



Green H₂ strategies towards hydrogen economy

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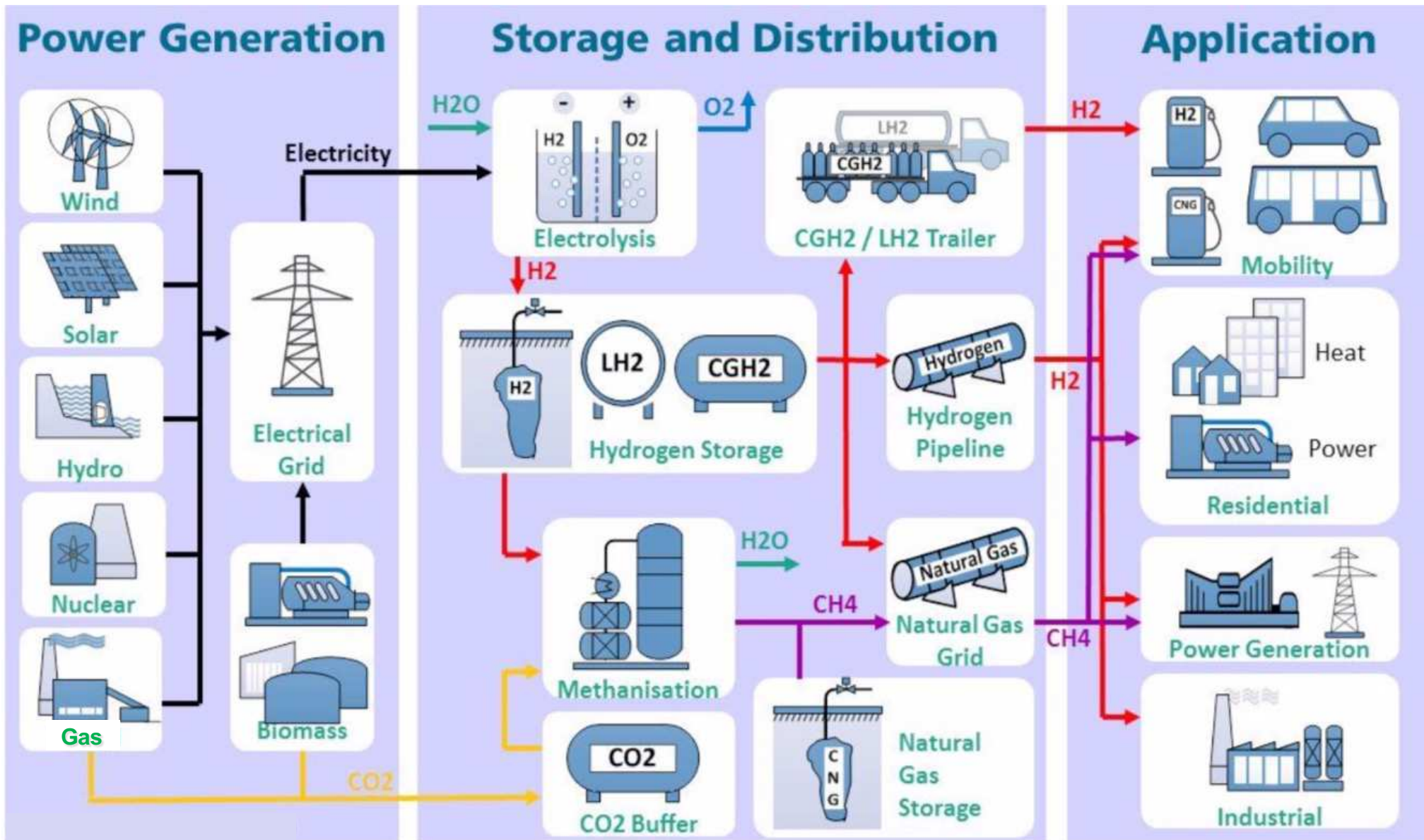
The role of H₂ in Energy Transition

