International Energy Agency

Hydrogen data collection

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Outline

Key trends

Methodology: key aspects

Key trends

Demand

Production

Trade

Hydrogen overview

Hydrogen is widely recognised as an **important option** in supporting **climate ambitions**; it can also help enhance **energy security**

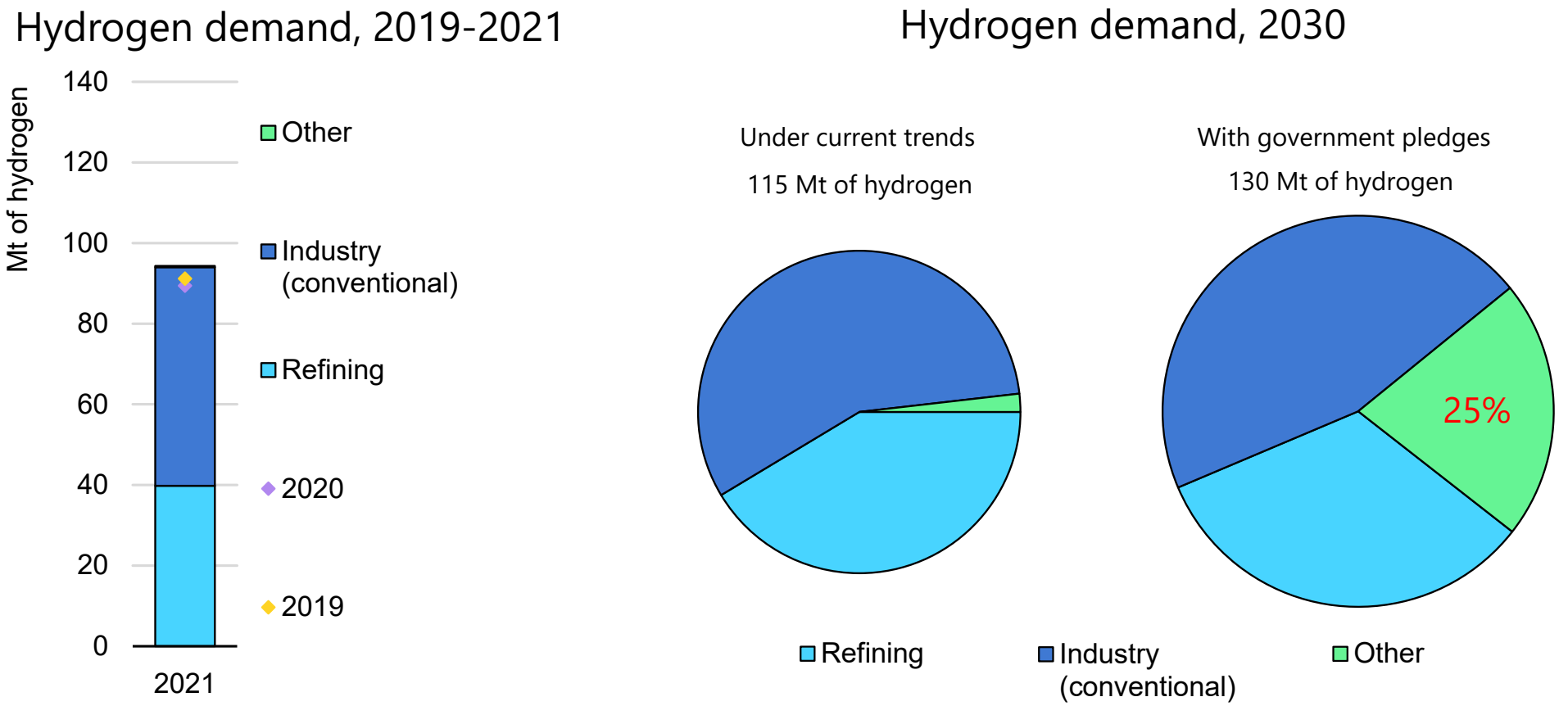
Net-zero pledges are boosting hydrogen interest, further bolstered by the global energy crisis:

- **Large projects** are starting to reach FID and major players are signing off-take agreements
- **Growing international cooperation** to develop hydrogen trade

