



Energy System Integration & Hydrogen ecosystem Strategies

The Regulatory framework may help the uptake of Hydrogen

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1st Powerfuels Annual Conference

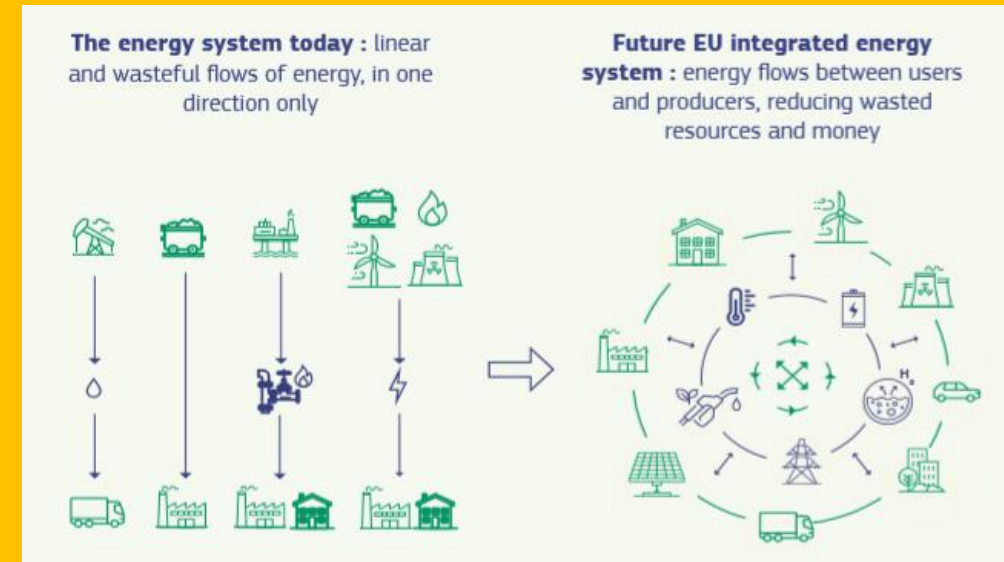
...how deep and how fast energy may decarbonize economy

Basically we know 3 modes to turn existing energy into tomorrow's decarbonized energy:

- I. Reduce the quantity of final energy consumption to consequently reduce the carbon amount → **ENERGY EFFICIENCY**
- II. Use carbon-free energy → **RENEWABLE ENERGY SOURCES** mainly linked to the electricity vector and bio-energies
- III. Reduce the carbon footprint of the final energy consumption → **DECARBONISATION** (derating the carbon content).

Nevertheless the **pace** (how fast) and the **scale** (how deep) of the **TRANSFORMATION** (both about energy itself and extended to other energy-powered sectors of economy) **DEPEND** upon the **SYSTEMIC STRUCTURE** – so upon the relationships among components of the energy sector and the ability of energy to penetrate and decarbonize economy and society.

The **SYSTEMIC STRUCTURE** of the future decarbonized energy should be re-designed to make it happen.

