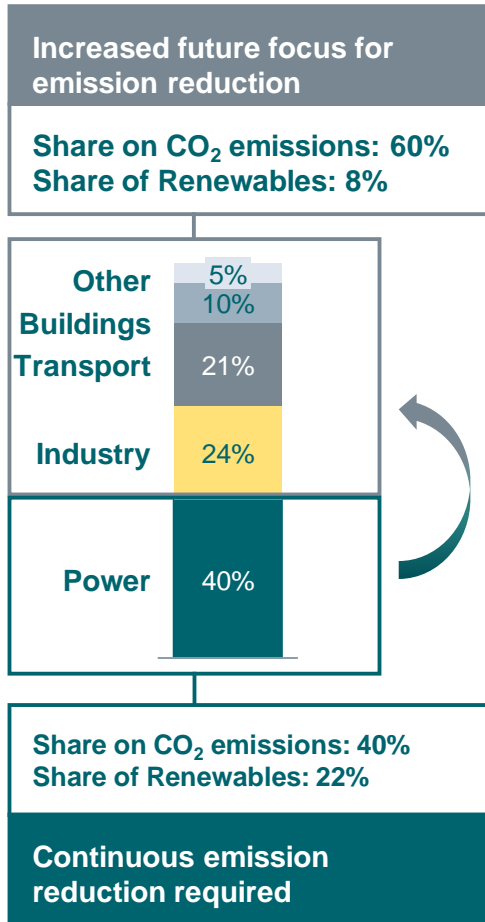


Energy storage technologies to support future energy systems for deep decarbonization



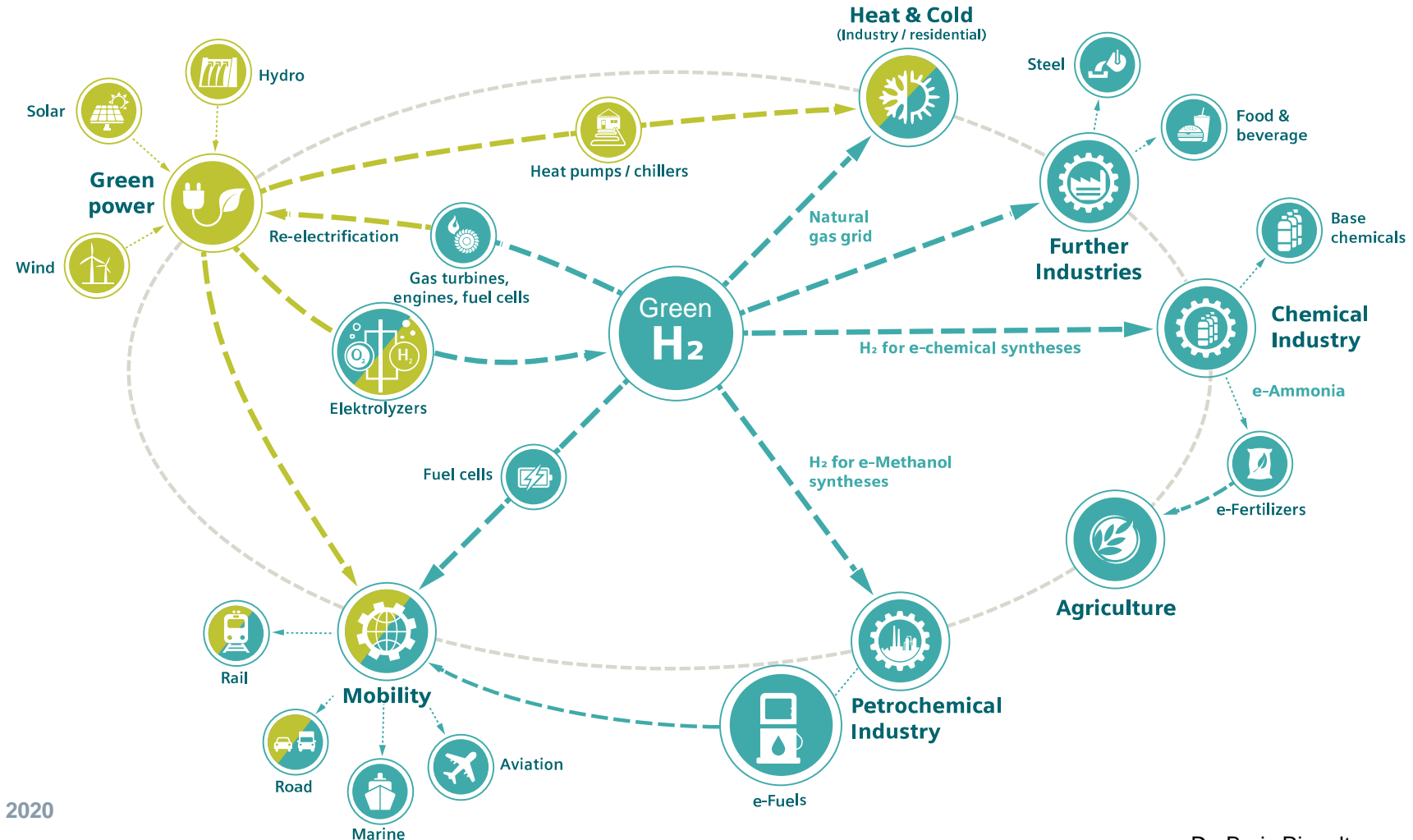
“Sector Coupling” is the key lever for decarbonization of all end-user sectors