Adoption of **low-emission hydrogen** as energy vector is at an early stage and needs regular and effective tracking

To track the growing role of this energy career, Eurostat and the IEA developed a **new joint-questionnaire** for specific reporting on Hydrogen production and uses

Demand is growing, with positive signals in key applications

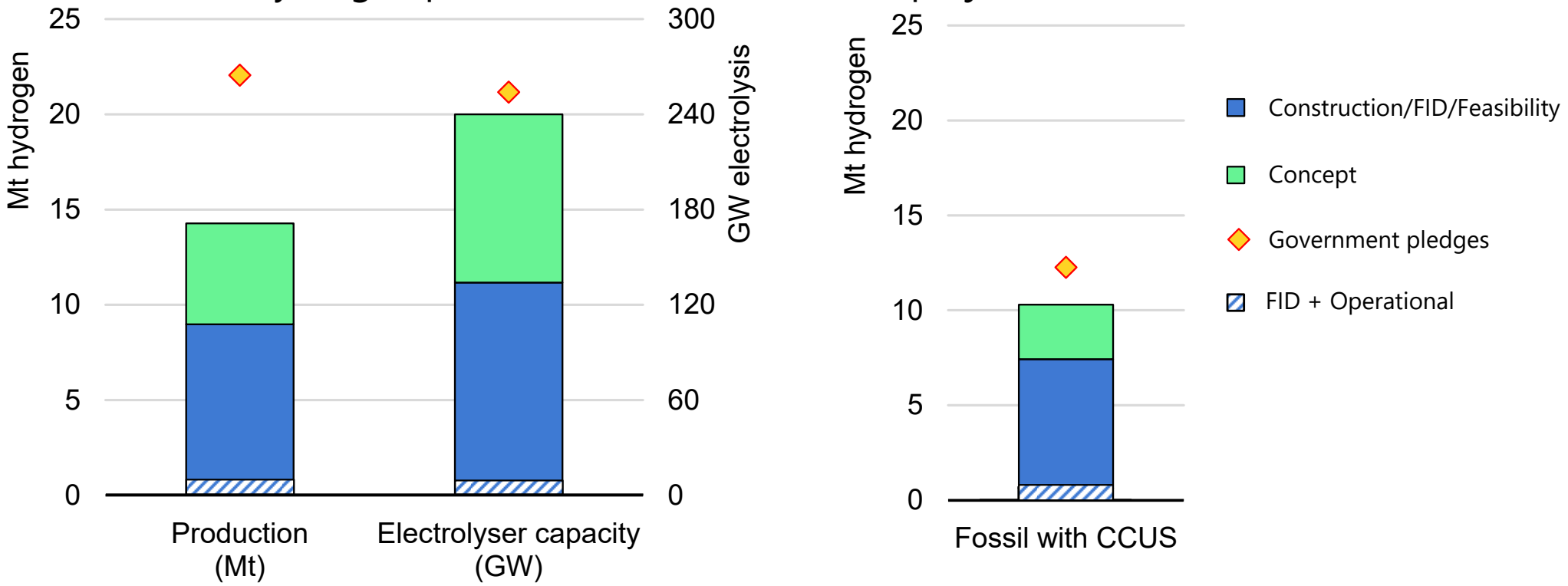


There are plans to increase hydrogen usage in heavy industry, transport, and power generation, but ambitious policies are needed for hydrogen to fulfil its role in meeting government climate pledges.

