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Hydrogen - The next Wave of Energy Disruption

Strategic Outlook

Agenda

Trends & Driver

Hydrogen Use Cases

Technology Roadmap 2020-2050

Roadblocks moving forward

Strategic Roadmap & Patterns for Success

IAC Service Offering

Regulatory environment, customer sentiment and technology maturity are expected to boost hydrogen in pole position of the ongoing energy transition race

Trends & Driver for H2 Momentum

Regulatory Environment

- 66 countries announced zero-emission goals as national target for 2050
- Global push for government and industry alliances (Hydrogen Council members 2017: 13, 2020: 60)

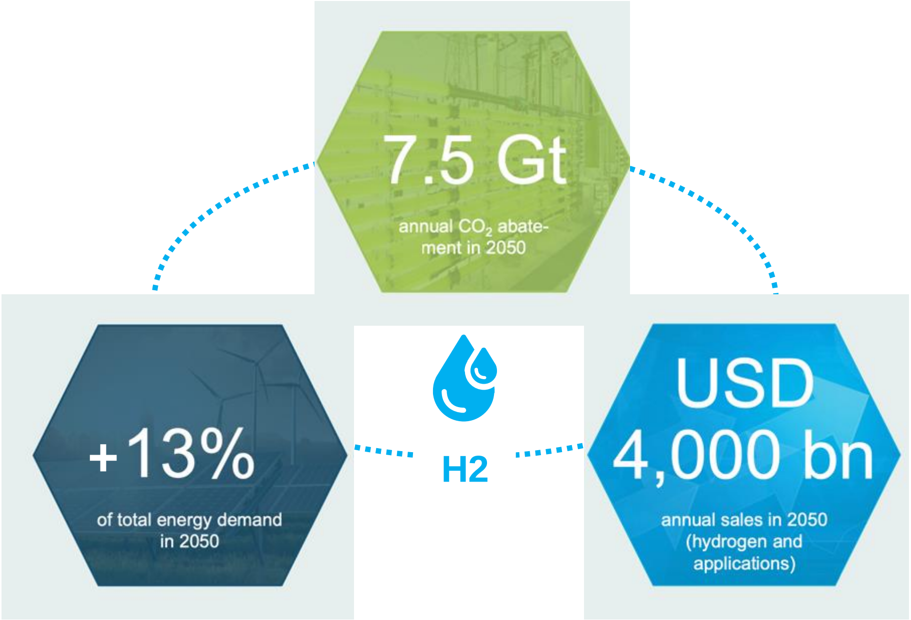
Customer Sentiment

- Sustainability as leading consumer motive moved from rank 7 to 3 in rankings globally
- Strong push expected by COVID and generation switch (Generation X and Y)

Technology Maturity

- Commercialization of H2 end-user use cases
- 80% decrease of global renewable energy prices (since 2010)
- 55x growth in electrolysis capacity (2015-2025)

Impact on H2 Consumption & Energy Mix



Source: Based on meta market research and IAC industry insights

The rise of hydrogen can kill over 60% of global CO2 emission – 4 industries will be impacted most, with first use cases reaching market readiness

	Share	Use Cases	H2 Substitution Applications
Not substitutable by H2	5%	Others	
	27%	Agriculture, forestry & other land use	
Partially substitutable by H2 • *Fuel for heat and power* • *Feedstock for industry*	6%	**Building**	• Heating networks with H2
	14%	**Industry**	• Clean feedstock for oil refining & chemicals • Circular economy with CCS**
	17%	**Mobility**	• Fuel cell electric vehicles • Synthetic fuels
	31%	**Power***	• Integration of renewables

Hydrogen Use Case Examples


Hydrogen Heating System


Ammonia Refinery

Hydrogen Fuel Station

H2 from Renewable Energies

9% Oil & Gas and others, 22% Coal
** Carbon Capture Storage

Technology Roadmap Snapshot 2020 shows diverse maturity across use cases - …

Hydrogen Use Cases			Industry	Power	Building	Mobility
Technology Readiness Levels:			**Feedstock** for production of ammonia fertilizers & steel	A **gap-filler** between variable production & demand	A progressive **substitute** to fossil fuels used for heating	A **new energy vector** for mobility applications
System Ready	9	Qualified system with **proof of successful use** – product	Petrochemical	(Regenerative) fuel cell; Storage	Heating	Buses; Cars; Forklifts
System Ready	8	Qualified system with **proof of functional capability** in area of use – product				Trains; Trucks
Prototype in work	7	Prototype in use – **demonstration almost to scale in the operational environment**	Decarbonized steel production			
Prototype in work	6	Prototype in operational environment – **technical feasibility demonstrated** in the area of application				Propeller aircraft
Experimental Tests	5	Experimental setup in operational environment – **key technology elements tested** in a relevant environment	'Green' ammonia fertilizers			
Experimental Tests	4	Experimental setup in **lab** environment – **key technology elements tested**				Jet

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Especially H2 powered vehicles start to scale-up on a global level with solid business potential – commercial aviation and ships lagging behind

Mobility	Forklifts	Cars	Buses I Trucks	Trams & Railways	Aviation	Ships
Market Readiness	Commercialized	Commercialized	Commercialized	Commercialized	Development	Demonstration I Pilots
Commercial Solutions	 Toyota  Linde – FC 35	 Renault - KangooZE  Hyundai - Nexo	 Solaris - Urbino 12  Hyundai - XCIENT	 ALSTOM - iLint  CRRC – H2 Tram	n/a	n/a
Final Stage of Development	Mature technology – key players already commercialized Forklifts (new Players can penetrate the market)	 Toyota - Mirai  BMW – i Hydrogen Next X5	 Daimler – Citaro FC  Nikola – tre hydrogen	 Siemens – Mireo  Stadler – H2 Flirt	 ZeroAvia  Apus - i-2	n/a
Business Potential 2020	31.000	15.000	4.000	100	UAV	Demonstration
Business Potential 2030	350.000	8.000.000	100.000	1.100	Biz Jets/ Small Aircrafts	Prototype

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● Commercialized ◐ Development ○ Demonstration I Pilots

[1]Chosen examples
[2] Uninhabited Aerial Vehicle

With 20 years of history, hydrogen-enabled buses are already the "new normal" in urban mobility globally

Mobility

1998-2000
Ballard Phase III
Test program with six 40-ft FCBs using 205 kW PEM fuel cell stacks from Ballard

2000-2001
Fuel cell bus
A MAN bus, was equipped with the components for a fuel cell system

2003-2006
Hino/Toyota FCB-JHFC
Eight 40-ft hybrid FCPs with Toyota PEM fuel cell stacks were tested