Shares in global CO₂ emissions by sectors



Sector Coupling

Sector Coupling – Links and Interactions



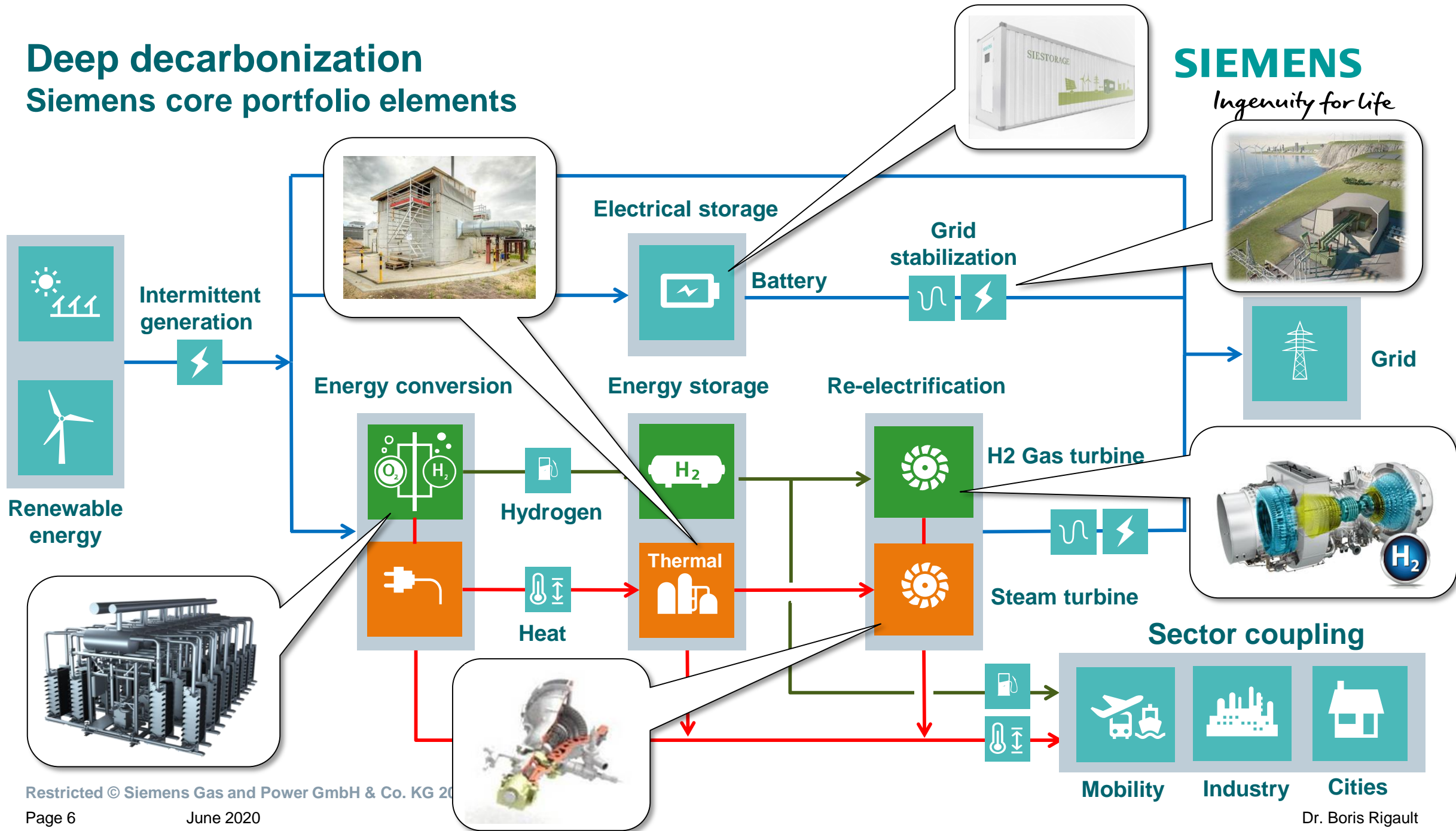
Source: WorldEnergy Balances 2018

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Deep decarbonization

