The Future of Hydrogen

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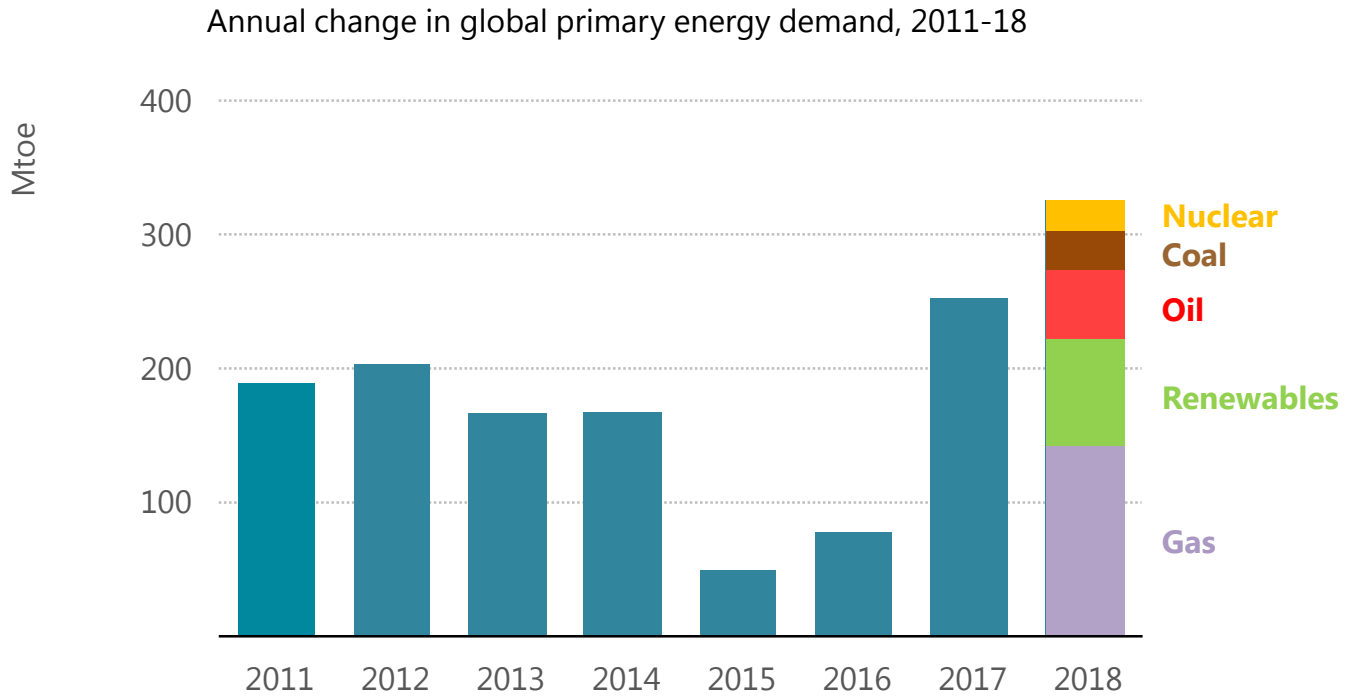
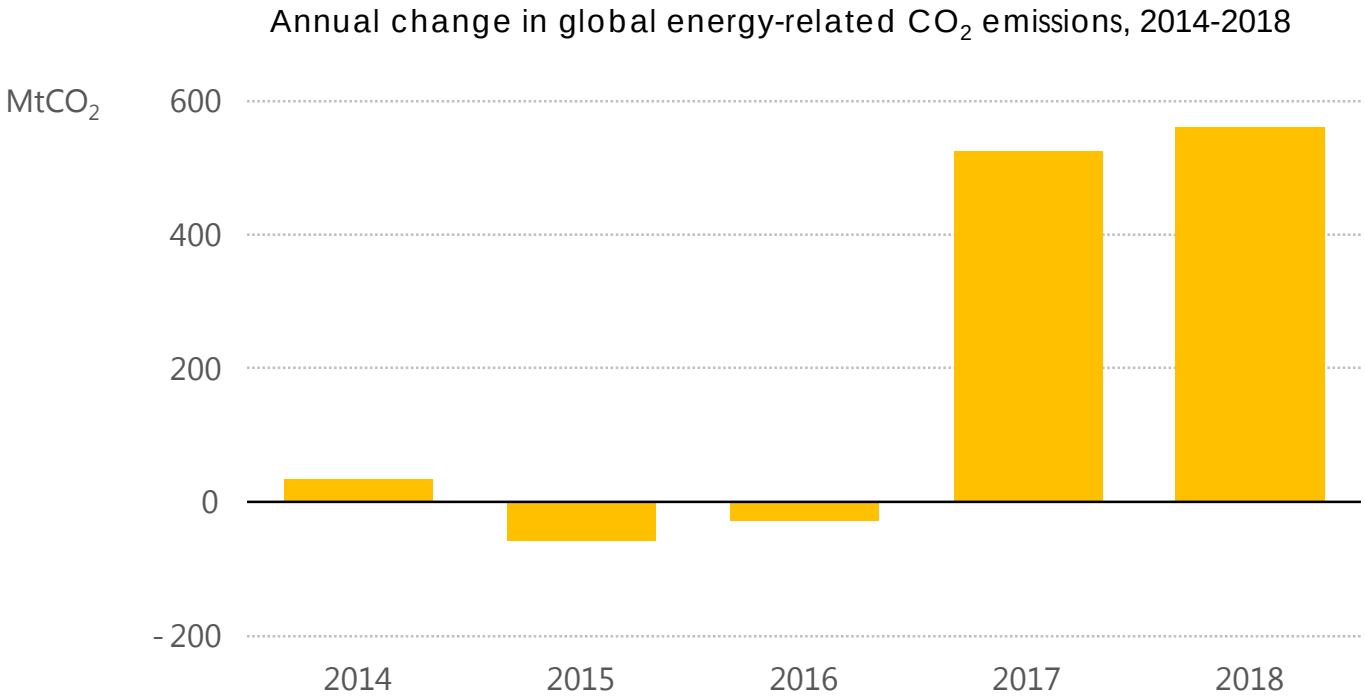
International Energy Agency

