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International Energy Agency

Hydrogen and fuel cells

Considerations for the California Energy Commission

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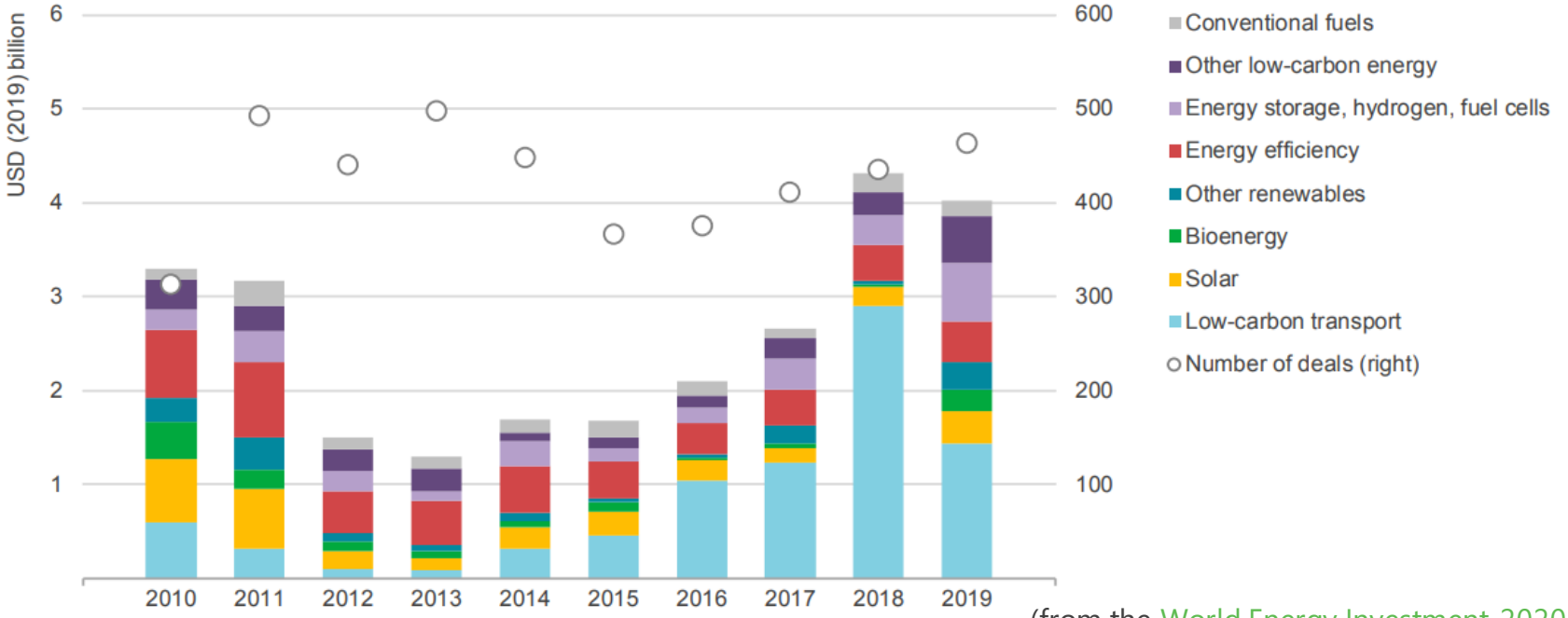
2 July, California Energy Commission

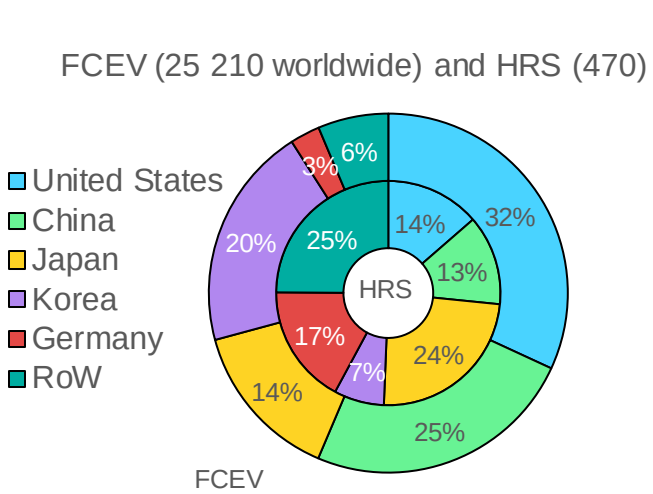
Global early-stage venture capital investment in energy technology companies