Source: *IEA, Global Hydrogen Review 2022.*

Pipeline of production projects expands, but few reach FID

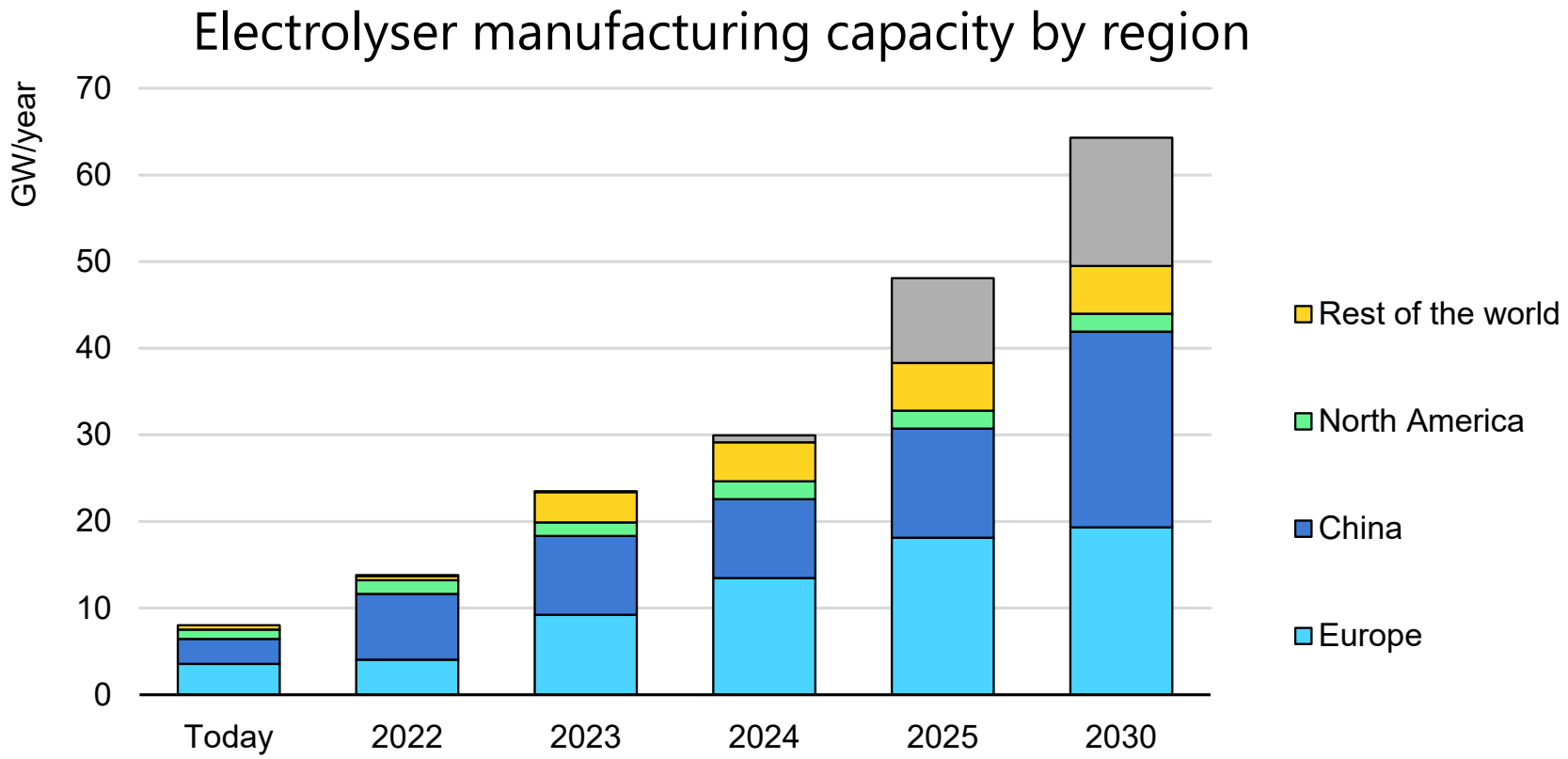
- Low-emission hydrogen production from announced projects, 2030



Low-emission hydrogen could reach 16-24 Mt per year by 2030. However, just a few projects are under construction or have reached FID due to uncertainties about demand, regulation and infrastructure

