ERCST – 16 June 2021

HYDROGEN POLICY DEVELOPMENTS, NEEDS AND REALITY 2.0

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AURORA ENERGY RESEARCH

Enabling the European hydrogen economy –

May 2021

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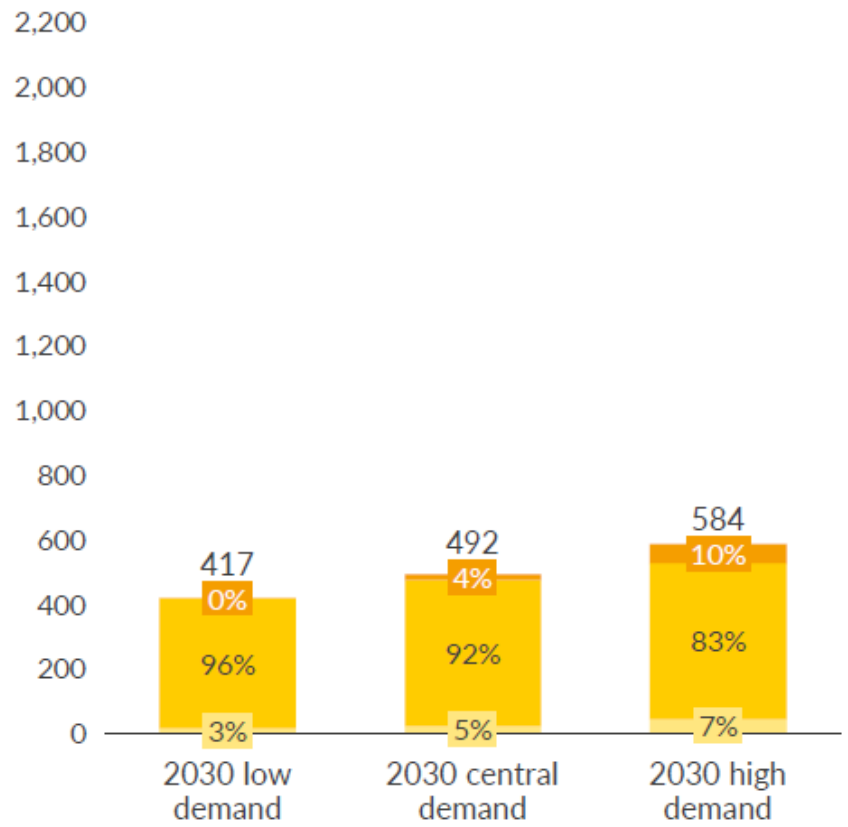
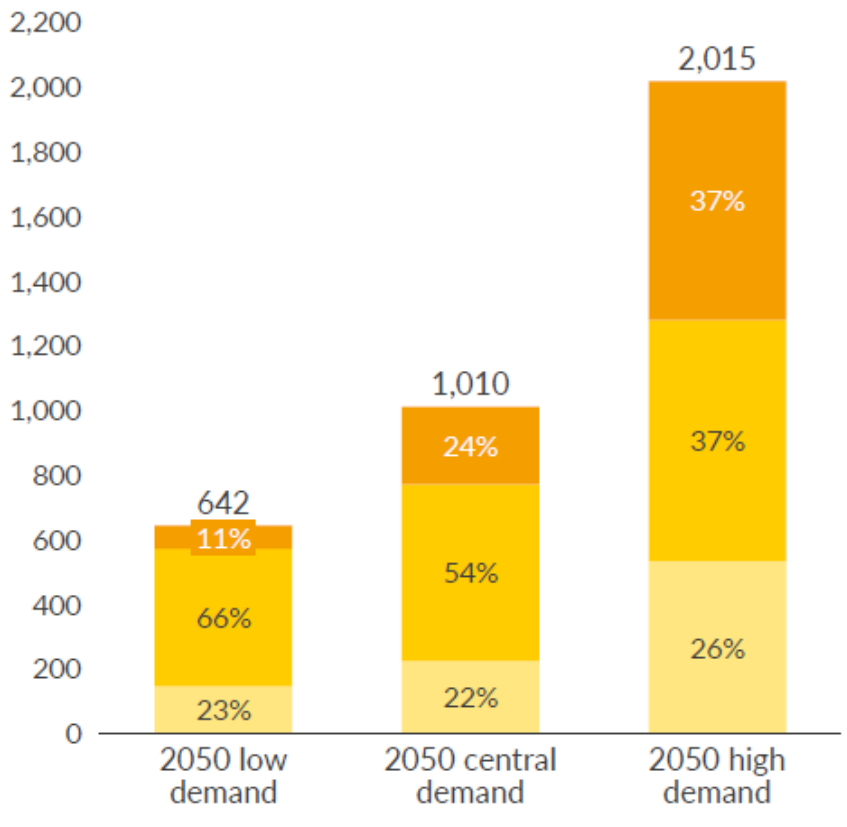
Hydrogen is needed in hard-to-abate sectors which cannot be directly electrified