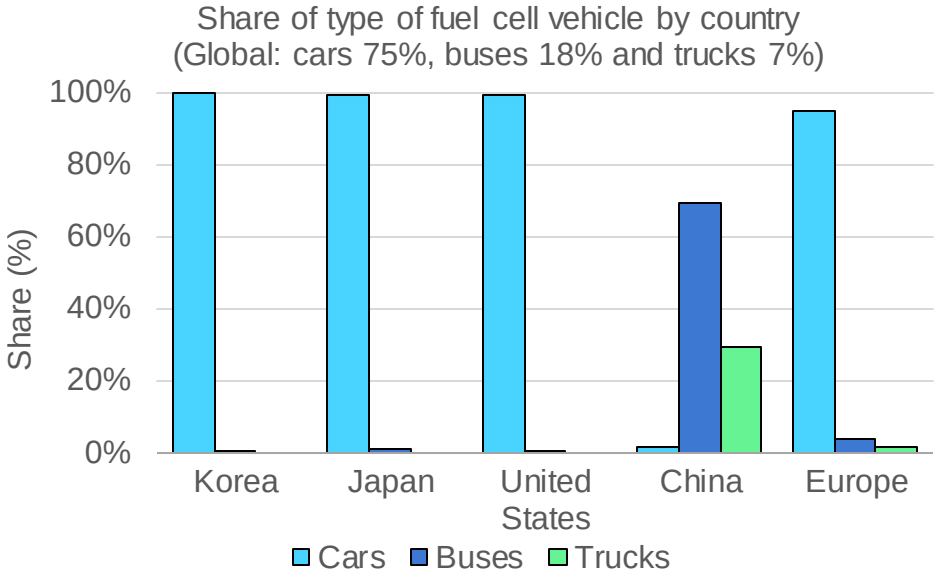


(from the World Energy Investment 2020 report)

Venture capital investment remained robust in 2019, with more diversification of sectors and countries for energy technology start-ups. Storage and hydrogen saw the most growth.

Global shares of fuel cell electric vehicles and hydrogen refuelling stations, and shares by vehicle mode and country, 2019



