



# The role of power-to-gas in enhancing flexibility

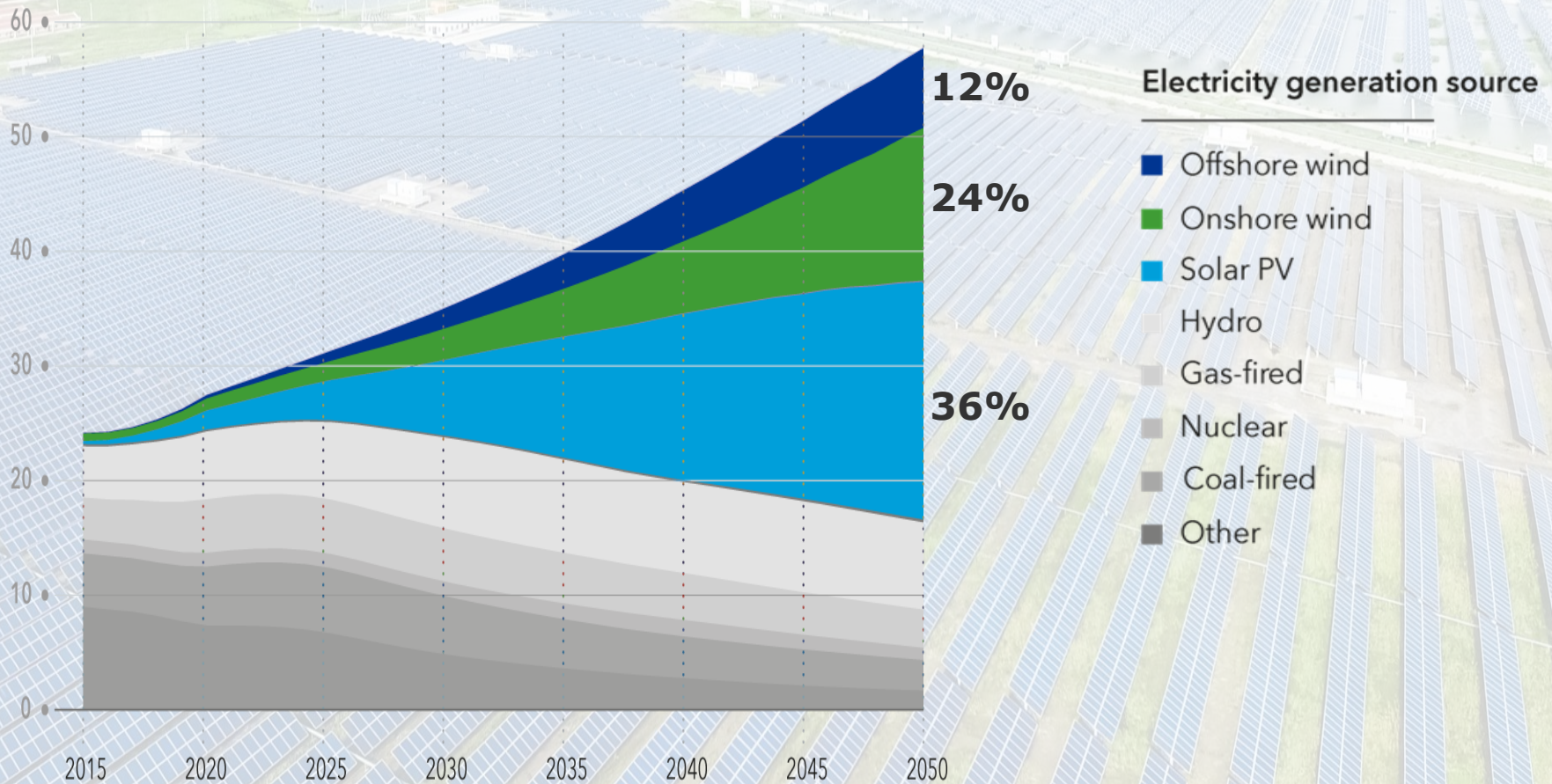
*Johan Holstein - DNV GL (also representing the European Power-to-Gas platform)*

Economic Commission for Europe, Committee on Sustainable Energy,  
Group of Experts on Gas