Source: *IEA, Global Hydrogen Review 2022.*

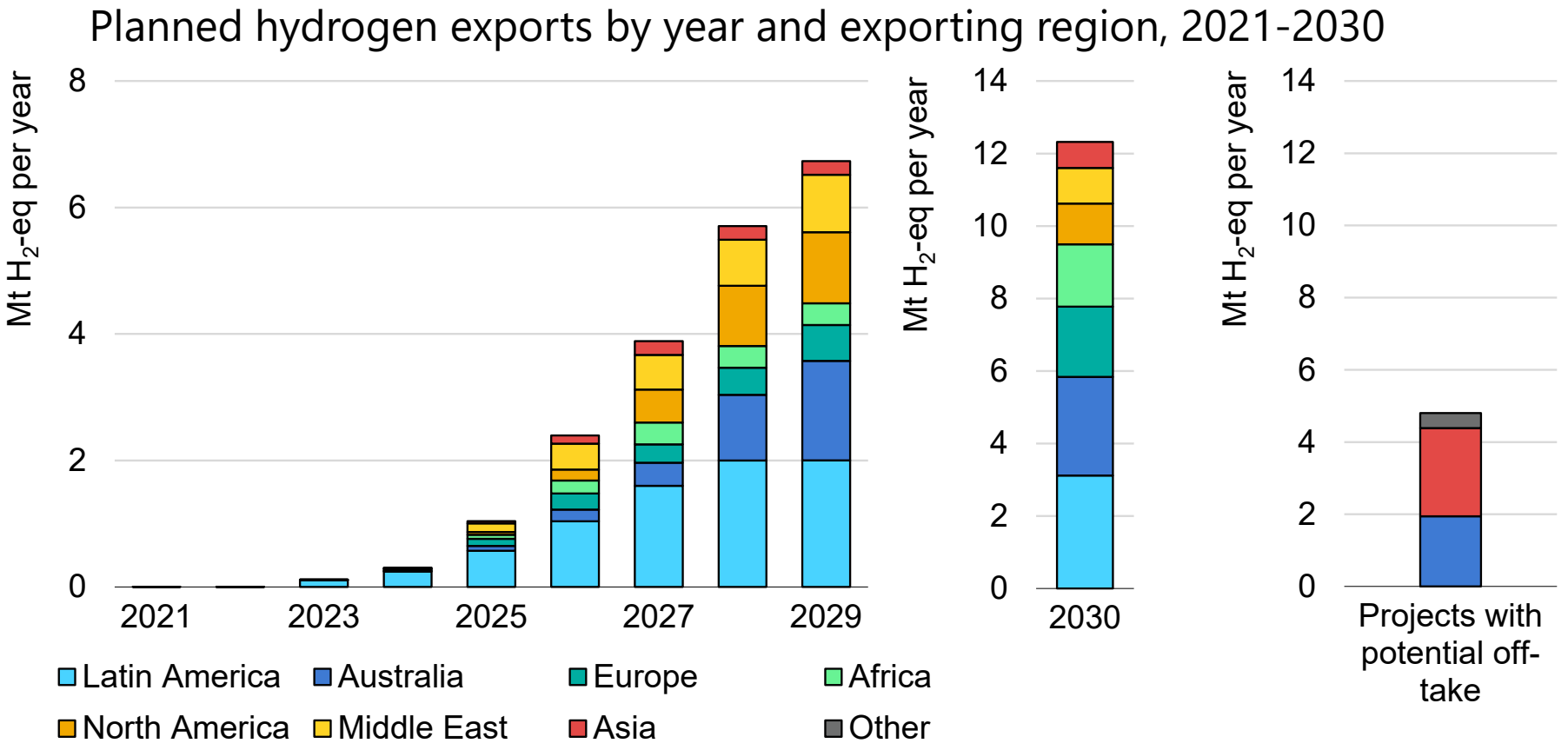
A new energy economy: the case of electrolyser manufacturing



Electrolyser manufacturing capacity could exceed 60 GW per year by 2030. This would be more than enough to support planned electrolyser projects and government targets.

Source: *IEA, Global Hydrogen Review 2022.*

Hydrogen trade can kick start soon, but barriers remain



Annual exports could reach 12 Mt of hydrogen by 2030, but off-take agreements are lagging behind. Key challenges remain in regulation, infrastructure, demand creation, value for exporters and trade rules

Source: *IEA, Global Hydrogen Review 2022.*

Methodology: key aspects

Assumptions and definitions

Hydrogen balance

Production

Trade

Transformation in refineries

Hydrogen in energy statistics

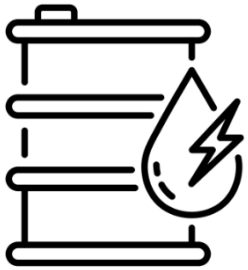
- **H2** (gas, odorless, non-toxic, highly combustible);
- Considered a derived (secondary) product, like oil products;
- Unit of measure: **TJ** (approx. 140 MJ x 1Kg, 3 times the energy content of gasoline);
- Gas purity of at least **98%**, we are not covering the presence of H2 in other compounds.

