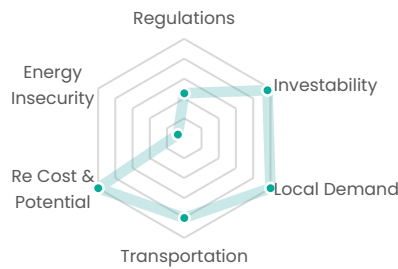
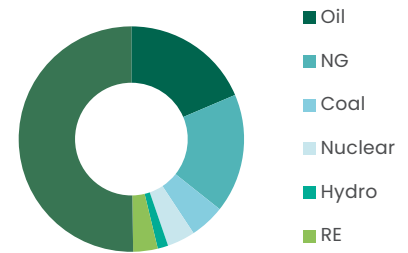


GDP – USD (trn):	20.9
GDP per capita – USD:	63,544
Land area ('000 km ²):	9,147
Population density (per km ²):	36
Grid emissions factor (gCO ₂ /kWh):	476

Hydrogen Drivers Matrix



Primary Energy Mix



2.3 Regulatory commitment

- USD73bn Biden infra. plan
- USD3/kg hydrogen PTC under review
- No federal net-zero commitment
- Limited carbon pricing

4.0 Transportation

- Transmission & energy storage tax credits included in infra. plan
- Extensive H₂ & chemical pipelines
- LNG/ammonia export facilities

4.8 "Investability"

- Rated AA+ by S&P
- 6th in WB Ease of Doing Business

5.0 RE cost and potential

- World class onshore wind and solar resources
- LCOE not the lowest but supported by federal tax credits

5.0 Local demand potential

- 4th largest steel manufacturing
- 1st largest oil refiner
- 4th largest ammonia producer
- Extremely car-centric

0.4 Energy insecurity

- Net import/export dependent on (shale) oil price environment

Energy behemoth ramps up ambition to be a global hydrogen leader.

A number of soft and hard factors position the United States well towards becoming a global hydrogen behemoth—more than half of the 5,000km of hydrogen pipelines globally are in the U.S.; it is an extremely car-centric society and mobility is the highest-value hydrogen use case; it is the world's top 5 producer of ammonia, steel and cement, the largest oil refiner, and sees the second highest container port activity – all key sectors in the energy transition. A number of challenges exist as well, the most fundamental of all being a need for a holistic carbon pricing structure nationally and with that, state and national carbon borders. In the context of enabling the massive-scale, cross-state hydrogen infrastructure needed to achieve commercially viable prices, a fundamental issue that first needs to be addressed is who is in charge of hydrogen— whether it falls under federal jurisdiction under the Natural Gas Act or under state responsibility—and this would determine the big picture of hydrogen procurement and transmission in the country. A hydrogen economy could generate USD140bn per year in revenue by 2030, reaching USD750bn per year by 2050. Hydrogen demand could rise four-fold to 41mtpa by 2050. Government funding for projects is gaining pace under the current Biden administration but remains marginal: the US' Department of Energy's (DOE) has earmarked only USD400m in their FY2022 Budget Request.

USD3/kg production tax credit

A bill is under review by Congress, under which green/blue hydrogen would

benefit from production tax credits up to USD3/kg depending on its carbon reduction factor from SMR grey hydrogen for up to 10 years; alternatively, an investment tax credit for as much as 30% of equipment costs.

Funding for transmission and storage

Biden's USD2.3trn Infrastructure Plan that was passed in July 2021 earmarks USD73bn for clean energy transmission infrastructure – unclear how much of that is targeted for hydrogen. The Plan also includes a limited investment tax credit to accelerate transmission and storage projects—to be determined if hydrogen projects will meet the subsidy timeline.

Numerous hydrogen pilots

A number of clean hydrogen pilot initiatives are in place, including the DOE's Energy Earthshots Initiative that aims to cut clean hydrogen costs by 80% to achieve USD1/kg in 1 decade – also known as the '111'. A small USD52m fund for 31 relevant technology projects lends support to the Initiative. A Government-led initiative H₂@Scale comprises 18 projects funded by USD64m from the DOE in FY 2020.

Need for carbon pricing support

Seven carbon pricing initiatives are in operation but remain limited in scope and effectiveness in the national context. The Regional Greenhouse Gas Initiative (RGGI), the country's first cap-and-trade system. Greater clarity over US' plans for a carbon-related import tax or fee, potentially an echo of the EU's carbon borders adjustment mechanism, is more likely by year-end.