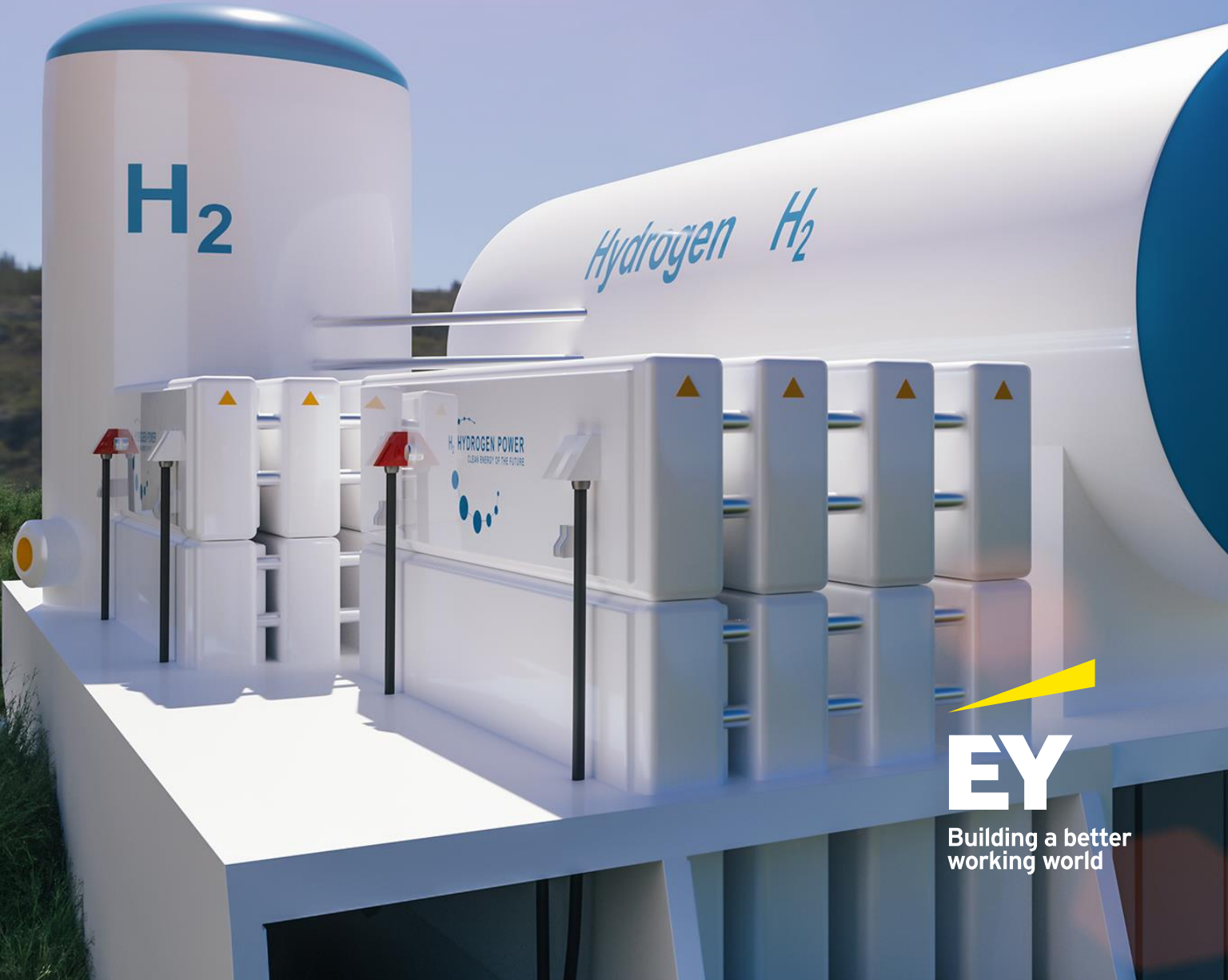


# The Inflation Reduction Act, 2022 – a step change for the hydrogen market

December 2022

Enter >>



Building a better working world



# Table of Contents

01	Legislation Overview	03
02	US - Current state of the market	05
	▶ Current players	
	▶ Key geographies	
	▶ Hydrogen hub development	
03	Growth trajectory to 2030/35	08
	▶ US as export base	
	▶ Domestic Demand	
	▶ Key players and expected capacity additions	
04	Way forward	11
	▶ How EY can help?	

