Hydrogen – A power system point of view

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Elia Group's vision

For a successful energy transition in a sustainable world

#EUGreenDeal

#NextGenerationEU

1

Increase energy efficiency, in buildings and of industry processes

2

Accelerate electrification of sectors such as road transport but also at industry side

The most efficient way to use renewable electricity is to use it as electricity in the power system.

- Developing the potential of renewable electricity generation, electrifying energy usage where it is efficient and building the necessary electricity grids to decarbonize the power system are no-regrets.

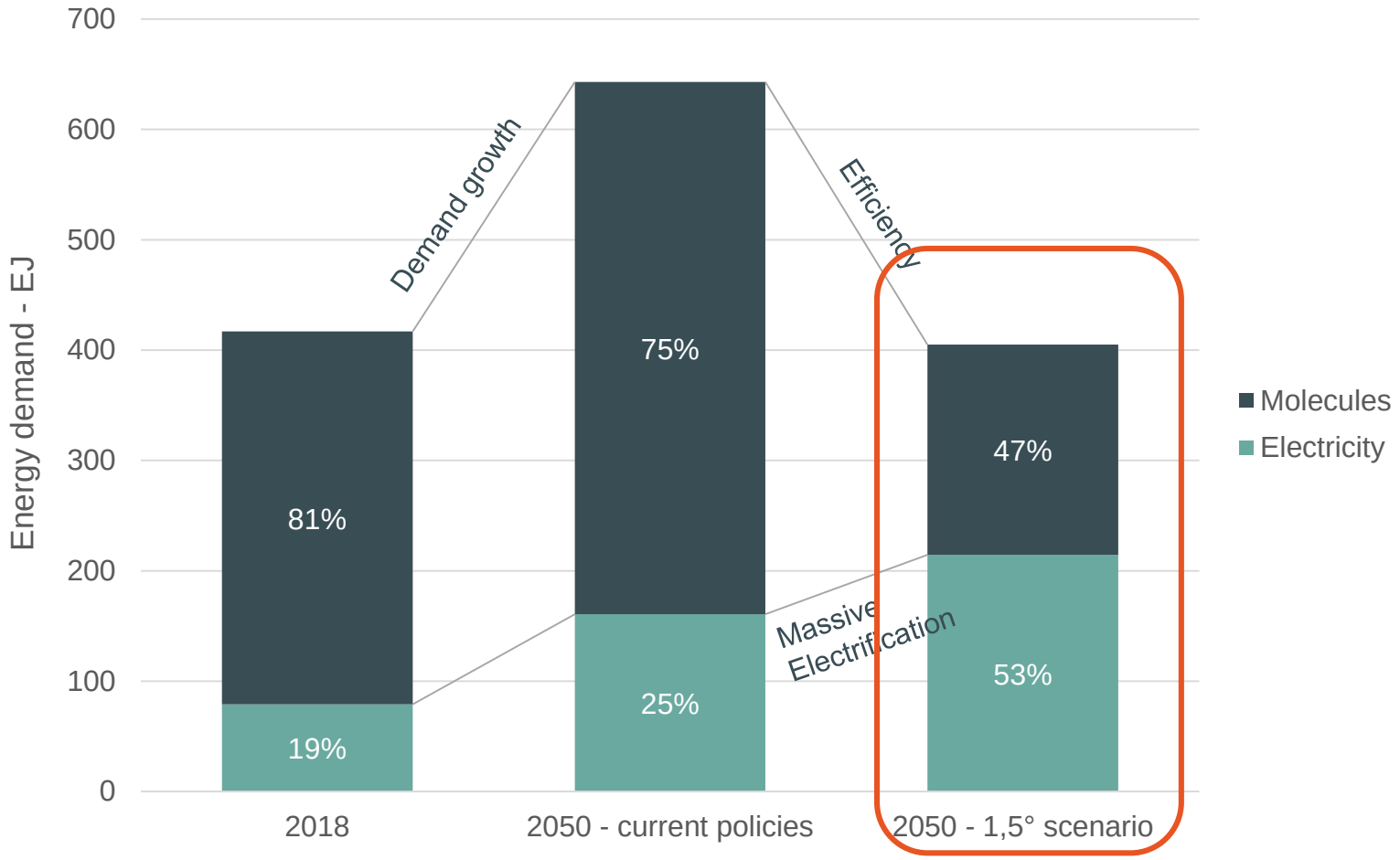
We must accelerate investments in those area