# Growth of solar PV and wind by 2050

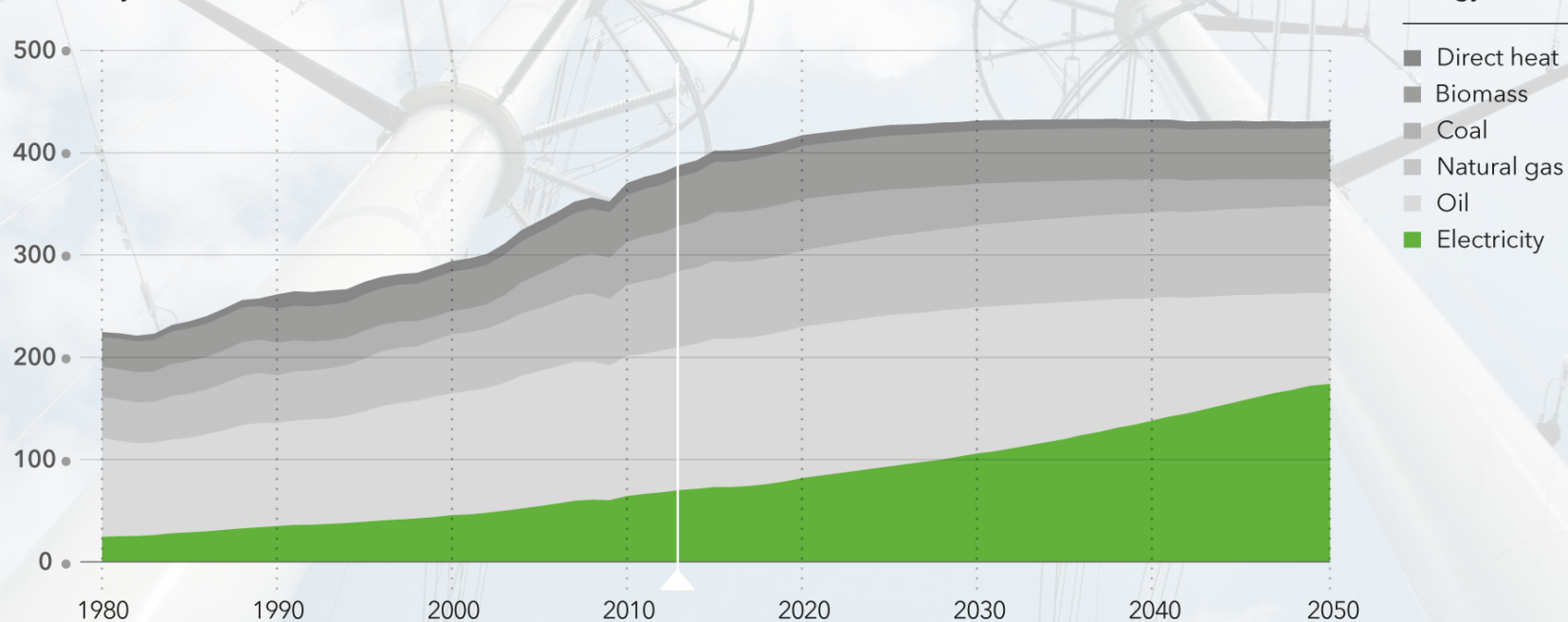
Units: PWh/yr



# DNV GL's 2017 Energy Transition Outlook: The world is electrifying

## World final energy demand by energy carrier

Units: EJ/yr



- Forecast: Electricity generation to increase rapidly globally, by 140% from 73 EJ to 174 EJ.