# Foreword

---



Mr. Kapil Bansal,  
Partner (Energy Transition &  
Decarbonization), EY India

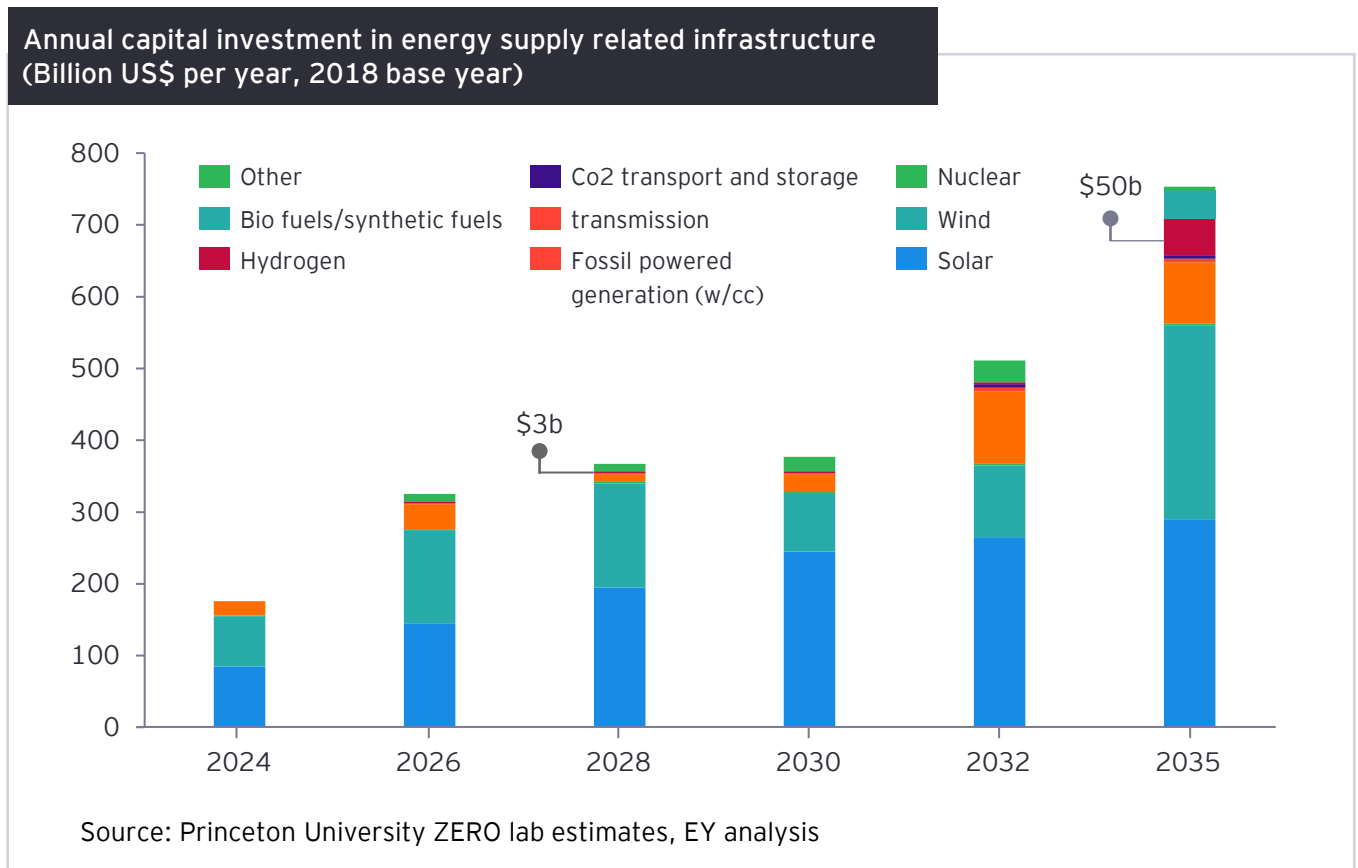
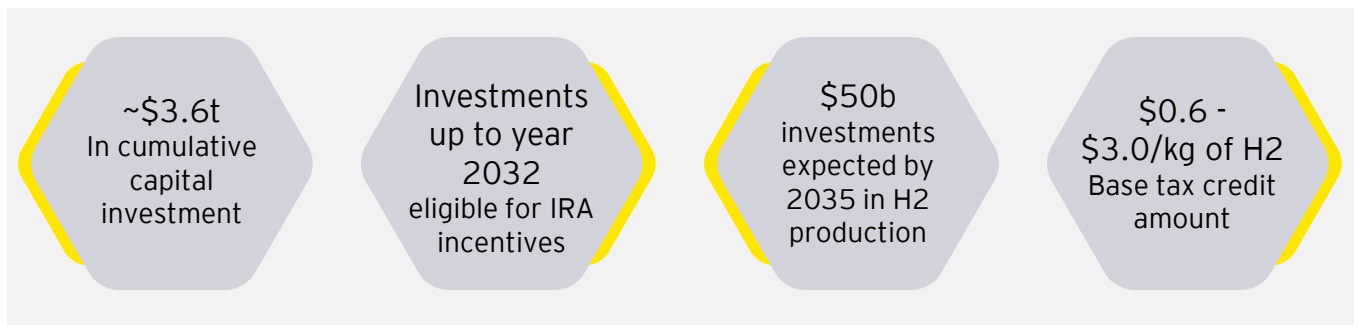
The Inflation Reduction Act, 2022 includes the largest hydrogen subsidies in the world. It marks an inflection point in technology's development, especially for green hydrogen, and will provide a substantial support for the hydrogen market. In some states of the US, IRA tax incentives have made green hydrogen production competitive with existing gray hydrogen. This development has reduced the earlier projected timeline for cost competitiveness compared to a gray alternative by more than a decade (from an earlier projected timeline of ~2035). Since the announcement of IRA in August 2022, US Department of Energy (DOE) has published a Draft National Clean Hydrogen Strategy & roadmap in September 2022, focusing on growth of hydrogen ecosystem (local manufacturing, production cost incentives, regional hydrogen hub development) setting a precedent for other economies to follow. In this report, we have investigated the regulation and assessed how companies are strategizing their green hydrogen development journey supported by ramp up in development of hydrogen infrastructure in US.