Potential H_2 demand, 2030
TWh



Potential H_2 demand, 2050 : **7% to 20% of total EU energy consumption**
TWh

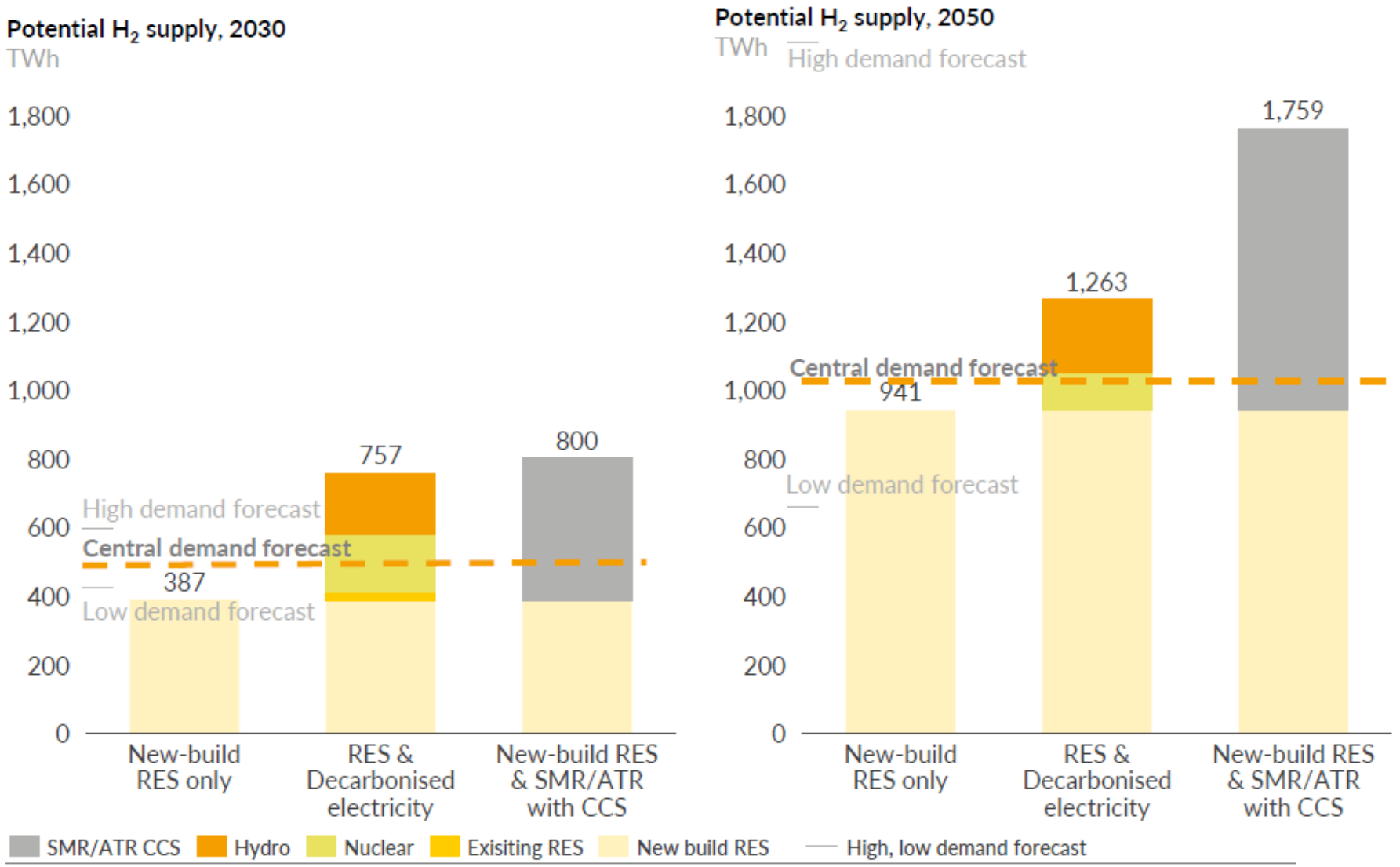


Transport Industry & Chemicals Heating

1) Heavy Good Vehicles 2) Switching to hydrogen or hydrogen-derived fuels

