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The Development of the Hydrogen Market Needs Significant Support

According to our Pathway to Net Zero, hydrogen is expected to meet 15% of global energy demand by mid-century. According to our forecasts, hydrogen will account for only 0.25% of the worldwide energy mix in 2030 and 3% in 2050. However, in some locations, this amount will be doubled.

While hydrogen is expected to account for only 3% of world energy demand, advancements in technology and infrastructure over the next 30 years will be considerable. This new energy source has the potential to alter several sectors and is becoming increasingly important in the global energy grid.

- By 2030, e-fuels (mostly e-methanol) are expected to account for 3% of marine fuel mix, rising to 1800 PJ (12%) in 2040 and 2600 PJ (19%) in 2050.
- Pure hydrogen and hydrogen-based e-fuels are expected to account for 16% of aviation energy demand by 2050.
- Hydrogen consumption in manufacturing is expected to increase gradually, reaching roughly 9 EJ/year. By 2050, hydrogen will account for approximately 6% of overall manufacturing energy consumption and 31% of worldwide demand. The iron and steel industry will consume the most hydrogen in production, accounting for 3 EJ/yr (37% of total demand).
- In 2050, hydrogen use in buildings is expected to be around 2 EJ/yr, accounting for only 1.3% of overall energy demand in the sector.

Up to 2050, the estimated global cost of producing hydrogen for energy purposes is expected to be USD 6.8 trillion, plus an additional USD 180 billion for hydrogen pipelines and USD 530 billion for the building and construction and maintenance of ammonia terminals.

Over 85% of the hydrogen produced worldwide by 2050 will come from low-carbon sources. This breakdown looks like this: Methane reforming with (Carbon Capture and Storage) CCS will account for 28% of the total, followed by grid-connected electrolysis at 15%, solar-based electrolysis at 28%, wind-based electrolysis at 7%, and nuclear-based electrolysis at 2%.

It is uncertain that hydrogen will be carried by pipeline across continents; instead, it will mostly be moved over medium distances within and between countries. By 2050, ammonia is predicted to make up 59% of energy-related ammonia trade between

regions due to its safer and more convenient mode of transportation, particularly by ship. From 2030 to 2050, it is anticipated a 20-fold growth in ammonia seaborne transport, reaching 150 million tonnes of exports at that point.

The decarbonization of the challenging-to-electrify aviation, maritime, heavy-transport, and high-heat manufacturing sectors depends on indirect electrification using hydrogen and its derivatives. It is not, however, on pace to expand quickly enough to achieve Paris Agreement commitments, mainly due to financial concerns.