

# Hydrogen Economy Programm Management at DEKRA



Opportunities of the Hydrogen Economy

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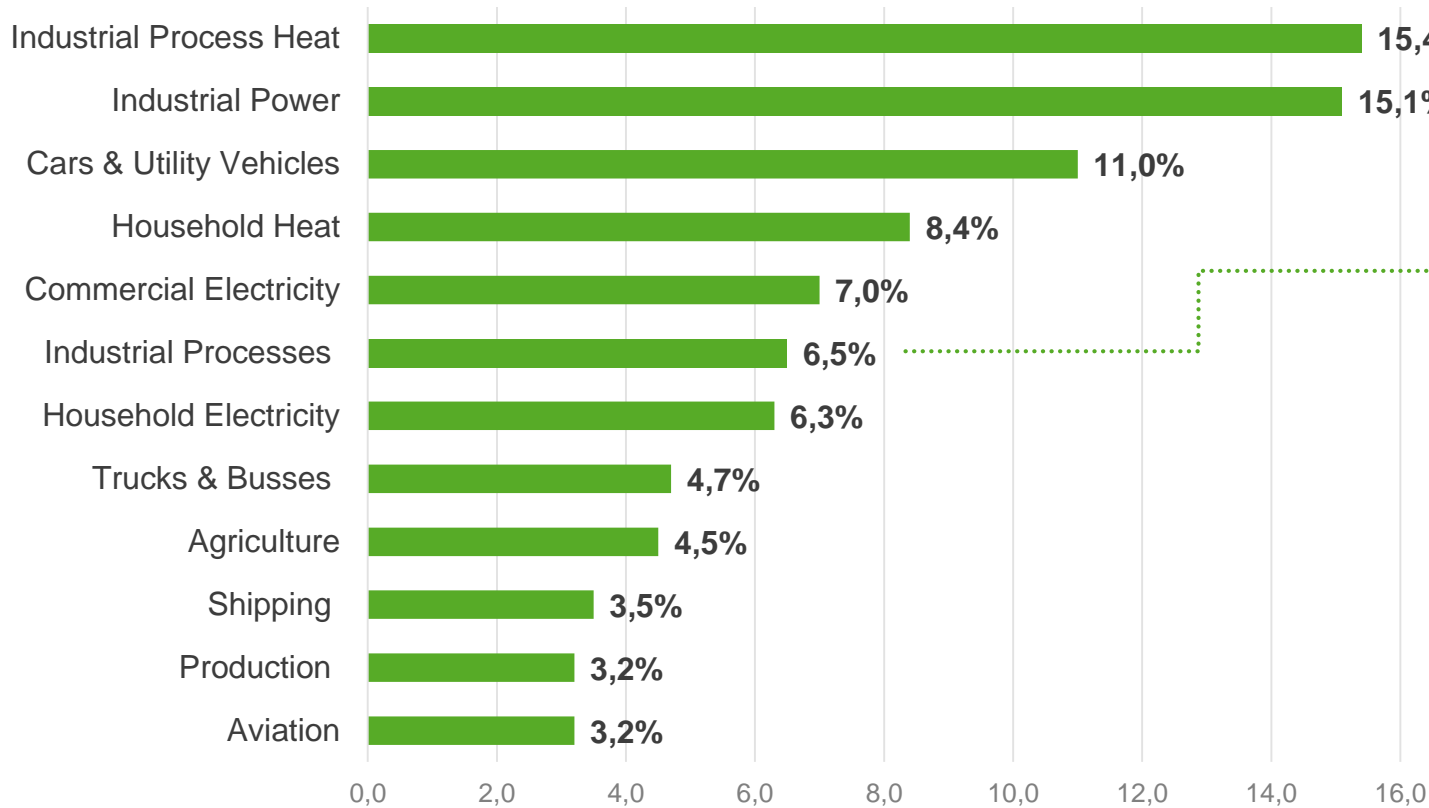
Hydrogen Programm Managment @DEKRA



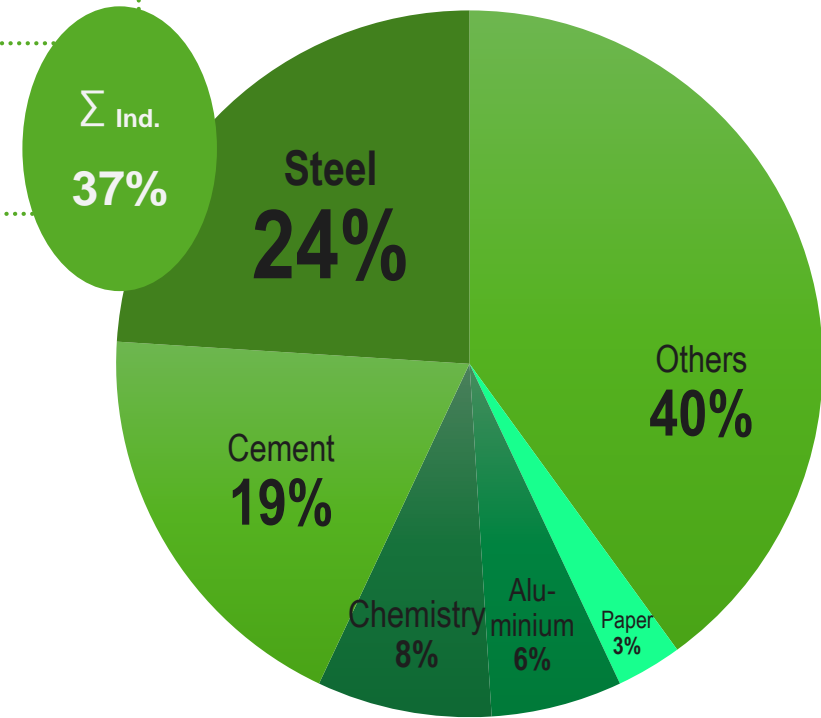
# How to reach Paris COP21 Targets for 2050

## Climate Neutrality requires Coupling of Sectors

Largest CO<sub>2</sub>-Producers in Europe (2018):



Quelle: Eurostat (2018)