**Long-term scenarios from carbon
economy to hydrogen economy**

Ιούλιος Βέρν (1874)

- “...το νερό θα χρησιμοποιείται ως καύσιμο, το υδρογόνο και το οξυγόνο που το αποτελούν, θα χρησιμοποιούνται μεμονωμένα ή μαζί, και θα παρέχει μια ανεξάντλητη πηγή θερμότητας και φωτός, τέτοιας ισχύος της οποίας ο άνθρακας δεν είναι ικανός
- Κάποια μέρα, στους χώρους αποθήκευσης άνθρακα των ατμομηχανών, αντί για άνθρακα, θα αποθηκεύονται αυτά τα δύο συμπυκνωμένα αέρια, τα οποία θα καίγονται στους θαλάμους καύσης με τεράστια θερμογόνο ισχύ...”

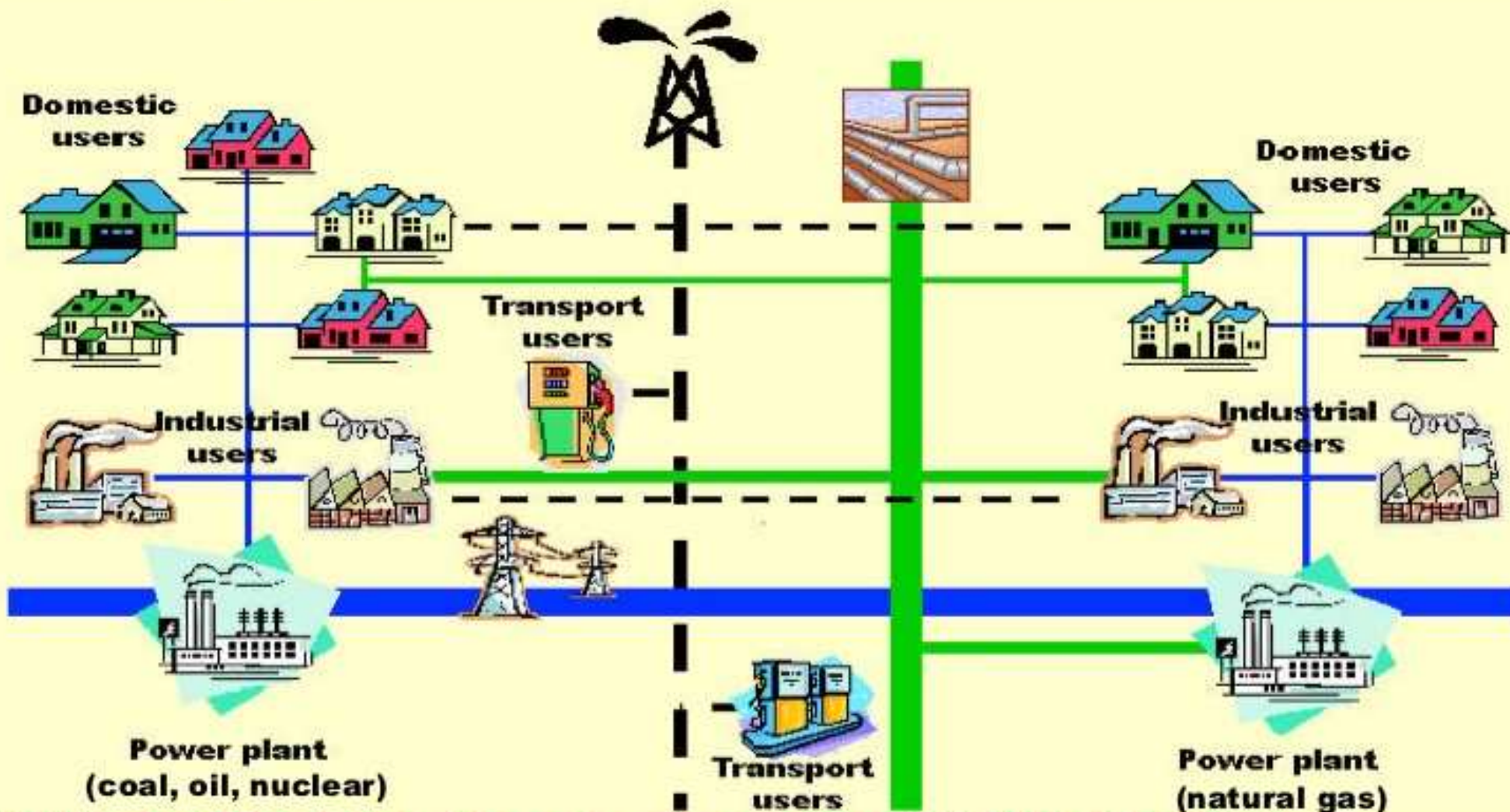
Potential role of hydrogen in the energy transition*