3

Decarbonise industry & hard-to-abate sectors with green molecules

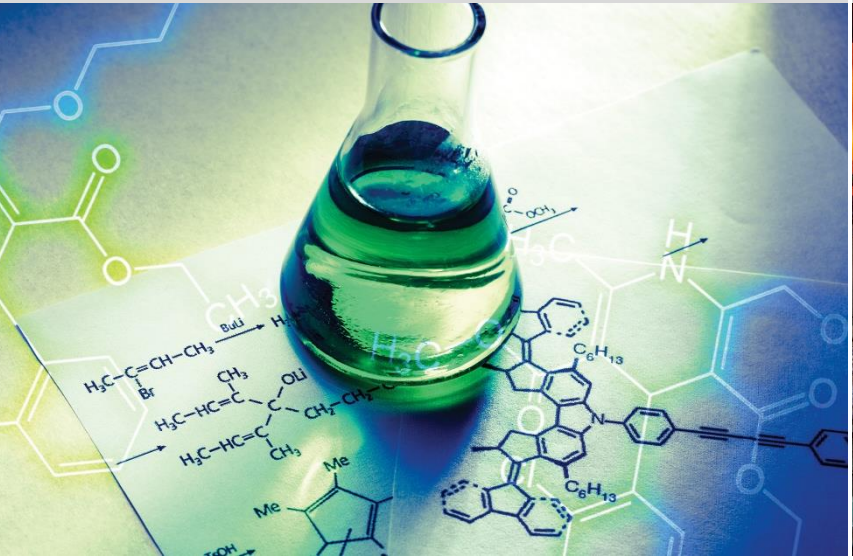
Despite an important electrification, a large part of the energy system will still structurally rely on other energy carriers than electricity



Source: BNEF

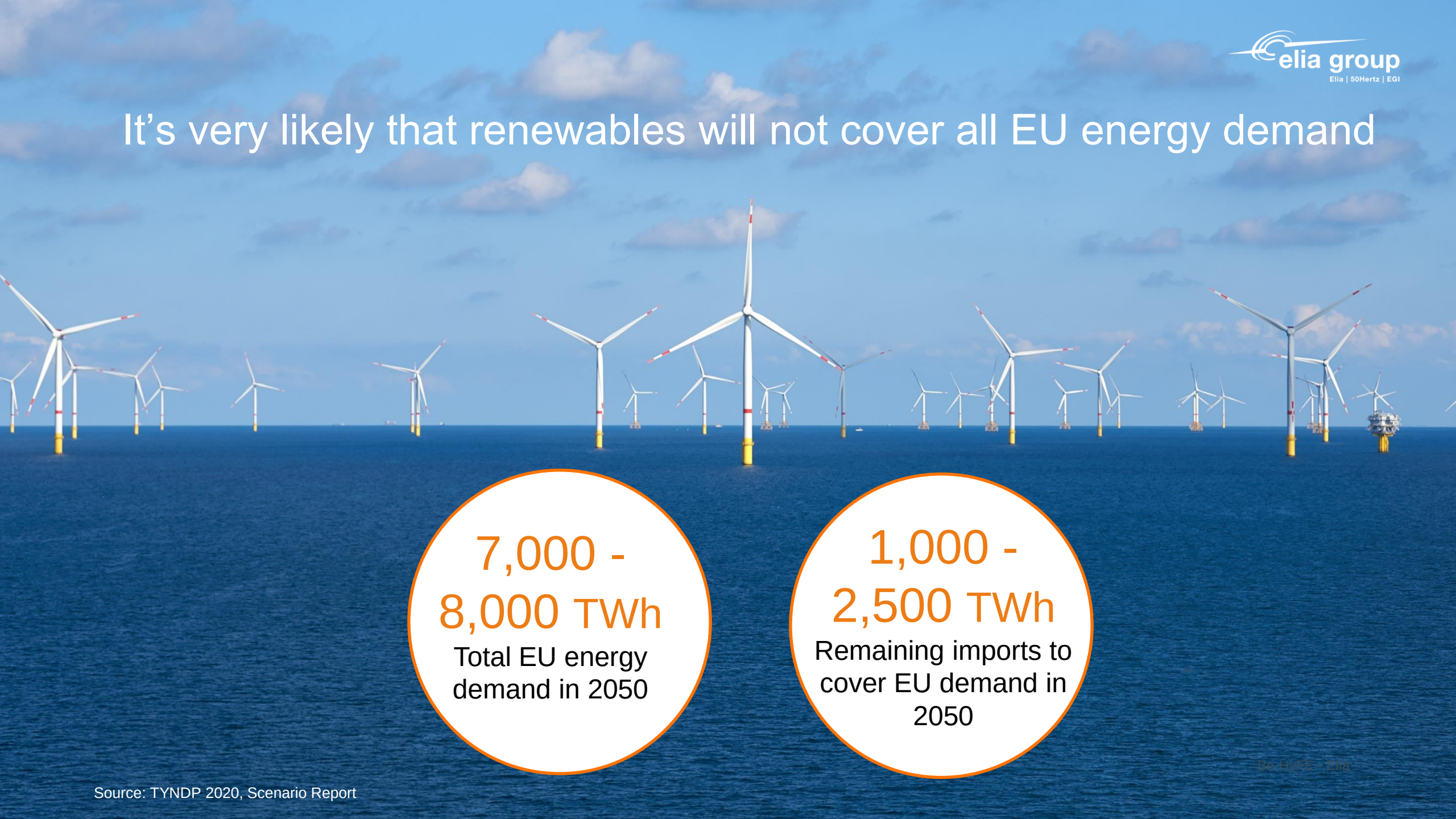
Use green molecules* to do things that cannot be done more simply, cheaply, and efficiently by the direct use of electricity