EY is uniquely positioned to assist companies in accelerating their journey in hydrogen. With significant experience and deep understanding of the entire hydrogen ecosystem, our global hydrogen team is actively involved in shaping, financing, and optimizing hydrogen ecosystems and business models across the world.

# 1

## Legislation overview

The recently enacted Inflation Reduction Act, 2022, by the US Congress, is a shot in the arm for the US as well as global climate and energy initiatives. With an earmarked funding of ~US\$369b for energy security and climate change, the Act will catalyze investments over the next decade, making the US one of the most competitive locations in terms of the landed cost of hydrogen.





The clean hydrogen credit is a 10-yr Production Tax Credit (PTC) for facilities that commence construction by 31 Dec 2022. Along with the additional credits across the value chain (for example, renewable credits), it will enable a credit of more than \$3/kg. As an alternative to the PTC, taxpayers may elect for the ITC (Investment Tax Credit) with respect to clean hydrogen production facilities, receiving an ITC of up to 30% depending on the carbon intensity of the production process. Further, multiplier mechanism would be triggered if producers build new facilities within a certain time period and if they meet certain wage and labor requirements for the project.

### Hydrogen tax credit mechanism under the IRA, 2022

H2 Source	Carbon intensity level	Tax credit amount		Wage/other benefits
	kg-CO2e/kg-H2	PTC Value (per kg of H2)	ITC Value (% of facility cost)	5x multiplier
SMR + CCUS	2.5 - 4	\$0.12	1.2%	\$0.60
SMR + CCUS	1.5 - 2.5	\$0.15	1.5%	\$0.75
Nuclear + Electrolysis	0.45 - 1.5	\$0.20	2%	\$1.00
RE Electrolysis	0 - 0.45	\$0.60	6%	\$3.00

PTC - Production Tax Credit; ITC - Investment Tax Credit

Source: US Department of energy, IEA, Ammonia Energy Association, BIS research

With IRA incentives, green hydrogen is expected to be competitive across the US by 2030. Considering that tax-credit is for first 10 years while H2 projects are for 20 years or so, about 60 to 65% of tax credit would reflect in LCOH (Levelized Cost of Hydrogen). So, a \$3/kg tax credit will lower LCOH by approximately \$1.9/kg.

It is expected that clean hydrogen's cost reductions will drive its use as a low-carbon fuel for energy and transport, and as a feedstock to decarbonize industrial production.








# 2

## US - Current state of the market

### Current players

The green hydrogen market of the US is still evolving, and the players are cautious in committing to large capacities for green hydrogen currently. There are three types of players developing green hydrogen capacity – pure hydrogen players, RE/utility firms and O&G/chemical players building capacities in the US market.

	Pure H2 players		RE/Utility players		Oil and gas/ Chemical players
Major players in US green hydrogen market	Industrial gas players	New entrants	Utilities	Independent RE players	
					
Announced capacity (MT, 2030)	3.8		1.2		0.1
Hydrogen ambition (Green+ Blue)	Focus on becoming major hydrogen suppliers (Green+ Blue) with ~1 MT of Blue H2 and ~3.8 MT of Green H2 capacities across the group		Primary focus is on broader clean energy dev. (Solar+ wind), with intent to forward integrate to GH2 business as tech. matures		Focus remains on CCS-based Blue H2 capacity at ~3 MT; GH2 aspirations not yet backed by concrete scale projects
Current Green H2 strategy	Building first mover advantage by ensuring own/exclusive electrolyzer relationships and binding RE power in long-term PPAs		Developing GH2 plant co located or near its RE assets and forging end-market relationships (Private players leading the development in early stages)		Wait and watch approach on G H2 projects; with small bets via investments in pilot scale projects