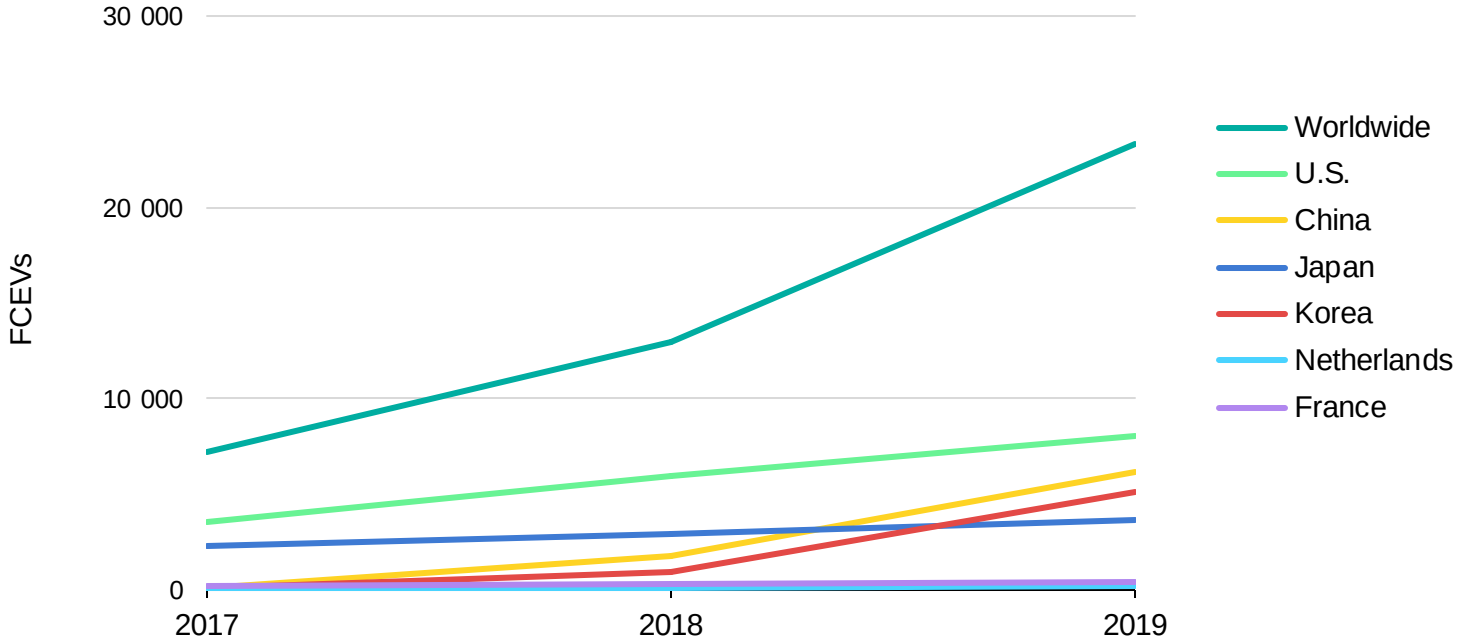


Notes: Global fleet shares include fuel cell electric passenger cars, buses and trucks.

Source: Advanced Fuel Cell Technology Collaboration (AFC TCP)

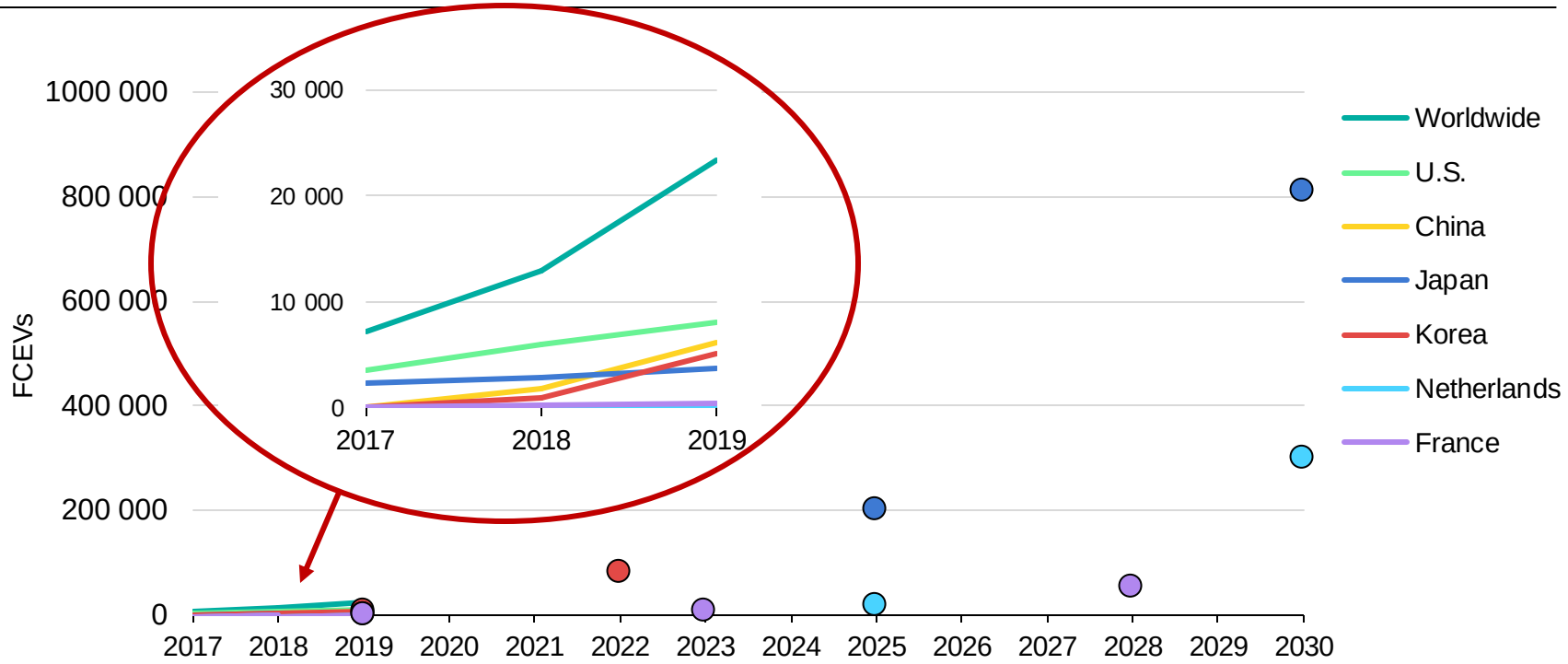
In 2019, FCEVs sales and global stock doubled the figures from 2018, pushed by a strong development in China, Korea and Japan, although these still accounts for just 0.7% of sales of ZEVs (BEVs, PHEVs, FCEVs)