Chemical feedstock	Hard-to-abate sectors	Long haul heavy-duty transport



*depending also on the role to be played by other technologies such CCS/ CCU, pyrolysis, etc

It’s very likely that renewables will not cover all EU energy demand



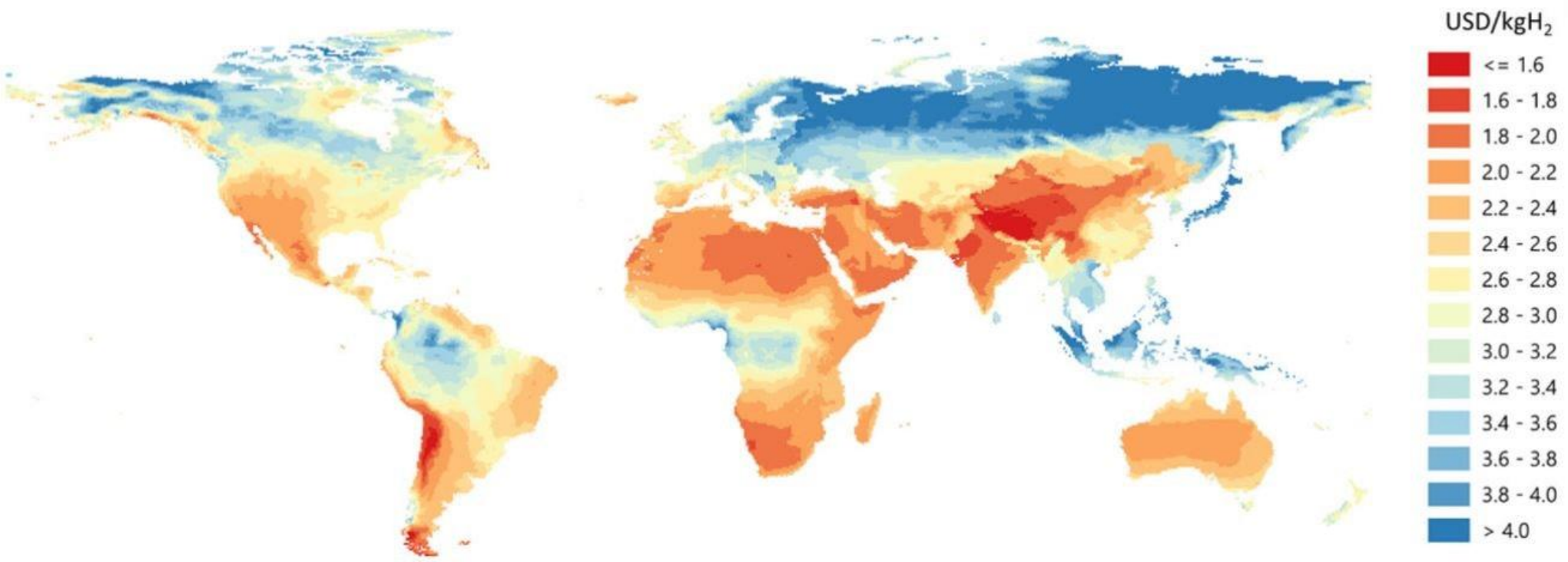
7,000 - 8,000 TWh
Total EU energy demand in 2050