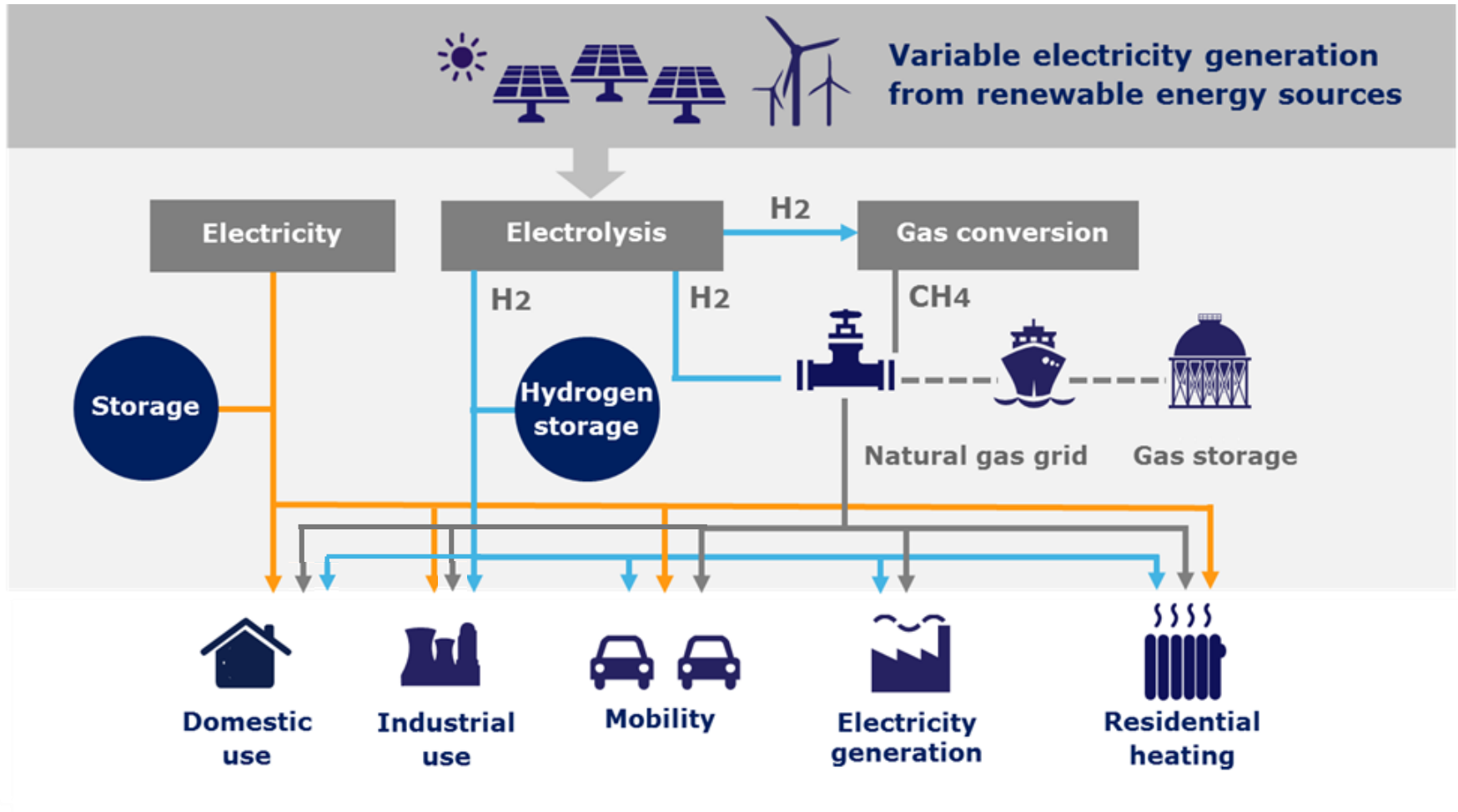


# Energy transition: need for flexibility

Challenge: match supply & demand

*Power system flexibility describes the extent to which a power system can adapt the patterns of electricity generation and consumption in order to maintain the balance between supply and demand*

# The role of power-to-gas in enhancing flexibility



## (Power-to-)Gas for large-scale energy storage



~ 900 TWh

currently stored in EU  
underground gas storages

Factor 12

~ 70 TWh

maximum potential for pumped  
hydro plants in Europe (mainly in  
Norway and Turkey)

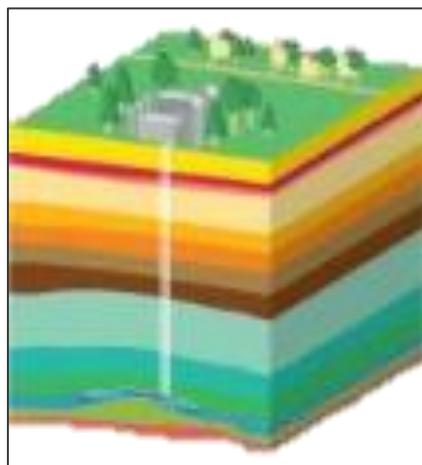


# Power-to-gas: the multi-purpose tool

**BALANCING &  
LARGE-SCALE  
ENERGY STORAGE**



**SUSTAINABLE FUEL  
FOR THE TRANSPORT  
SECTOR**



**SUSTAINABLE  
FEEDSTOCK FOR  
INDUSTRIES**



**POTENTIAL OF  
AVOIDING  
SIGNIFICANT  
INVESTMENT COSTS  
IN POWER CABLES**

# Sector integration and the beneficial role of gas transport

## Electricity transmission



Source:ABB

### BritNed Interconnector



Length	260 km
Investment	600 MEUR
Capacity	1 GW
Specific investment	€ 230 per kW/100 km