Siemens core portfolio elements

SIEMENS
Ingenuity for life

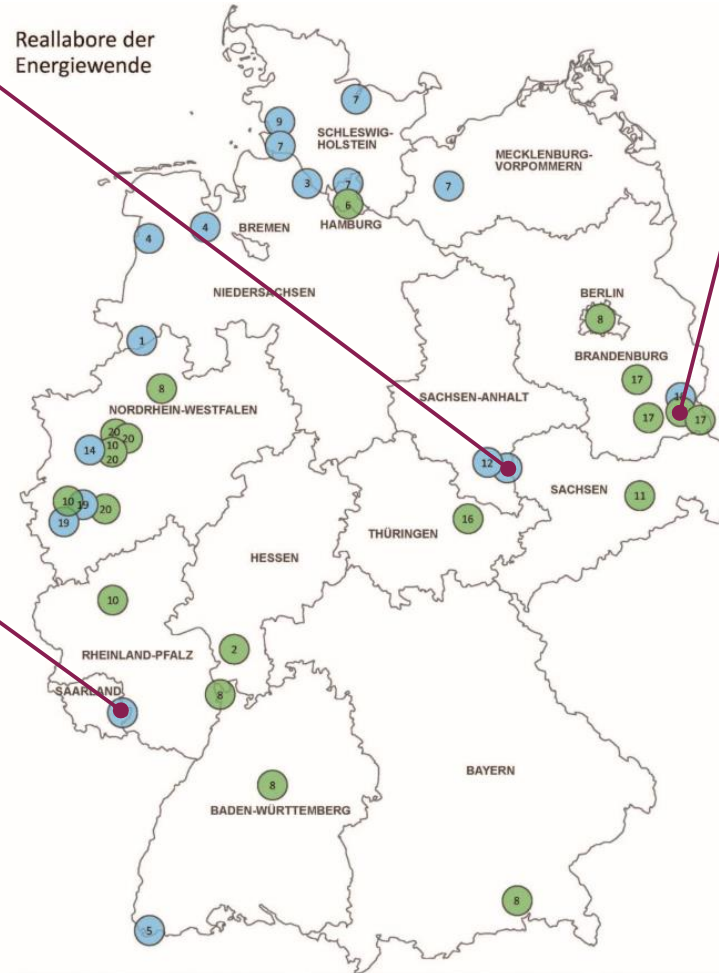


Winner of the ideas competition 'Reallabore der Energiewende' Siemens participation mainly in areas of structural changes