FCEVs deployment is still low, but has observed a significant acceleration in 2019…



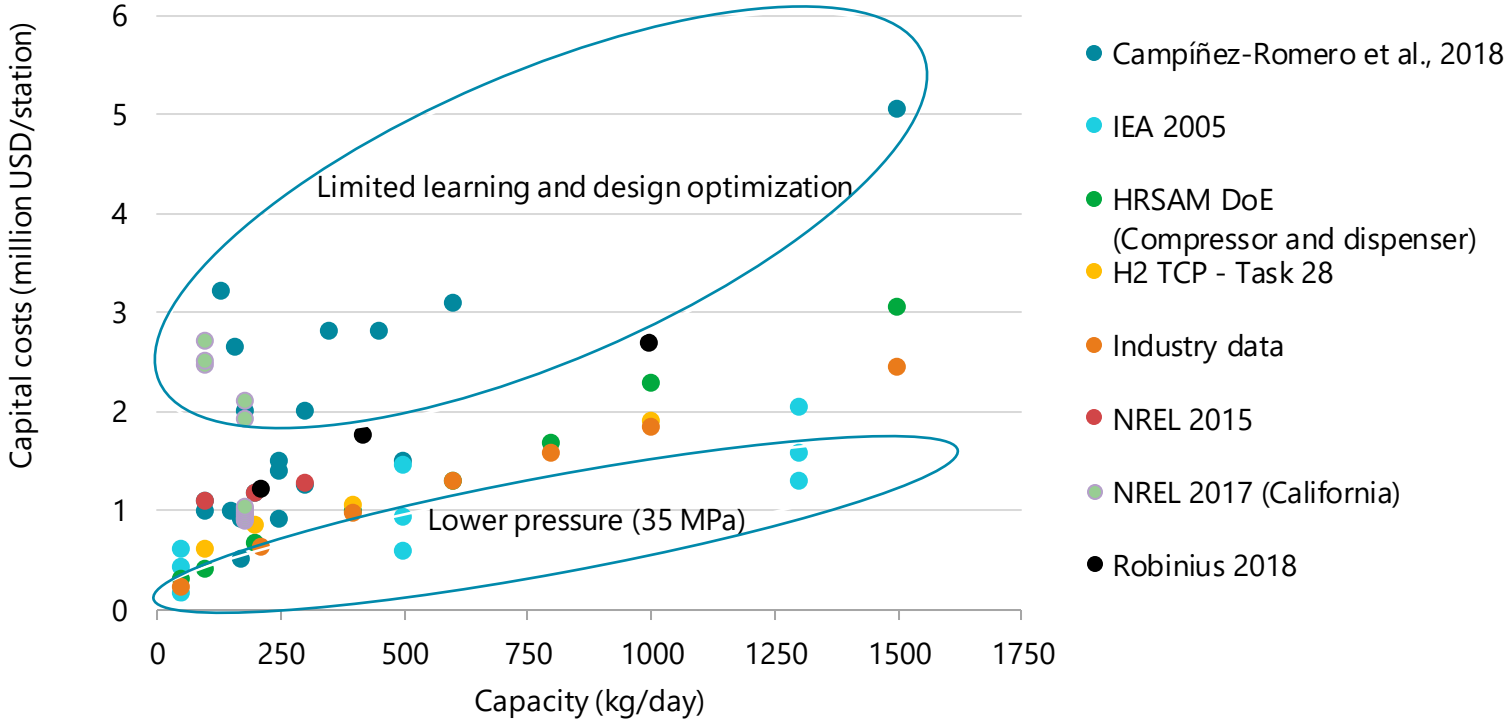
With different roll-out strategies and focusing on different vehicle categories, China, Japan and Korea are accelerating the deployment of FCEVs