2018 – a remarkable year for energy



Global energy demand last year grew by 2.3%, the fastest pace this decade, an exceptional performance driven by a robust global economy, weather conditions and moderate energy prices.

Energy-related CO_2 emissions hit a record high…



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Higher demand for fossil fuels drove up global CO_2 emissions for a second year after a brief hiatus. Increases in efficiency, renewables, coal-to-gas switching and nuclear avoided 640 Mt of CO_2 emissions.

Hydrogen – A common *element* of our energy future?

- Momentum currently behind hydrogen is unprecedented, with more and more policies, projects and plans by governments & companies in all parts of the world
- Hydrogen can help overcome many difficult energy challenges
  - ***Integrate more renewables,*** including by enhancing storage options & tapping their full potential
  - ***Decarbonize hard-to-abate sectors*** – steel, chemicals, trucks, ships & planes
  - ***Enhance 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

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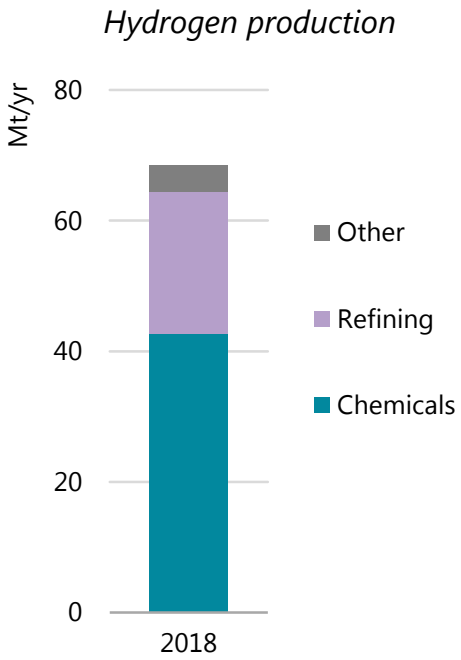
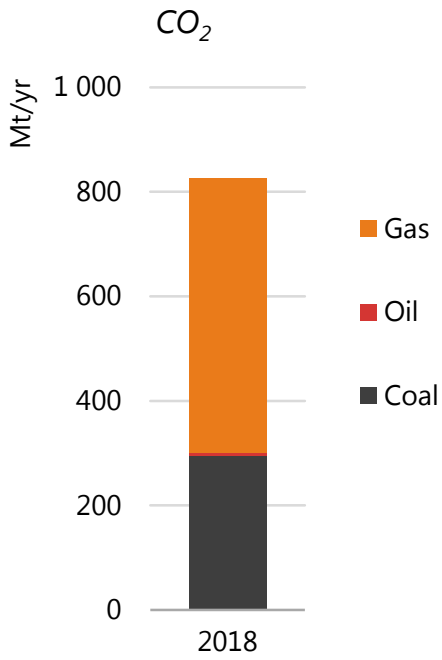
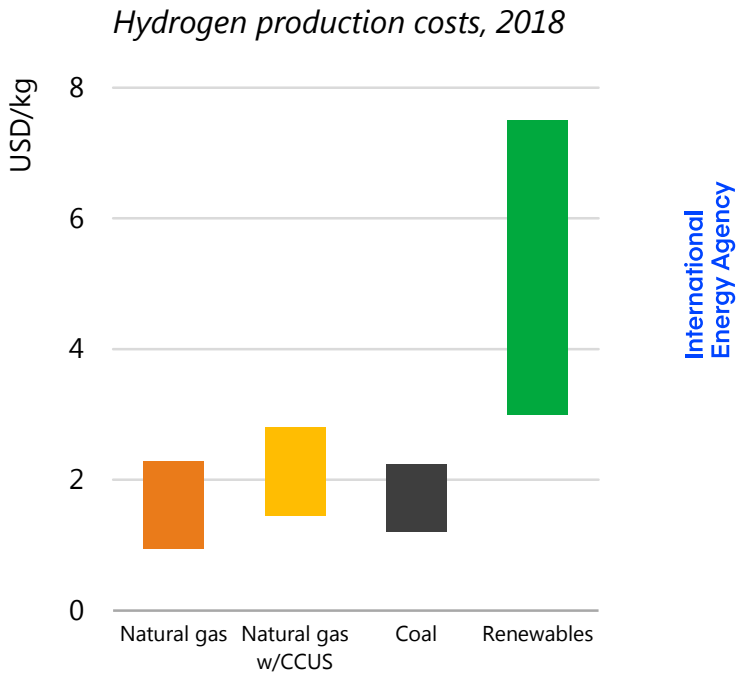
Hydrogen is already part of the energy mix







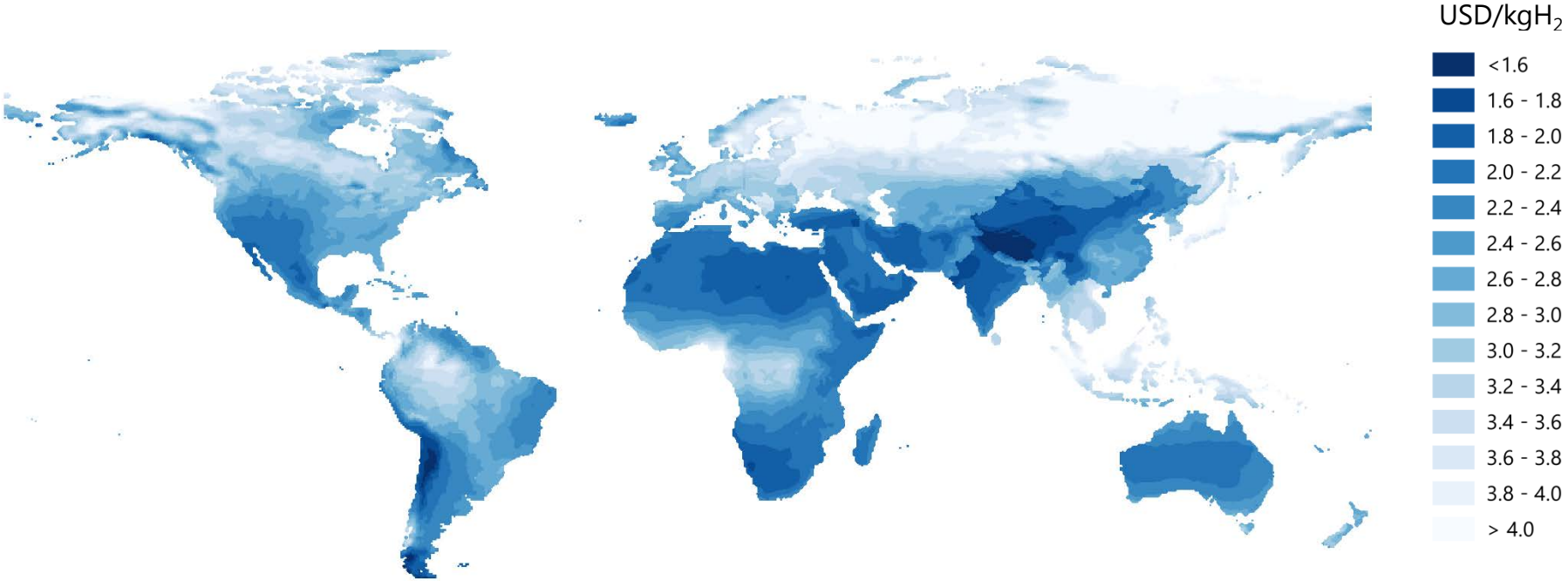
Dedicated hydrogen production is concentrated in very few sectors today, and virtually all of it is produced using fossil fuels, as a result of favourable economics.