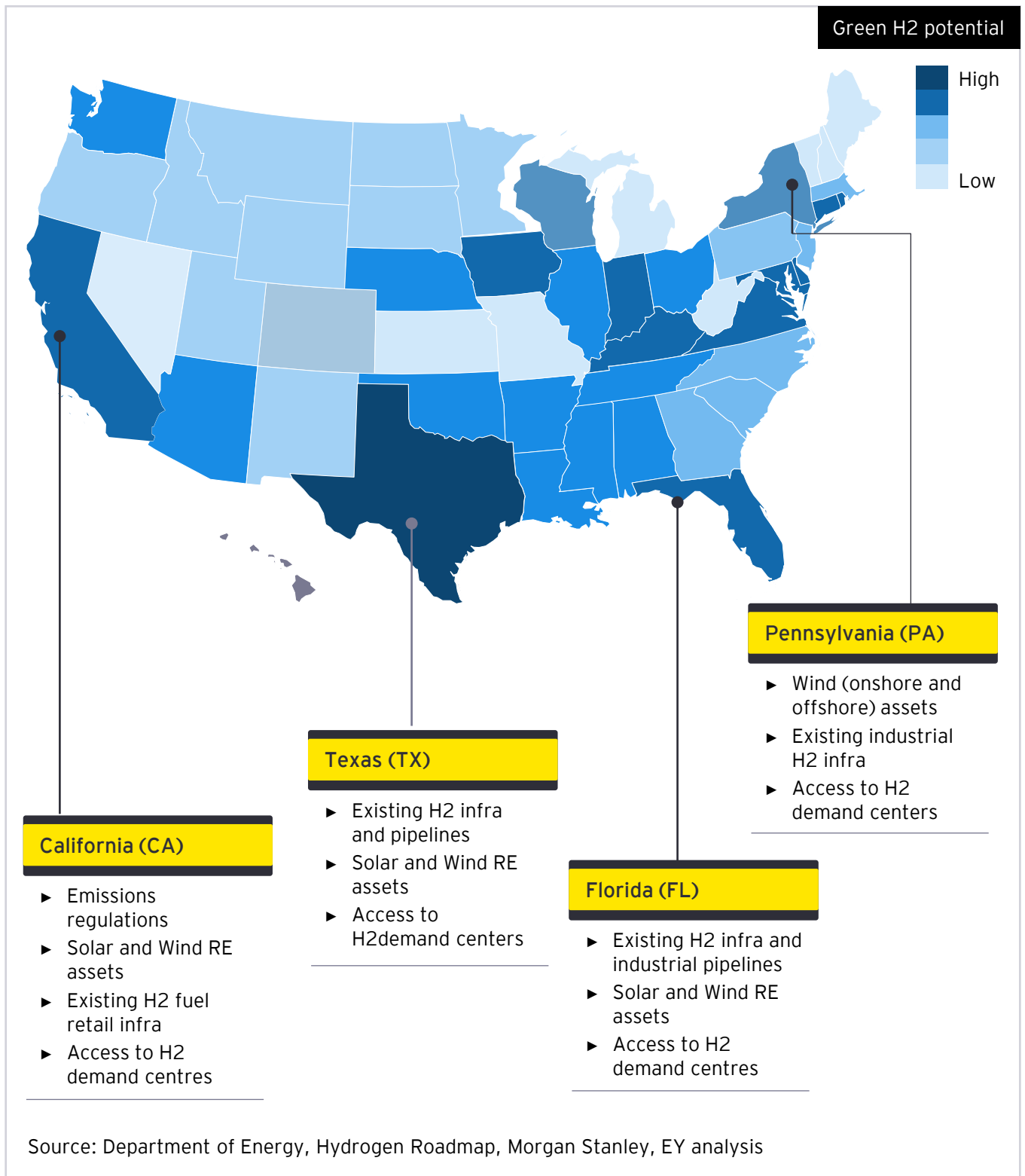
Source: IEA Hydrogen project database (Oct, 2022), EY analysis

Currently, **75%** of the announced green hydrogen capacity is from **H2 players**, with **24%** of the announced project capacity **from RE/utility players** and **~1%** announced capacities **from oil and gas/chemical players**