2004-2006
UNDP-GEF
Three 40-ft FCBs using Ballard PEM fuel cell stacks were tested

2006-2020
Hydrogen Bus Alliance
High level political support for hydrogen bus deployment programs

2010-2016
*CHIC**
Demonstrating the readiness of fuel cell electric buses for commercial deployment

2012-2018
High Vlo City & HyTransit
Deployment of a hydrogen infrastructure with hydrogen buses in several cities

2018
*Several projects***
Introduction of 35 hydrogen buses in different cities in the USA

2018
TATA Motors Hydrogen Bus
India's first-ever hydrogen fuel cell powered bus

2020
Toyota SORA
Introduce FCEBs for 2020 Olympic Games in Tokyo

2022
Winter Olympics
Deploy FCEBs in multiple cities and for the 2022 Winter Olympics

*CHIC: Clean Hydrogen in European Cities
**Several projects: NFBCP, CEC, Low-No, CARB

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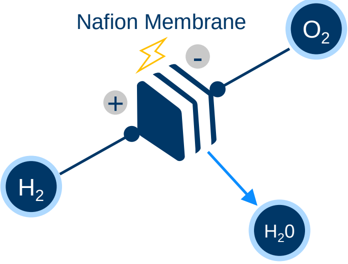
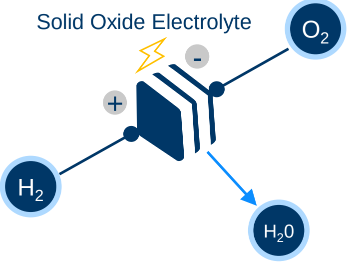
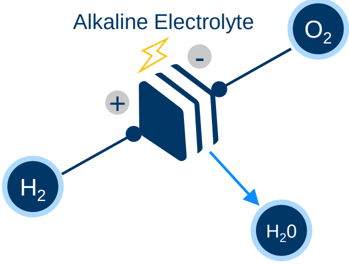
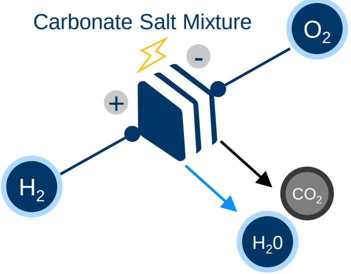
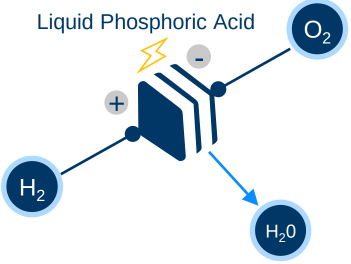
Still, the technology architecture is still diverse across applications and use cases with no stable conversion towards global technology standards

Technology / *Criteria*	Polymer Electrolyte Membrane	Solid Oxide	Alkaline	Molten Carbonate	Phosphoric Acid
Stack Functioning					
Maturity	Mature, Scalable	Mature, Scalable	Mature, Scalable	Mature, Large Scale	Mature, Large Scale
Mobility*	Portable, Stationary, Transportation	Stationary, Transportation	Stationary	Stationary	Stationary
Stack power range	1 – 100 kW	0.5 kW – 2 MW range	1 – 100 kW	100 kW – 1 MW range	4 kW – 400 kW range
Peak power density	0.6 – 1.2 W/cm²	0.4 – 2 W/cm²	0.5 – 0.7 W/cm²	0.8 – 1 W/cm²	0.5 – 0.7 W/cm²
Operating temp.	LT: 40 °C – 90 °C / HT: 200 °C	500 °C – 1 000 °C	80 °C – 100 °C	600 °C – 700 °C	200 °C – 220 °C
Lifetime	20 000 hours	20 years	8 000 – 10 000 hours	20 years	40 000 hours
Efficiency	60 % - 70 %	40 % - 80 %	60 % - 70 %	60 % - 80 %	40 % - 50 %
CAPEX	50 $/kW	80 $ / kW	40 $ / kW	1300 $ / kW	400 $ / kW
2019 capacity sold	934 MW	78 MW	0.1 MW	10 MW	107 MW
Distinction	Quick start-up time	High operating temperature	Low cost components and electrolytes	Suitable only for centralized production	Liquid electrolyte adds on-board weight in vehicles

***Mobility:**
Portable: Designed to be moved around, including APUs (0.5-20kW)
Stationary: Provide electricity and not designed to be moved (0.2kW-2MW)
Transportation: Provide propulsion or range extension to a vehicle (1-300kW)

Advantage for Mobility

Disadvantage for Mobility

Sources: DoE Fuel Cells Factsheet, NED Stack, E4Tech, Fuel Cells Today, Fuel Cells History and Principles, Research Gate publications on Direct Methanol Fuel Cells, DNVGL Report, Design News – Hydrails are the future of Rail Transportation, 2016 Fuel Cells Technologies Multi Year Research and Development

For commercial aviation, we see 3 evolutionary steps to reduce CO_2 emission via H_2 - close to zero-carbon emission solutions not expected to rise before 2040

Mobility

2030

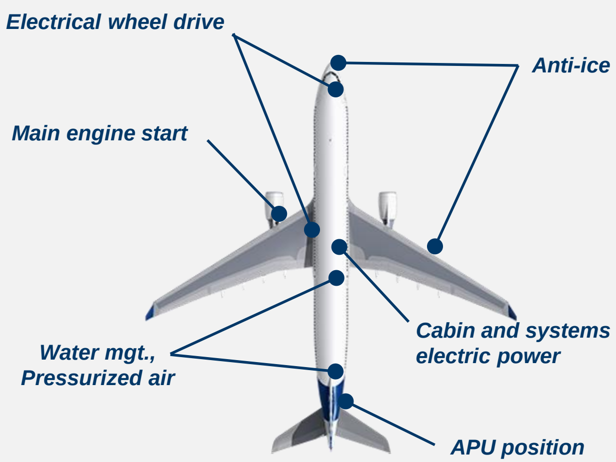
2040

1 Synthetic Kerosene – E-Fuels

- Synthesized from CO2 and Hydrogen
- ✓ **No impact on the aircraft design**
- ✓ **Compatible with current engines**
- X Higher fuel cost than H_2

2 Fuel cells as auxiliary power unit

Electrification of auxiliary systems by
Hydrogen based fuel cells:



3 Hydrogen fuel cells as propulsion

Existing small planes prototypes

ZeroAvia 6 seaters

Radical rethink of the design for small aircraft
(e.g. distributed electric propulsion)