## Gas transport



### Bacton-Balgzand Gas Pipeline

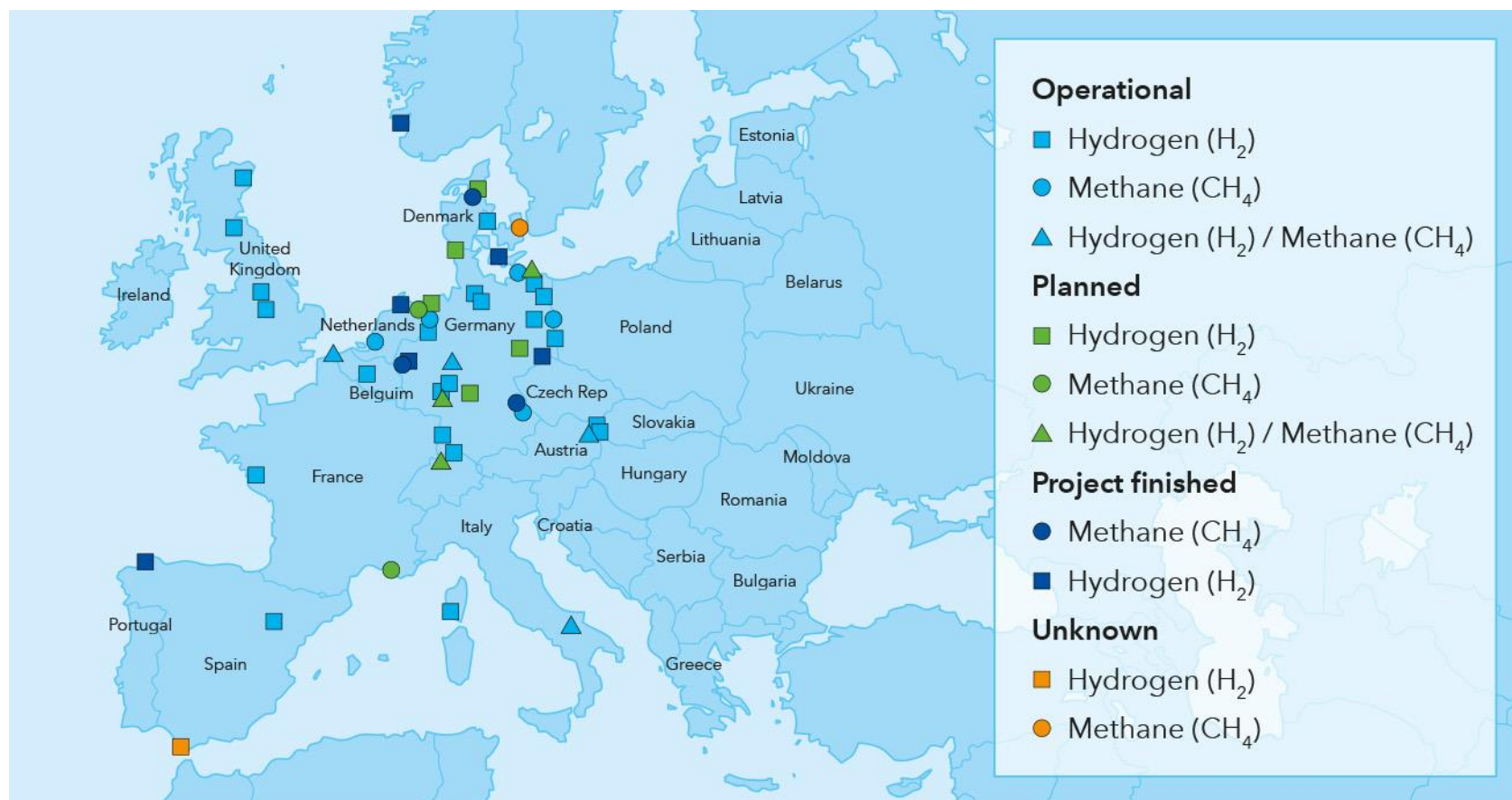
bbl company

Length	230 km
Investment	600 MEUR
Capacity	20 GW capacity
Specific investment	11 EUR per kW/100 km



