

Hydrogen as a Fuel

European Market Analysis

Content

◀ **01** Market Overview & Roadmap ▶

◀ **02** Standardization & Regulations ▶

◀ **03** Tradeshows & Conferences ▶

◀ **04** Regional & National Orgs. ▶

◀ **05** European Major Hydrogen Projects ▶

◀ **06** Energy Sector & Transportation Comps. ▶

◀ **07** H₂ Equipment & Solution Suppliers ▶

◀ **08** European Competitors ▶

◀ 01 Market Overview & Roadmap ▶

Many of **Europe's larger cities** have set out **ambitious policies** designed to **stimulate a transformational shift** in the dominant powertrain technology used in their bus fleets

National level plans	<i>Norway</i>	All new urban buses sold in 2025 to be zero emission or use biogas. Aim to have a fully ZE transport system by 2030.
	<i>The Netherlands</i>	All new buses procured from 2025 to be ZE.
City-specific commitments	<i>Athens, Greece</i>	Commitment to remove all diesel vehicles from city by 2025.
	<i>Copenhagen, Denmark</i>	Phase out of diesel vehicles as part of plan to be carbon neutral by 2025.
	<i>Hamburg, Germany</i>	All buses purchased from 2020 to be ZE.
	<i>London, UK</i>	All new single deck buses to be ZE from 2020, all new single and double deck buses to be ZE from 2025.
	<i>Madrid, Spain</i>	Commitment to remove all diesel vehicles from city by 2025.
	<i>Paris, France</i>	Commitment to remove all diesel vehicles from city by 2025.