# Key geographies

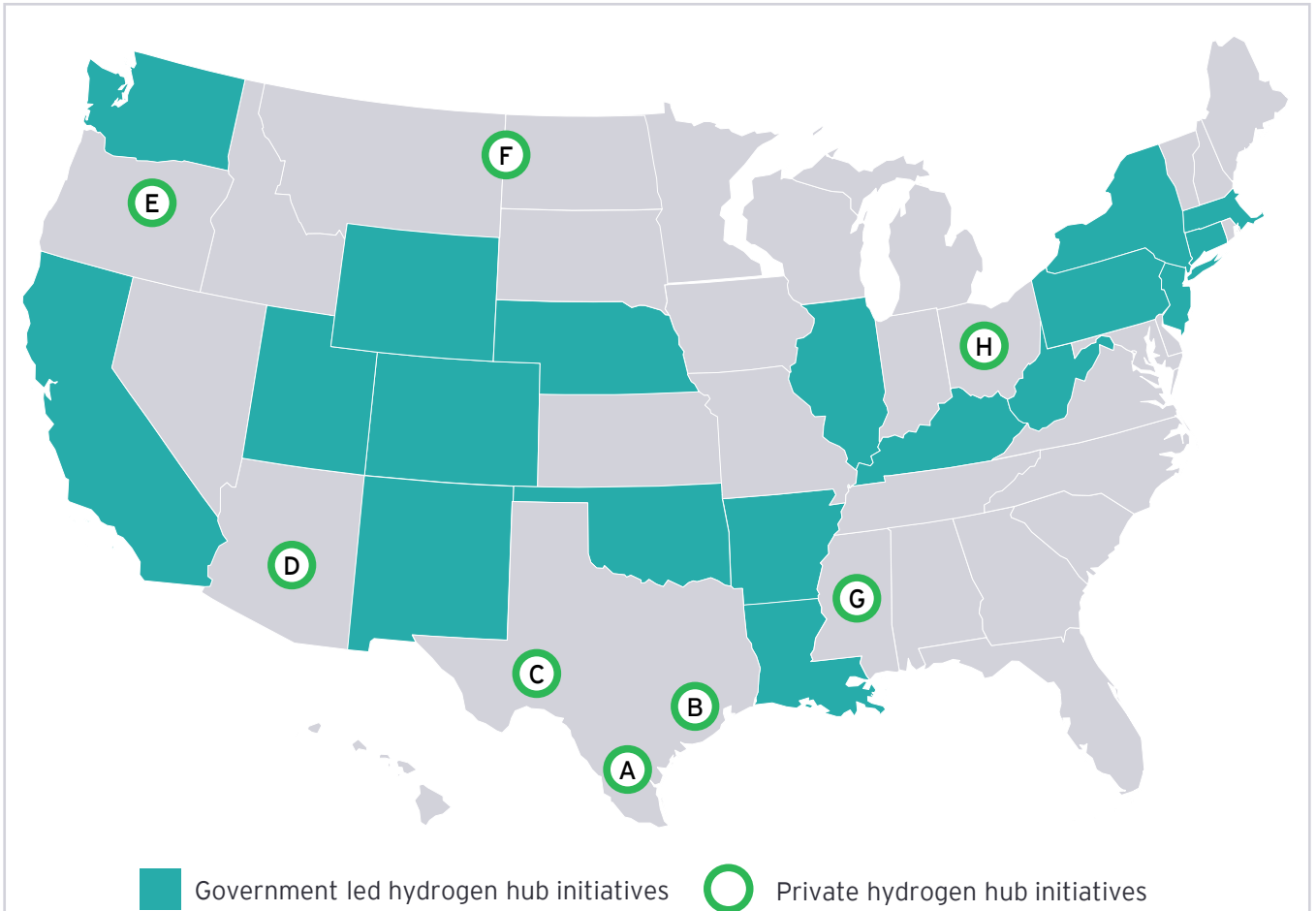
US is the second largest producer and consumer of Hydrogen globally after China, accounting for ~13% of global demand. Post IRA (Inflation Reduction Act) developments have accelerated energy transition and incentivized green hydrogen capacity development, however some states such as Texas, Florida, California, and Pennsylvania have high green hydrogen potential driven by access to low LCOE, existing hydrogen infra and proximity to large hydrogen demand centers.

Texas has an upper hand with high regulatory support, including faster permit approvals for new energy (including hydrogen) infrastructure and project development and has become a first mover with new players looking to set up large scale green hydrogen projects.



# Hydrogen hub development

In 2021, the US bipartisan infrastructure law committed **\$8 billion** for the development of **six to ten hydrogen hubs**, with the US Department of Energy setting up a program by early 2023 to provide support to shortlisted government led or private hydrogen hub initiatives in US. It has spurred hydrogen infrastructure developers to step forward with **more than 15 government led and private hydrogen initiatives proposed for development in US.**



## Private hydrogen hub initiatives in the US

- (A) Hydrogen city, Texas
- (B) H2 Houston hub
- (C) Apex Clean Energy LLC, Ares Management Corp., EPIC Midstream holdings, Port of Corpus Christi Authority
- (D) Center for Arizona Carbon Neutral Economy
- (E) Obsidian Pacific Northwest Hydrogen Hub
- (F) Great Plains Hydrogen Hub
- (G) Mississippi Clean hydrogen hub
- (H) Ohio Clean Hydrogen Hub Alliance

