



# Hydrogen Forum

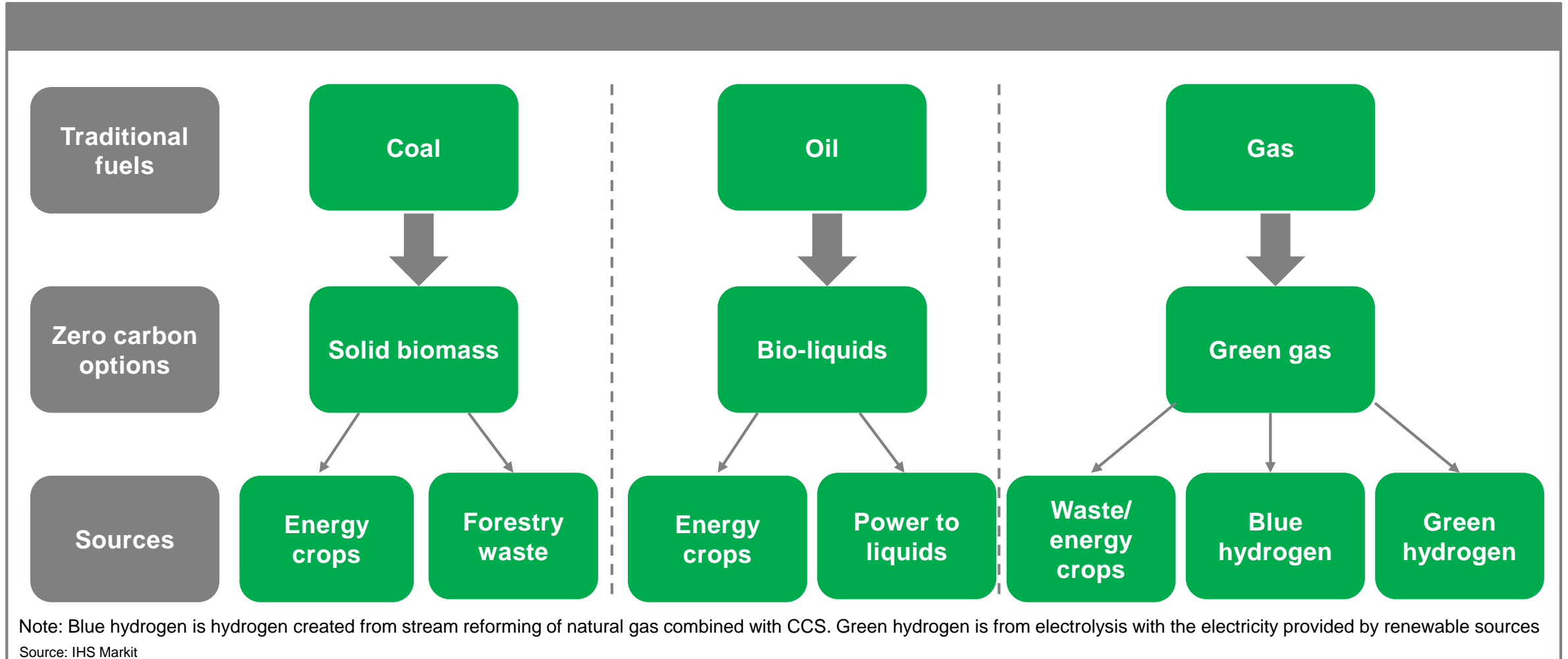
An IHS Markit initiative considering the potential role of hydrogen in a net-zero carbon world

2019

## Why a Forum on Hydrogen in Europe now?

- A 'net zero-carbon world' has been the announced objective of the revised 2050 energy roadmap that the European Commission released in 2018. If the European Union agrees to adopt this target, then by mid-century there will be no role for the combustion of unabated natural gas in EU countries;
- Hydrogen is one option that is receiving increased attention. Hydrogen and other green gases can both address the short-term need for rapid greenhouse gas abatement and can provide a long-term solution to the difficulties of storing large volumes of energy over long periods of time. Hydrogen can be used in all energy sectors—for power generation, heat, industrial uses and transport
- Energy suppliers, gas infrastructure companies, consumers and government have all started exploring the advantages of hydrogen. Public awareness and policy measures to encourage the development of hydrogen could allow for transformation of the energy industry by using the substantial gas infrastructure already in place while meeting long-term zero carbon targets;
- If conditions are right for widely adopting hydrogen, it can provide a truly transformational opportunity for the European energy transition and for the established European gas industry.
- IHS Markit has build structured insight per sector and a unique cross-industry space with a community of 150+ representatives from 30+ organizations in order to monitor those changes in the European markets