* EU, 2019

Energy system in 2010

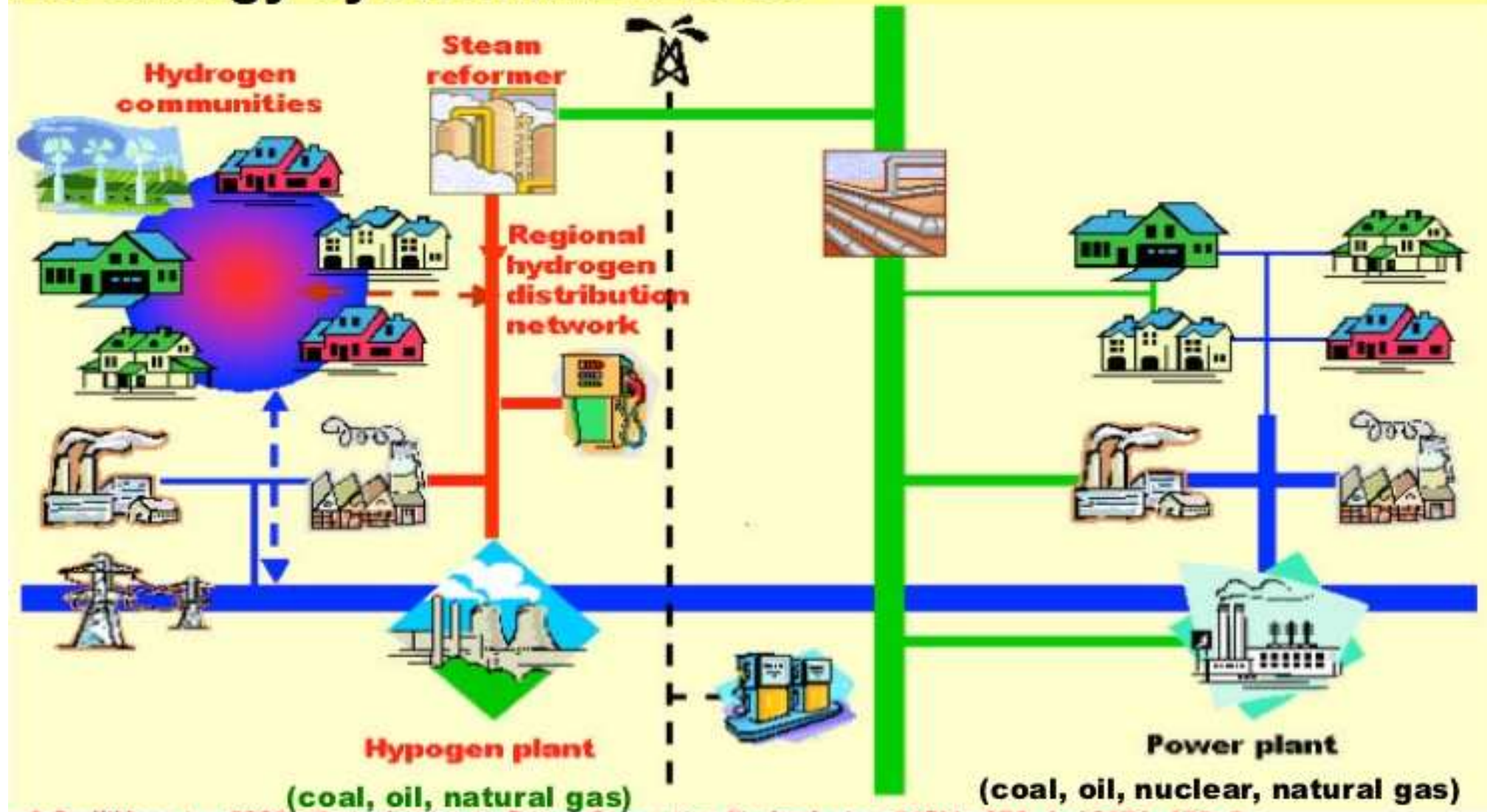
EU energy system in 2010*



* Poullikkas A., 2009, *Introduction to Power Generation Technologies*, ISBN: 978-1-60876-472-3

Future energy systems (optimistic scenario)