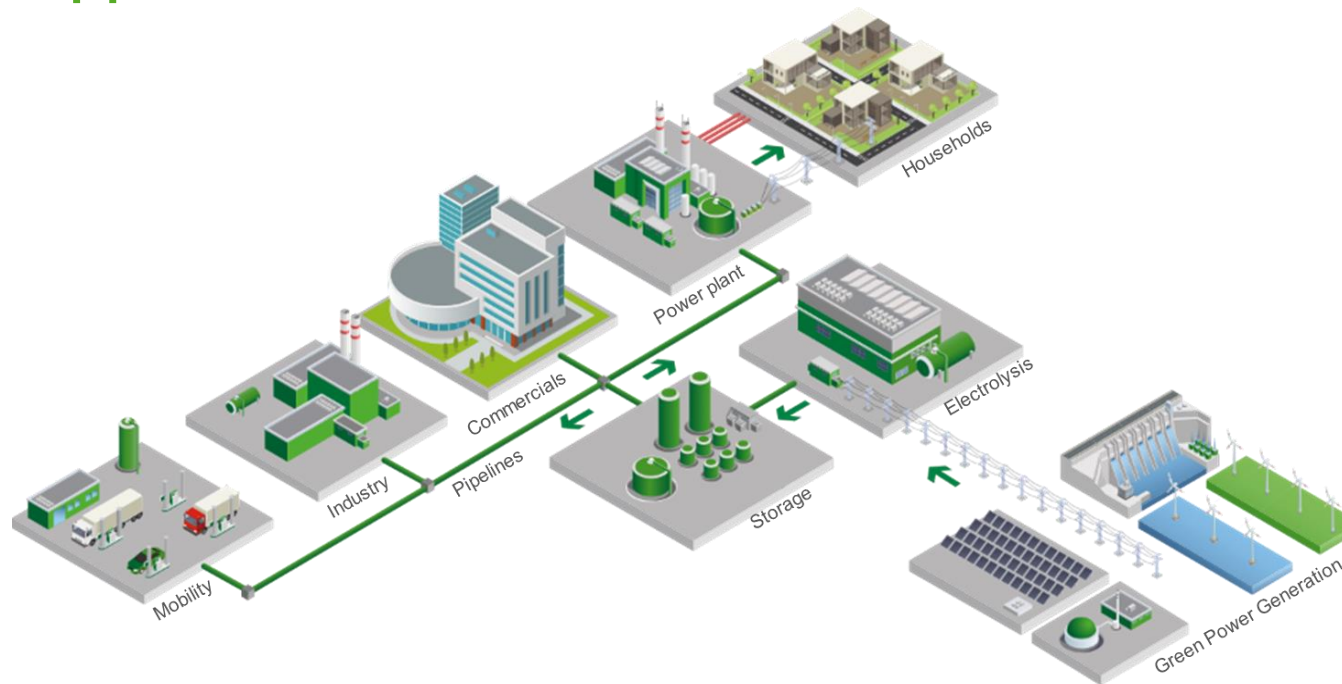
Quelle: IEA

# Hydrogen Economy Supply Chain

## Numerous Applications

### Mobility and Transportation

- > Forklifts
- > Busses
- > Utility Vehicles
- > Transportation Vans
- > Trucks
- > Passenger Cars
- > Trains
- > Shippis
- > Planes
- > Refilling Stations (HRS)



### Industry und Buildings

- > Industrial Heat and Material
  - > Steel Industry
  - > Cement Industry
  - > Chemical Industry
  - > Refineries
- > Fertilizer Production
- > Building Heat
- > Power Production

### Hydrogen Infrastructure

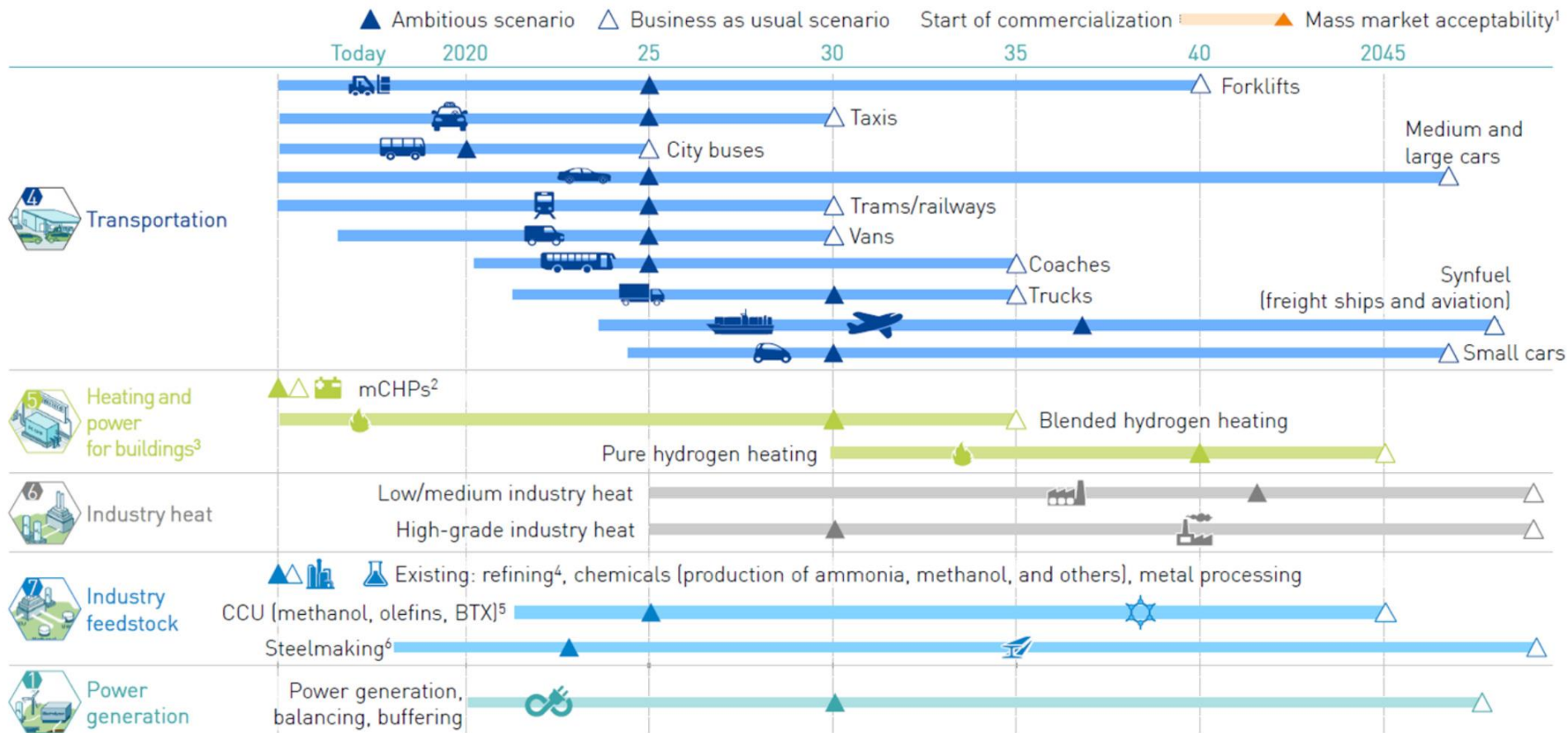
- > Hydrogen Electrolysis
- > Synthetic Fuels
- > Green Ammonia
- > Transport via
  - > Trucks
  - > Shippis
  - > Pipelines
- > Seasonal and Backup Storage