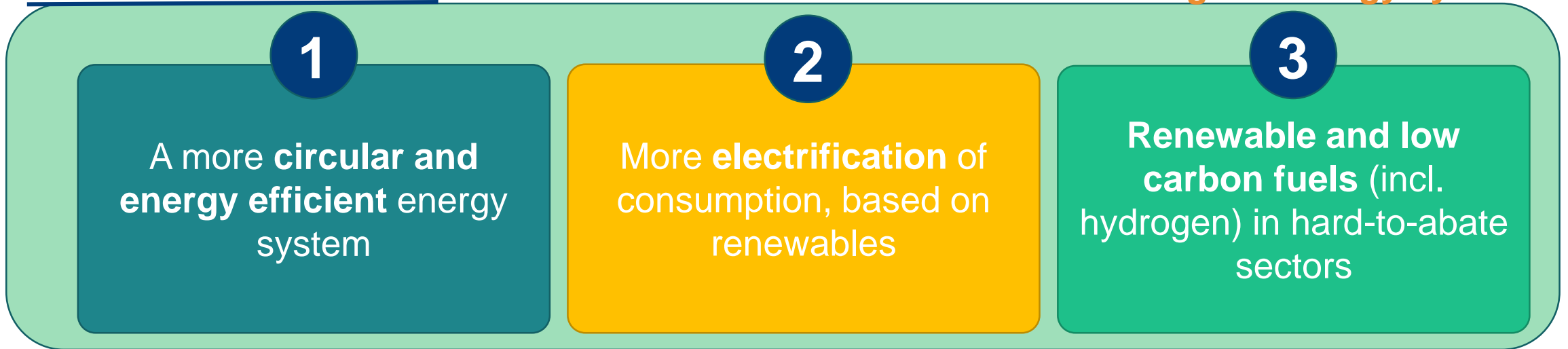


RE-DESIGN SHOULD ENABLE THE SYSTEM TO SWITCH FROM SILOS TO A FULLY-BRIDGED LAYOUT ALLOWING DECARBONIZATION TO SPREAD OVER AT THE MAXIMUM EXTENT INFRASTRUCTURES AND MARKETS TO ENLARGE THEIR COVERAGE TO IMPROVE EFFICIENCY

Energy System Integration (ESI) is the integrated design, planning and operation of the energy system 'as a whole', across multiple carriers, infrastructures and consumption sectors

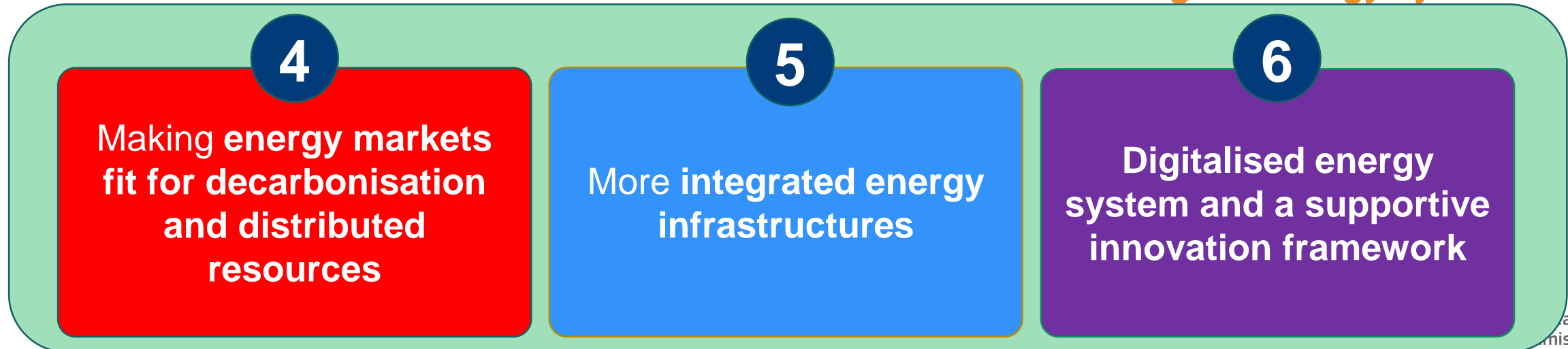
The Energy System Integration Strategy: the concept and relevant pillars