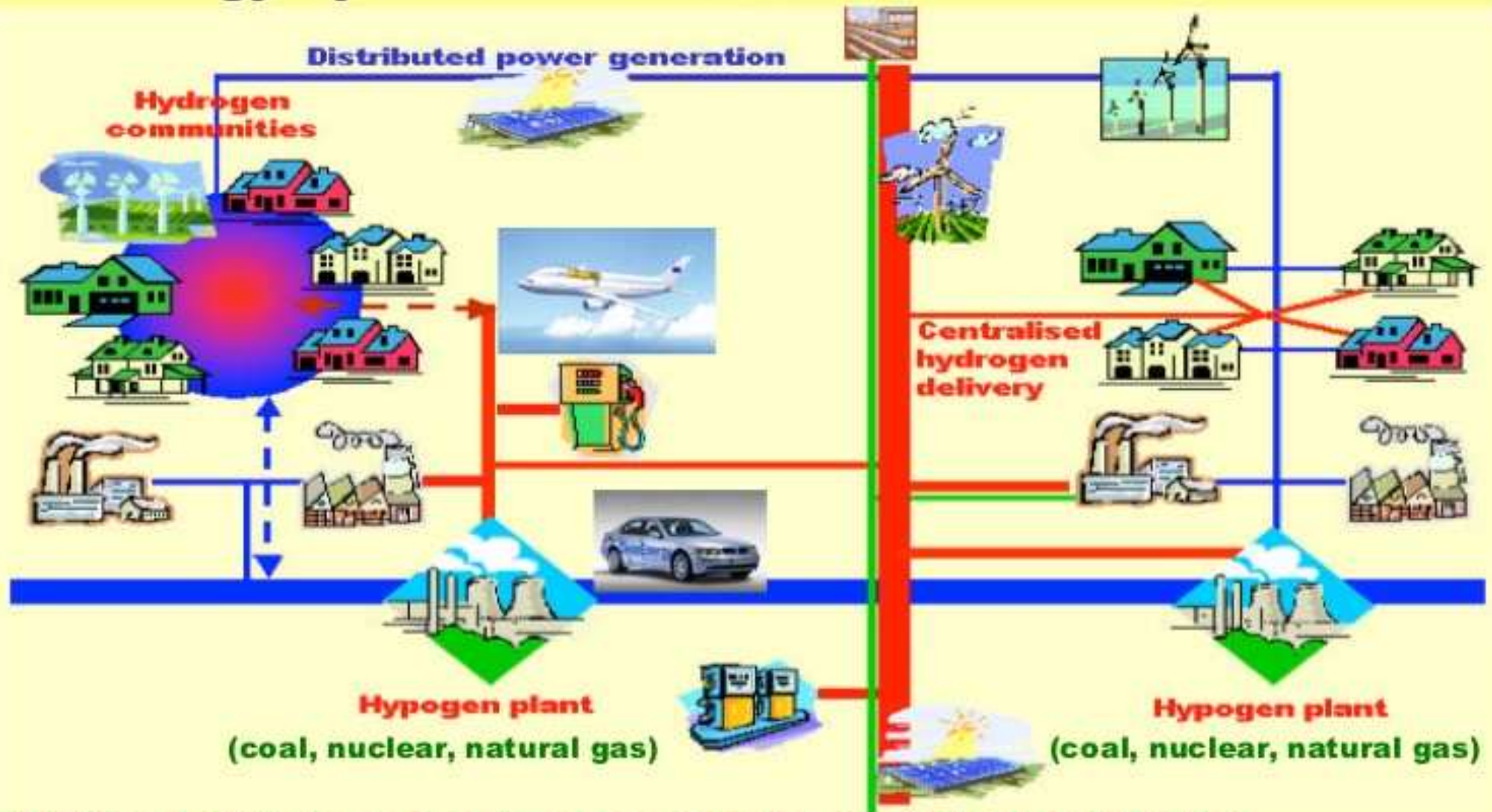
EU energy system in 2020-30*



* Poullikkas A., 2009, *Introduction to Power Generation