### Renewable Energy Production

- > Solar Power
- > Wind Power
- > Hydro Power
- > Biogas

# Technology Roadmap

## Applications Ready for Deployment









<sup>1</sup> Defined as sales >1% within segment; <sup>2</sup> mCHPs sales in EU independent of fuel type (NG or H<sub>2</sub>); <sup>3</sup> Pure and blended H<sub>2</sub> refer to shares in total heating demand; <sup>4</sup> Refining includes hydro-cracking, hydro-treating, bio-refinery; <sup>5</sup> Market share refers to the amount of production that uses hydrogen and captured carbon to replace feedstock; <sup>6</sup> CDA process and DRI with green H<sub>2</sub>, iron reduction in blast furnaces, and other low-carbon steel making processes using H<sub>2</sub>

SOURCE: Hydrogen Roadmap Europe team



# What's about The Hype of Hydrogen ?

## A strong momentum builds up that we should not miss

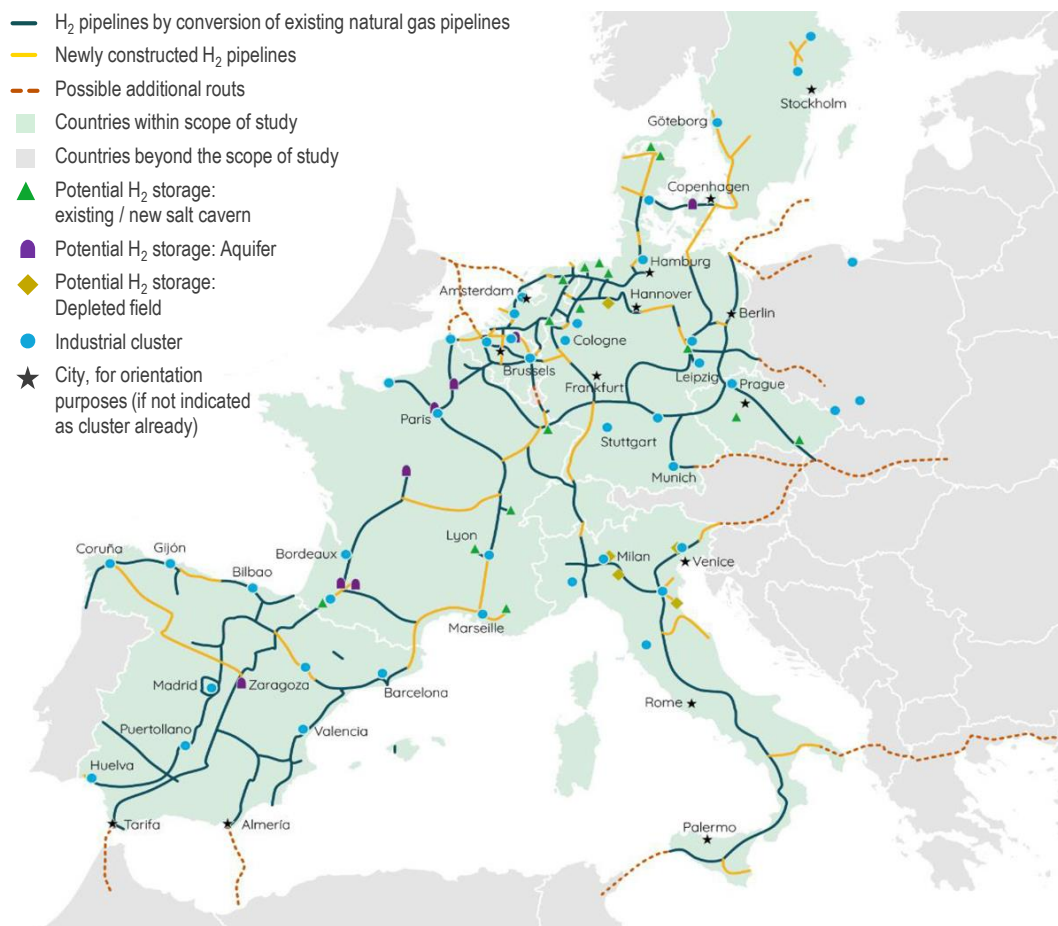
Germany		€7bn (+€2bn external partnerships)
Spain		€8.9bn (estimated mobilised investment)
France		€7.2bn (of which €1.5bn for an IPCEI project)
Portugal		€7-9bn (estimated mobilised investment). As public funds around €1bn (½ national, ½ from EU funds)
Austria		€2bn (draft) of public support requested by 2030 (of which €1bn by 2024) [tbc – 1-2 GW by 2030]
Italy		€10bn (draft) estimated mobilised investment of which 5 bn will be EU and Italian public funds [tbc – 5 GW by 2030]



EU Public  
Funding  
€ 470 billion



# EU-WIDE HARMONIZED STANDARDS FOR A PAN-EUROPEAN PIPELINE SYSTEMS



European Hydrogen Backbone initiative 2020 supported by Guidehouse

## European Hydrogen Backbone – Retrofit is a must

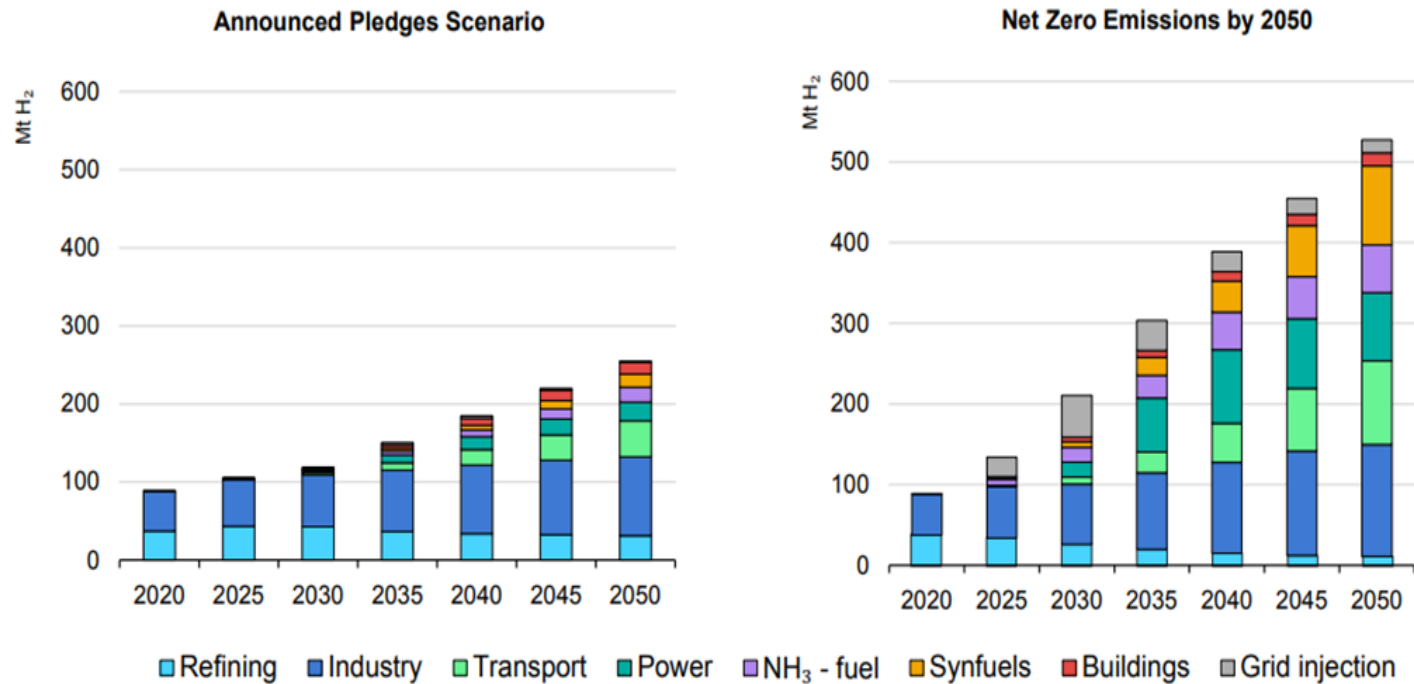
- > To realize the Hydrogen Economy a Hydrogen Backbone pipeline network across Europe of pure Hydrogen transport is needed
  - ❖ 3,900 km for 2030
  - ❖ 22,900 km for 2040
- > Paris 2015 targets and The Green Deal can only be met if 75% of these pipelines are retrofitted from natural gas pipelines through one-by-one expert evaluations