Re-sourcing the energy system



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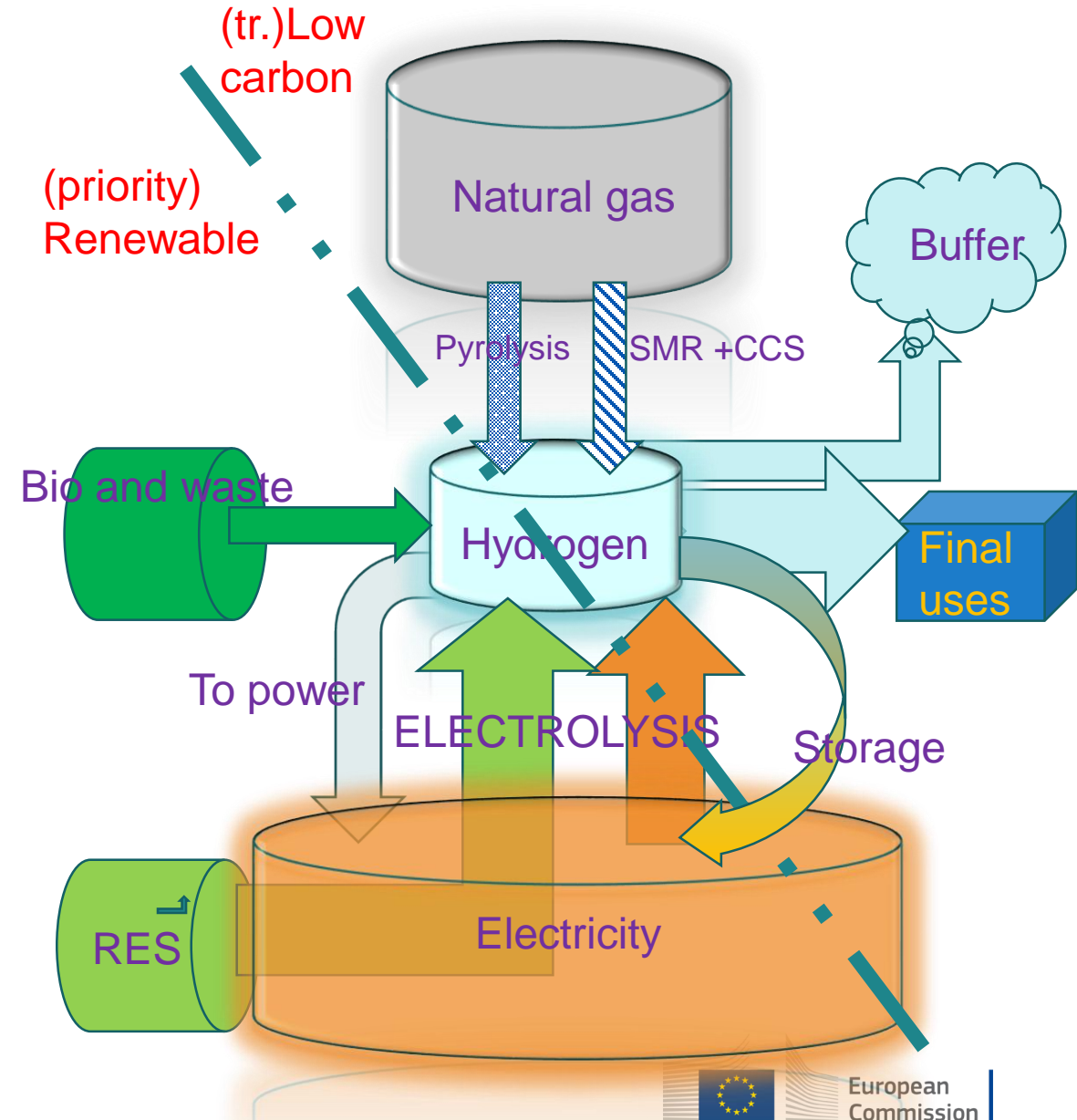
Re-tooling the energy system



Why Hydrogen

- “Hydrogen is enjoying a renewed and rapidly growing attention in Europe and around the world. Hydrogen can be used as a **feedstock**, a **fuel** or an **energy carrier** and **storage/buffer**, and has many possible applications across industry, transport, power and buildings sectors. Most importantly, it does not emit CO2 and almost no air pollution when used. It thus offers a solution **to decarbonise industrial processes and economic sectors where reducing carbon emissions is both urgent and hard to achieve**. All this makes hydrogen essential to support the EU’s commitment to reach carbon neutrality by 2050 and for the global effort to implement the Paris Agreement while working towards zero pollution” – COM(2020) 301 final