1,000 - 2,500 TWh
Remaining imports to cover EU demand in 2050

Source: TYNDP 2020, Scenario Report

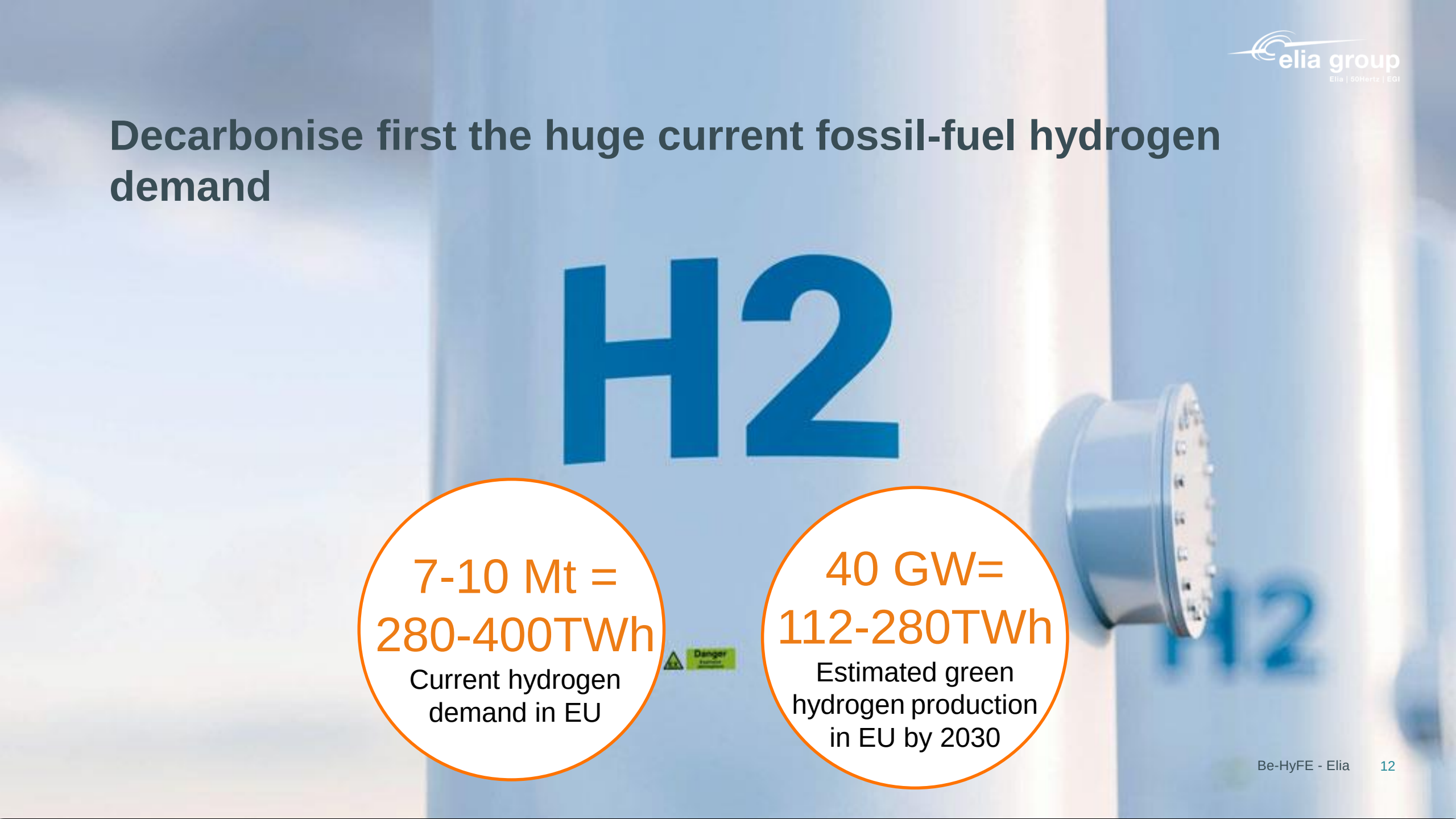
Importing hydrogen from others placed might be preferred to local production.

