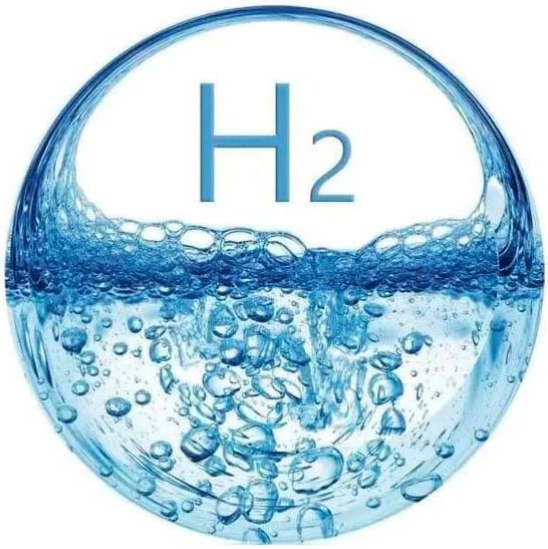
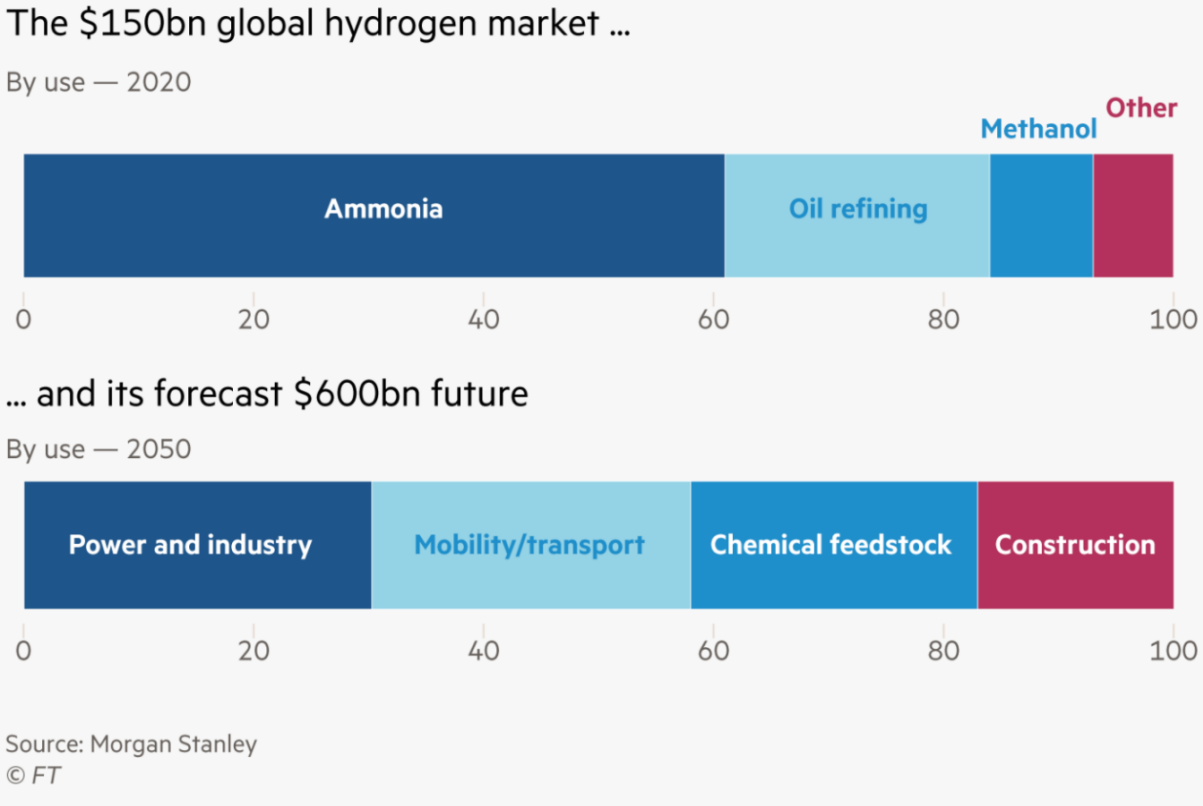
Blue Hydrogen, a silver lining for hard to decarbonize industries?