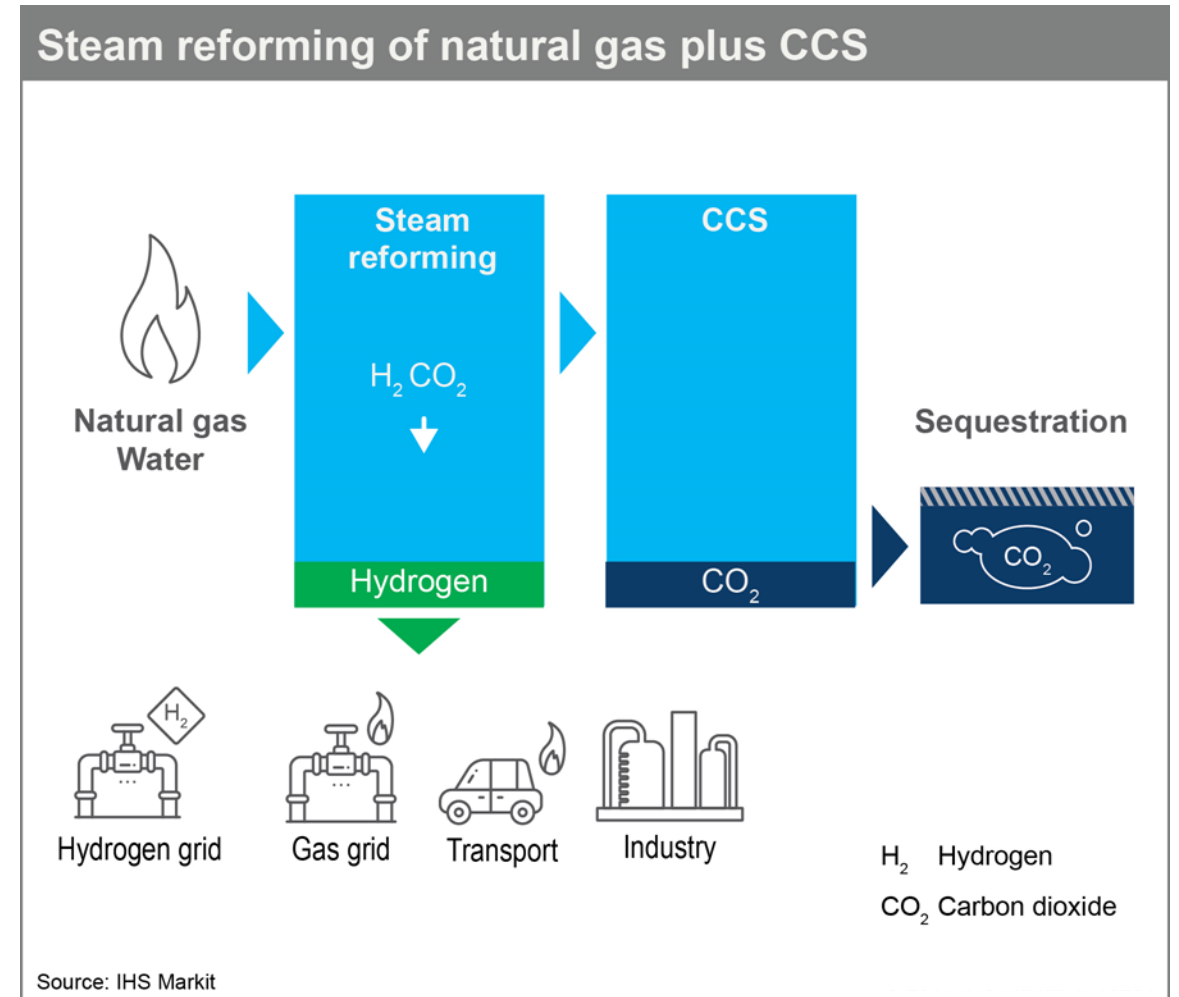
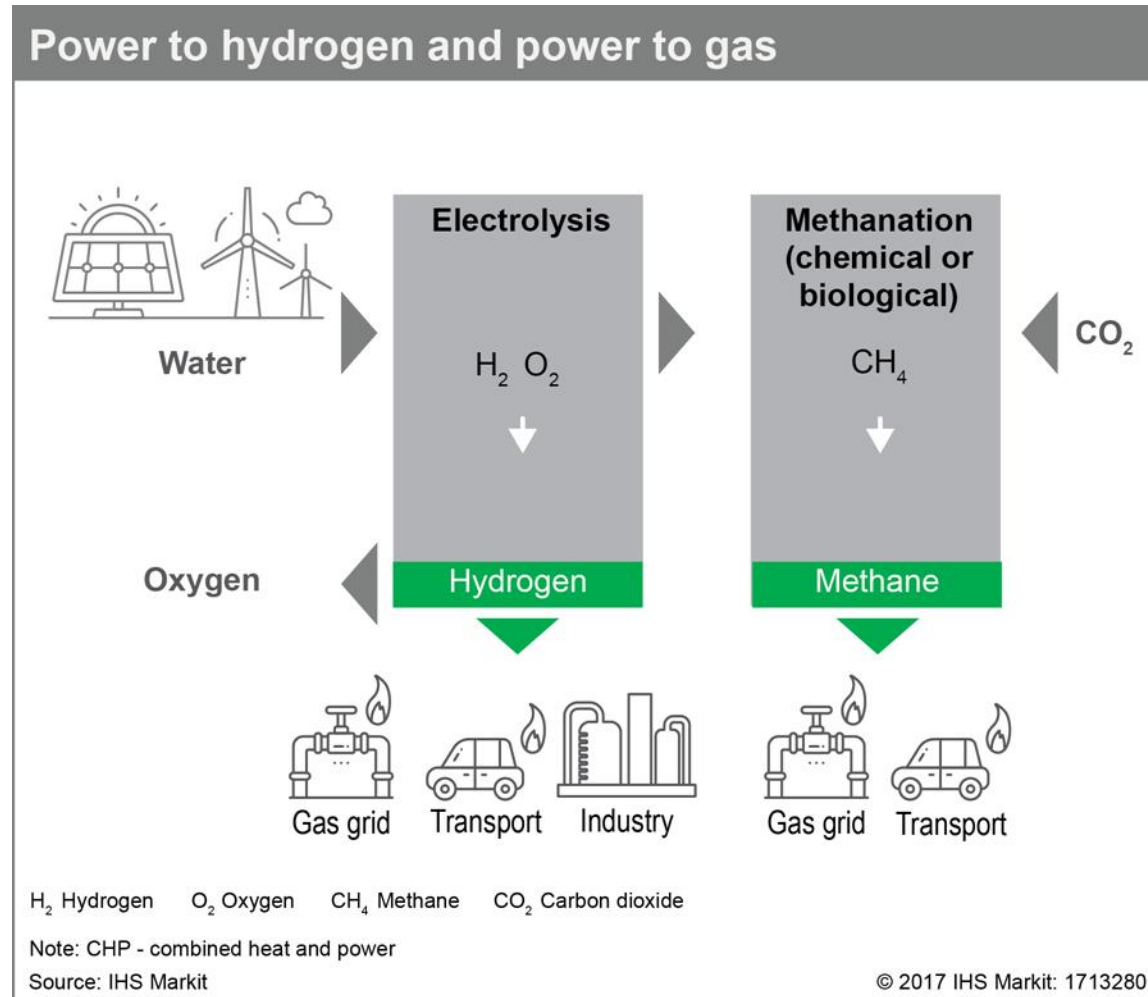
# Storable energy: From high to zero carbon options