Hydrogen costs from hybrid solar PV and onshore wind systems in the long term



Source: IEA

Decarbonise first the huge current fossil-fuel hydrogen demand



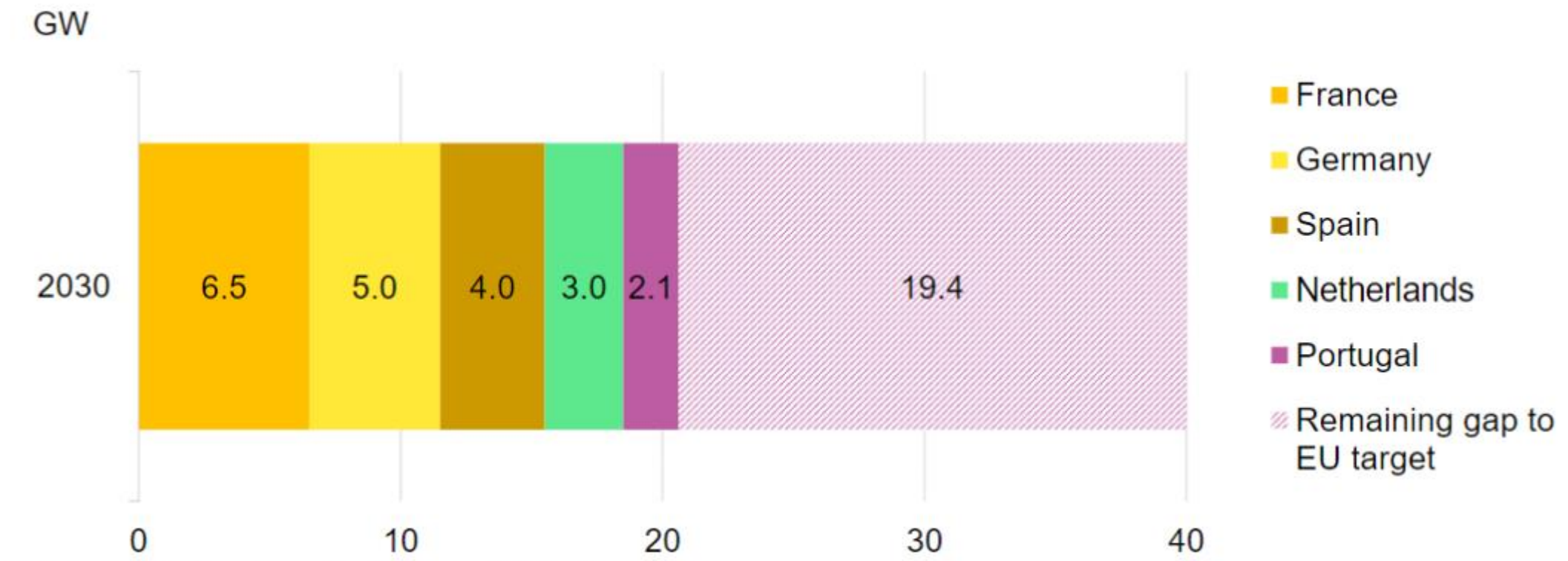
7-10 Mt = 280-400TWh

Current hydrogen demand in EU

40 GW= 112-280TWh

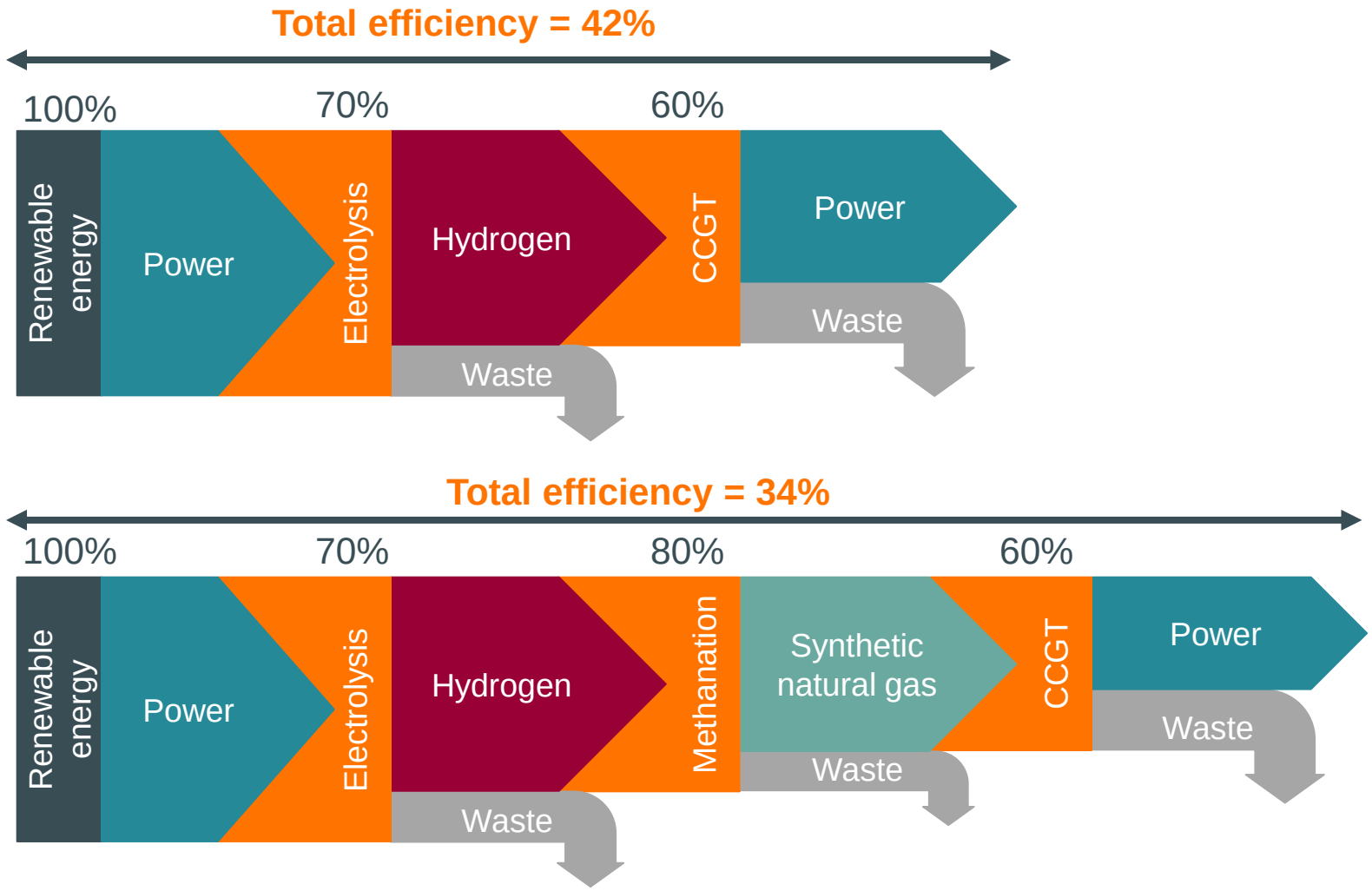
Estimated green hydrogen production in EU by 2030