Technologies*, ISBN: 978-1-60876-472-3

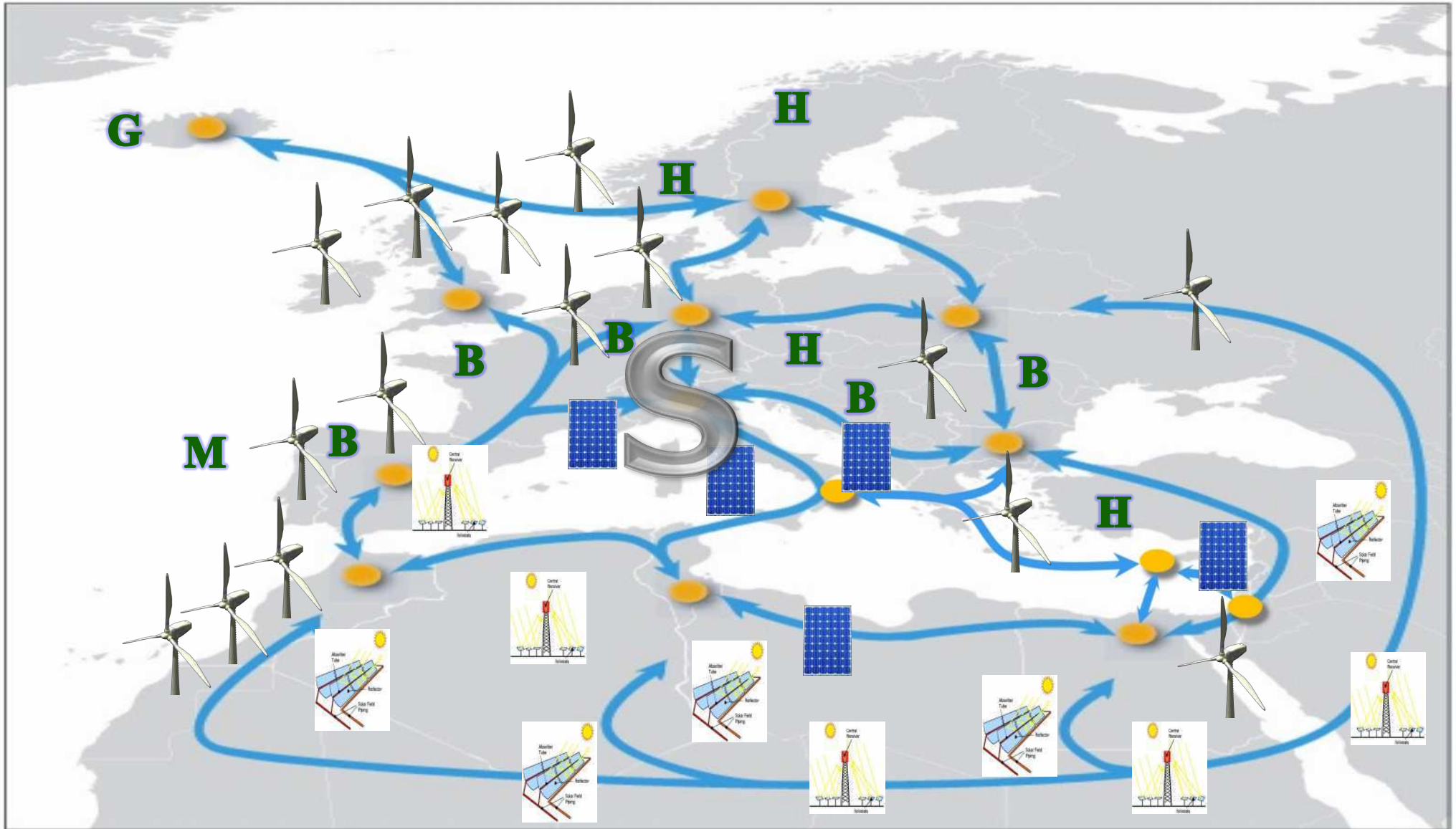
Future energy systems (optimistic scenario)