- We are covering intentional production and by-product;
- Auto produced and auto consumed quantities (Captive);
- Energy and non-energy use;
- We are not distinguishing "clean hydrogen" or doing a sustainability accounting, we want to account **all hydrogen.**

- We are **not** covering the hydrogen **presence in other compounds**. Only the part extracted from it or used to produce it. With a few exceptions detailed later.
- We are **not** covering the H2 contained in **intermediate products**.

Hydrogen in other compounds: Exceptions

- Ammonia: NH3
  - Relevant commodity already exchanged worldwide.
  - Applications in Non-energy use, energy use and energy carrier
  - Many interactions with hydrogen



- E-fuels = Electrofuels. We include also other fuels of non-biological origin
  - Including also RFNBO and synthetic fuels if not reported in other questionnaires
  - Following here the SIEC revision (Methanol, hydrogen e-fuels, synthetic fuels)
  - It can be produced starting from hydrogen feedstocks

H2, NH3 and E-fuels balance – Overview

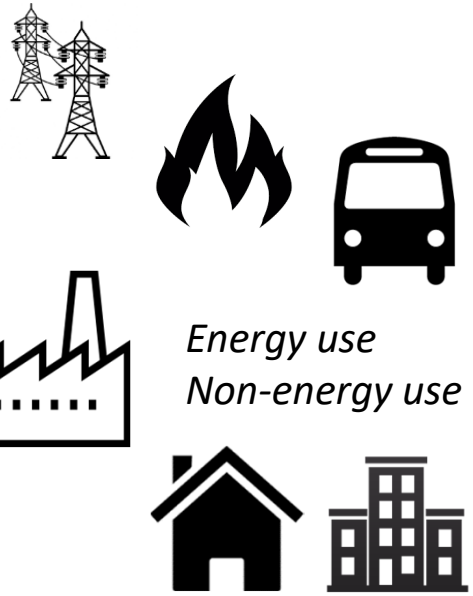
Production:
- From other energy commodities
- From electrolysis
- From other sources

Imports
Exports
Intl. bunkering
Stock changes

Supply

Statistical difference

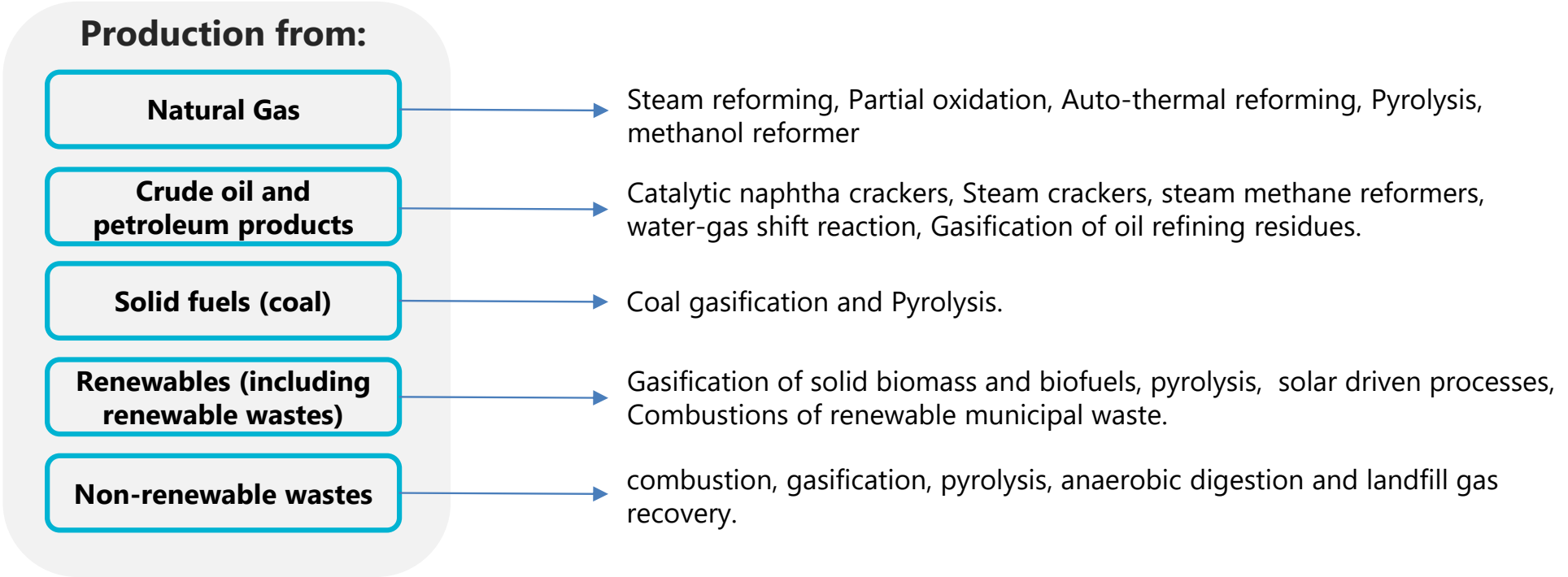
Transformation
…
Energy sector
…
Final consumption
Transport
…
Industry
…
Other sectors
…