## European Guidelines – Safety and Efficiency without borders

- > Differences in national technical evaluations and practices can become an obstacle to a pan-European Hydrogen transportation network, as cross-border transportation systems may have a different kind of usability after Hydrogen pipeline retrofit
- > A joint and rapid EU-wide development of technical test procedures for the retrofit of transportation systems is an important base for the realization of the European Hydrogen Backbone

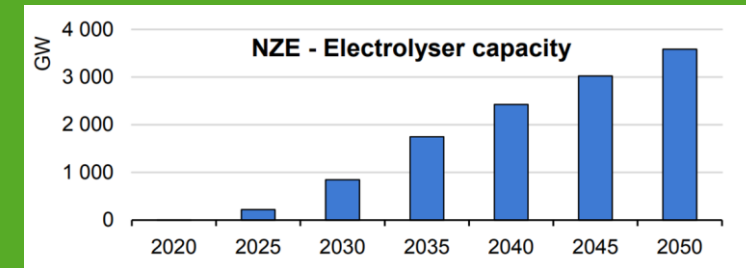
# GREEN HYDROGEN DEMAND

## All Scenarios with A HUGE INCREASE



Global Hydrogen Review 2021 IEA. All rights reserved.

Although recent government net zero commitments create momentum for adopting hydrogen-based fuels across the energy system, **volumes are insufficient** to achieve net zero emissions by 2050.



# Near-Future Market Potential

## What's in for us?

**Hydrogen Insights Report 2021, Hydrogen Council, McKinsey & Company:**

Already planned projects in Europa totaling € 130 billion investment volume until 2030, with many more projects needed to reach targets.

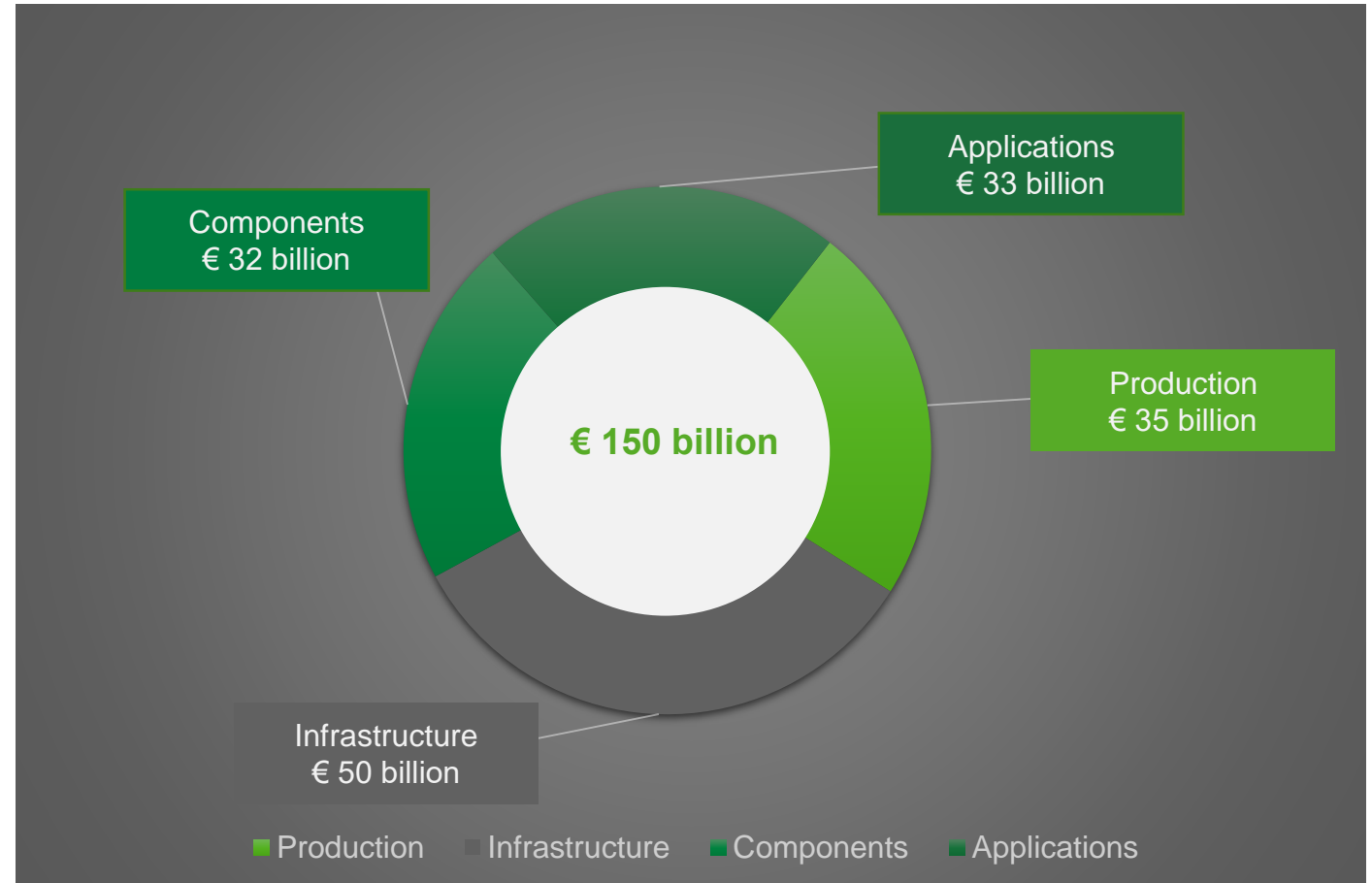
**FCH JU Report 2019 at request of the EC:**

EU market size and exports in 2030 add up to more than € 150 billion of revenues (conservative).