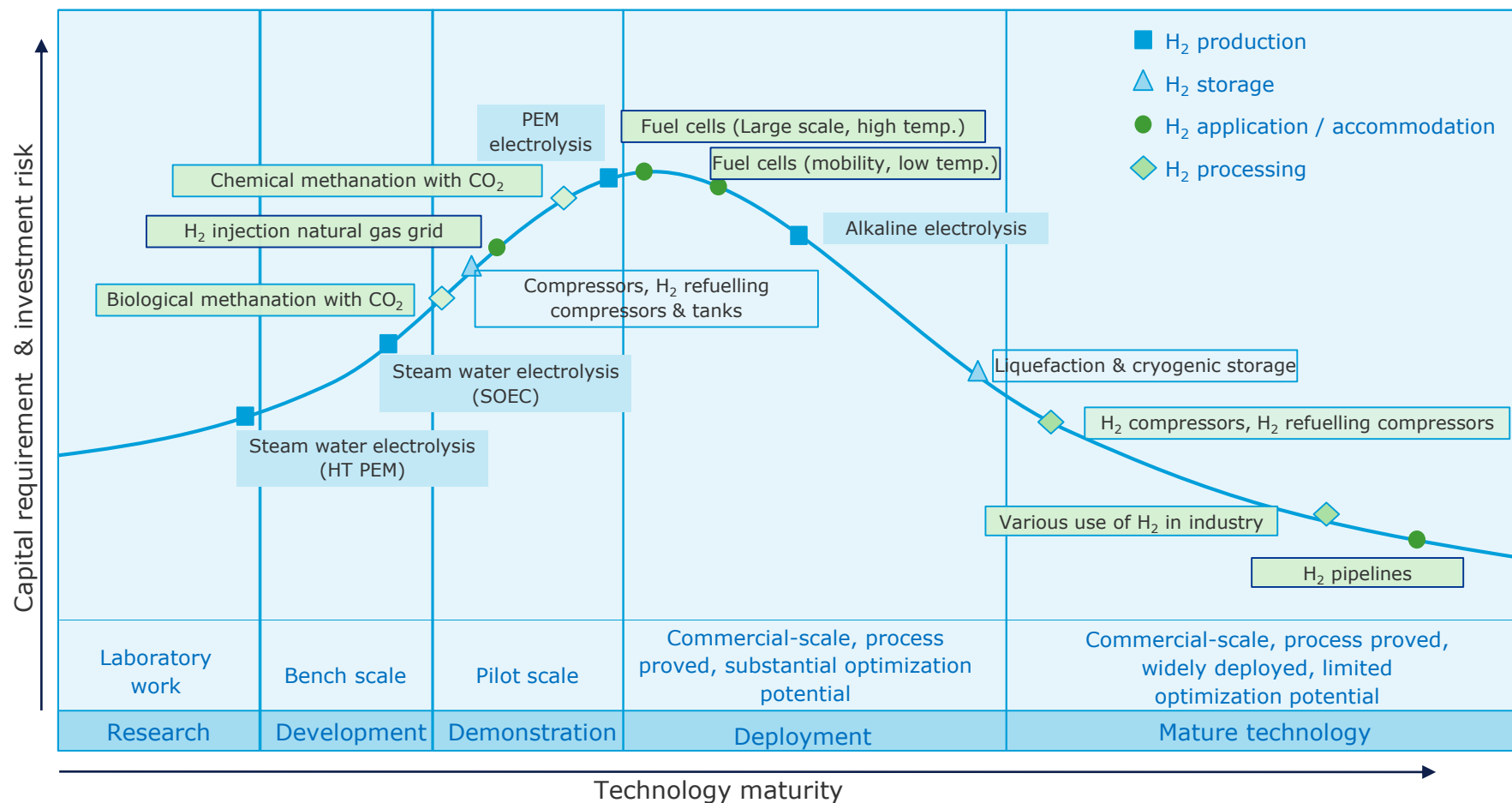
# Growing number of pilot plant throughout Europe enabling operational learning and technology de-risking

Currently there are ~70 PtG projects in Europe; 30 MW<sub>el</sub> of electrolyser capacity installed and another 50 MW<sub>el</sub> in planning