Source: S&P Global, EY analysis





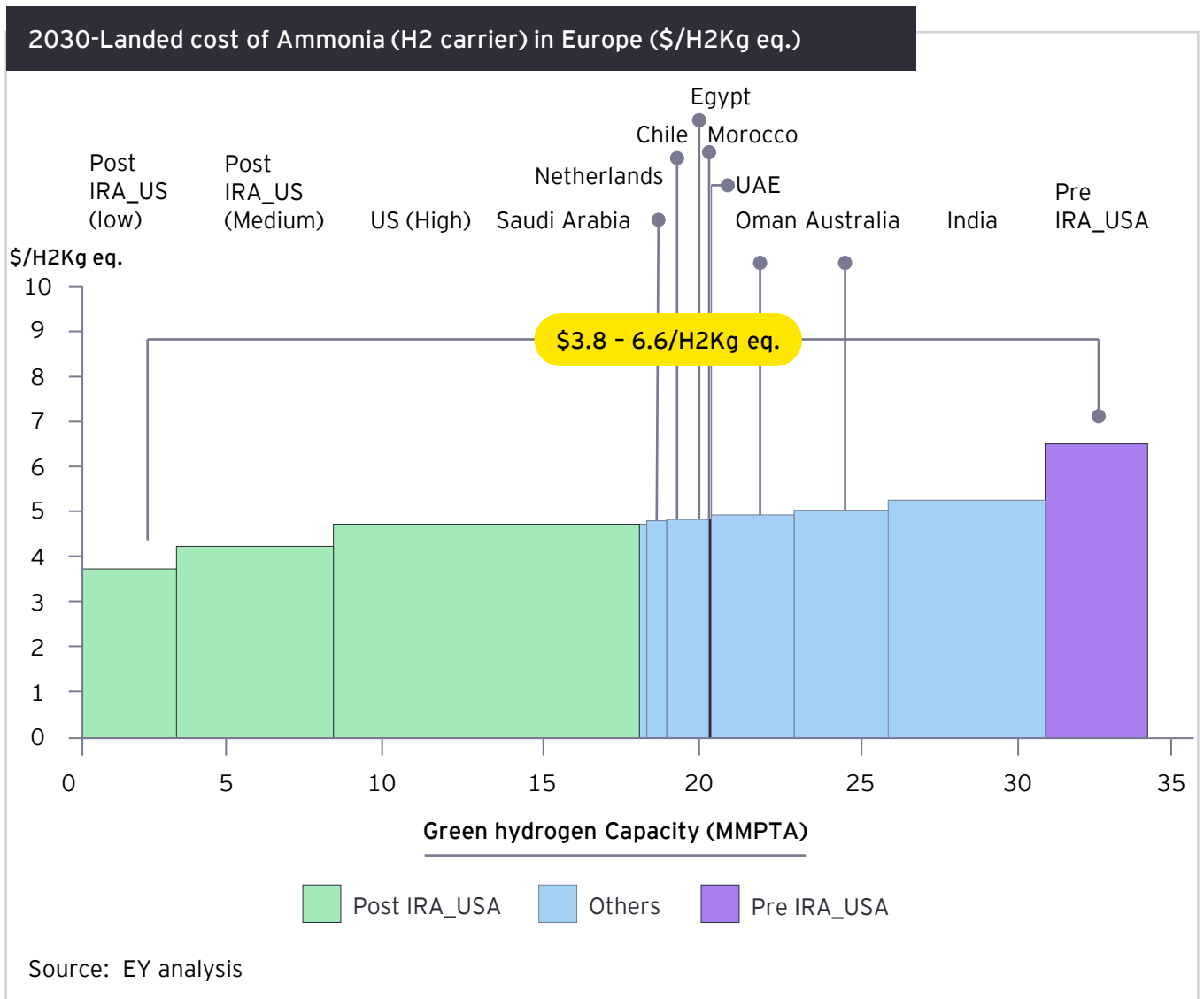
**H<sub>2</sub>**  
GREEN  
HYDROGEN

# 3

## Growth trajectory to 2030/35

### US as export base

By 2030, the expected production cost of the US Green H<sub>2</sub>, including the IRA tax benefits, would be in the range of \$0.5-1.5/KgH<sub>2</sub>, which makes it the lowest production cost region in the world. Based on EY analysis, the US will have high export potential as they will be competitive with regions, such as the Middle east and North Africa, on a landed cost basis to global hydrogen demand regions such as Europe and East Asia.





## Domestic demand

Currently, the US is a 10 MMT/year Hydrogen market, with about 60% used in oil refining, about 30% going to production of fertilizers, and the remaining going to methanol, synfuels, explosives, and other demand applications. The IRA is expected to substantially boost domestic demand for hydrogen in the US, potentially growing 9-10x by 2030-35.

Most of the growth in hydrogen supply is expected to come from low-carbon hydrogen sources, with advancements in carbon capture technologies and associated regulatory environment driving the share of blue hydrogen to grow by 40 to 45% of the overall hydrogen demand. Additionally, IRA positions the US as the largest market for green hydrogen with generous incentives (as tax credits) expected to boost the share of green hydrogen from near-zero today by ~30 to 35% by 2030-2035.

While current hydrogen demand comes from its use predominantly as a feedstock for industrial processes, much of the anticipated growth is expected to come from several emerging applications of hydrogen not only as a feedstock but also as an energy vector. These applications span across numerous industrial sectors such as iron and steel, biofuels/sustainable aviation fuels, energy storage, heating (blending with natural gas) and transport (in fuel cell electric vehicles), with the potential to significantly displace fossil fuel use in these industrial sectors and reduce overall carbon dioxide emissions.