Planned national hydrogen developments by 2030



Source: BloombergNEF, European Commission, national hydrogen strategies

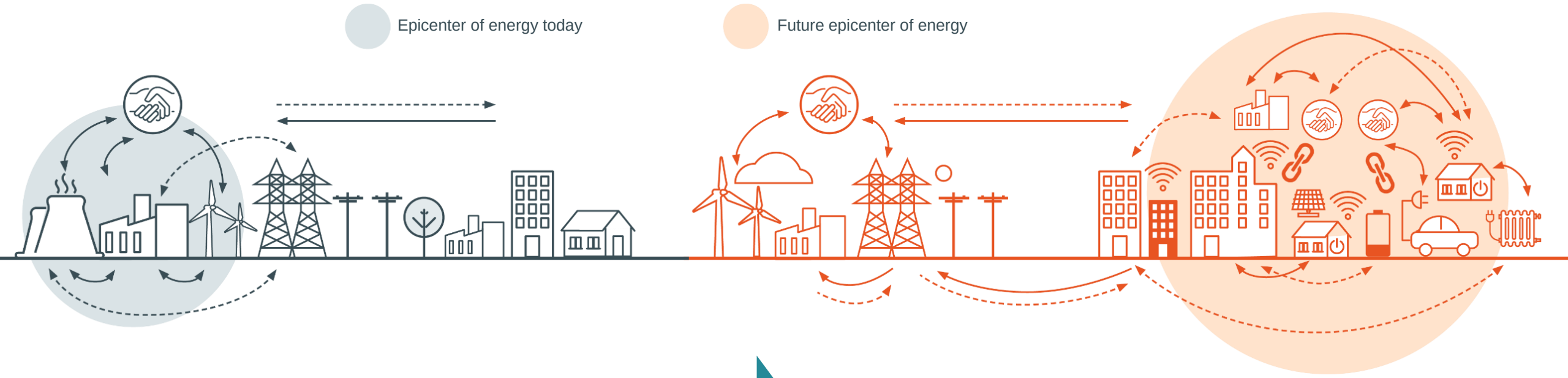
Use renewable hydrogen for direct applications in industrial sectors and avoid reconversion



60%-70%

Total reconversion losses

Will the power grid need more flexibility? – Yes
Will the power grid need hydrogen? – Not sure