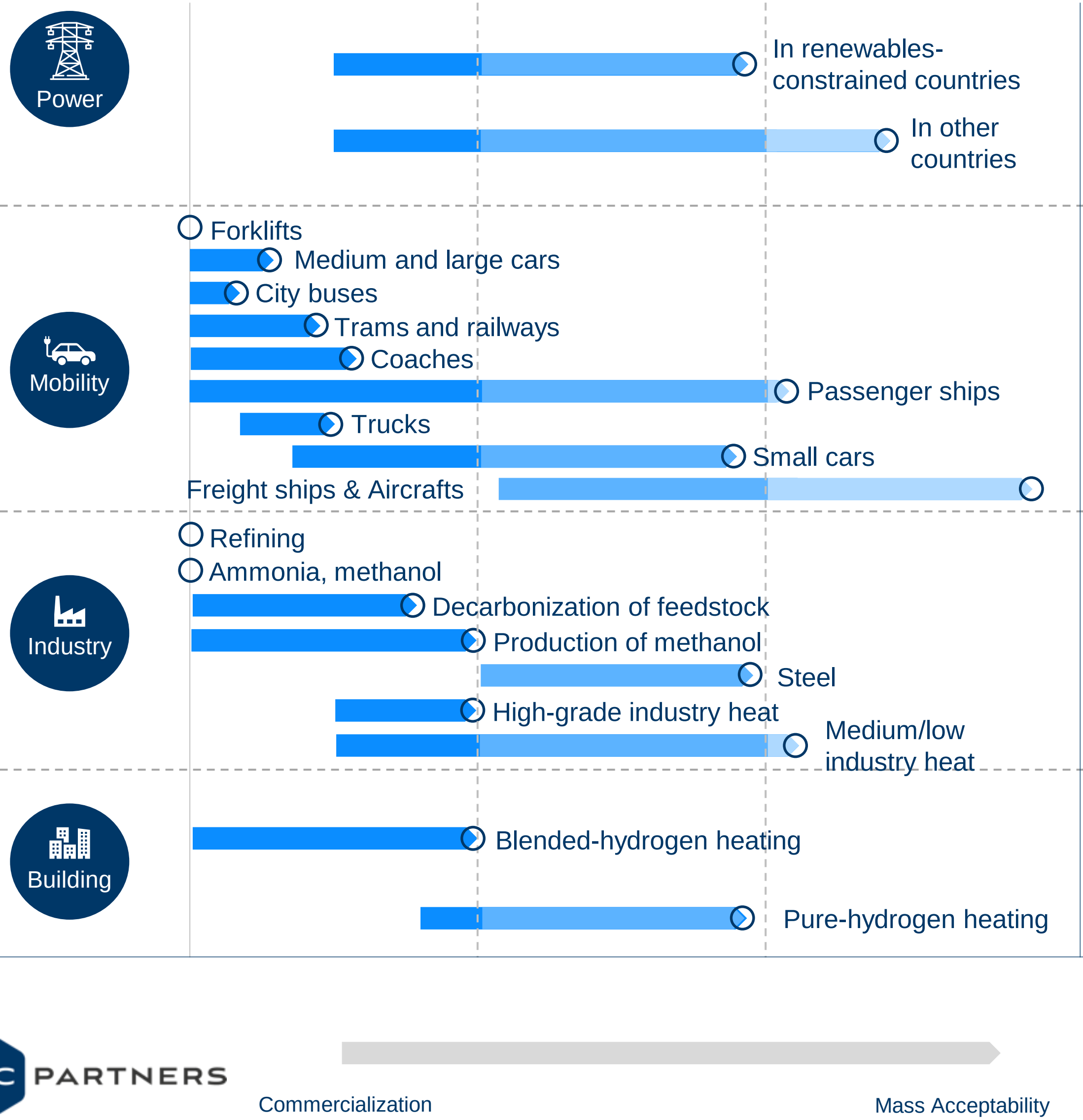
LH2 for propulsion

Re-design of jet aircrafts

Early 2000 Cryoplane project

Could appear earlier than fuel cells for mid-size carriers

Still, the potential of hydrogen is significant through all applications and unleashes big opportunities across all hydrogen relevant use cases



Sector	Application	Business Potential	Drivers
Power	Electricity storage	High	• In the longer term, hydrogen can play a role in large-scale and long-term storage to balance seasonal variations • Push towards a zero-emissions renewable energy system
	Flexible & back-up power generation	Medium	
Mobility	Forklifts	High	• Zero-emission solution with similar usability compared to conventional vehicles • No emissions of pollutants and greenhouse gases • Quick refueling time, allows operation continuity
	Cars	Medium	
	Buses I Trucks	High	
	Trams & Railways	High	
	Aviation	Medium	
	Ships	Low	
Industry	Industrial high temperature heat	Low	• Tougher air pollutant standards could increase the use of hydrogen in the industry application • Political support in conjunction with low green energy costs offer vast potential
	Chemicals	High	
	Refining	High	
	Iron & Steel	Medium	
Building	Blending in the gas grid	Low	• By integrating blending hydrogen into existing natural gas networks • High potential to use low-concentrated blending to reduce emissions till 2030
	Conversion to 100% H2	High	

Business Potential

Low Medium High

Drivers

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The devil is in the details: We see 4 significant roadblocks for large-scale commercialization of full hydrogen-enabled use cases

Roadblocks towards large-scale H2 use cases

Technology Breakthrough

- **Diverse maturity** levels for H2 use cases with fragmented commercialization roadmaps
- Still ongoing **technology competition** in key use cases (regarding business potential and end user relevance) like mobility (eCars vs H2 cars)
- **Transition phase** from todays solutions to target solutions will take **up to 20 years**

Value Chain Complexity & Infrastructure needs

- Widespread and sustainable (green) H2 solutions will require **+35% electricity production than today**
- To guarantee full-scale distribution, storage and delivery will lead to **massive updates of current infrastructure** (transition phase for the 40.000 airports globally of > 30 years expected)

Regulatory Uncertainty

- Although strong momentum on national level for H2, **global standardization efforts only at the beginning** – in strong competition with further “next generation” technologies
- **Impact of COVID not clear yet** – but expected to slow-down “appetite for investments” esp. in China and the US until 2022

End User Acceptance

- Operational optimization efforts and public incentives (e. g. tax benefits) will not fully compensate **cost increase on the medium-term** (at least 2030)
- Solution provider need to **balance ecological and economical KPIs** in defining their commercial offers (esp. in mobility)
- **Trade-off needs to be transparently articulated** to get end user commitment and secure RoI