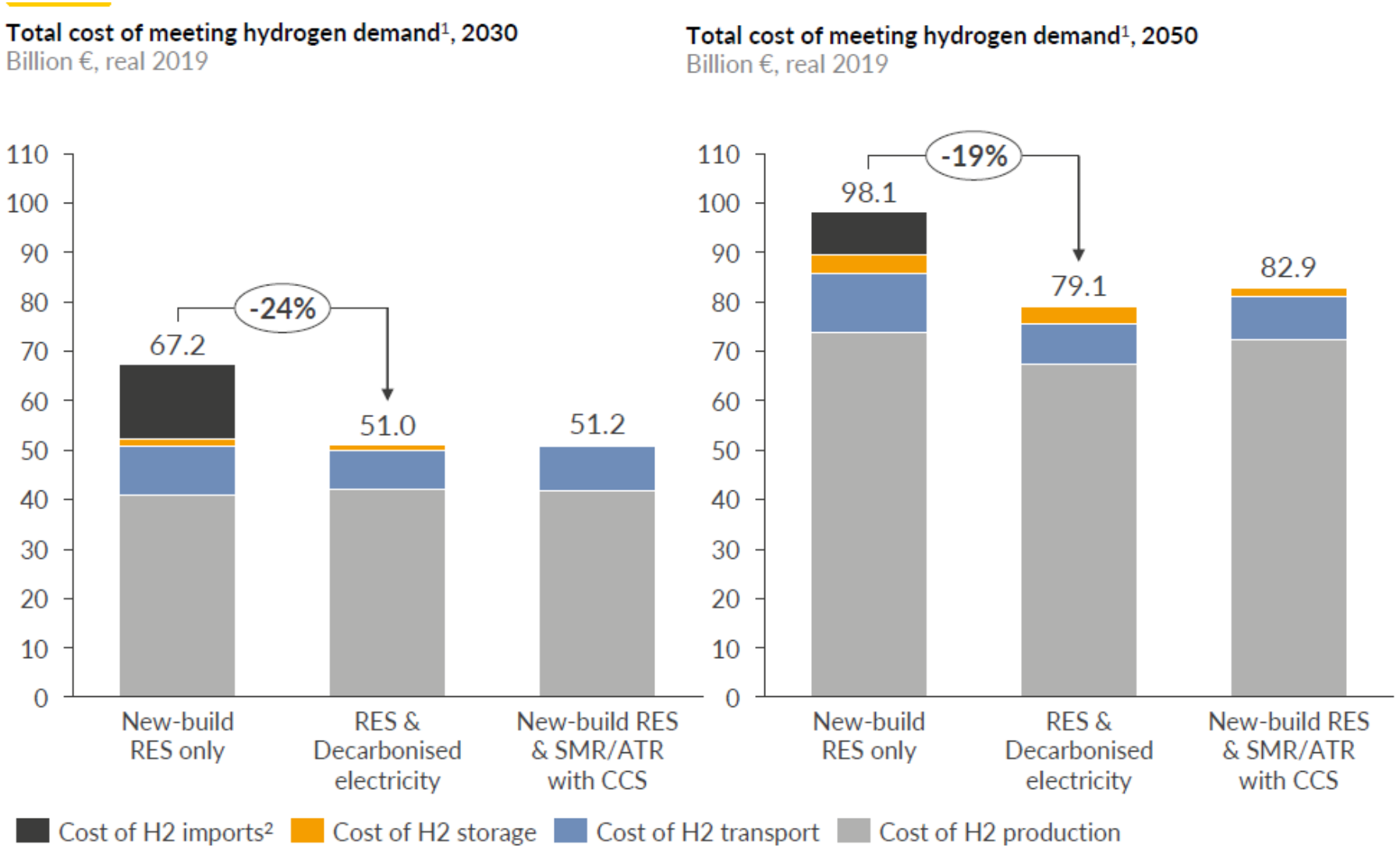
Source: Enabling the European Hydrogen Economy, Aurora Energy Research, May 2021 - full report

By allowing the use of all forms of RES and decarbonised electricity to produce H2, the EU could meet its demand