…and countries have announced ambitious targets over the next decade



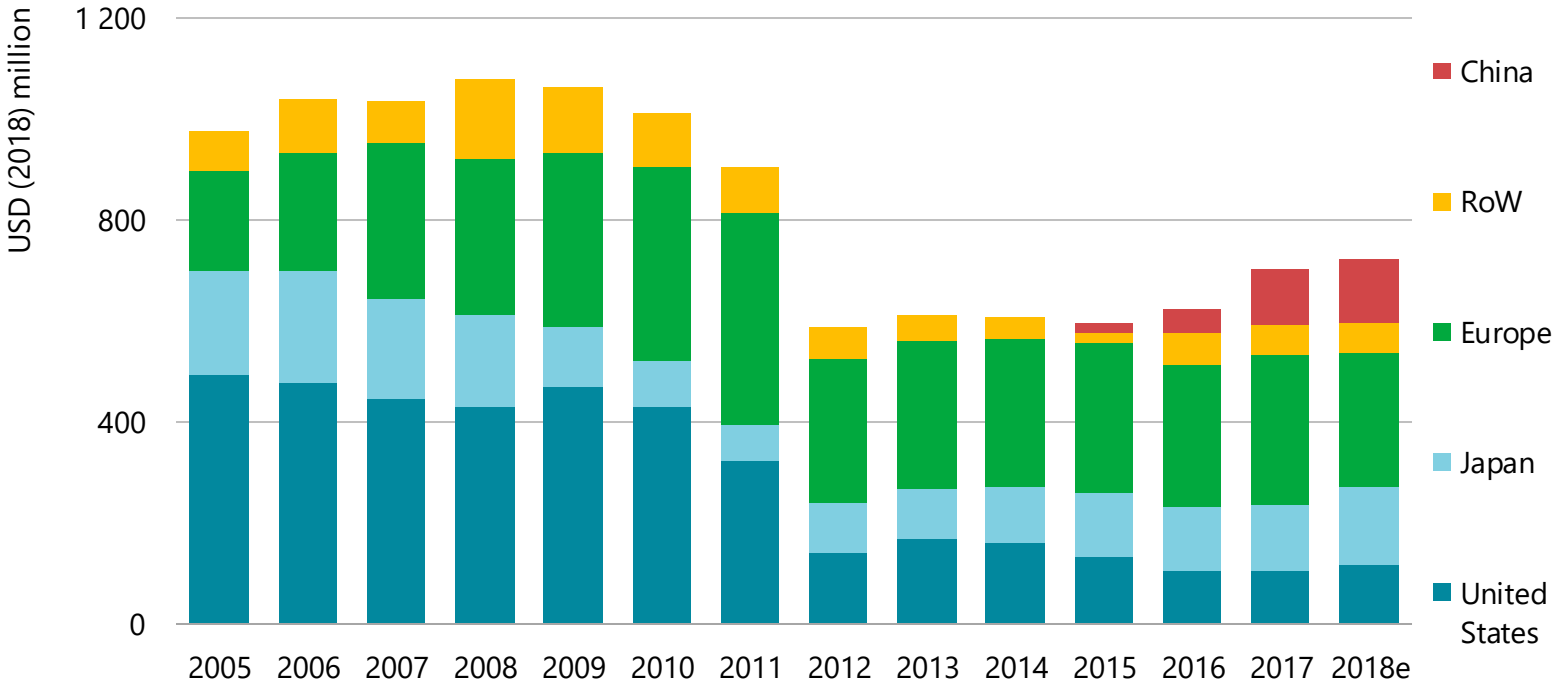
Combined FCEVs deployment targets across countries exceed 10 million vehicles in 2030 (400 times the current stock)

Benchmarking hydrogen refuelling station capital costs as a function of capacity



The costs of providing hydrogen to FCEVs can be brought down by building larger refuelling stations as long as expected hydrogen demand allows.

Government RD&D budgets for hydrogen and fuel cells



Investments peaked in 2008, but the resurgence in interest in hydrogen is obvious, and recognition of its potential role in addressing 'hard-to-abate' energy demand sectors is growing

(from the Future of Hydrogen report)