GreenHydroChem

- 50 MW PEM Electrolyzer
- Overall expansion target of 100 MW
- Use case: Industry



Reallabore der Energiewende

Referenzkraftwerk Lausitz

- 10 MW PEM Elektrolyzer
- + 500 MWh H₂ storage, 2 MW fuel cell, 7.9 MW gas turbine , 2 MW super condenser and 2 MW Li-battery
- Use case: Mobility, Energy and Industry



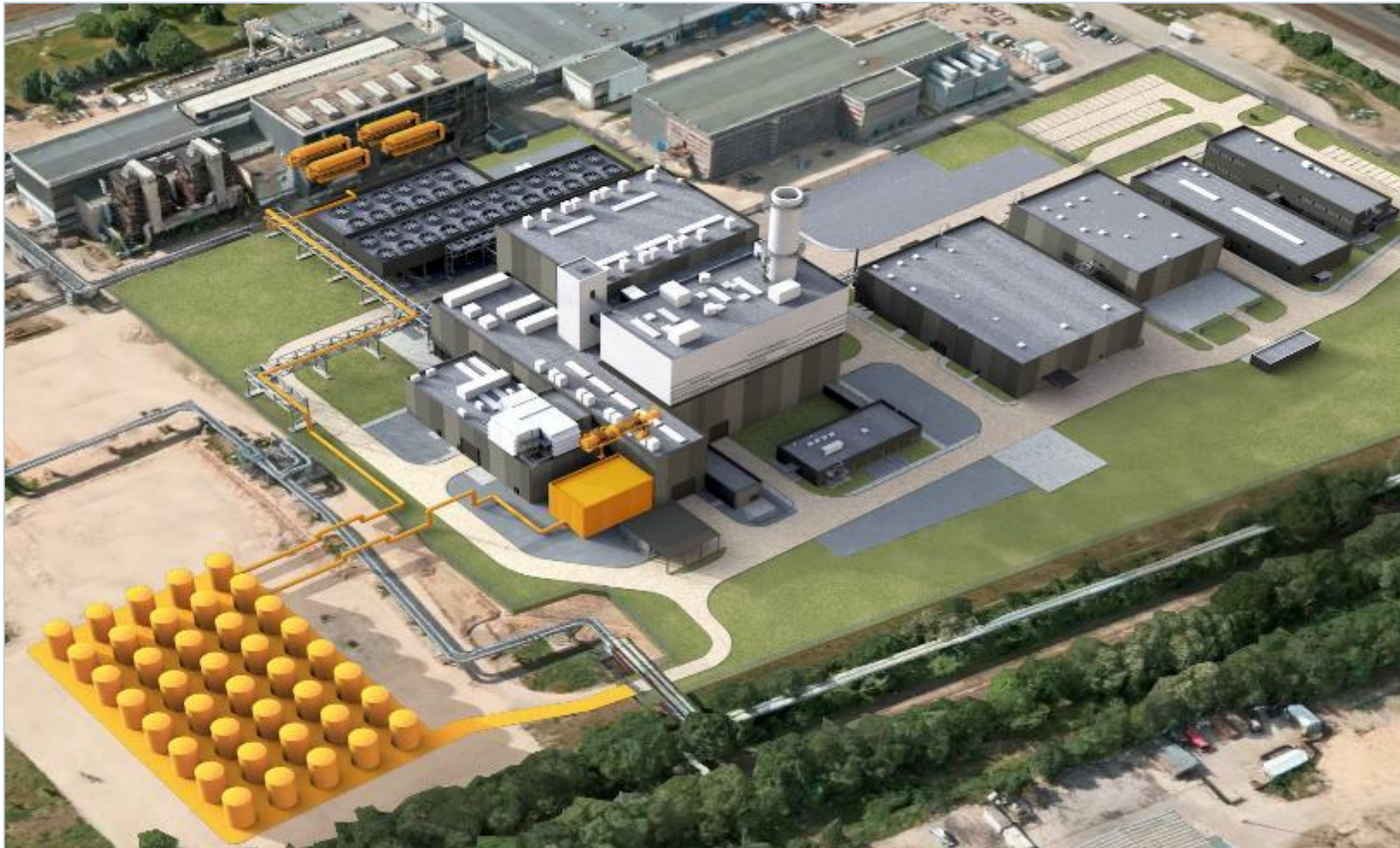
Hydro Hub Fenne

- 17.5 MW PEM Elektrolyzer
- Use case: Mobility and Industry

Example

”Concept for hydrogen upgrade of an existing CCPP plant”

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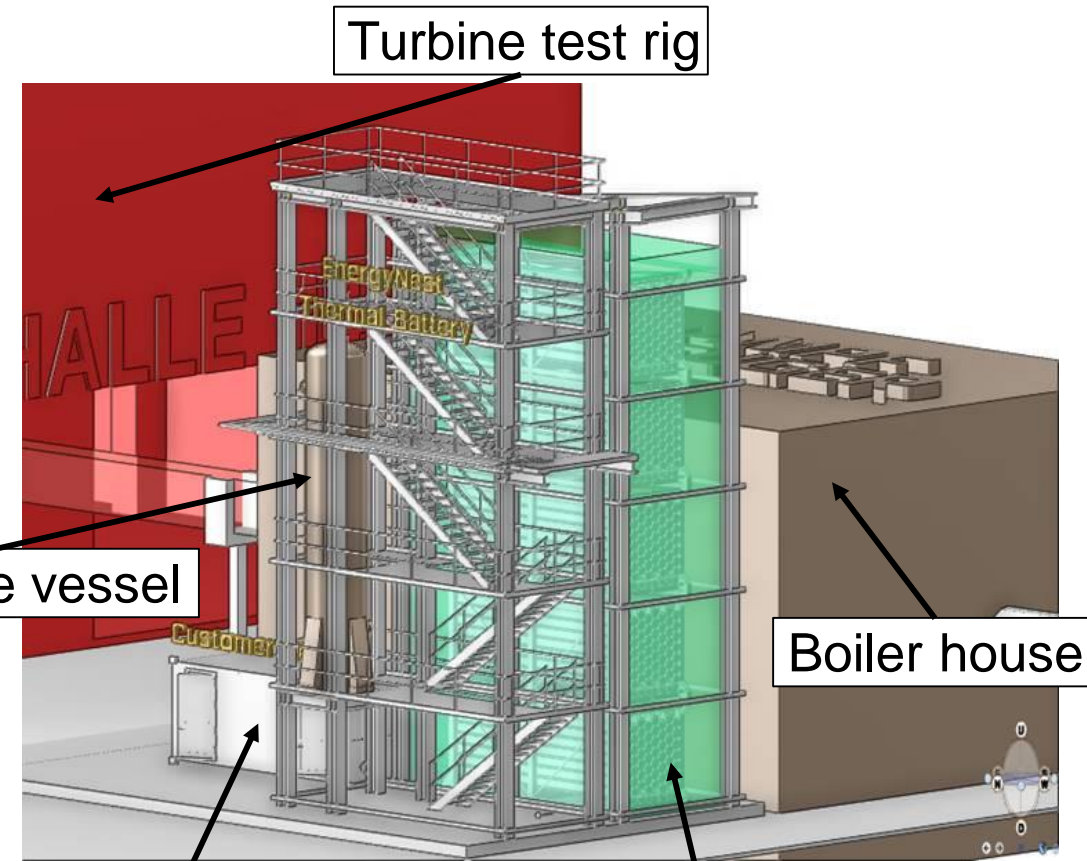