Energy use
Non-energy use

Demand

H2 balance – Production



WITH AND WITHOUT CARBON CAPTURE AND STORAGE (CCS)

H2 balance – Production

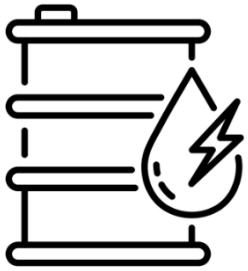
From electrolysis

Grid elctricity	The electricity used to produce hydrogen, has been produced from several sources in a central power plant or another infrastructure.
Electricity from renewables (DL)	This process could be also to produce Hydrogen and mix it with N2 to generate renewable ammonia.
Electricity from nuclear (DL)	Various processes are foreseen to be used in H2 generation in the coming two decades.
Electricity from fossil fuels (DL)	Production from fossil fuels through a transformation process in a central power plant or another energy infrastructure.
From electricity - Others	Produced as a by-product and production in other electricity-base processes not listed above.

DL: Direct Line, only the electricity production that is physically connected to the electrolyser!

NH3 and E-fuels balance – Production

- Ammonia, NH3:
  - Quantities of ammonia produced from other energy sources: fossil fuels, renewables, wastes, electricity, nuclear energy, and other natural sources.
  - All ammonia produced, for either energy or non-energy purposes.
  - Currently 80% of ammonia is coming from natural gas.



- E-fuels:
  - Quantities of e-fuels produced from other energy sources: renewables, wastes, electricity, nuclear energy, and other natural sources.
  - Currently at the early stages of development.
  - Include renewable liquid and gaseous fuels of non-biological origin (RFNBO).

H2 balance - Trade

As for the fossil fuels, focusing on **the country of origin** or of **final destination**.

Most of the H2 trade is currently done by **pipeline** (injected or blended). Other transportation system included transformation into **ammonia** or **Methyl-cyclohexane**.

The transformation losses incurred during these processes will be recorded under “Transformation losses” in the Transformation table.

Use the remarks sheet to specify if hydrogen is transported in another form!