**EU TIC Revenues for 2030**

**> € 1 billion per anno**

### European Hydrogen Market Volume in 2030





# Safe Transition is Our Responsibility

## Public Acceptance is imperative to reach targets



By **Echo Huang**  
Reporter

June 12, 2019

Hydrogen gas leak caused fire at a hydrogen fueling station in Norway's Bærum — Quartz

### **A hydrogen fueling station fire in Norway has left fuel-cell cars nowhere to charge**



ERIC C. EVARTS  
SEPTEMBER 5, 2019

### **Northern California fuel-cell drivers still left dry since June explosion**



# Hydrogen TIC Activities

## The Competition IS AHEAD



DNV

SECTORS SERVICES INSIGHTS ABOUT US

Sign in Global

Overview Latest outlook Safety Infrastructure Decarbonizing production Policy/strategy

DNV.com

### Hydrogen

DNV is helping to chart the horizon to hydrogen

H<sub>2</sub>

Hydrogen H<sub>2</sub>

in

The world is heading for hydrogen, essential to a clean energy future. From production to consumption, a hydrogen economy is emerging. governments must focus on fo

TÜV

BRANCHEN UND DIENSTLEISTUNGEN WISSEN UND INFO STORE

WASSERSTOFFTECHNOLOGIEN UND BRENNSTOFFZELLEN

### NACHHALTIGE SICHERHEIT, EFFIZIENZ UND ENERGIEWENDE

Wasserstoff gewinnt immer mehr an Bedeutung und bietet die Möglichkeit, die Dekarbonisierung zu unterstützen. Doch welche wirtschaftlichen Aspekte gilt es zu berücksichtigen? Die Experten von TÜV unterstützen Sie gerne.

#### UNSERE SERVICES ZU:

- Produktion von Wasserstoff
- Speicherung, Transport und Verteilung von Wasserstoff
- Einsatz von Wasserstoff
- Schulung: Sicherer Umgang mit Wasserstoff

TÜVRheinland<sup>®</sup>  
Genau. Richtig.

KONTAKT TRAINING & WEBINARE FAQs REFERENCE CASES NEWS DE

Home Energiegewinnung Produktion Speicherung Transport & Verteilung Anwendung Zertifizierung „Grüner Wasserstoff“

Grüner Wasserstoff - Ein Energieträger mit Perspektive.

Kontakt

Inhalt

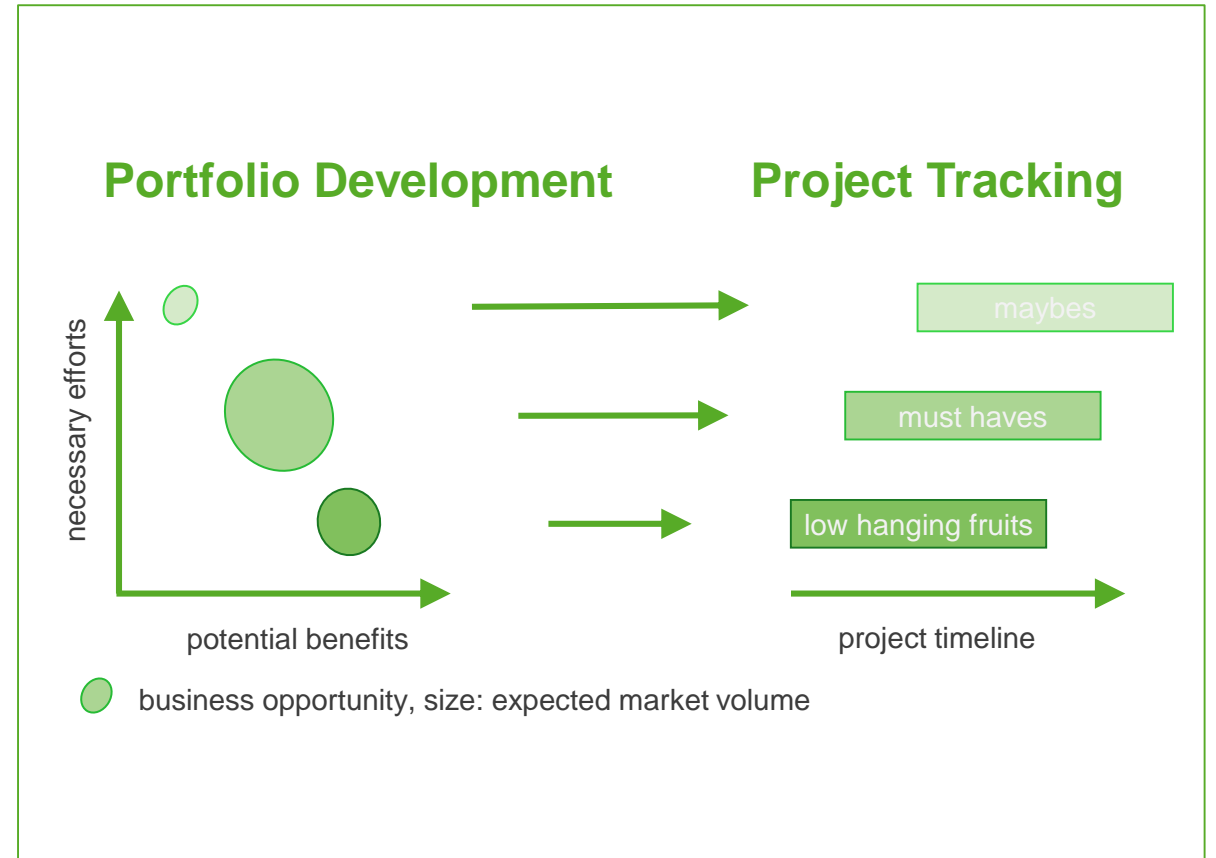


Ready to go  
... the industry is not waiting!

# Why Program Management at DEKRA

## Driving an Industry Hot Topic: The Hydrogen Economy

- Develop new Hydrogen related service packages
- Introduce a transparent project selection process
- Execute efficient project management and reporting
- Aim to maximize performance and profitability
- Channel cross-SD and trans-regional communication
- Facilitate intra-company information management
- Aid integrated marketing communication concepts



# Hydrogen PROGRAMM MANAGEMENT

## Tasks Overview

### Portfolio Management



- > Define new Service Packages across SDs
- > Prepare Resource Management and Prioritization Information
- > Carry out Project Tracking and Reporting to the Board

→ Service Development

### Internal Communication



- > Form Hydrogen Teams across SDs and Regions
- > Facilitate a Network and News Intranet Platform
- > Consolidate Information on Hydrogen Industry and Competitor Activities

→ Knowledge Sharing

### External Communication



- > Channel Hydrogen Economy Customer and Market Communications
- > Support Hydrogen Industry Conferences and Projects
- > Align with Lobbyists and Industry Associations

→ Market Positioning

# Activities Hydrogen @ DEKRA

## Where are we?

### Phase 1 Knowledge @DEKRA

- > Webinar organization & presentation preparation
- > Formation of Hydrogen Team with each SD & some Regions
- > Questionnaire results and conclusive report summary
- > Program and portfolio management proposal