EU energy system in 2040-50*



* Poullikkas A., 2009, *Introduction to Power Generation Technologies*, ISBN: 978-1-60876-472-3

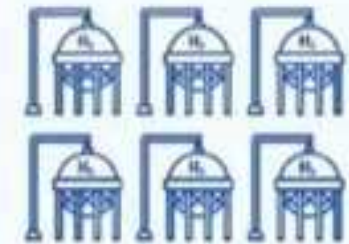
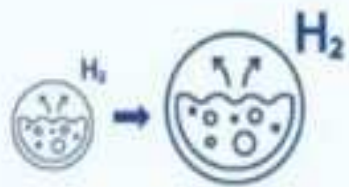
The Super Smart Grid after 2050* (may allow for 100% RES)



* Poullikkas A., 2013, *Sustainable Energy Development for Cyprus*, ISBN: 978-9963-7355-3-2

National hydrogen strategies towards 2030-2050

EU H₂ strategy*



Today - 2024

- Installation of Electrolysers: at least 6GW for green H₂ production
- Production of green H₂: up to 1mt

2025-2030

- H₂ to become part of the integrated energy system
- Production of green H₂: more than 10mt

2030

- Large scale integration of green H₂

* *A hydrogen strategy for a climate-neutral Europe, EU, 2020*

Saudi Arabia \$5bn Helios H2 project

- Desert area = Belgium
- 4GW of Wind and PVs
- Production of 650t/day of H₂
- Reduce of H₂ production from 5US\$/kg to 1.5US\$/kg
- Long-term: Saudi Arabia to become H₂ exporter