Over the recent past, the World's interest in hydrogen has gone up significantly. The trend has even accelerated on the back of the 2015 Paris Climate Agreement and the increasing number of countries pledging to invest massively in hydrogen to reset and boost their economies post Covid-19.

In this context, the $150 billion hydrogen market is expected to quadruple in just 30 years. Interestingly enough, hydrogen will play an increasingly pivotal role in power generation, heating & cooling but will also help decarbonize heavy industries such as Steel, Cement and Transport through clean mobility solutions. According to the World Steel Association, the production of steel alone is responsible of 6% to 9% of carbon dioxide emissions in a given year. Another hard to decarbonize sector is transport. It is responsible for 15% of the world's carbon dioxide emissions, with passenger vehicles and road transport accounting for 60% of those emissions, while maritime and air transport making up the balance (IEA source).

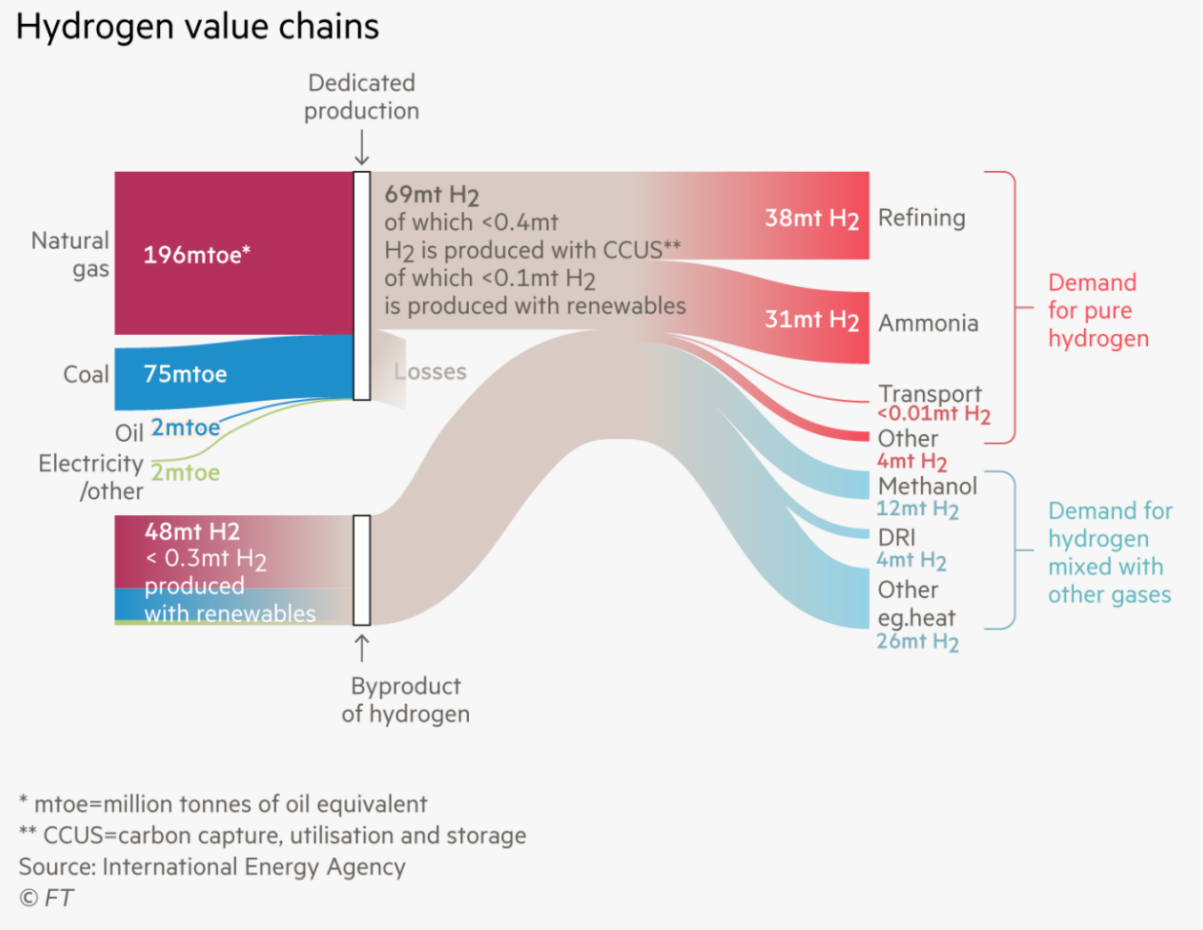


The use of hydrogen in steel production allows phasing out the use of coke, which is responsible for those hard to abate carbon emissions. Using hydrogen in the process allows making direct reduced iron (DRI), which can then be directly fed into an electric arc furnace to produce steel, the latter being powered by electricity from renewable sources. While industrially feasible, this technology is currently 20% more expensive than conventional blast furnaces but is expected to come at par with the latter as hydrogen becomes more competitive.

In the transport sector, the hydrogen makes even more sense given that it has the highest energy density of any fuel (33.6 kWh/kg), nearly is 3 times that of gasoline for the sake of comparison. The real issue though, is hydrogen's low gravimetric density, thereby requiring advanced storage solutions, such as ultra-high pressure, liquid or advanced solid hydrides. As we speak, research and development funding are ramping up with high hopes to deliver industrially viable solutions.