H2 balance – Transformation

H2 → **Electricity & heat**

Hydrogen	→	Electricity/heat plants	→	Electricity Heat Electricity and heat

H2 → **Converted to gas**

Hydrogen	→	Gas works and gasification plants	→	Gas-works gas, other gases

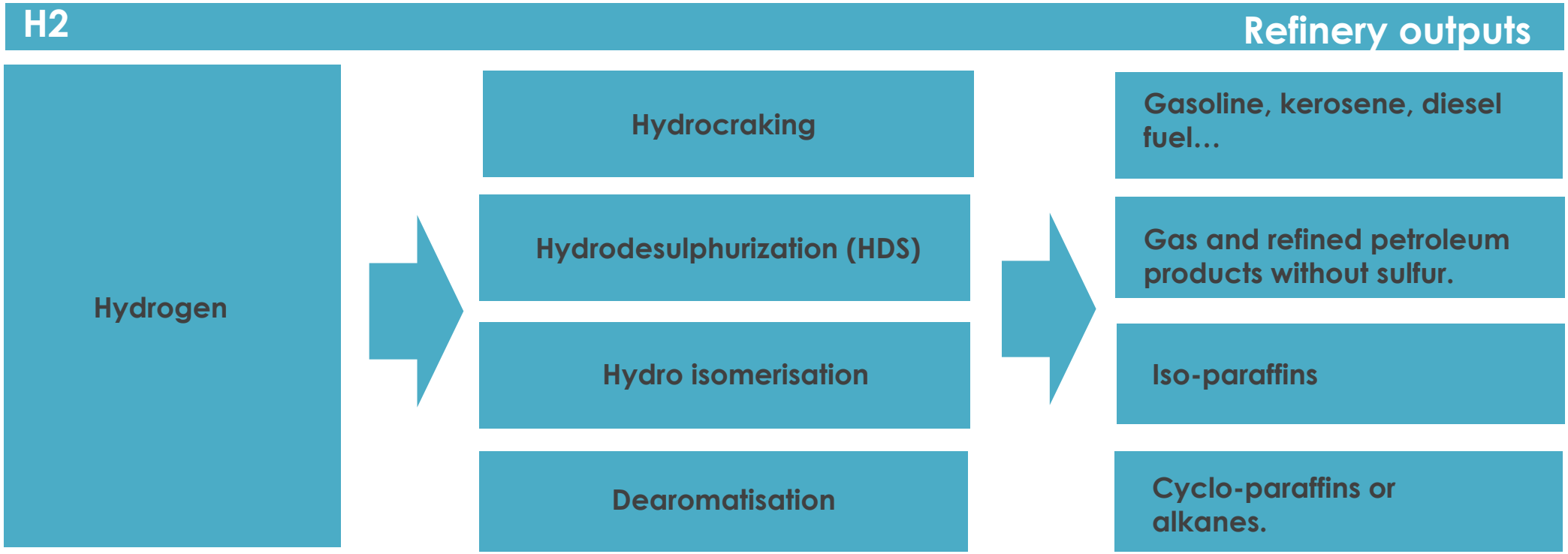
H2 → **Ammonia**

Hydrogen	→	Haber-Bosch process	→	Quantities of ammonia also reported in table 1

H2 → **E-fuels**

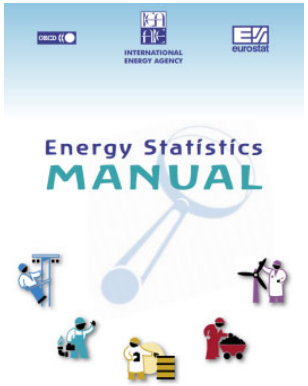
Hydrogen	→	Fisher-Tropsch process	→	Quantities of E-fuels also reported in table 1

H2 balance – Transformation



Learn more about energy statistics

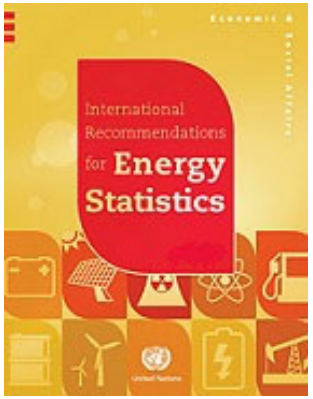
Energy Statistics Manual



- Available in 10 languages
- Data collection methodologies
- Consistent with the IRES framework

Click here

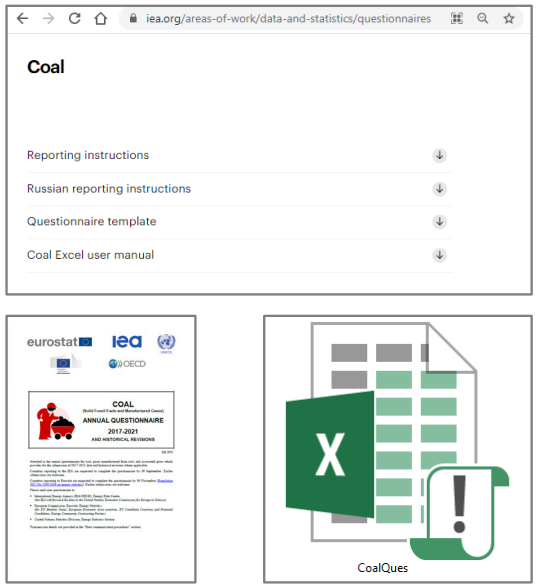
United Nations' International Recommendations for Energy Statistics (IRES)