Source: Enabling the European Hydrogen Economy, Aurora Energy Research, May 2021 - full report

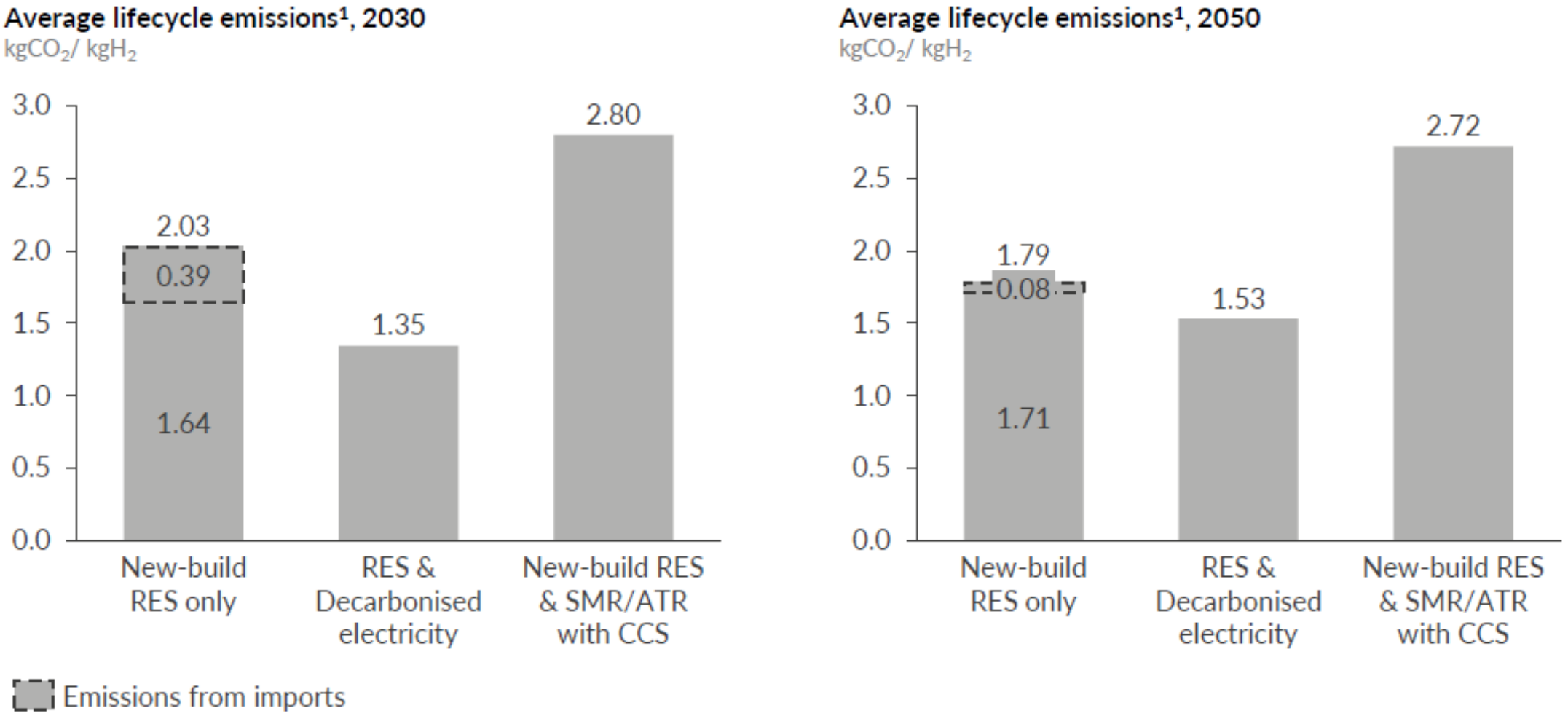
Using all types of renewable and decarbonised electricity leads to lower costs



1) Calculated to the central demand forecast. An EU-ETS carbon price of €38.34/t in 2030 and €71.0/t in 2050 was applied to residual emissions as a result of CCS. No carbon price has been applied to full-lifecycle emissions from any technology. 2) Cost of imports is calculated assuming 20% if imports from Morocco (via pipeline), 30% from Australia and 50% from Chile.