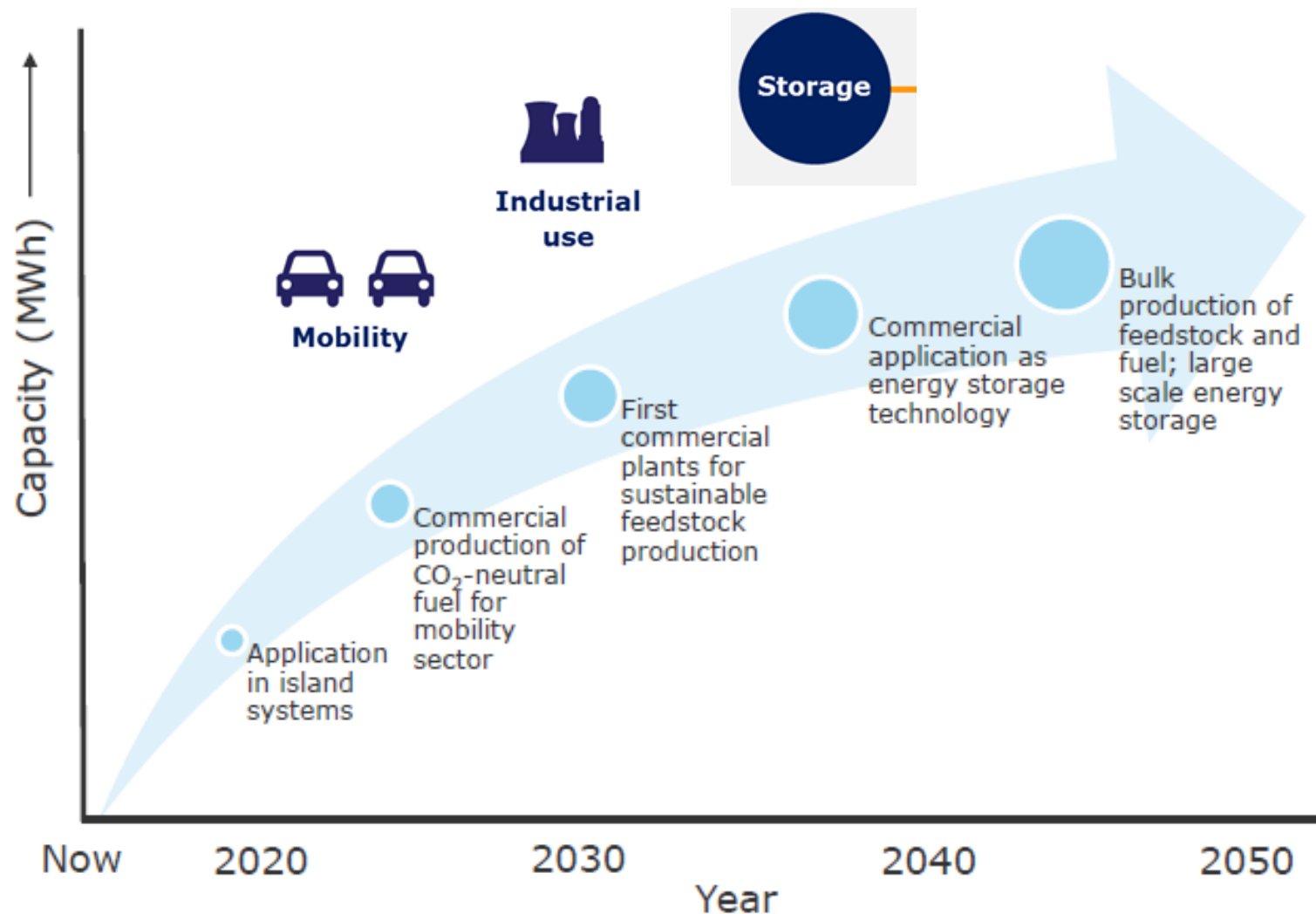
**Power-to-gas (demonstration) projects in Europe; Source:**  
[www.europeanpowertogas.com](http://www.europeanpowertogas.com)

# State of the art PtG components and hydrogen integration



Readiness of power-to-gas technology; Source: DNV GL 2016

# Roadmap of commercialisation





## Profile

The European Power to Gas Platform is a forum for stakeholders of the Power-to-Gas value chain to gain and share knowledge and experience about Power-to-Gas.



## Objectives

- Exchange experiences and knowledge between the members,
- Fill knowledge gaps
- Develop and facilitate collaborations in Power-to-Gas projects
- Disseminate know-how on Power-to-Gas.

## Members 2018





# Thanks for your attention

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