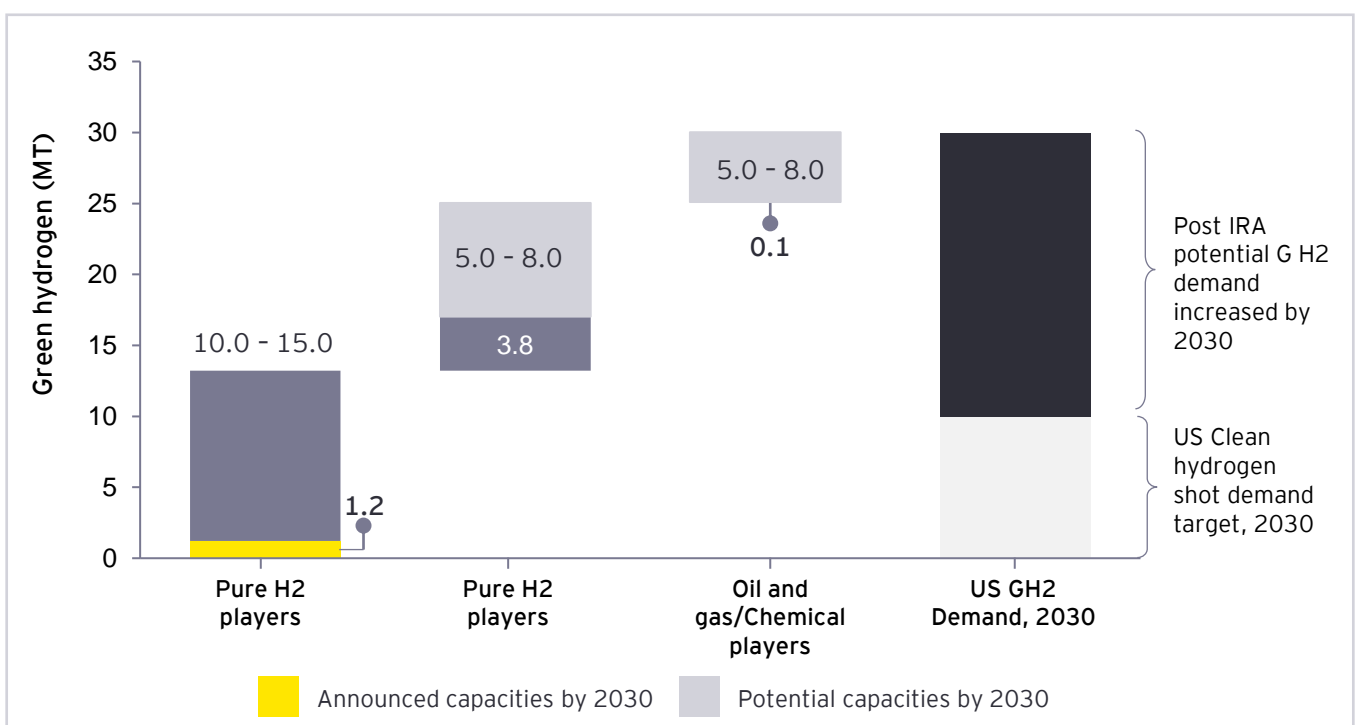
## Key players and expected capacity additions

Existing players with capability gaps are bridging them through partnerships for electrolyzer access, Engineering Procurement and Contract (EPC) support and offtake security.

By 2030, US-based hydrogen producers will require ~500 GW electrolyzer capacity and ~750 GW of solar/wind power capacity to meet green hydrogen demand. All players are building partnerships with electrolyzer Original equipment manufacturers (US-based and global) to meet their requirements, on renewable power sourcing, RE/utility players have an advantage, nonetheless Pure H2 and oil and gas/chem players are seeking partnerships or project level Power Purchase Agreement (PPA)/grid offtake as power transmission infrastructure improves.

By 2030, RE players are expected to have a leading position in the US green hydrogen market with >40% capacity, driven by access to low cost renewable power

Foreign players have already started participating in domestic green hydrogen market, the activity is expected to increase till 2025 support by strong government incentives and demand growth.





## 4 Way forward

Post IRA, US Department of Energy (DOE) has published a **Draft National Clean Hydrogen Strategy & roadmap** in September 2022, focusing on growth of hydrogen ecosystem (local manufacturing, production cost incentives, regional hydrogen hub development), to build on the IRA support to green hydrogen development over blue hydrogen, as it prohibits blue hydrogen producers from stacking 45Q carbon capture credits on top of hydrogen tax credits. Green hydrogen is positioned to be one of the important elements for USA's path to decarbonization and new energies development, with increased interest from industry stakeholders to collaborate and form coalitions to develop capital projects and build a presence in the market.

However, project developers and financiers across categories looking to enter green hydrogen segment need to consider development issues and risk factors like other energy projects, as the technology is still at its early stage of commercial development and project economics still depend on regulatory support. For **greenfield projects**, key project parameters are **electricity supply and cost** as it has a significant impact on project competitiveness and economic viability, **secured off-take agreement** with midstream distributors and end users to support capital financing and de-risk investments.