## Gas grid owners and operators are looking at ways to decarbonize gas and ensure the future of their assets

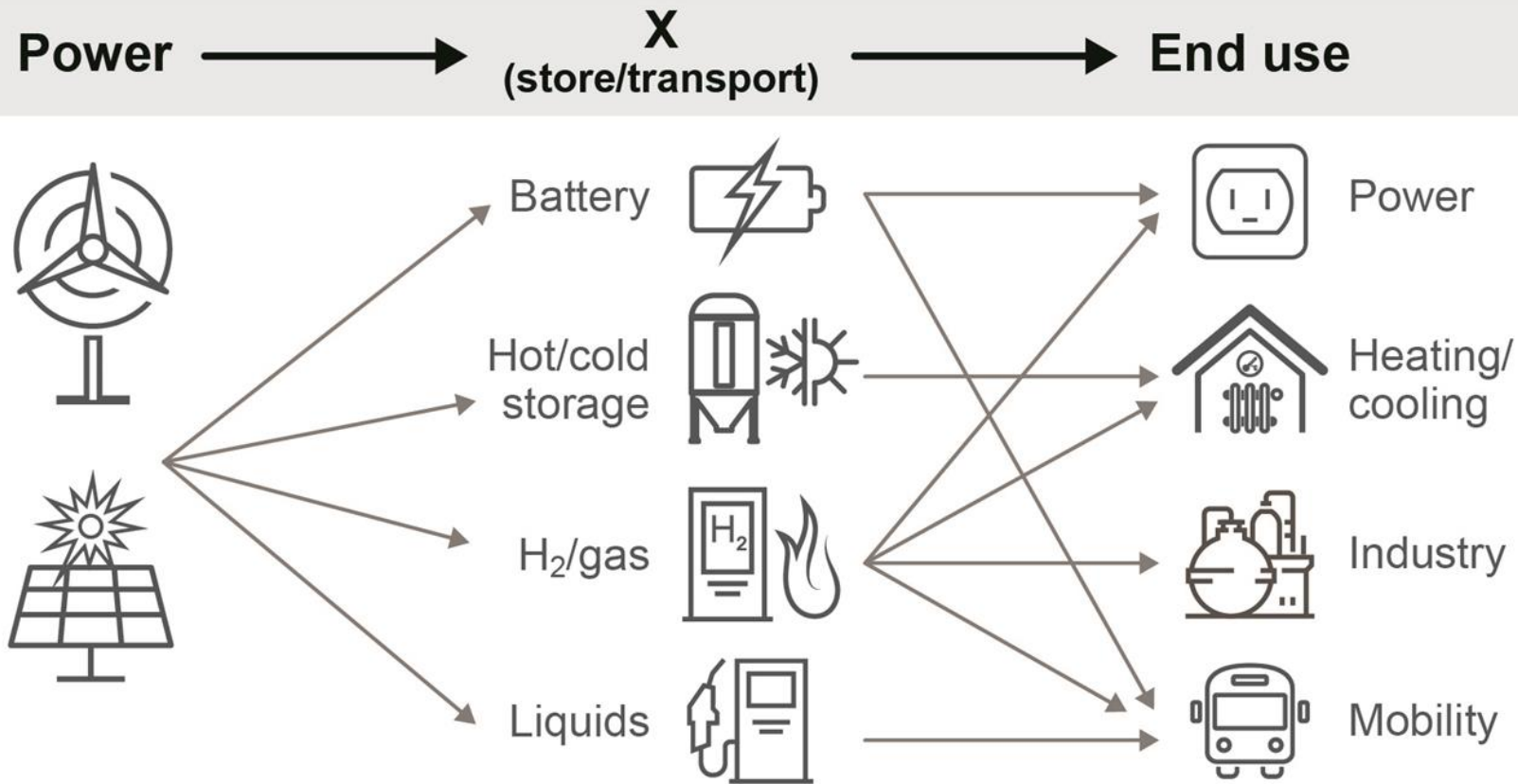
- Gas is a low carbon fossil fuel, but not low enough for 80-95% decarbonization by 2050
  - Grid operators are turning to green gas as a possible replacement for natural gas beyond 2030 —so far biogas only used for small-scale combined heat and power (CHP)
  - Biogas and biomethane are constrained by feedstock availability
  - Power to hydrogen, or power to gas, may become a much more important source of green gas
  - Clean gas from steam reforming of natural gas plus carbon capture and storage could work synergistically with green gas
  - A choice may be needed between blending gases in the grid or converting parts of grid to hydrogen
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# Hydrogen from power to gas or steam methane reforming plus CCS Stores electricity and decarbonize the gas grid