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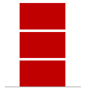
3 different hydrogen production paths compete for the best trade-off between economical and ecological KPIs

Different "shades of green"

CO_2 emissions from hydrogen production depends on technology and energy mix

	Grey H2	Blue H2	Green H2
Characteristics	Produced from fossil fuels via carbon intensive processes (96% of all hydrogen today)	Grey hydrogen whose CO2 emitted during production, sequestered via carbon capture and storage	Low or zero-emission hydrogen produced using clean, renewable energy sources
Types	• Gasification – coal / lignite • Steam methane reforming	• Grey with CCS* • Grid electrolysis	• Electrolysis from low-carbon renewables source
CO2-Footprint			
Cost			

In addition, significant infrastructure upgrades will be necessary to scale-up – both for Hydrogen production and distribution

Client Example

Mobility

Use Case: Impact of H2 on energy demand and supply (Example: Atlanta Airport)

1,200
Take-offs / day

Energy Demand

7,200t
Kerosene / day

≙

2,600t
H_2 / day

≙

6.5 GW
Power needed to produce H_2 via electrolysis

Energy Supply

Nuclear plant: 1,65 GW

4
EPR reactors

$16 bn
Capex Cost*

or

Solar farm: of 130 km²

87M
300 watt solar panels with 25% load factor

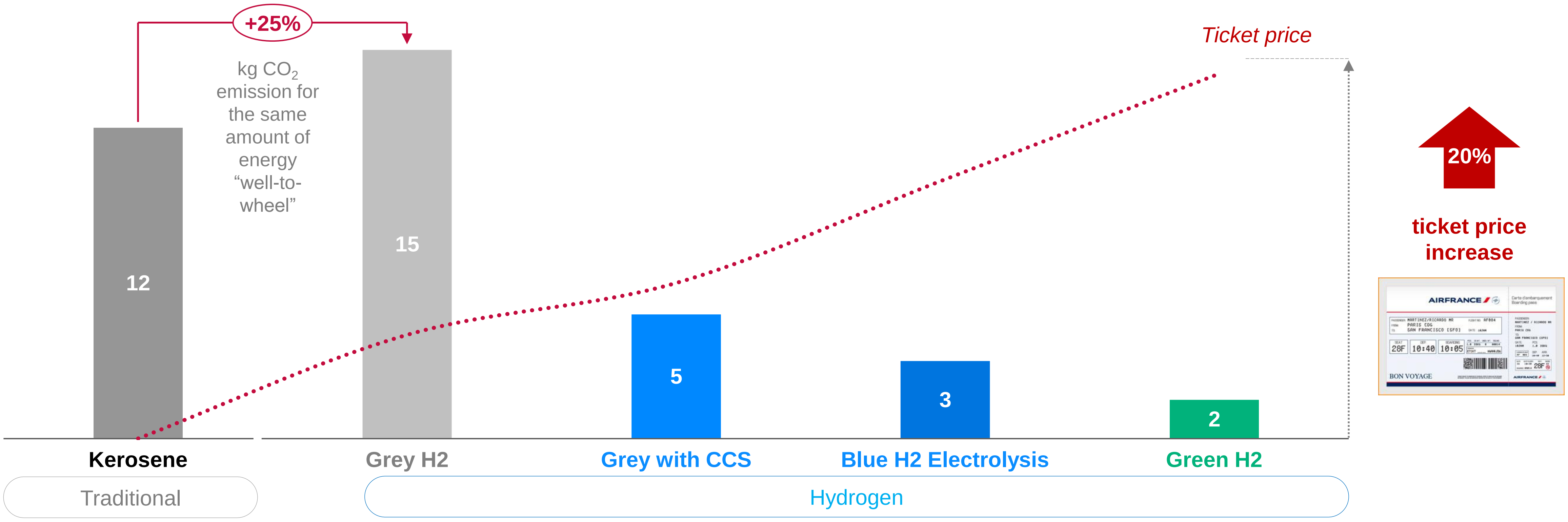
$50 bn
Capex Cost

* Based on a cost estimation of $4bn

Finding the right balance between emissions and cost will be key for the future – for some use cases end user acceptance will require dedicated marketing strategy approach

Mobility

Emission & cost impact balance*



Calculation based on the French energy mix with 58 gCO2/ kwh I Cost impact on a Boeing 737 or A320 block-hour cost for a 3,000km flight

We support clients in modeling H2 scenarios and business cases to simulate cost, revenue and investments for an objective RoI* decision basis moving forward

H2 Business Case Model for Analysis and Simulation

1 Supply Chain Scenarios (End-to-end)

Production Method	Production Energy Source	Feedstock
Liquid Alkaline	Electricity-Grid	N/A
	Electricity-Renewables	Wind
Polymer Electrolyte Membrane	Electricity-Mixed	Grid + Wind
Steam Methane Reforming	Natural Gas	Natural Gas

+

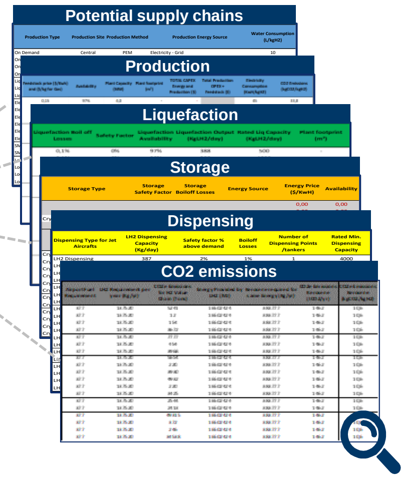
Main parameters taken into account			
Production	Liquefaction	Storage	Dispensing
Water Consumption	Liquefaction Boil-off Losses	Storage Boil-off Losses	Dispensing Boil-off Losses
Feedstock Price	Liquefaction plant Availability	Energy Price	Station Dispensing Capacity
Production plant Availability	Energy price	Number of Tanks	Numbers of Dispensing Points
Efficiency per Method	Liquefaction Efficiency	Days of available Storage due to seasonality	Dispenser Availability
Scale effect	Scale Effect	Required Storage Capacity per day	Energy Price

=

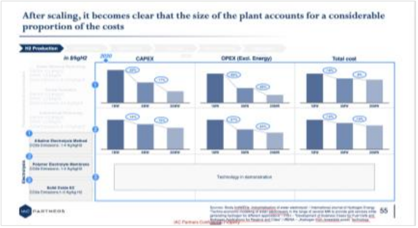
Airport specificities may influence the parameter values