### Phase 2 Services @DEKRA

- > 27 existing Hydrogen Economy service packages
- > Solution landing page on DEKRA.com and DEKRA.de
- > Supply chain breakdown and first customer requests
- > Next step Hydrogen service packages identified

### Phase 3 Structure @DEKRA

- > Setup of portfolio management to evaluate Hydrogen projects
- > Service package specifications and role-out requirements
- > DEKRA presence at relevant conferences and associations
- > Creation and connection of a trans-regional expert network



# Phase 1 (early 2021) : Questionnaire



## Information Gathering Process

- ✓ First round “get to know” Interviews with SD-Heads
- ✓ Cross-SD Hydrogen Team Definition
- ✓ Second round “working” Interviews with Hydrogen SD-Contacts
- ✓ SD-Questionnaire development, distribution and collection

## Evaluation of Results

- Complete list of existing Hydrogen related Service Packages
- Collection of customer demands and requests, low hanging fruit potentials
- Inventory on memberships and participations in Hydrogen related associations, working groups, conferences and research projects
- Expectation and role to a Hydrogen Program Management at DEKRA
- Hydrogen SD-resources requests at DEKRA

## Outcome

- Inventory and Proposal for the Implementation of a Hydrogen Program Management

# Phase 2 (end 2021) : DEKRA.com Solution Page Hydrogen Economy



DEKRA.COM SEARCH CONTACT

BUSINESS SERVICES CONSUMER SERVICES INDUSTRIES SOLUTIONS ABOUT DEKRA NEWSROOM

Homepage > Solutions > Future Energies > Hydrogen Economy

## Hydrogen Economy

DEKRA shares the envisioned future of the Hydrogen Economy and is a prominent facilitator of safe decarbonization. Check out our hydrogen-related services!

### Hydrogen Economy

#### Green hydrogen is the fuel for a carbon-neutral future

Hydrogen technologies are poised to take on an indispensable role in global climate change control strategies, using green hydrogen as an emission-free or a synthetic fuel, as a universal energy storage option with applications ranging from auxiliary services to seasonal storage, and as a green feedstock solution for high-emission industries.

The phase-out from the fossil fuel economy in accordance with the Paris COP21 global climate change agreement can only be achieved through the implementation of a Hydrogen Economy as depicted in the graphics below. This means integrating the renewable power sector with the end-user energy sectors **Mobility**, **Industry** and **Buildings** via a **Hydrogen-Infrastructure** sector, the latter including production, storage, and distribution of hydrogen.

#### Hydrogen Infrastructure

A reliable supply of green hydrogen is critical for a smooth realization of the Hydrogen Economy. Consumers, companies, and countries need to be able to depend on an uninterrupted access to sufficient amounts of hydrogen. Safe production, storage and distribution systems, and operations are therefore imperative to generate the necessary trust in the Hydrogen Economy. At the same time, the certified origin of a hydrogen supply source and its carbon footprint must be dependable. These are all services provided by DEKRA.

[Read more >](#)

#### Hydrogen Mobility

The utilization of hydrogen as a green fuel or as a component for green synthetic fuels in the Mobility sector is not undisputed and it is not yet clear which emission-free technology will prevail for which type of vehicle and application. Nonetheless, DEKRA services will support any trend to ensure a safe development.

[Read more >](#)

#### Hydrogen Industry

Today's high-emission industries, such as the fertilizer, chemical, steel and cement industries are currently developing and implementing production processes based on green hydrogen as a raw material and for heating. DEKRA's expertise in process and chemical safety management, engineering and testing makes us a globally recognized hydrogen specialist and trusted advisor in the chemical and process industry.

[Read more >](#)

#### Hydrogen Building Heat

Commercial and Household Building Heat is another end-user energy sector that must be integrated with the renewable energy generation sector by using green hydrogen as an emission-free fuel and to meet rising greenhouse gas footprint requirements. DEKRA services can ensure a safe operation. But we are also prepared to support you in property-related damage assessment in case of hydrogen-related incidents.

[Read more >](#)



# Hydrogen Infrastructure Solution Page Example

## INFRASTRUCTURE Service Packages



### Hazard and operability (HAZOP) studies

Performing hazard and operability studies, our experts effectively identify and analyze the risks of potentially hazardous process operations.

[Details >](#)



### Incident and Near Miss Investigation

Near misses provide a fantastic opportunity to improve your process safety performance. Our experts can help you by providing impartial assessments.

[Details >](#)



### Claims Handling

We deliver claims management services to insurance companies, leasing companies, government agencies and corporate clients.

[Details >](#)



### Loss Adjusting CAT

Remote or On-site Assessments in the Case of Catastrophes

[Details >](#)



### NDT and Advanced NDT

Non-destructive material testing plays a vital role in many industries. Alongside traditional testing techniques, DEKRA offers a wide range of special methods.

[Details >](#)



### Organizational Process Safety

An innovation in Process Safety Management (PSM), melding risk-based process safety with human factor elements for better safety outcomes.

[Details >](#)



### Product Life Cycle and Carbon Footprint Assessment

We verify Life Cycle Assessments (LCAs) and related data to confirm the sustainability and carbon footprint of your products.

[Details >](#)



### Explosion Protection Services

Testing of Products Designed for Use in Dangerous or Potentially Explosive Environments

[Details >](#)



### Explosion Protection Consulting

Our team of explosion protection experts provides comprehensive consulting services from hazardous area classification to full explosion hazards and risk assessment.

[Details >](#)



### Loss adjusting

With our 90 years of experience and usage of the latest technology, our experts will deliver you the highest service in non automotive expertise.

[Details >](#)



### Periodical Inspections of Pressure Equipment

Assisting end users with Periodical Inspections of Pressure Equipment and Boilers.

[Details >](#)



### Process Hazard Analysis (PHA)

Our specialists are experienced in the full suite of process hazard analysis methods and are ready to advise you in choosing the right PHA for your company.

[Details >](#)



### Process Safety Verification of Pressure Equipment

Assisting Manufacturers and End Users with Process Safety Verification of Pressure Equipment.

[Details >](#)



### Safety Testing for Electrical Products

Safety Testing of Electronic Machines, Products, Systems and Parts.

