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Global Trends in Hydrogen IP protection

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The European Patent Office (EPO) and the International Energy Agency (IEA) recently published a joint report summarizing innovation and patent trends within the hydrogen economy.[1] The report is based on global patent activity since 2001[2] and is intended to help governments and businesses understand which parts of the hydrogen value chain appear to be making progress and which parts may be lagging behind.[3] The report dives deep into specific technologies, lists the most active applicants in select technologies, and attempts to identify the impact of different governmental programs in specific sectors, with a goal of trying to help focus future innovation efforts.

The report analyzes patent activity at the following three primary stages of the hydrogen value chain[4]:

i. **production**: technologies that improve the performance or reduce costs associated with isolating hydrogen from water and produce low-emission hydrogen from biomass and fossil fuels;

ii. **storage, distribution, and transformation**: technologies that facilitate the use of hydrogen at a different location or time than at production; and

iii. **end-use applications**: technologies that make it more attractive to utilize hydrogen to make products and/or supply energy.

Within each stage, the study evaluates whether innovation is diversifying away from or towards established approaches by categorizing technologies as: (i) established hydrogen technologies already employed in the industry; and (ii) newly-emerging hydrogen technologies motivated by climate concerns.[5]

Of the three primary stages, hydrogen production has had the largest international patent activity

overall.[6] Technologies are trending towards using electrolysis and low CO2 emission fossil fuel facilities for hydrogen production.[7] The report theorizes that developing new approaches to hydrogen production from natural gas may be increasingly attractive and feasible due to the potential to use existing infrastructure.[8]

Within the storage, distribution, and transportation stage, the established distribution infrastructure technologies have generated high levels of patenting activities.[9] While transforming hydrogen into synthetic fuels or other hydrogen carriers could support widespread distribution of hydrogen, even penetration into difficult-to-reach markets, the report indicates that patenting within these categories peaked in 2011.[10]

The report finds that end-use applications within the automotive, aviation, and shipping sectors have also experienced high patent activity.[11] For example, the report notes that strong growth in international patent families in transportation was driven by fuel cell innovation in the automotive and aviation sectors.[12] Additionally, innovation related to the use of hydrogen in production of methanol and ammonia has increased, as equipment suppliers become more interested in using low-emission hydrogen to reduce reliance on fossil fuels during these energy-intensive industrial processes.[13]

Going forward, the results of this study provide patentees, applicants, and participants in the hydrogen economy with a greater understanding to leverage their technologies and efforts. For example, established corporate entities can use this data as a starting point to identify white space for research and development. Startup entities can use this data to find leverage in licensing negotiations through benefits derived from complex interrelationships to other points along the value chain. Patentees and applicants, as well as general market participants, should be aware of their positioning along the hydrogen patent landscape and use this information to their benefit.

This article is the first in a series of posts on the EPO and IEA's report, "Hydrogen Patents for a Clean Energy Future: A Global Trend Analysis of Innovation Along Hydrogen Value Chains." Stay tuned for further analyses of the report.

FOOTNOTES

[1] EPO and IEA, "Hydrogen Patents for a Clean Energy Future: A Global Trend Analysis of Innovation Along Hydrogen Value Chains," January 2023.

[2] *Id*., at page 27.

[3] *Id*., at pages 24-26.

[4] *Id.*, at page 24 and pages 39-68.

[5] *Id*.

[6] *Id*., at pages 31 and 32.

[7] *Id.*, at pages 31, 32, 39, and 40.

[8] *Id.*, at page 43.

[9] *Id.*, at page 51.

[10] *Id.*, at pages 51, 52, and 56.

[11] *Id*., at pages 31, 32 and 62.

[12] *Id.*, at pages 16, 62, and 64-66.

[13] *Id.*, at page 59.

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