

# *Centre for Energy*

## Decarbonising EU Economies: A Hydrogen Strategy for the Green Deal



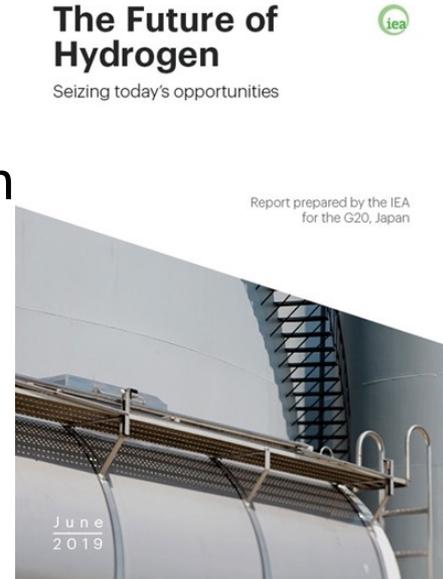
**Cédric Philibert, associate fellow, 22 April 2020**

# Clean hydrogen, enabling the decarbonisation

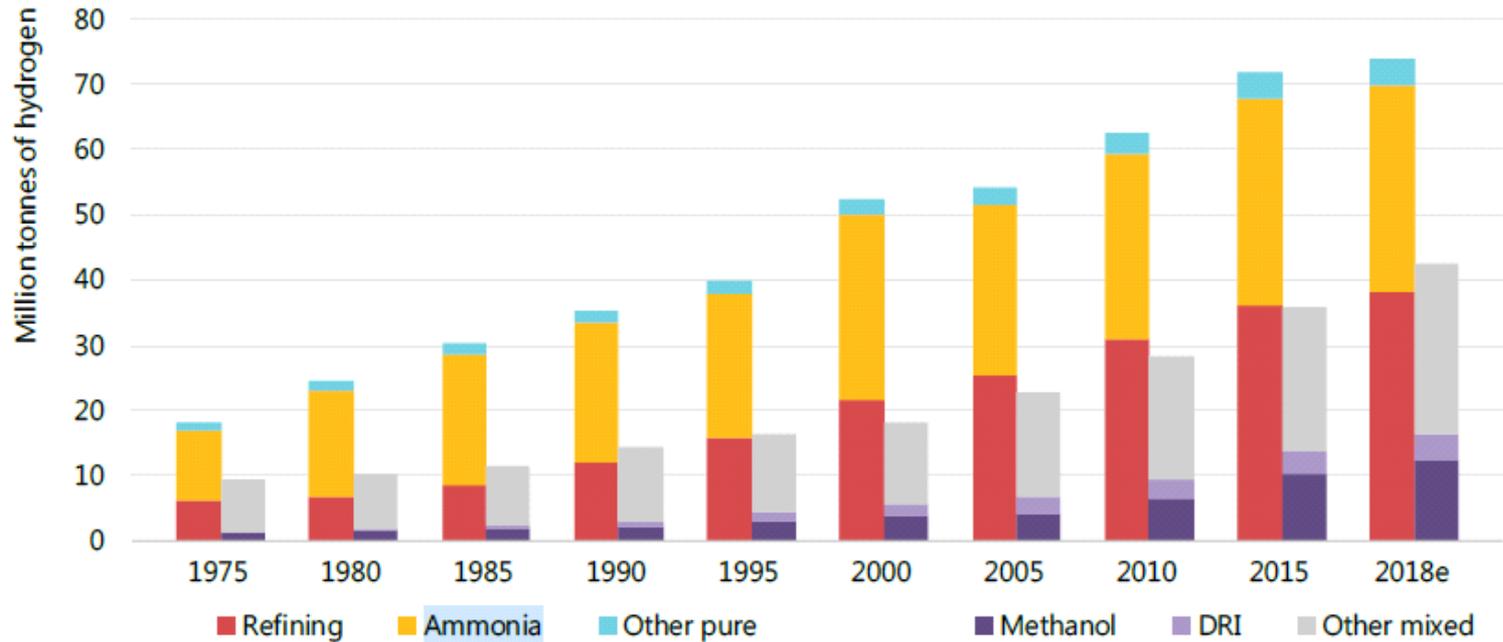
Hydrogen can help overcome many difficult challenges:

- ***Integrate more renewables***, including by enhancing storage options and “exporting sunshine & wind” from places with abundant resources
- ***Decarbonize “hard to abate” sectors*** - steel, chemicals, trucks, ships & planes
- ***Boost energy security*** by diversifying the fuel mix & providing flexibility to balance grids

But there are challenges: ***costs*** need to fall; ***infrastructure*** needs to be developed; ***cleaner hydrogen*** is needed; and ***regulatory barriers*** persist



# Hydrogen today



Hydrogen today is produced from fossil fuels and mostly used in refineries, chemical and fertiliser industries

# Main options for clean hydrogen

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- Electrolysis of water from low carbon electricity
  - How low ?
- Steam methane reforming with carbon capture and storage
  - How much carbon can/should be captured?
- Methane pyrolysis
  - What will it cost?

## Hydrogen strategies around

- Korea: an industrial strategy focussed on FCEVs
- Japan: a broad strategy with FCEVs, LNG reform&FC in buildings, use of  $\text{NH}_3$  in coal and gas plants, industrial furnaces, imports of green and blue  $\text{H}_2$ ,  $\text{NH}_3$
- US, California: production of low-C  $\text{H}_2$  for mobility
- China: adding FCEVs to strong BEV shift; industrial interest in electrolysers
- Australia, Chile, Morocco, M-East: interested to export green or blue  $\text{H}_2$
- UK: testing gas change in Northern England
- NL, Germany: industry, mobility,  $\text{H}_2$  prod. & imports
- Fr: Decarb. of current  $\text{H}_2$  uses, R&D & pilot projects for other applications

## Perspectives for a European hydrogen strategy

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- Progressively and cost-effectively deploy low carbon H<sub>2</sub> where it is the sole or preferred decarbonisation solution:
  - Feedstock uses: NH<sub>3</sub>, MeOH, iron & steel
  - Fuel use for deep-sea shipping (as NH<sub>3</sub>)
  - Some storage use in islanded power systems
- Support R&D and pilot projects & design safety regulations/standards where H<sub>2</sub> may prove to be the preferred options, or will be in the future
  - Fuel use for aviation (as synthetic liquid fuels)
  - Fuel use for long distance heavy duty (trucks & coaches)
  - Some uses in building to complement electrification
  - Storage use in the continental power system after 2035

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