Hydrogen Can Play 7 Major Roles in the energy transformation

Enable the renewable-energy system

1 Enable large-scale renewables integration and power generation



2 Distribute energy across sectors and regions



3 Act as a buffer to increase system resilience



Decarbonize end uses



4 Help decarbonize transportation



5 Help decarbonize industrial energy use

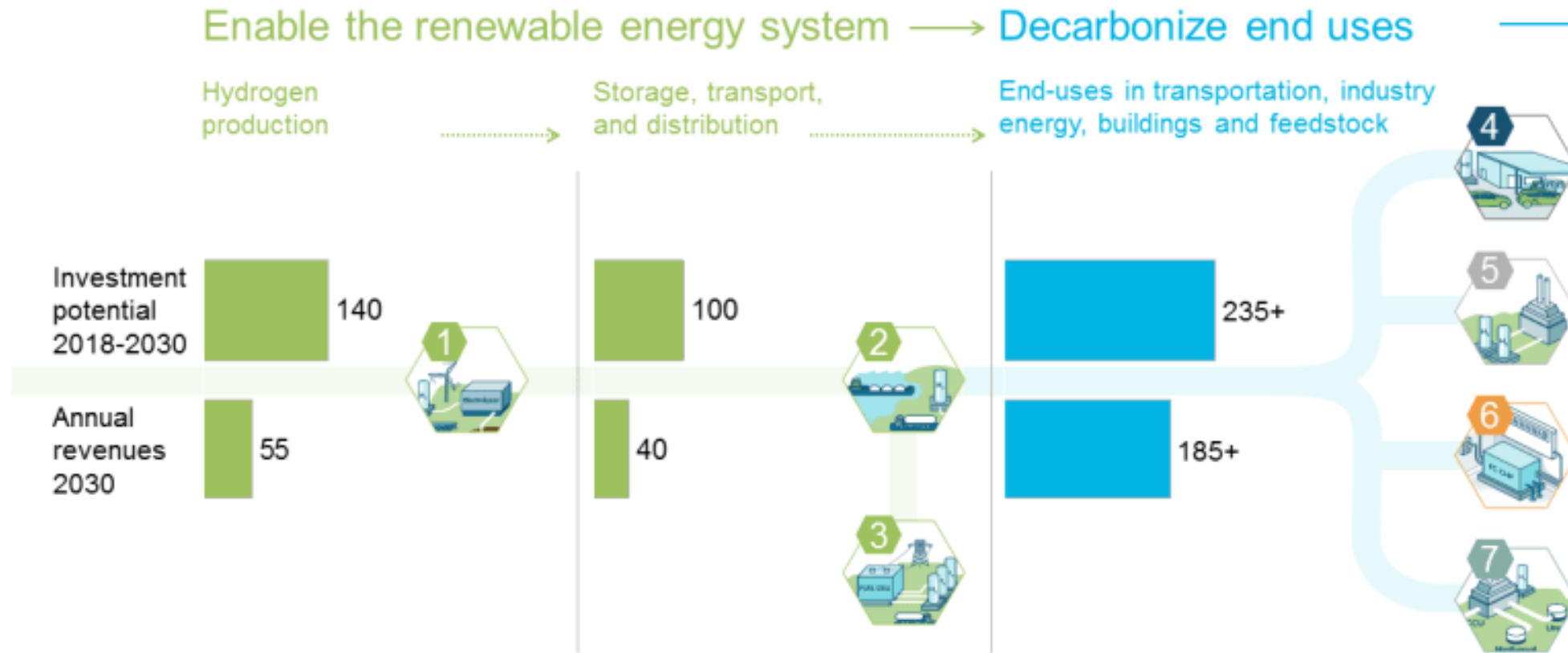


6 Help decarbonize building heat and power



7 Serve as renewable feedstock

Global Investment Opportunities Amount to ~\$475 Billion until 2030



1 Excluding existing feedstock uses

SOURCE: Hydrogen Council

◀ 02 Standardization & Regulations ▶



◀ 03 Tradeshows & Conferences ▶

Relevant Tradeshows & Conferences



3i Jul 2-5, 2019



Lucerne, Switzerland



3i Jun 2-7, 2019



Tokio, Japan



3i Sep 10-11, 2019



Stuttgart, Germany



3i Sep 26-27, 2019





San Fransisco, USA




3i Mar 10-12, 2020



Düsseldorf, Germany



3i Apr 20-24, 2020



Hanover, Germany

◀ 04 Regional & National Organizations ▶



Regional & National Organizations Overview

- The European Union and its member states are involved in regional and national projects.
- Their activity is lead by organizations: some of which are purely national/federal, and some are a joint effort of both industry and national entities.
- This chapter covers the following organizations:




Ministerium für Wirtschaft, Innovation,
Digitalisierung und Energie
des Landes Nordrhein-Westfalen








NOW GmbH (National Organisation Hydrogen and Fuel Cell Technology)

- NOW GmbH is responsible for the coordination and management of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP) and the Electromobility Model Regions programme of the Federal Ministry of Transport and Digital Infrastructure (BMVI).






[Wolfgang Axthammer](#)
Managing Director



[Thorsten Herbert](#)
Divisional Head Transport and Infrastructure |
Head of [Programme NIP](#)



2016-2026 Federal Funding € 1.4 bn

Combining R&D Funding with Market Activation

Battery Electric Mobility

- Research and Development
- Communal mobility concepts
- Vehicle procurement



Federal Programme Charging Infrastructure

- Nationwide buildup
- Normal charging
- Fast charging



National Innovation-Programme Hydrogen and Fuel Cell Technology

- Research and Development
- Market activation



Mobility and Fuels Strategy

- Alternative fuels (efficient, emission-free)
- LNG as a marine fuel
- Pilot projects

Export Initiative Environmental Technology

- German-Japanese cooperation PtG
- H2/FC technology in developing countries (cooperation with GIZ)

◀ 05 European Major Hydrogen Projects ▶

8 relevant projects are covered in this chapter



H2 Mobility Deutschland

Today

52 stations live, 50 projected



2019

100 stations live in Q4



Originally it was planned to be the 2018 # of stations

2021

Regional growth to 140





H2 Mobility Deutschland

- H2 Mobility is a JV by 6 industry companies:



- Supported by 6 OEMs and the German Government:





The 3 Main Challenges to Continue with Strong Growth


[as perceived by H2 Mobility General Mng.]




- More HRS, availability and reliability close to 100%.
- Growing choice of available and affordable FCEVs.
- Supply and distribution of affordable green hydrogen.




H2 Mobility Deutschland Key People



[Nikolas Iwan](#), Managing Director
✉ ...



[Ben Becker](#), Funding Manager
✉ ...



[Lorenz Jung](#), Head of Network Delivery
and Project Management
✉ ...

◀ 06 Energy Sector & Transportation Companies ▶

14 companies are covered in this chapter




Air Liquide


- A very involved company in the European region;
- Air Liquide in Numbers:
Group revenue: €21billion 2018 ; 80 countries ; # of employees: 66,000
- Air Liquide portfolio of Hydrogen technologies includes:
 - Pressure Swing Adsorption (PSA) - Hydrogen
 - SMR-X™ - Zero Steam Hydrogen Production
 - Steam Methane Reforming - Hydrogen Production







Air Liquide – Key People



[Pierre-Etienne Franc](#), Vice President, Airliquide
Hydrogen Energy World Business Unit
 ...



[Erwin Penfornis](#), VP Hydrogen Energy Market
 ...



[Laurent Allidieres](#), H2 Technologies Director,
Hydrogen Energy World Business Unit
 ...
 ...

◀ 07 H₂ Equipment & Solution Suppliers ▶


9 suppliers are covered in this chapter






Diamond Lite S.A [Electrolyzers]





- Diamond Lite is a systems integrator of PEM electrolyzers.
- On March 2017, [Alpiq has acquired Diamond Lite S.A.](#), the Swiss specialist for hydrogen gas production facilities.
- Alpiq is thus **expanding its portfolio of services to include power-to-gas production facilities** and will offer planning, turnkey construction and marketing of such solutions to European industrial customers.
- The acquisition follows **Alpiq's strategy** to continue expanding its market presence in the energy services sector and to make targeted investments in growth fields.



 [DIPL.-ING. Alexander Gremm,](#)
General Manager

 [Christoph Heller,](#)
Head of BD Power-to-Gas



 Hans J. Vock, **Managing Director (?)**

◀ 08 European Competitors ▶