### How EY can help?

**EY** is uniquely positioned to assist companies in accelerating their journey in hydrogen. With significant experience and deep understanding of the entire hydrogen ecosystem, our global hydrogen team is actively involved in shaping, financing, and optimizing hydrogen ecosystems and business models across the world.

EY has already supported over 30 clients in over 50 hydrogen projects, developing hydrogen policy and strategy, building out light, heavy duty and industrial H<sub>2</sub> applications, and investing across green and blue hydrogen production. Bringing together business, technical, tax, legal, regulatory, and modeling specialists, EY's globally connected hydrogen team is ideally placed to support clients in day-to-day queries.



# Our offices

## Ahmedabad

22nd Floor, B Wing, Privilon  
Ambli BRT Road, Behind Iskcon  
Temple, Off SG Highway  
Ahmedabad - 380 059  
Tel: + 91 79 6608 3800

## Bengaluru

12th & 13th floor  
"UB City", Canberra Block  
No. 24, Vittal Mallya Road  
Bengaluru - 560 001  
Tel: + 91 80 6727 5000

Ground Floor, 'A' wing  
Divyasree Chambers  
# 11, Langford Gardens  
Bengaluru - 560 025  
Tel: + 91 80 6727 5000

## Chandigarh

Elante offices, Unit No. B-613 & 614  
6th Floor, Plot No- 178-178A  
Industrial & Business Park, Phase-I  
Chandigarh - 160 002  
Tel: + 91 172 6717800

## Chennai

Tidel Park, 6th & 7th Floor  
A Block, No.4, Rajiv Gandhi Salai  
Taramani, Chennai - 600 113  
Tel: + 91 44 6654 8100

Delhi NCR  
Golf View Corporate Tower B  
Sector 42, Sector Road  
Gurugram - 122 002  
Tel: + 91 124 443 4000

3rd & 6th Floor, Worldmark-1  
IGI Airport Hospitality District  
Aerocity, New Delhi - 110 037  
Tel: + 91 11 4731 8000

4th & 5th Floor, Plot No 2B  
Tower 2, Sector 126  
Gautam Budh Nagar, U.P.  
Noida - 201 304  
Tel: + 91 120 671 7000

## Hyderabad

THE SKYVIEW 10  
18th Floor, "SOUTH LOBBY"  
Survey No 83/1, Raidurgam  
Hyderabad - 500 032  
Tel: + 91 40 6736 2000

## Jamshedpur

1st Floor, Shantiniketan  
Building, Holding No. 1  
SB Shop Area, Bistupur  
Jamshedpur - 831 001  
Tel: + 91 657 663 1000

## Kochi

9th Floor, ABAD Nucleus  
NH-49, Maradu PO  
Kochi - 682 304  
Tel: + 91 484 433 4000

## Kolkata

22 Camac Street  
3rd Floor, Block 'C'  
Kolkata - 700 016  
Tel: + 91 33 6615 3400

## Mumbai

14th Floor, The Ruby  
29 Senapati Bapat Marg  
Dadar (W), Mumbai - 400 028  
Tel: + 91 22 6192 0000

5th Floor, Block B-2  
Nirlon Knowledge Park  
Off. Western Express Highway  
Goregaon (E)  
Mumbai - 400 063  
Tel: + 91 22 6192 0000

## Pune

C-401, 4th floor  
Panchshil Tech Park, Yerwada  
(Near Don Bosco School)  
Pune - 411 006  
Tel: + 91 20 4912 6000

## Ernst & Young Associates LLP

**EY** | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. Information about how EY collects and uses personal data and a description of the rights individuals have under data protection legislation are available via [ey.com/privacy](https://ey.com/privacy). EYG member firms do not practice law where prohibited by local laws. For more information about our organization, please visit [ey.com](https://ey.com).

Ernst & Young Associates LLP is one of the Indian client serving member firms of EYGM Limited. For more information about our organization, please visit [www.ey.com/en\\_in](https://www.ey.com/en_in).

Ernst & Young Associates LLP, is a Limited Liability Partnership, registered under the Limited Liability Partnership Act, 2008 in India, having its registered office at 22 Camac Street, 3rd Floor, Block C, Kolkata - 700016

© 2022 Ernst & Young Associates LLP. Published in India. All Rights Reserved.

EYIN2212-023  
ED None

This publication contains information in summary form and is therefore intended for general guidance only. It is not intended to be a substitute for detailed research or the exercise of professional judgment. Neither EYGM Limited nor any other member of the global Ernst & Young organization can accept any responsibility for loss occasioned to any person acting or refraining from action as a result of any material in this publication. On any specific matter, reference should be made to the appropriate advisor.

JN

[ey.com/en\\_in](https://ey.com/en_in)

 @EY\_India  EY  EY India  EY Careers India  @ey\_indiacareers