CLEAN HYDROGEN: THE MISSING LINK IN ESI



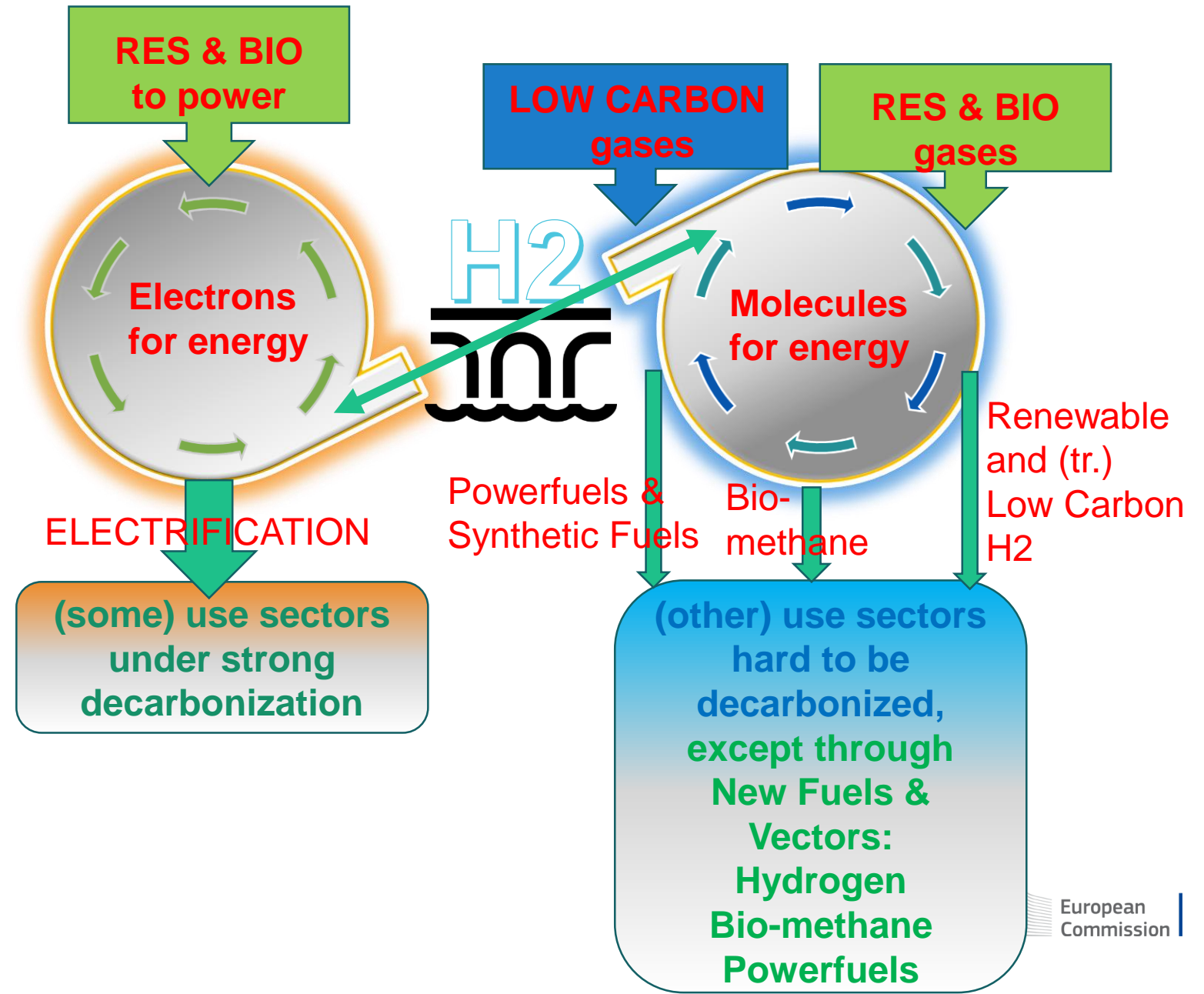
Why H2 is an essential link to efficiently decarbonize

On Hydrogen link (bridge) 3 main decarbonization processes:

- 1. energy efficiency/circular
- 2. (close to) zero-carbon energy from renewable, mainly on the most efficient and shortest value chain of power
- 3. (new) renewable and low-carbon gases and liquids

are further enabled to foster:

- The **decarbonization** to **penetrate all sectors** of economy and society
- To connect and widen the **marketplaces for sake of efficiency**



Why Regulatory Framework could help hydrogen uptake

- **From Hydrogen Strategy** <<...from 2020 up to 2024 (1st phase) the policy focus will be on laying down the regulatory framework for a liquid and well-functioning hydrogen market and on incentivizing both supply and demand in lead markets [industry and transport. In a **second phase, from 2025 to 2030**, hydrogen needs to become an intrinsic part of **an integrated energy system** with a strategic objective...>>.
- That means that H2 value chain is going firstly to growth as separate ecosystems mainly linking demand-supply but its development has been already figure out as a piece of the INTEGRATED ENERGY SYSTEM, intrinsically coupled with renewable electricity.
- Covering these 2 energy vectors (power and hydrogen into a “coupled” configuration), there is a clear need to cope with complexities and reducing risks of the future energy system (in particular its 2 “synthetic” components) to have it growing.
- **Regulation is a tool to guide and assure such a growth, mainly via rule-making of H2 incentive schemes, markets, infrastructures**

Thank you for attention