[Details >](#)

# Phase 3 (mid 2021) : Hydrogen Associations Memberships

“Propelling global carbon neutrality by accelerating the European hydrogen industry”



Hydrogen Europe



DWV  
Deutscher Wasserstoff- und Brennstoffzellen-Verband

## Working Groups

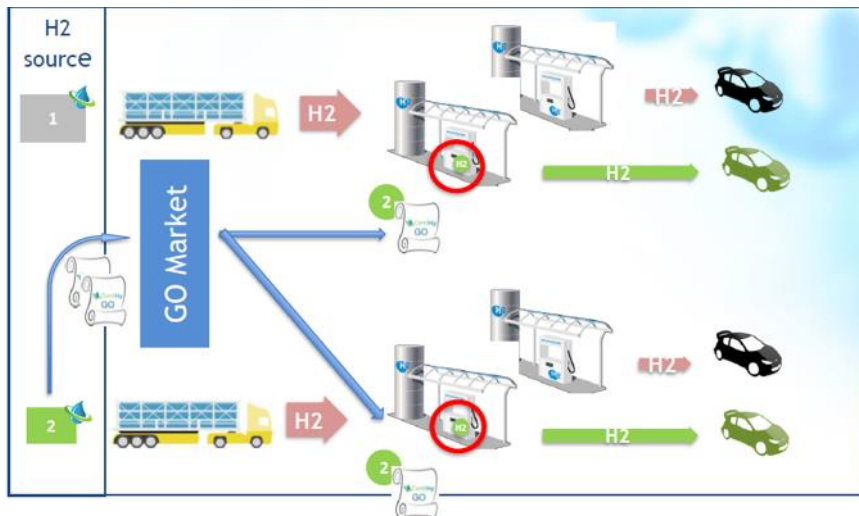
- ✓ Energy Working Group
- ✓ Mobility Working Group
- ✓ Infrastructure Working Group
- ✓ Industry Working Group
- ✓ Production Working Group
- ✓ Buildings Working Group
- ✓ Funding and Finance Working Group
- ✓ Maritime Subgroup
- ✓ Trucks Subgroup
- ✓ Aviation Subgroup

# DEKRA Participation at CertifHy Certification of Green Hydrogen



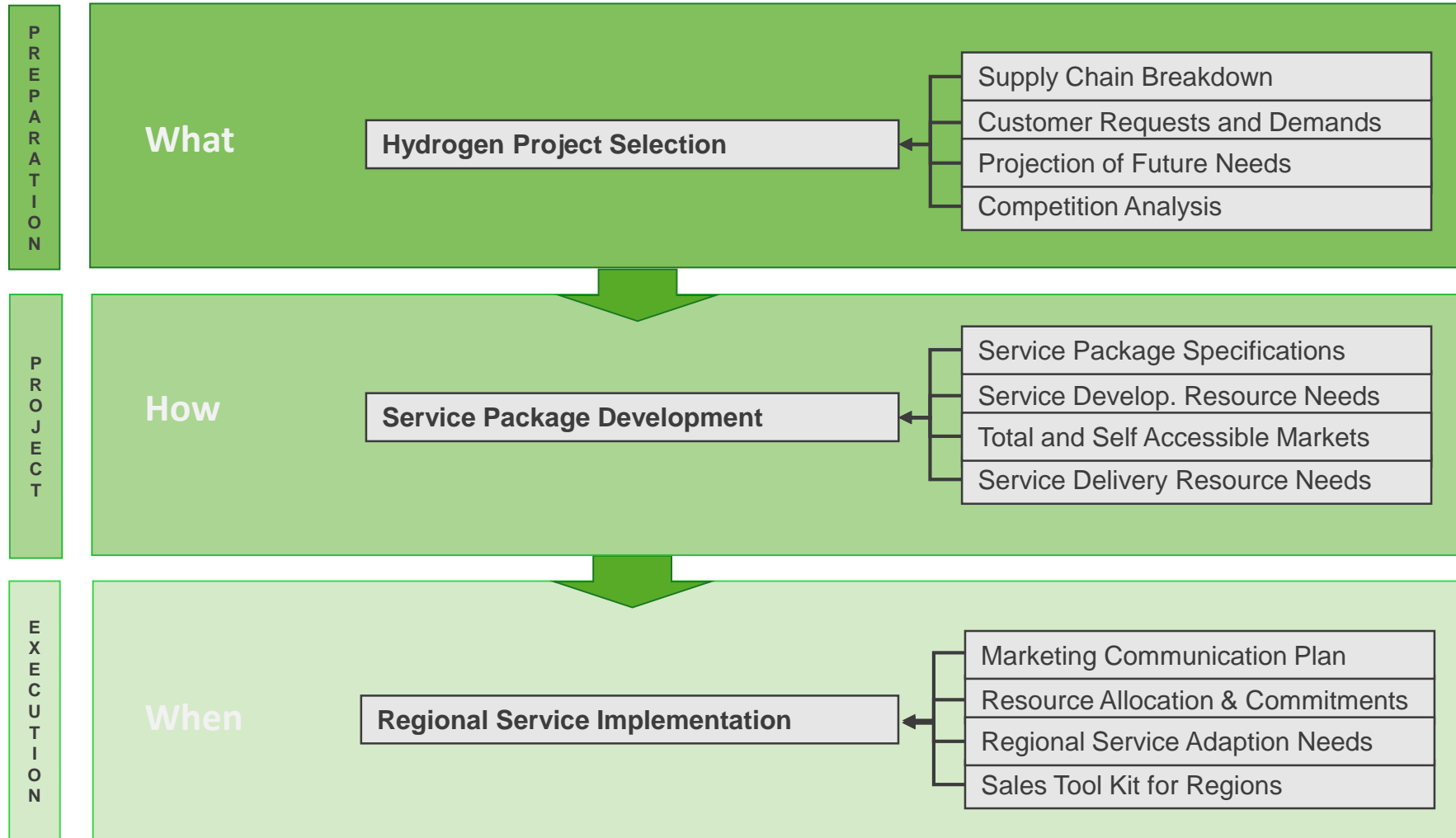
CertifHy phase III will implement a harmonized H<sub>2</sub> Guarantee of Origin (GO) scheme across Europe & beyond, build a market for H<sub>2</sub> GO trade in close collaboration with market actors, and design a Certification Scheme for compliance with RED II renewable fuels for transport