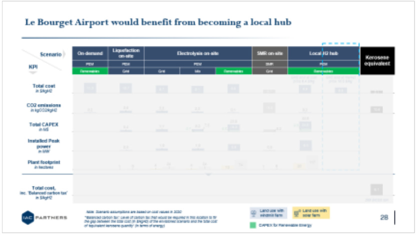
- Total Cost ($/kgH2)
- CO2 Emissions (KgCO2e/kgH2)
- Total CAPEX (M$)
- Peak Power Required (MW)
- Plant Footprint (hectares)

2 *Detailed cost model*



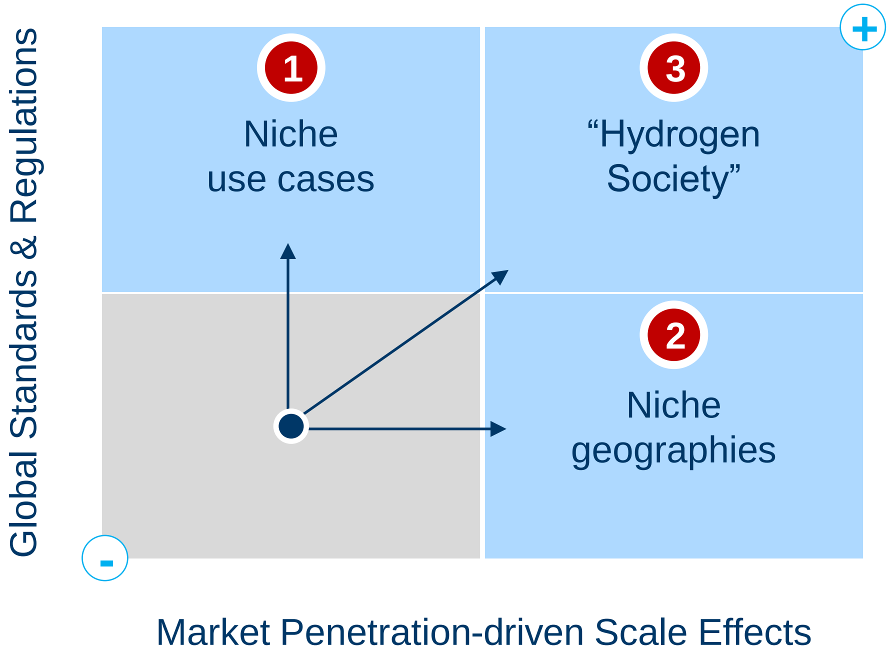
Strategic Recommendations





Ability to globally scale use cases driven by international standards will decide the path going forward – we see 3 potential target scenarios for players to consider

Hydrogen Target Scenarios

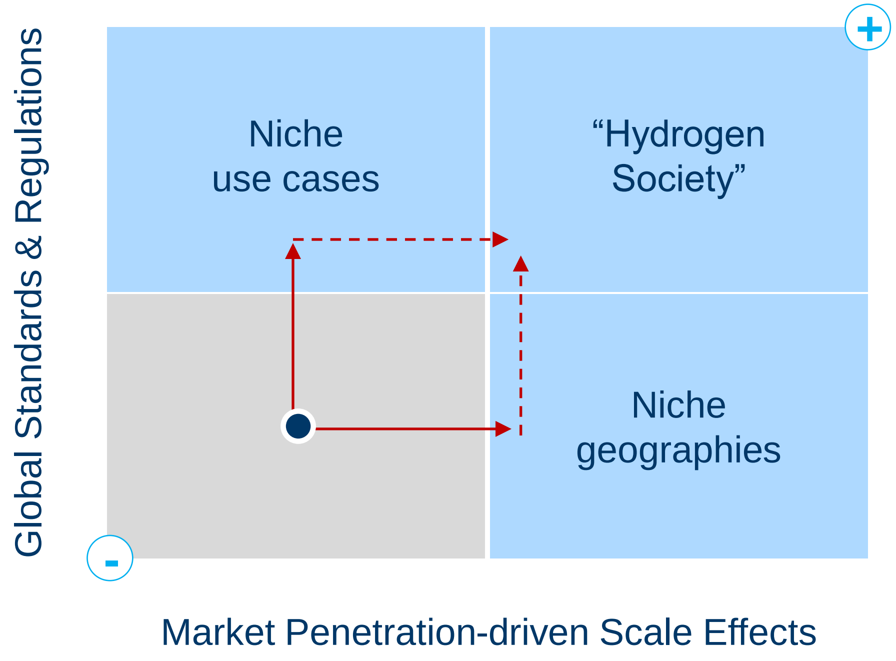


Impact on Low-carbon emission & end user acceptance

1. Hydrogen is used as **complementary solution** to low-carbonize **dedicated use cases** or is used as main solution for **separate niche use cases** (e. g. forklifts). **Mass usage** is **limited** due to availability (production capacity and distribution network) and cost constraints
2. Fragmented policies and local standards drive **regulatory uncertainty** and limit development of a global export network. **Local niche markets** and **applications** develop driven by end user acceptance / demand and technology innovation but remain **limited regarding** its **global scalability.**
3. Global long-term strategies, standardized policies and incentives (e. g. tax benefits) offer a **positive investment climate –** boosting hydrogen to become the **clean energy carrier of choice across** major **use cases and applications**. Synergies and scale effects accelerate transition from blue to green hydrogen globally

We expect an evolutionary path towards full-scale hydrogen solutions – a "joint force"– approach between Governments and Industry will be mission critically to not stop halfway

Hydrogen Evolution Paths



10 Implications for Key Players on the Hydrogen Value Chain

Governments

1. Establish **long-term targets** (incl. KPIs) and **evolutionary roadmaps** to get there
2. **Mitigate investment risks** by funding and easy access to investors – esp. for 1st movers
3. Foster **climate of innovation** by R&D funding and establishment of national "CoE"s*
4. Support **demand creation** via end user communication and industry incentives (e. g. tax or subsidies)
5. Harmonize standards by contributing to **global Hydrogen communities** and councils

Industry

1. Strategy & Roadmap to focus on "**1st mover solutions**" to commercialize and scale-up
2. Build an **ecosystem** of **end-to-end value chain** actors to deploy "plug-&-play" solutions
3. Deploy applications with **x-use case synergy effects** on time and cost (e.g. airport infrastructure for refueling, heating and power)
4. **Enable R&D** to foster low cost production, performance improvement and drive technology innovation
5. **Enable Marketing** to **promote positive end user climate** towards balance between economical and ecological factors

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* Center of Excellence

Local governments are investing heavily in a "hydrogenized" world - formulating dedicated hydrogen strategies to address regulatory barriers and stabilize investment climate