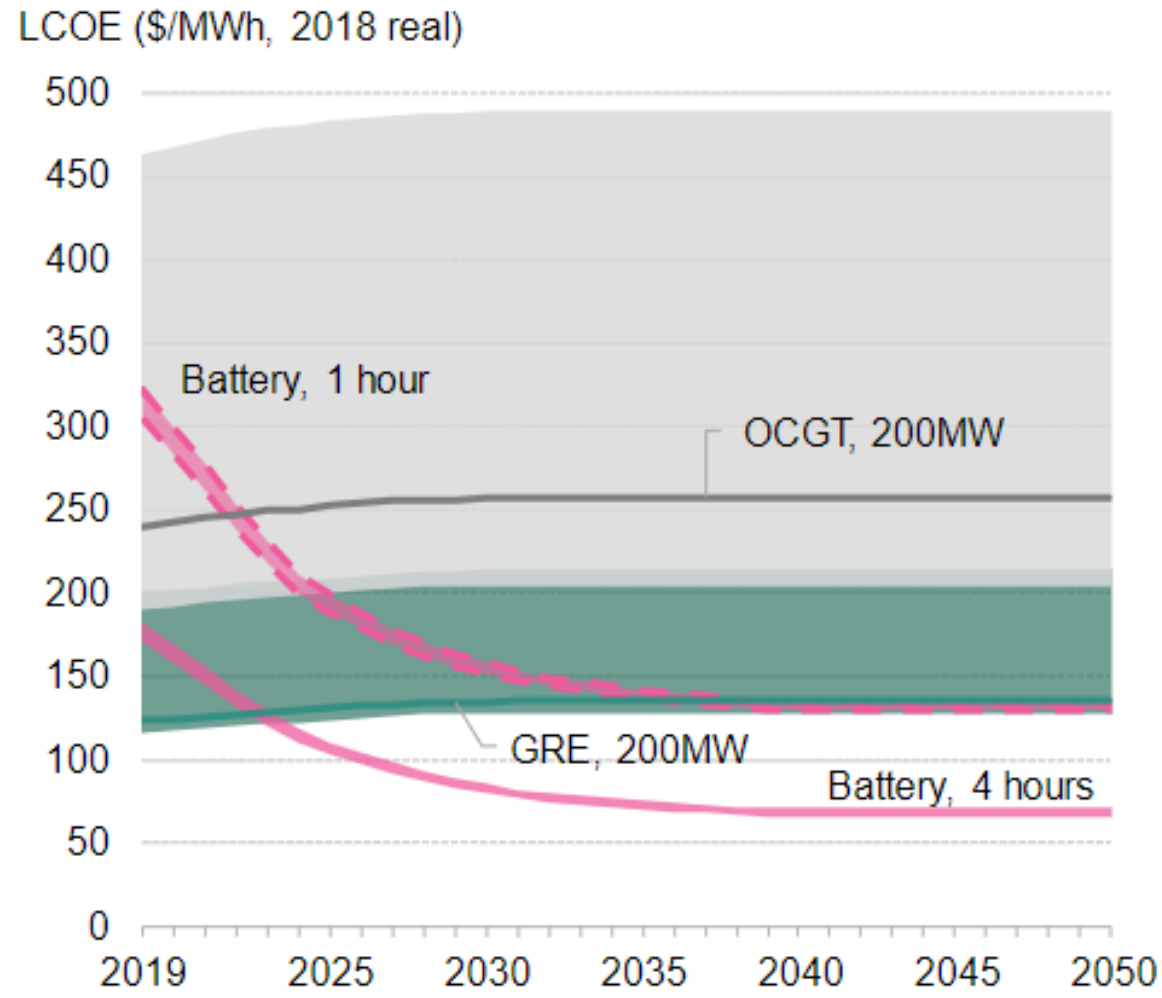
Generation follows consumption

Demand will follow generation

Hydrogen and flexibility:

not the cheapest option

Cost of new peaking generation



Source: BloombergNEF

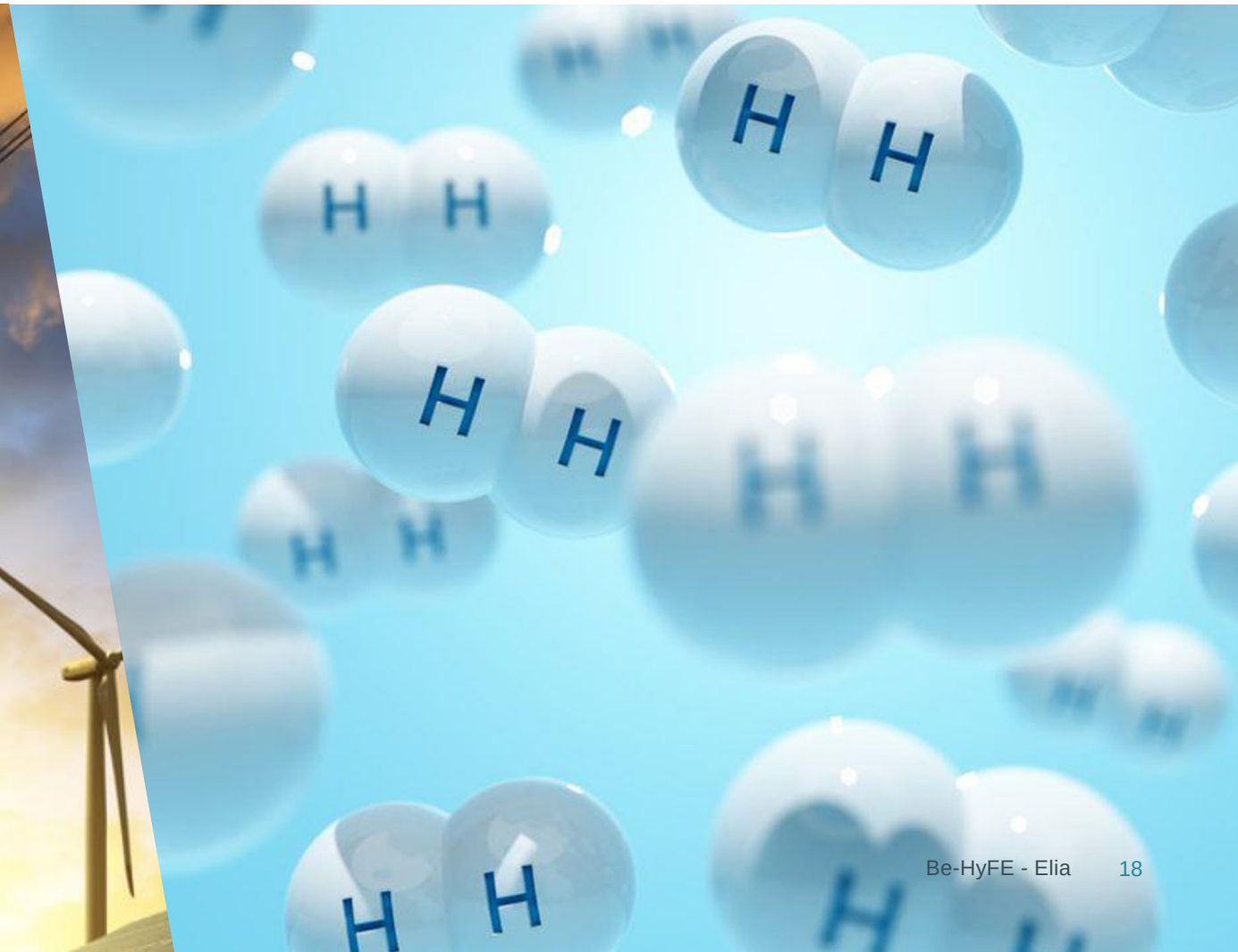
OCGT = open cycle gas turbine, GRE = reciprocitating engine (piston engine)

Industry clusters around ports:
a good place to start placing hydrogen electrolysers

Port of Antwerp, Belgium

Port of Hamburg, Germany

Electricity and hydrogen are two fundamental pieces of the decarbonised world of tomorrow



Elia Group vision - Key messages

1

Green Deal

Europe need to fully decarbonize by 2050
Considering the limited RES capacity, focus on the most cost-efficient and energy-efficient solutions

5

European Industrial policy

It is important for Europe to remain a frontrunner and to the develop the knowledge around hydrogen through pilot projects

Efficiency and electrification first

The most efficient way to use renewable electricity is to use it as electricity in the power system

2

Industrialization to start with existing market

As the limited RES potential of Europe is limited, start by decarbonising the existing hydrogen market in the industry, while supporting direct electrification

6

3

Complement by green molecules

Despite an important electrification, a large part of the energy system will still structurally rely on other energy carriers than electricity (hard-to-abate sectors)

7

Flexibility and security of supply

Reconversion of green hydrogen to electricity should be avoided. However hydrogen based products could play a role to cover “dunkelflaute” periods

Energy imports will remain important

Due to limited RES potential, an important part of the energy will be imported. Green molecules are likely to play an important role in that respect

4

Not a structural alternative to power grids

The electricity and gas infrastructures are complementary. Their planning should be based on joint storylines and more consistent and coherent sets of scenarios, while there is little to be gained from a single network planning

8

Electricity and hydrogen are two fundamental pieces of one puzzle

Thanks for your attention

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