# Power-to-X-to-power? Other solutions may be better

## Power-to-X-to-power? Other solutions may be better



Source: IHS Markit

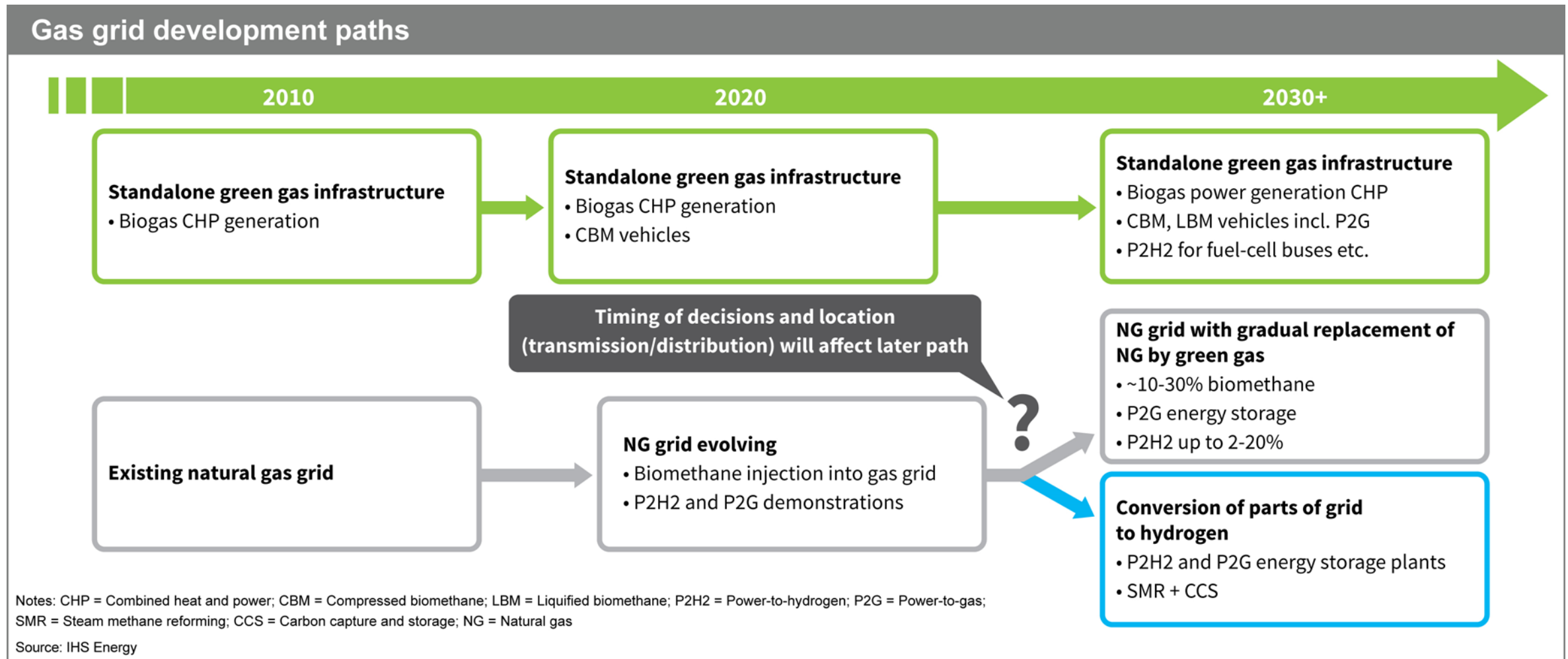
Power to X to power is in direct competition with batteries