						
Time	**July 2020**	**June 2020**	**Sept 2019**	**June 2018**	**June 2019**	**June 2020**
Budget	**$64 million**	**€1.5 billion**	**£12 billion**	**$22 billion**	**$17 billion**	**€9 billion**
Objectives	Support for industry and academia to **scale-up America's hydrogen economy** (US Department of Energy)	Develop a **carbon-neutral aircraft** by **2035** (Prototype -2028)	Deployment of a **4GW floating wind farm** for **hydrogen production** in the **early 2030s.**	Develop private-public **Industry ecosystem for Hydrogen fueled vehicles** by **2022.**	Develop **fuel cell industry** and **H2 mobility supply chain** by **2023**.	Ramp up **Hydrogen production** capacity to **5 GW by 2030** and **10 GW by 2040**
Main Projects & Initiatives	3M to develop advanced manufacturing equipment for "gigawatt-scale" proton exchange membrane electrolysis technology	France's ambitions for a zero-carbon plane include a reworking of the popular Airbus A320 product line by 2030 and the move to hydrogen fuel by 2035.	ITM Power uses power from Ørsted's Hornsea One offshore wind farm to generate U.K.'s first green hydrogen using 100 MW of electrolyzers.	South Korea's priorities are leadership in fuel cell cars and large-scale stationary fuel cells for power generation.	China's industrial hub Hebei approved 43 H^2 projects for production, equipment manufacturing, filling stations and fuel cells	German steel giant Thyssenkrupp and the country's largest utility, RWE to forge a long-term green hydrogen alliance

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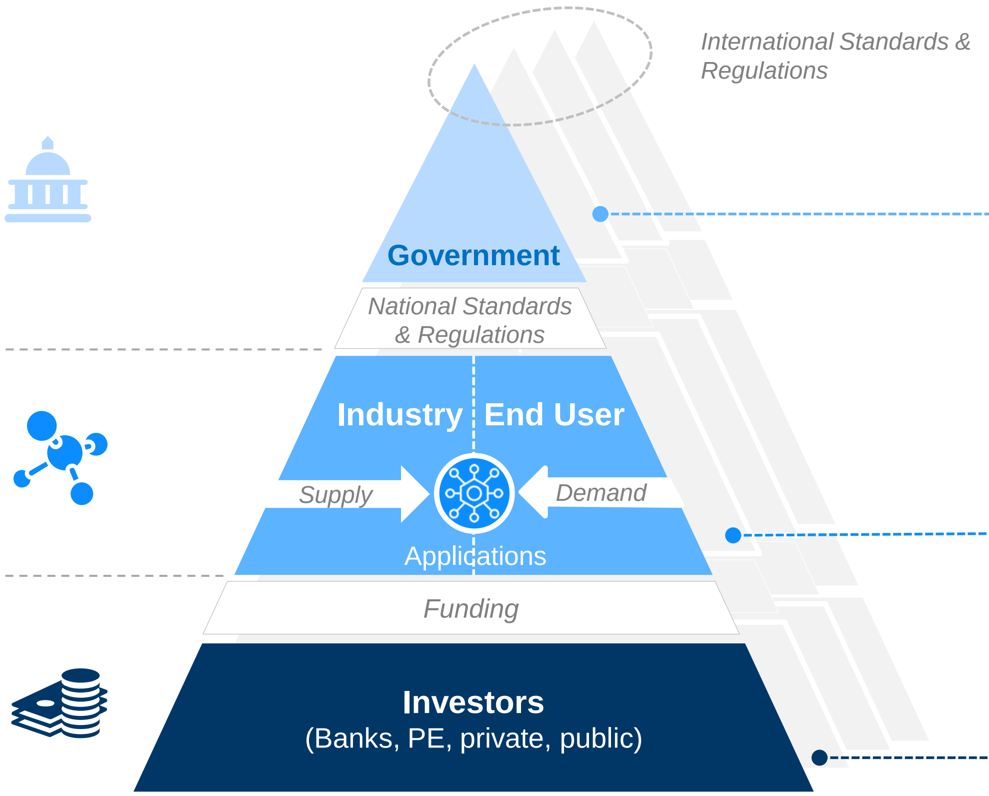
First councils start to build to join forces between industry, governmental organizations and investors – we recommend to strategically build a global H2 Ecosystem

Architecture of a global Hydrogen Ecosystem



Examples for ongoing initiatives

National Hydrogen Strategies

Hydrogen Council

3M, AIRBUS, Air Liquide, AIR PRODUCTS, ALSTOM, AngloAmerican, aramco, Audi, BMW GROUP, BOSCH, bp, CHN ENERGY, CNH INDUSTRIAL, Cummins, DAIMLER, EDF, ENGIE, equinor, faurecia, GM, Great Wall, HONDA, HYUNDAI, Iwatani, Johnson Matthey, ENEOS Nippon Oil & Energy, Kawasaki, KOGAS, Linde, MICHELIN, OP, SCHAEFFLER, Shell, SIEMENS, SINOPEC, thyssenkrupp, TOTAL, TOYOTA, WEICHAI

AFC Energy, AVL, BALLARD, CHART, Chevron, elringklinger, Faber, Fortescue, galp, GORE, Hexagon, ILJIN, ITOCHU, LIEBHERR, MANN+HUMMEL, Marubeni, McDERMOTT, McPhy, Mitsubishi Corporation, Mitsubishi Heavy Industries, MITSUI & CO., nel, NGK NTK, NIKOLA, PLUG POWER, REFIRE, SINOCAT, SinoHytec, SMBC, snam, SoCalGas, Sumitomo Corporation, TOYOTA TSUSHO, TRUE ZERO, Vopak, Woodside

ANTIN, BNP PARIBAS, CRÉDIT AGRICOLE, John Laing, SOCIETE GENERALE

First global standards emerge and start to converge – with solid maturity for Buses and Cars and a “way-to-go” for Aviation and railway