Project example: Thermal Energy Storage at Siemens Görlitz

Location within the site and plant layout



Boiler house



Turbine test rig

Pressure vessel

Boiler house

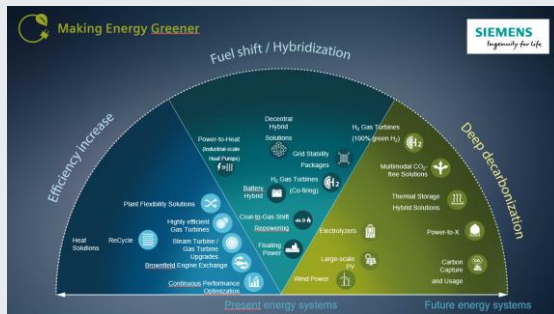
Customer Showroom

Storage containers

Jointly develop options to manage coal exit and reach decarbonization targets considering existing assets

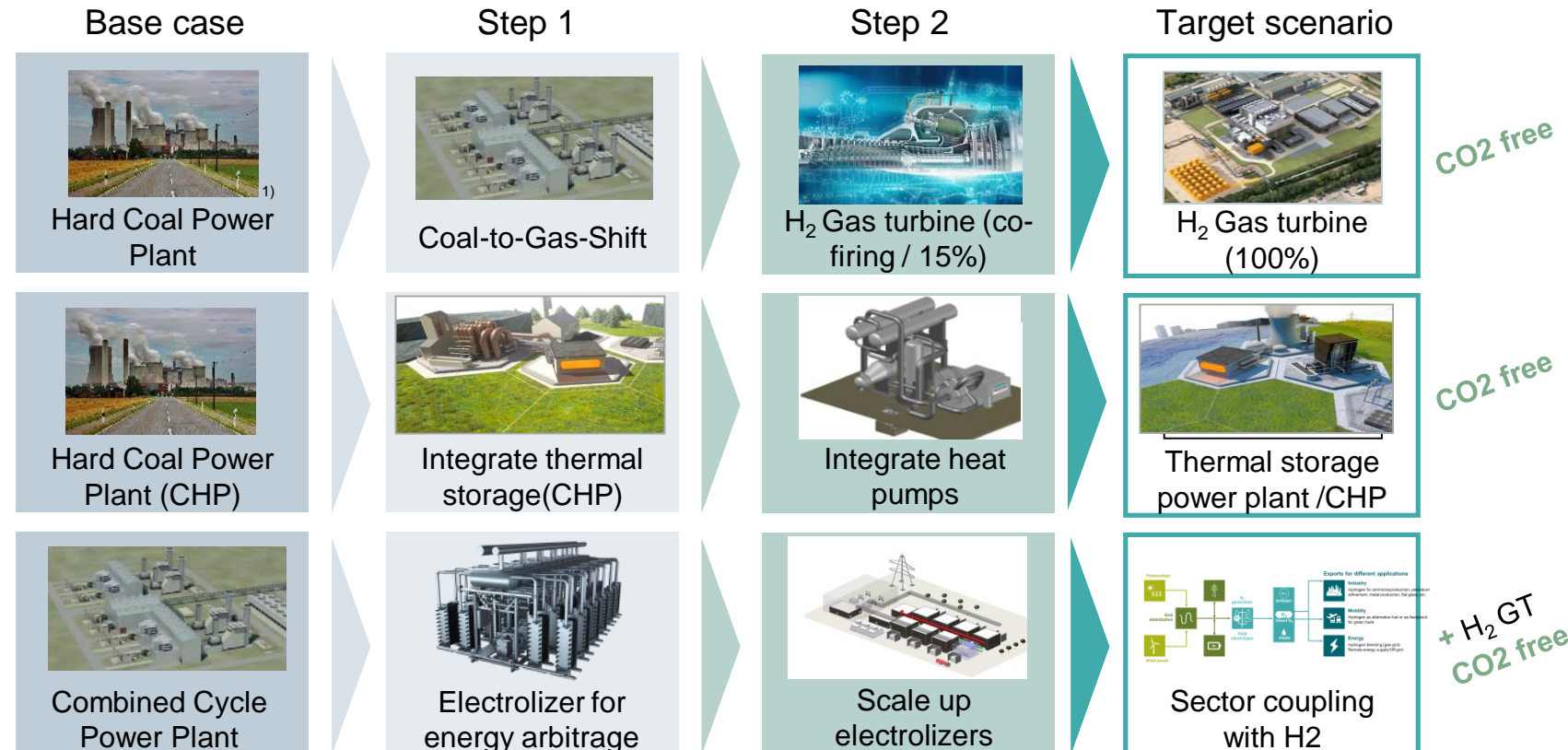


Siemens Toolbox