Power to heat requires a heat sink

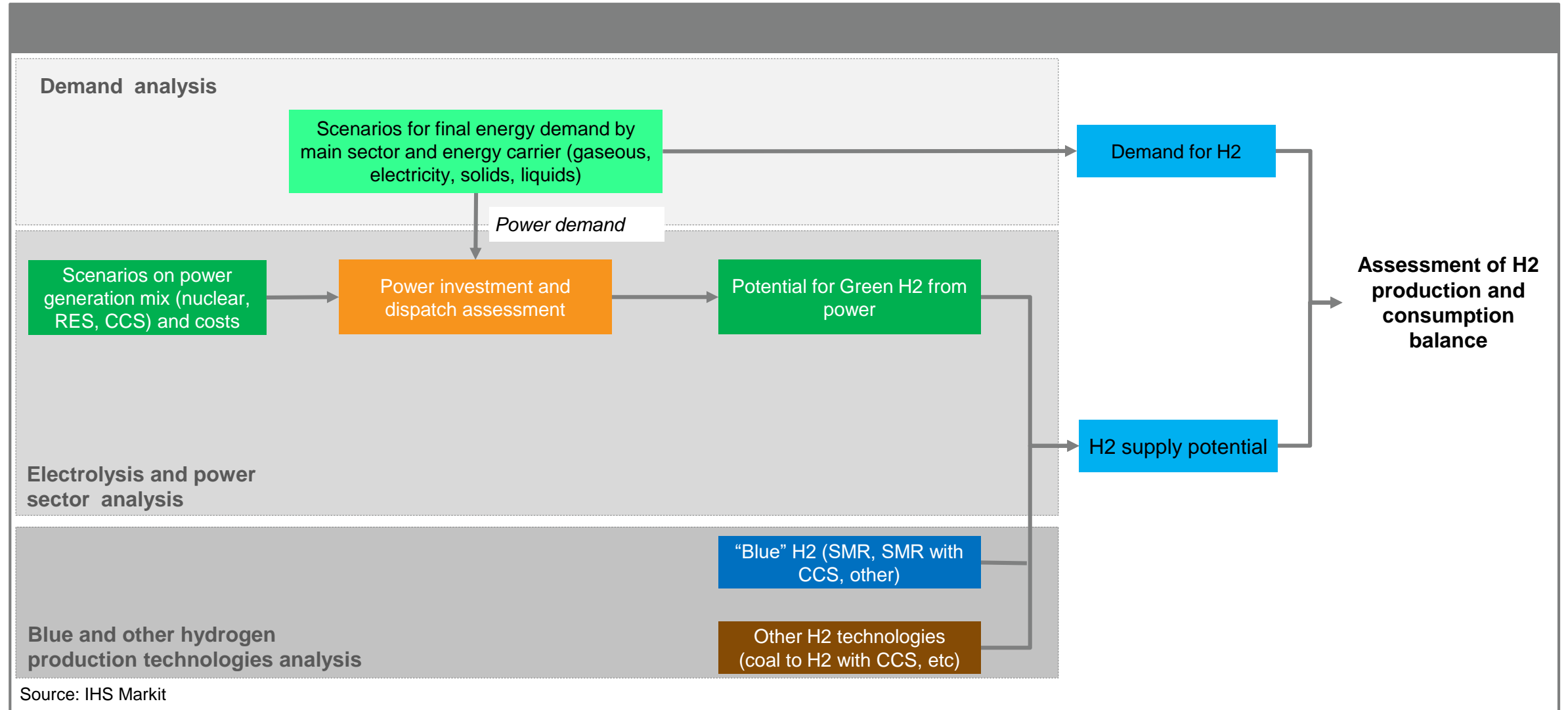
Power to gas could replace natural gas in industry—need is often for hydrogen

Power to liquids and power to gas competes with gasoline or diesel

# As Europe seeks to decarbonize its gas, a decision between a methane/hydrogen mix and hydrogen-only may be needed for the gas grid



# Overall Quantitative Approach





## 26 organizations have already participated in the pilot study



## Structure of the Hydrogen Forum

Deliverables and scope of work can evolve based on participants feedback

- Two meetings during the year -- spring and autumn
- Location: a 'hydrogen-interesting' location. Suggestions: Leeds, to include a presentation by H21, Northern Gas Networks, an area with hydrogen infrastructure in the Netherlands, a hydrogen plant in southern France, or Brussels, to include policymakers in the process.
- A two-day session for each meeting – the first day will be (where appropriate) a visit and dinner, the second day of presentation on specific topics. These could include:
  - **Supply:**
    - Comparison of a broader set of hydrogen production options from biomass/waste; a further review of costs
    - Exploring options for hydrogen imports
    - Costs of for example biomethane, synthetic gases
  - **Infrastructure:** Are synthetic methane or other synthetic fuels a better option than hydrogen?
  - **Policy:** Review of current/prospective support policies for hydrogen
  - **Scenario:** The development of a net zero carbon scenario using hydrogen
  - **Renewable partnership:** An analysis of the interaction between hydrogen and renewable deployment in the power sector
  - **Investment:** estimating capital expenditure and operating expenditure by segment, to help identify any investment challenge and where the value is in the chain.

# Who can benefit from Hydrogen Forum?

## Key Questions for Upstream Oil and Gas Companies:

- Can blue hydrogen offer a long term future for natural gas via steam reforming plus CCS?
- Will the costs of blue hydrogen be lower than green hydrogen from renewable electricity?

## Key Questions for Electric Utilities:

- What is the role of hydrogen storage in integrating intermittent renewable power?
- Is large scale hydrogen power feasible?
- Can hydrogen electrolysers offer ancillary services?

## Key Questions for Financial Institutions:

- How will projects be financed?
- Will there be policy support for hydrogen?

## Key Questions for mobility sector:

- Could hydrogen be a major means to decarbonise trucks, buses, cars?
- What refueling infrastructure would be needed?

## Key Questions for Industrial End-users:

- Can green/blue hydrogen replace conventional sources of process hydrogen?
- Can fossil fuel heat sources be replaced by hydrogen?

## Key Questions for Gas Distributors:

- How much hydrogen can the gas grid accommodate?
- Is a mix of methane/hydrogen or partial conversion to hydrogen-only optimal?
- What heating technologies/appliances are most suitable for use with hydrogen

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