Non-exhaustive

Standards / Applications	Operations for Fuel Cells*: FCEVs	Buses	Trains	Airplane (only APUs)
Safety Standards related to safety of use, best practices and lessons learnt	Working Party 29 - Global Technical Regulations (GTR) GTR-13: Hydrogen and Fuel Cell Vehicle Safety IEC 62282-4-101 IEC 62282 (2012-2019) GB/T 31037.1 (2014) Plan No. 20130689-T-604 (2017) JIS C 62282	Working Party 29 - Global Technical Regulations (GTR) GTR-13: Hydrogen and Fuel Cell Vehicle Safety IEC 62282-4-101 IEC 62282 (2012-2019) GB/T 31037.1 (2014) Plan No. 20130689-T-604 (2017) JIS C 62282		SAE AIR 6464 (2013) DO-160 (Explosion and Fire resistance)
Testing & Performance Standards related to testing, verification procedures, measurement parameters and devices	IEC 62282 (2015-2017) PTC 50 (2002) GB/T 20042 (2008) GB/T 25319 (2010) GB/T 31035 (2014) GB/T 23645 (2009) GB/T 26991 (2011) GB/T 34544 (2017) GB/T 37154 (2018)	IEC 62282 (2015-2017) PTC 50 (2002) GB/T 20042 (2008) GB/T 25319 (2010) GB/T 28183 (2011) GB/T 31035 (2014) GB/T 23645 (2009) GB/T 26991 (2011) GB/T 34544 (2017) GB/T 37154 (2018)		
System Design Technical and infrastructural requirements, design parameters, guidelines for integration on vehicles	ISO 23273 (2013) IEC TC105 SAE AS 6858 (2017) SAE J2579 SAE J2719 JIS C 8800 (2008) JIS C 8826 (2020) JIS C 8851 (2013)	ISO 23273 (2013) **CEN/TC 268** IEC TC105 SAE AS 6858 (2017) SAE J2579 SAE J2719 JIS C 8800 (2008) JIS C 8826 (2020) JIS C 8851 (2013)		SAE AS 6858 (2017)

Key Findings

- **Preliminary standards** were created by **SAE Germany in 2013** for installation of **Fuel Cell Systems in Large Civil Aircraft, & technical guidelines for the safe integration of PEM Fuel Cell,** (considered to be LH2 and CGH2 types only), fuel storage, fuel distribution and appropriate **electrical systems** into the aircraft.
- **Safety codes and standards** have yet to be developed specifically for **hydrogen fuel and power systems** for **rail applications**. **Harmonizing international standards** might expedite the **use of H2 fuel and fuel cell systems** in **rail applications. Infrastructure and safety** under **crash scenarios** is also **underdeveloped.**
- **China** has a larger number of **hydrogen national standards** than ISO and IEC, focused on **terminology, fuel quality, safety, construction, production and purification, storage, transportation and fueling, applications, and testing**. ISO standards are mainly specialized in hydrogen **fuel quality, safety and testing.**

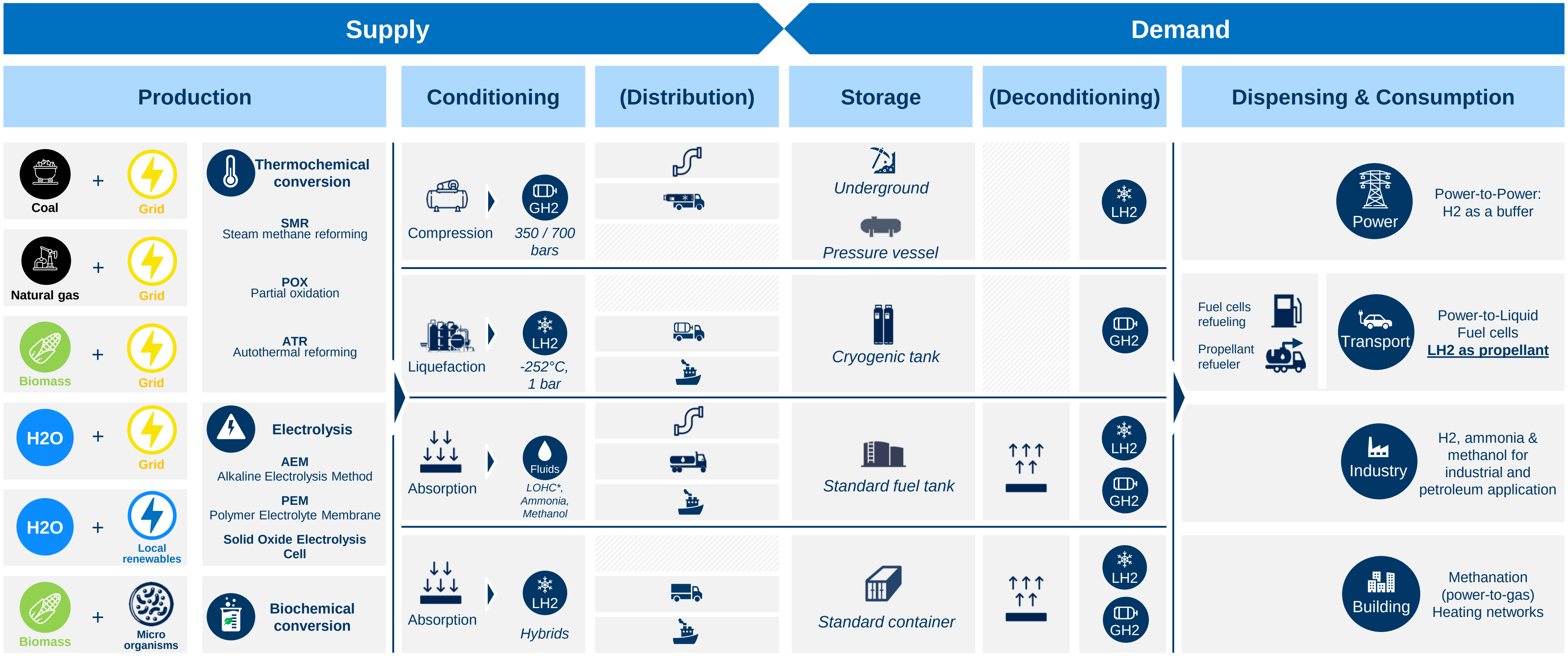
International Standard

Note:
*Operations include Fuel Cell functioning, power density, working conditions, hydrogen fuel purity & contamination standards.
IEC: International Electrotechnical Committee
Codes marked in bold are specific to Liquid Hydrogen.