- Open Platform for further Siemens Offerings (incl. Siemens Gamesa)
- Systematic evaluation of offerings
 - CO₂ – Saving Potential
 - Cash-Flow
 - Return on invest
- Compatibility with other Offerings

Potential decarbonization options (examples)



Develop & evaluate most probable decarbonization paths

Siemens Energy Transition Technologies

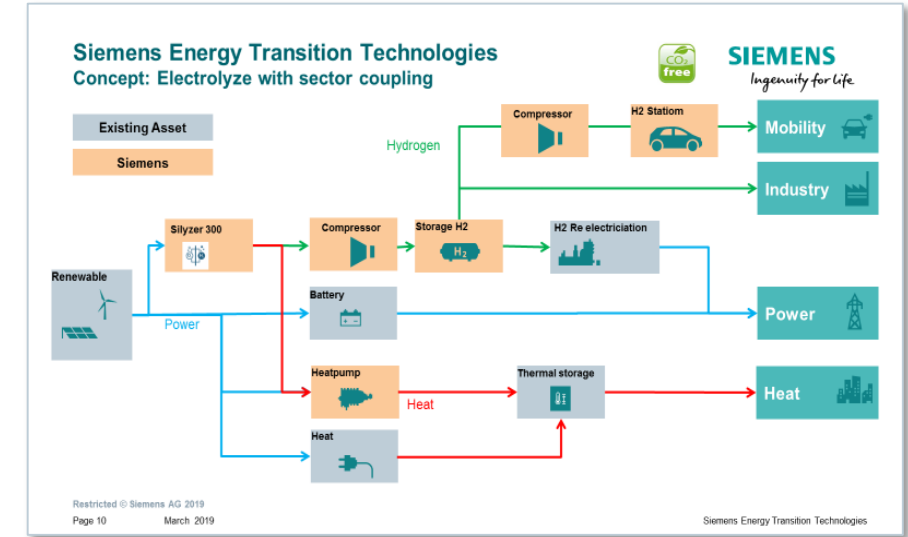
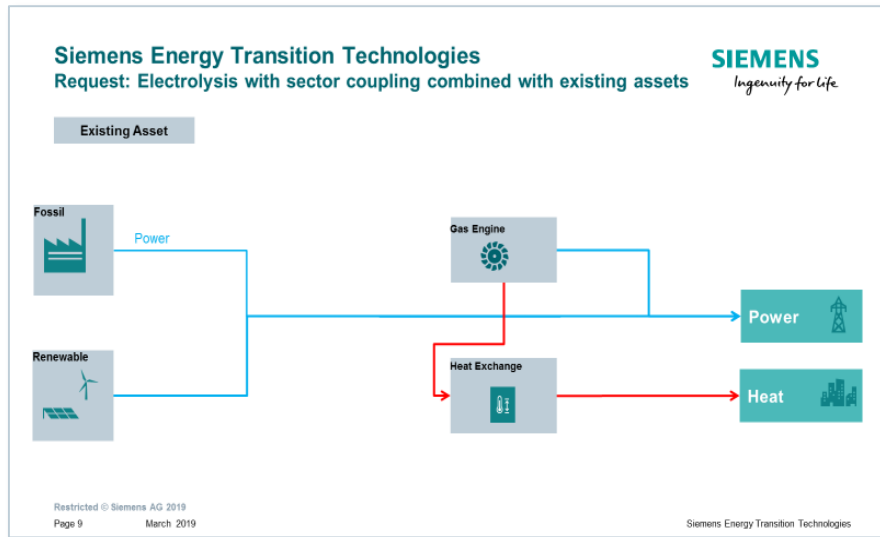
Co-creation: Let's develop projects together!