Source: Enabling the European Hydrogen Economy, Aurora Energy Research, May 2021 - full report

Life cycle emissions are lowest when all forms of RES and decarbonised electricity is utilised to produce H2



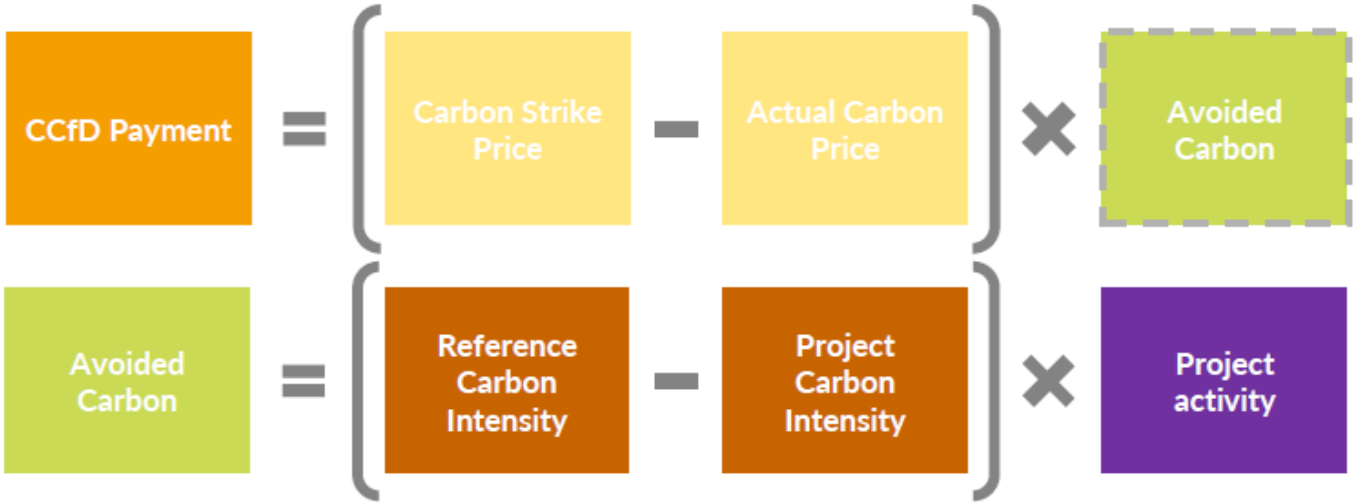
Source: Enabling the European Hydrogen Economy, Aurora Energy Research, May 2021 - full report

Key principles

- **Clearly define** the different types of renewable and low carbon hydrogen, **based on CO2 emissions throughout the production process**, and put in place **robust certification schemes**.
- Introduce **Guarantees of Origin** for renewable and low carbon hydrogen to **give transparency** to consumers
- Ensure that **imports respect the same criteria** as EU based hydrogen and **include the hydrogen sector in the Carbon Border Adjustment Mechanism**
- Make clean hydrogen competitive against fossil alternatives thanks to **support schemes** + **review energy taxation and address free ETS quotas** for fossil hydrogen
- **Both on the demand and supply side** need for **support to CAPEX and OPEX. OPEX are the dominant cost element for hydrogen (buying electricity)**
- On the supply side **focus on projects which have identified H2 consumers**: not effective to subsidize H2 production to just inject it into the gas grid (blending) without any identified offtaker.
- Consider **supporting CCU for unavoidable CO2 emissions** by rewarding the use of CO2 to produce high added value products or chemicals (and avoid double counting of CO2 emission reductions!)

CCFDs would provide a payment for avoided carbon emissions which could be applied across multiple sectors

Current EU-ETS prices are too low to drive decarbonisation and as future carbon prices are uncertain, securing funding for abatement projects is challenging. CCfDs are designed to hedge against volatile carbon prices. Under a CCfD scheme, investors would be guaranteed a carbon price needed to finance their project.



How could the carbon strike price be designed? Sector or project specific CCfDs would be needed, with specific strike prices. A single strike price for all industries would mean for many sectors the strike price would be too low to support decarbonisation.

How could CCfDs be auctioned? Sector-specific auctions would fairly allocate CCfDs across all sectors, allowing segments such as steel to realise the full potential of decarbonised H_2.

Would a CCfD scheme be implemented at a national or EU level? A CCfD scheme would likely be implemented at a national level, however compatibility with state aid rules will be vital.

What would the duration of a CCfD be? CCfD contracts should be designed to cover the full investment period of a project. Decarbonisation of many industrial sectors will introduce high technological and financial risks and support is needed for the entire investment period for a project to be successful.