Sources: FCHEA “Global Hydrogen and Fuel Cells Codes and Standards”, FCHJU “Hydrogen Safety Reference Database”, European Hydrogen Safety Planning Committee, Review of Hydrogen Standards in China (2019), SANDIA National Laboratories (H2 Workshop 2019)

Value Chain

The race is on – we already see significant movement on the value chain, but no demand / supply convergence across use-cases expected on the short-term



Adapted to on-site H2 production

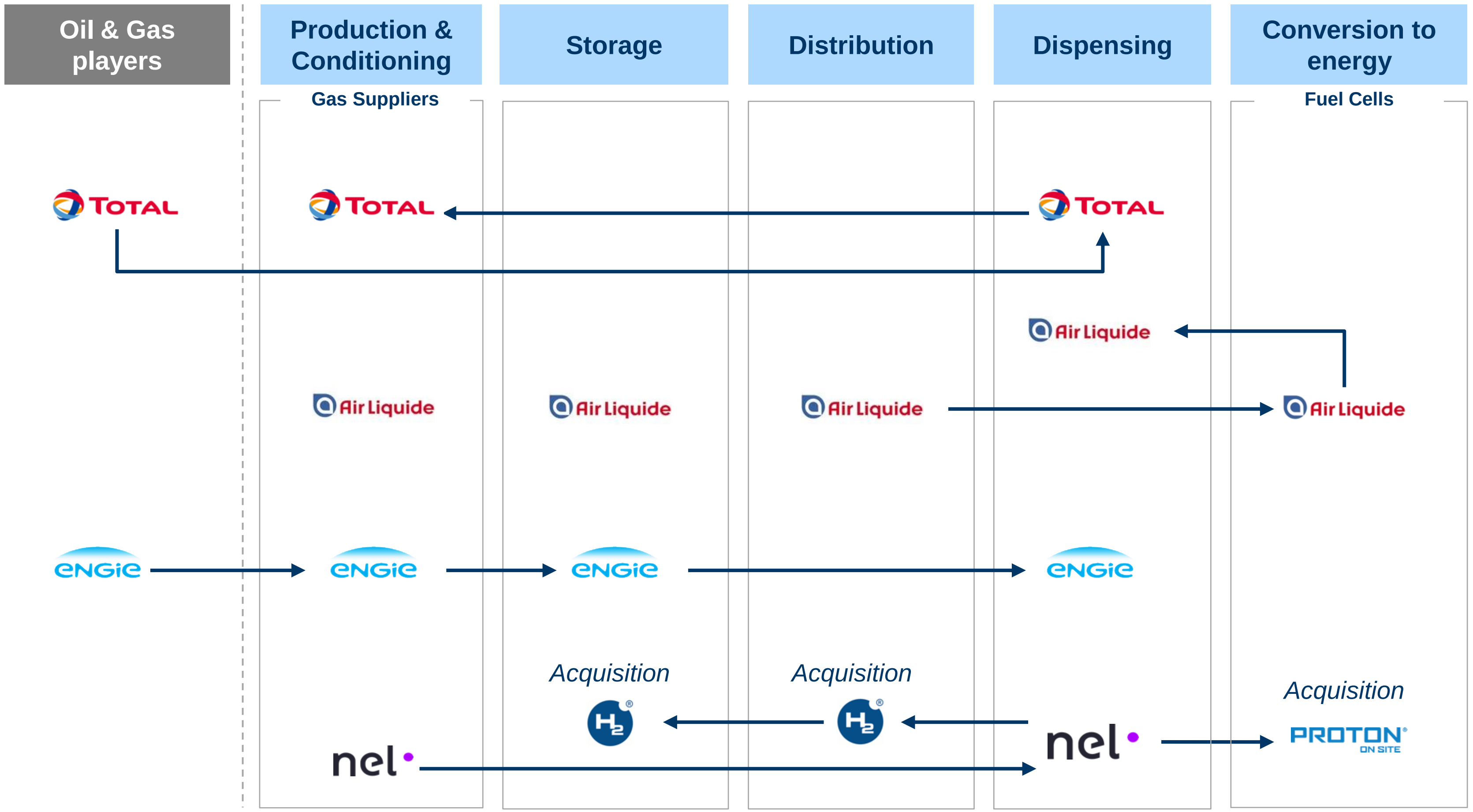
Dehydrogenation | Gasification/ liquefaction

*Liquid Organic Hydrogen carrier

Positive momentum and market outlook mobilizes established and new players along the whole value chain to secure quick-mover-advantage

Strategic Moves on the H2 Value Chain (selected key players)

Key player	Their vision of hydrogen
TOTAL	*TOTAL sees hydrogen as a green fuel (potential threat to the fossil fuel market)*
Air Liquide	*AIR LIQUIDE sees hydrogen as a molecule and wants to remain a world leader in gaseous/liquid molecules production & distribution*
ENGIE	*ENGIE considers hydrogen as a clean source of electricity / a useful buffer for renewable energy production*
nel	*NEL sees itself as a hydrogen conversion specialists*



Analysis shows, quick-moving companies start mobilizing to secure pole position – we condensed 4 patterns for success to consider to not fall behind

Patterns for Success

1 Objective Market Assessment

- Leave opportunistic “trial-&-error” approach phase by putting H2 on the **board agenda – linking** with overall **sustainability** strategy and “purpose-driven mission statements
- Define “**capability-driven” Business Case** – incl. Make-Build-Partner scenarios

2 End-to-end system value (TVO)

- Apply a **customer 1st** approach – Understanding value-driver and -killer from an **end-user perspective**
- Build **“ready-to-use” end-to-end solutions** – covering H2 production, distribution, storage and use case design

3 Central Hydrogen Center of Excellence

- Nominate **dedicated responsibility** to **proactively scan regulatory and industry environment** to identify strategic opportunities and roadblocks
- Build **x-functional task force** (incl. R&D and marketing) to bundle expertise across industries, use cases and geographies

4 Global Ecosystem Strategy

- Identify **industry partners** on the end-to-end value chain (see no 2) to secure capability access
- Participate in **national councils** and **regulatory work groups**
- Build **international relationships** to promote national demand on global scale

IAC PARTNERS

How we can help: IAC supports companies shaping their strategic footprint in Hydrogen – accelerating the race towards competitive edge

1 **Strategic Market Studies**
Room,- Right- and Way-to-Win –
Business Potential I Market Segments I Key Success Factors & enabling Capabilities I Capability Heatmap I Strategic Roadmap I Business Case

2 **Business Model Design**
Product Portfolio & Roadmap I Target Use Cases & Customer Segments I Value Chain Design I Operating Model

3 **Go-to-Market Strategy**
Ecosystem Strategy & Design I Commercial Offer I Marketing & Communication

Let's get in touch! –
Our hydrogen experts are happy to share industry insights and good-practices with you

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Our Values

Commitment, Responsibility, Team Spirit and Innovation

These are the values shared by all IAC's employees - Values at the heart of our vision of a consulting firm deeply committed to the competitiveness of its clients.

Our history started more than 30 years ago; we reaffirm the values that connect our employees by emphasizing commitment and responsibility. We believe in both the strength of the collective and the potential of each, that we engage individually and collectively for our clients and the firm.

We are a responsible company because each one of us acts as a responsible individual, being personally a custodian of our common culture.

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