- Available in 6 languages
- International framework for energy statistics

Click here

IEA Statistics website

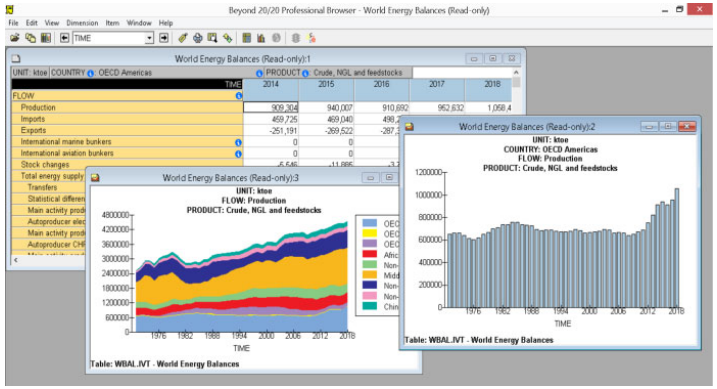


- Questionnaires
- Reporting instructions

Click here

Beyond data collection

Data services for purchase



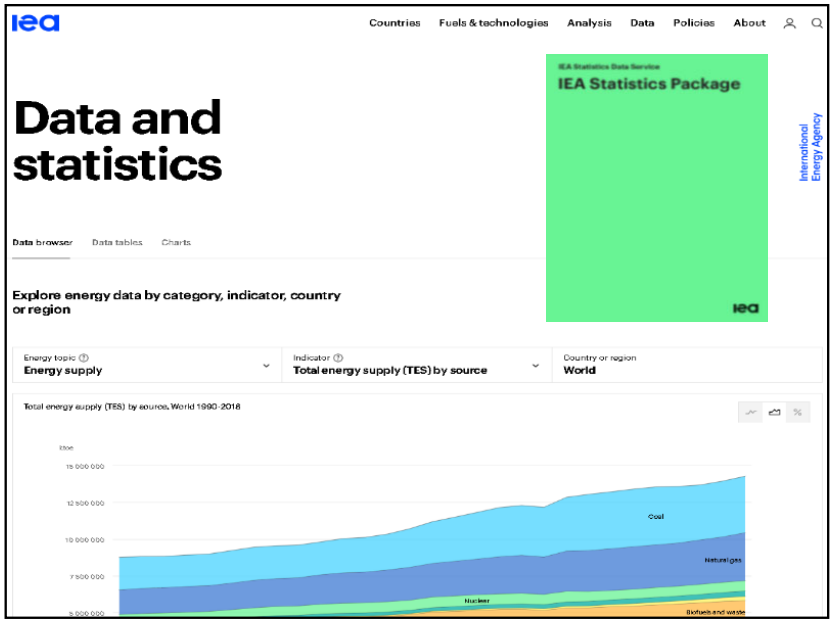
[Energy Carbon Tracker]
[World Energy Balances & Statistics]
[Monthly Oil Data Service]
[Oil Information]
[Natural Gas Information]
[Coal Information]
[Electricity Information]
[Renewables Information]
[Energy Efficiency Indicators]
[Greenhouse gas emissions from energy]
[Energy Prices]
[Projections: Energy Policies of IEA Countries]

Free products

[Real-Time Electricity Tracker]
[Data and Statistics data browser]
[Energy Balance Flows (Sankey diagrams)]
[Energy Atlas]
[Weather for Energy Tracker]
[Monthly OECD oil], [gas] and [electricity statistics]

Annual highlights:

[Energy balance], [CO_2 emissions], [Energy Technology RD&D], [Efficiency indicators], [Gas Trade Flows]



Data support for the Agency