



Hydrogen Could Contribute to 20 per cent of CO2 Emissions Reduction Targets by 2050

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The Hydrogen Council reveals first-of-a kind study showing hydrogen's contribution as a key pillar of the energy transition

Bonn, Germany—13 November 2017: As global leaders gathered at COP 23 in Bonn, 18 key leaders in their industry verticals, united in the Hydrogen Council coalition, came together to launch the first globally quantified vision of the role of hydrogen, developed with support from McKinsey. In addition to being a key pillar in of the energy transition, the study shows that hydrogen has the potential to develop US\$2.5 trillion of business, creating more than 30 million jobs by 2050.

Taking the Hydrogen Council's vision for hydrogen to the next level, the study entitled [Hydrogen, Scaling Up](#) outlines a comprehensive and quantified roadmap to scale deployment and its enabling impact on the energy transition.

Deployed at scale, hydrogen could account for almost one-fifth of total final energy consumed by 2050. This would reduce annual CO₂ emissions by roughly six gigatons compared to today's levels, and contribute roughly 20 per cent of the abatement required to limit global warming to two degrees Celsius.

On the demand side, the Hydrogen Council sees the potential for hydrogen to power about 10 to 15 million cars and 500,000 trucks by 2030, with many uses in other sectors as well, such as industry processes and feedstocks, building heating and power, power generation and storage. Overall, the study predicts that the annual demand for hydrogen could increase tenfold by 2050 to almost 80 Exajoules in 2050 meeting 18 per cent of total final energy demand in the 2050 two-degree scenario. At a time when global populations are expected to grow by two billion people by 2050, hydrogen technologies have the potential to create opportunities for sustainable economic growth.

"The world in the 21st century must transition to widespread low carbon energy use," said Takeshi Uchiyamada, Chairman of Toyota Motor Corporation and co-chair of the Hydrogen Council. "Hydrogen is an indispensable resource to achieve this transition because it can be used to store and transport wind, solar and other renewable electricity to power transportation and many other things. The Hydrogen Council has identified seven roles for hydrogen, which is why we are encouraging governments and investors to give it a prominent role in their energy plans. The sooner we get the hydrogen economy going, the better, and we are all committed to making this a reality."

Achieving such scale would require substantial investments; approximately US\$20 to 25 billion annually for a total of about US\$280 billion until 2030. Within the right regulatory

framework—including long-term, stable coordination and incentive policies—the report considers that attracting these investments to scale the technology is feasible. The world already invests more than US\$1.7 trillion in energy each year, including US\$650 billion in oil and gas, US\$300 billion in renewable electricity, and more than US\$300 billion in the automotive industry.

"This study confirms the place of hydrogen as a central pillar in the energy transition, and encourages us in our support of its large-scale deployment. Hydrogen will be an unavoidable enabler for the energy transition in certain sectors and geographies. The sooner we make this happen the sooner we will be able to enjoy the needed benefits of Hydrogen at the service of our economies and our societies," said Benoît Potier, Chairman and CEO, Air Liquide. "Solutions are technologically mature and industry players are committed. We need concerted stakeholder efforts to make this happen; leading this effort is the role of the Hydrogen Council."

The launch of the new roadmap came during the Sustainability Innovation Forum in the presence of 18 senior members of the Hydrogen Council led by co-chairs Takeshi Uchiyamada, Chairman of Toyota and Benoît Potier, Chairman and CEO, Air Liquide and accompanied by Professor Aldo Belloni, CEO of The Linde Group, Woong-chul Yang, Vice Chairman of Hyundai Motor Company and Anne Stevens, Board Member of Anglo American. During the launch, the Hydrogen Council called upon investors, policymakers, and businesses to join them in accelerating deployment of hydrogen solutions for the energy transition. It was also announced that Woong-chul Yang of Hyundai Motor Company will succeed Takeshi Uchiyamada of Toyota in the rotating role of the council's co-chair and preside over the group together with Benoit Potier, CEO Air Liquide, in 2018. Mr. Uchiyamada is planning to return as Co-chairman in 2020, coinciding with the Tokyo Olympic and Paralympic Games, an important milestone for showcasing hydrogen society and mobility.

Hydrogen, scaling up—Key takeaways¹



About the Hydrogen Council

Launched at the World Economic Forum in Davos in early 2017, the Hydrogen Council is a first-of-its-kind global CEO initiative to foster the role of hydrogen technologies in the global energy transition. Current members include 18 leading multinationals—Air Liquide, Alstom, Anglo American, Audi, BMW GROUP, Daimler, ENGIE, General Motors, Honda, Hyundai Motor, Iwatani, Kawasaki, Plastic Omnium, Royal Dutch Shell, Statoil, The Linde Group, Total, and Toyota—as well as 10 dynamic players from across the value chain—Ballard, Faber Industries, Faurecia, First Element Fuel (True Zero), Gore, Hydrogenics, Mitsubishi Corporation, Mitsui & Co, Plug Power, and Toyota Tsusho. The coalition collectively represents total revenues of over € 1.5 trillion and more than 2 million jobs around the world.² To find out more: www.hydrogencouncil.com.

About Hydrogen Council meetings at COP 23

The council will gather at COP 23 to conclude the first year of its activity. While in Bonn on 13-14 November 2017, CEOs and other senior representatives participated in a range of high-level roundtables, interactions with policy-makers as well as the media and the broader stakeholder community. The Hydrogen Council is led by two Co-Chairs from different geographies and sectors,

elected by Steering Members for a two-year term, each year one of the two Co-chair mandates is renewed for continuity.

About Hydrogen

Hydrogen is a versatile, clean, and safe energy carrier that can be used as fuel for power or in industry as feedstock. Generating zero emissions at point of use, it can be produced from (renewable) electricity and from carbon-abated fossil fuels, thereby achieving completely zero-emission pathways. The uses for hydrogen continue to grow as it can be stored and transported at high energy density in liquid or gaseous form and can be combusted or used in fuel cells to generate heat and electricity. This versatility confers to hydrogen a key enabling role all together in the transport, the industry and the residential sectors, as well as for the large-scale storage of renewable energies, making it a promising solution to overcome the challenges of the energy transition.

¹SOURCE: Hydrogen Council; IEA ETP Hydrogen and Fuel Cells CBS; National Energy Outlook 2016

²Company figures from financial years 2015 and 2016.