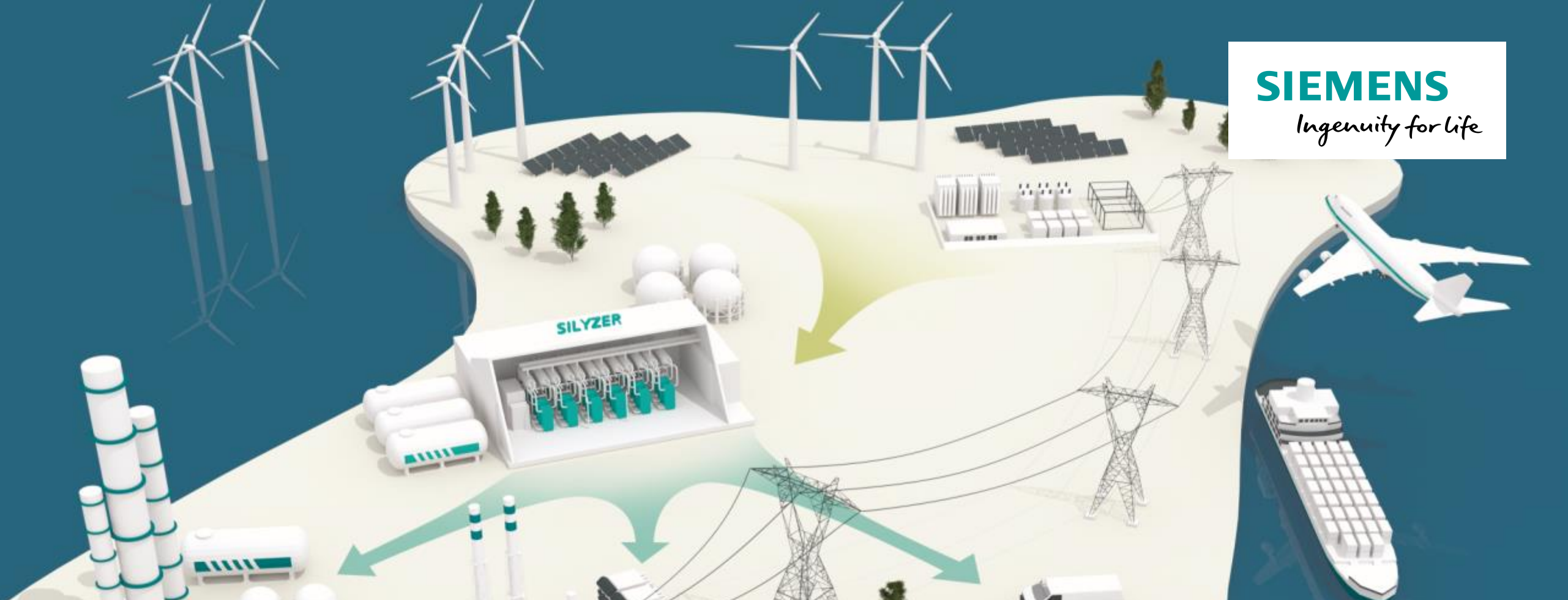


Customer's existing assets

Co-creation

Final concept





Thank you



Dr. Boris Rigault
+49 162 4423282
boris.rigault@siemens.com