Hydrogen production with CO_2 capture is coming online

Low-carbon hydrogen from fossil fuels is produced at commercial scale today, with more plants planned. It is an opportunity to reduce emissions from refining and industry.

Renewables hydrogen costs are set to decline

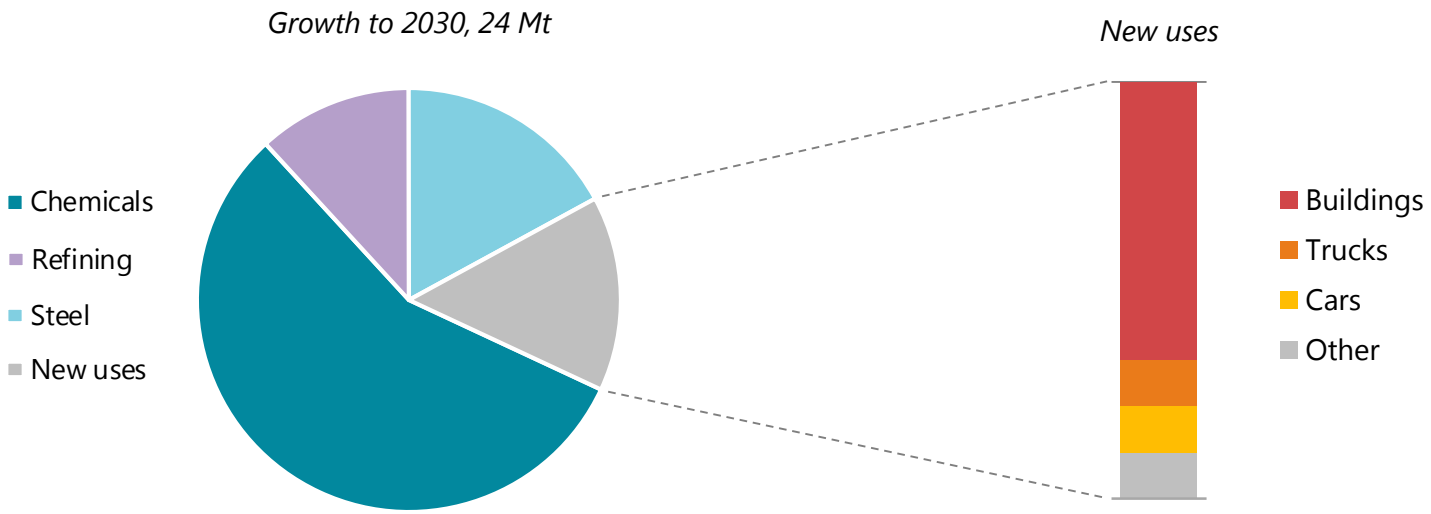
Long-term hydrogen production costs from solar & wind systems



The declining costs of solar PV and wind could make them a low-cost source for hydrogen production in regions with favourable resource conditions.

The challenge to 2030: expand hydrogen beyond existing applications

Growth in hydrogen use based on announced policies, 2018-2030



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Dependable demand from current industrial applications can be used to boost clean hydrogen production; policies & industry targets suggest increasing use in other sectors, but ambition needs to increase.

Four key opportunities for scaling up hydrogen to 2030

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