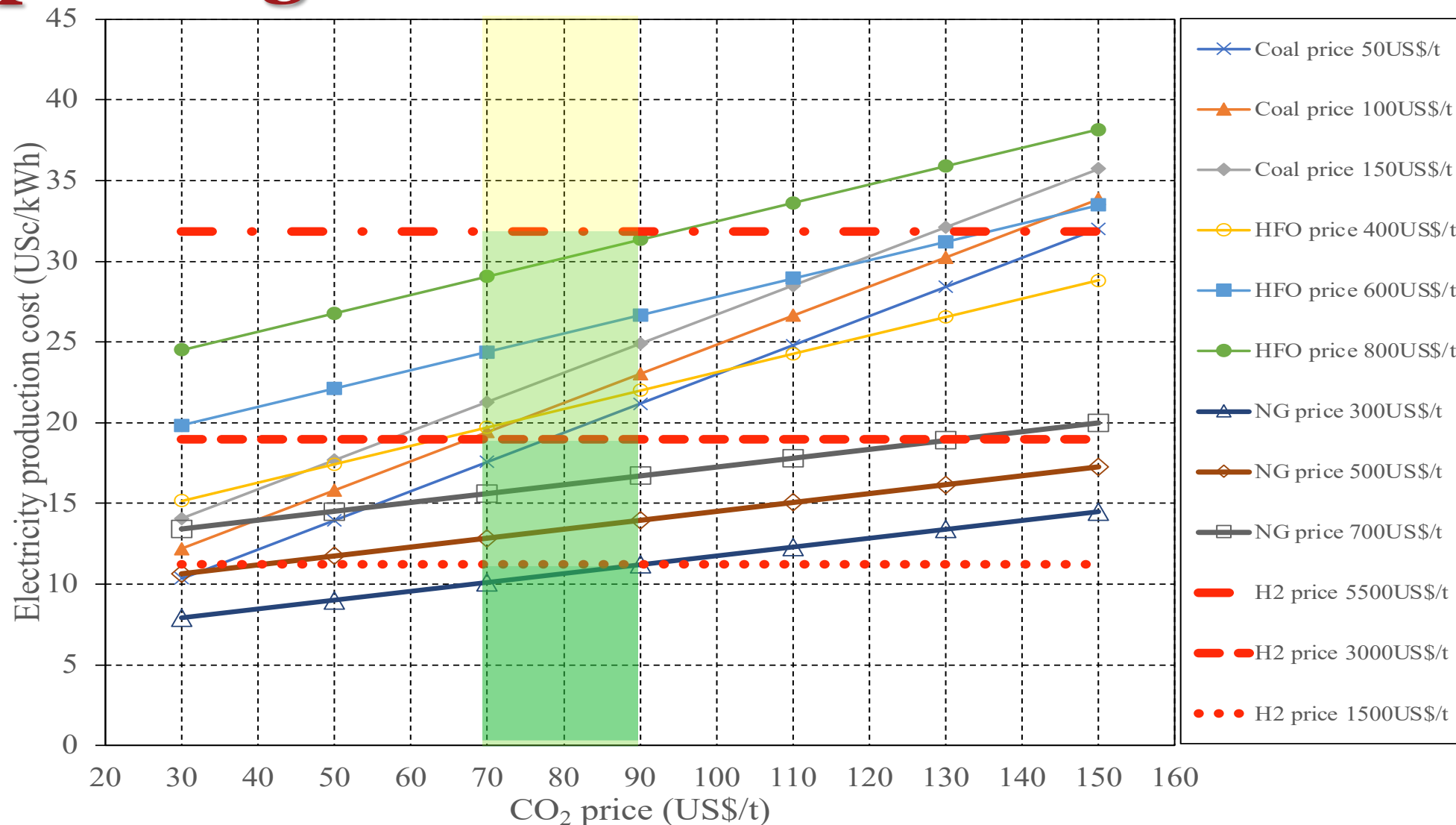
Cyprus H2 strategy?

- Recognition of hydrogen as a key component of the energy mix for 2030 and up to 2050
- Creation of a long-term national energy strategy considering hydrogen
- Creation of a legislative framework - allow the introduction of participants in H₂ market
- Harmonization of national regulatory framework with the relevant European Directives
- Targeted measures to kick-start the hydrogen value chain: production; transport and storage; use in final consumption

Green H₂ economics

The effect of carbon price

Carbon price vs green hydrogen power generation*



* Venizelos V., Poullikkas A., 2023, "The effect of carbon price towards green hydrogen power generation", in preparation