According to the hydrogen Council, $300 billion will be invested over the next decade to decarbonize the world economy. By 2050, hydrogen could make up to 20% of the world's energy mix and help phase out 10.5 billion of oil barrels equivalent, which is equivalent to 110 years' worth of production at pre-crisis rate. Given the strong commitment on the part of governments in Western Europe, North East Asia, Australia and the US, the real concern is the pace at which hydrogen will take its fair share in the new unfolding energy market. Most oil majors have pledged net zero objectives (to attain anywhere between 2030 and 2050) and have already committed $80 billion in investments in Carbon Capture Utilization and Storage (CCUS) to make blue hydrogen and in green hydrogen projects. It is more than likely than blue hydrogen will pave the way to the rapid adoption of this energy carrier by world economies

thanks to its relatively high Technology Readiness Level (TRL) and cost competitiveness. According to Transengy research data, blue hydrogen produced in the oil rich Gulf States will be around $1.0/kg by 2030 and $0.5/kg fifteen years from now. These cost breakthroughs will enable stem a realm of hydrogen end-uses in advanced economies and sustainably fast track the decarbonization of heavy industries, power generation and mobility sectors. This intermediate step is pivotal on the path of green hydrogen, keeping in mind that over 95% of today's hydrogen is produced by steam reforming of hydrocarbons, a process that emits 850 million tons of carbon dioxide a year.



Blue hydrogen may very well be the silver lining of the hard to decarbonize industries as they grapple with the energy transition. That said, it will require sustained investments to set out cost-effective and environmentally friendly production, storage and distribution solutions. Governments must accompany the roll out of blue hydrogen through subsidies, credits and/or carbon taxes to foster the entire ecosystem. Lastly, infrastructure investments will come apace when hydrogen price drops below $1.5/kg, allowing a plethora of new end-uses to come to birth. By then, innovation, continuous improvement in yields and large-scale production of green hydrogen -the so-called Megawatt Electrolyzers- will entrench the use of this molecule in our post-oil economy and help decarbonize heavy industries in conjunction with other renewable energies such as solar or wind.

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