Last update: 16/12/2020

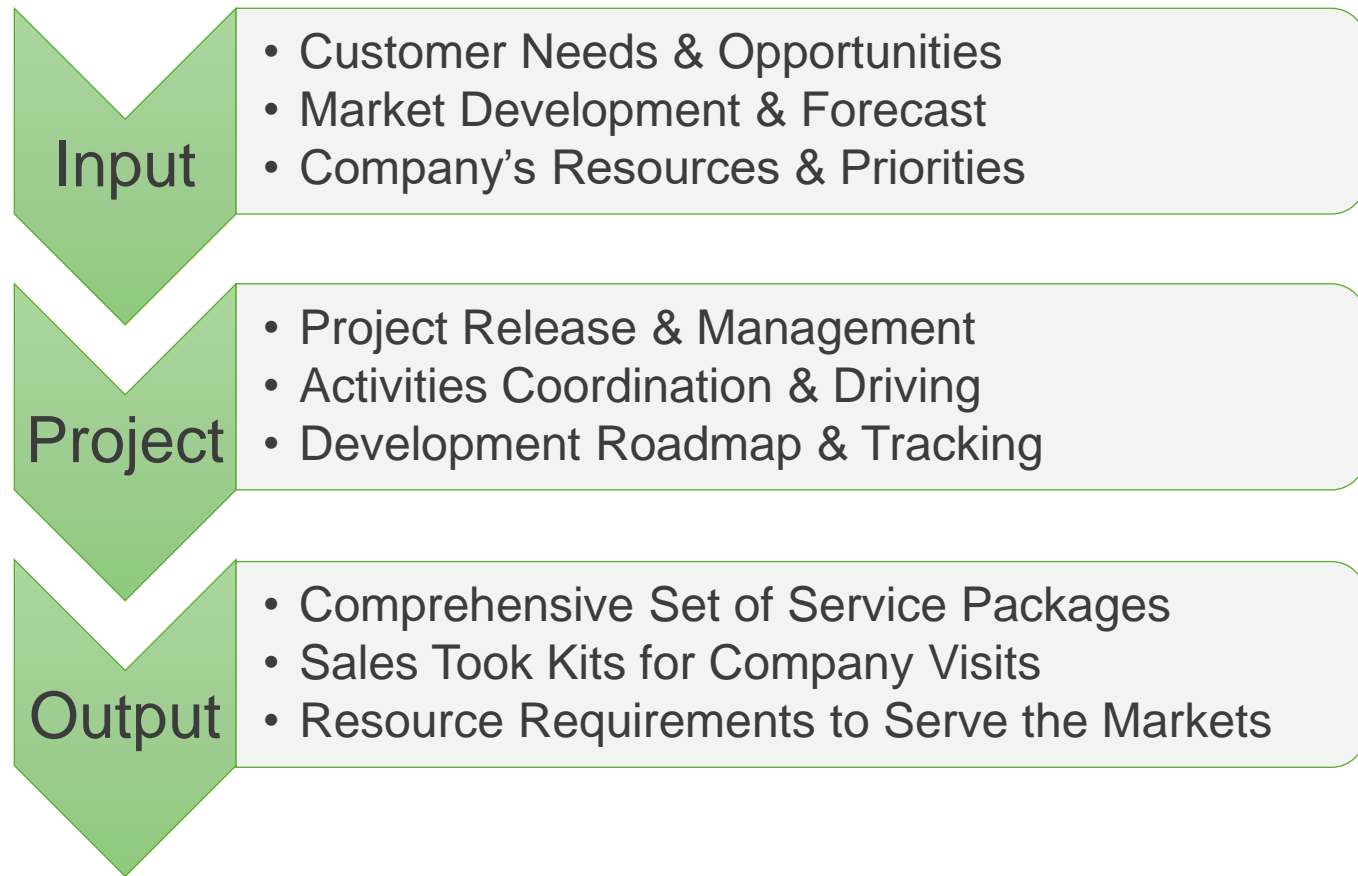


Members		
Category	Sub-category	Stakeholders
Industry	Industrial gas suppliers	<i>Air Liquide</i>
	Utilities	EDF, Engie, HYGRO, Statkraft Markets, Uniper, Verbund
	Oil&Gas	Shell
	Other operators	Colruyt
	Equipment manufacturers	Hydrogenics, Mitsubishi Hitachi Power Systems Europe
	Automotive	Daimler
GO Scheme experts		AGCS, <i>AIB</i> , I-REC Standard, Energinet, Vertogas
Standardisation experts		NEN
Associations		H2NL
Regulators		VREG
Research organisations		European Marine Energy Centre (EMEC), Groupe Européen de Recherche sur le Gaz (GERG), NREL
Consultancies		Deloitte Tohmatsu Consulting, Patch LLTD

# Hydrogen New Portfolio Management Flow



# Hydrogen Application Project Management Process

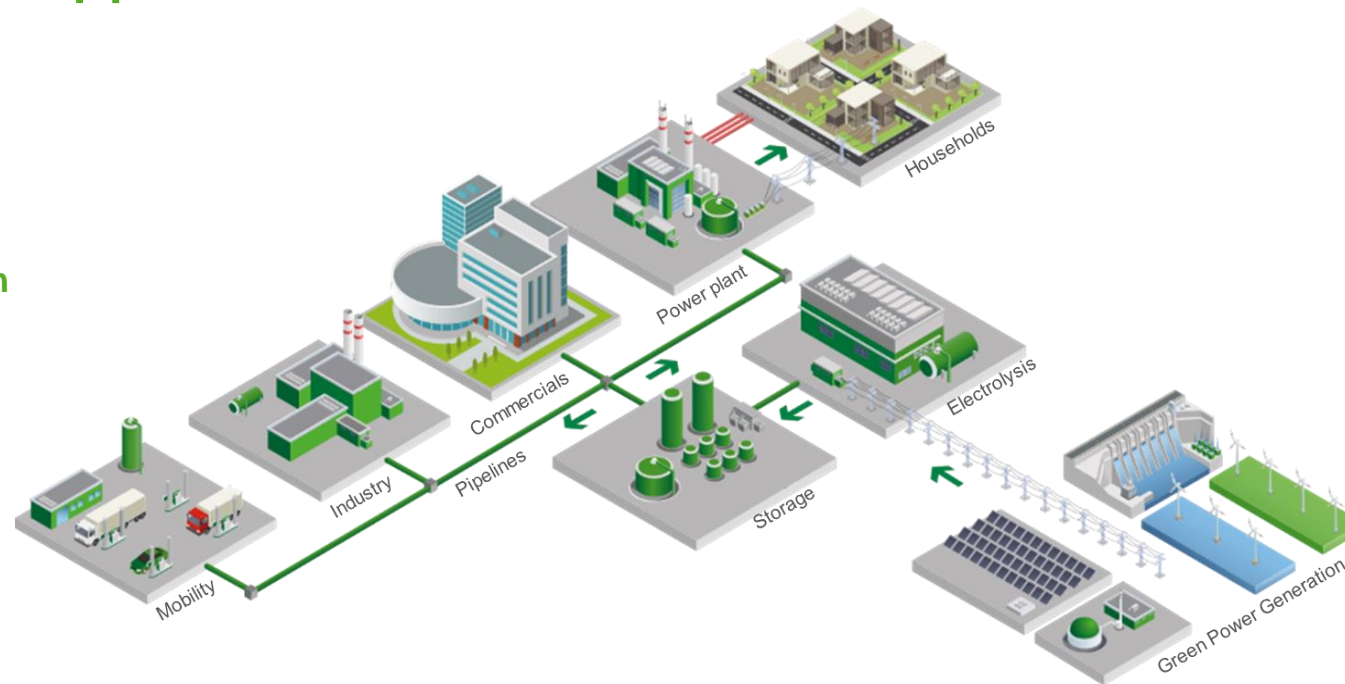


# Hydrogen Economy Supply Chain

## Numerous Applications

### Mobility and Transportation

- > Forklifts
- > Busses
- > Utility Vehicles
- > Transportation Vans
- > Trucks
- > Passenger Cars
- > Trains
- > Shippis
- > Planes
- > Hydrogen Refueling Stations (HRS)



### Industry und Buildings

- > Industrial Heat and Material
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- > Power Production

### Hydrogen Infrastructure

- > Hydrogen Electrolysis
- > Synthetic Fuels
- > Green Ammonia
- > Transport via
  - > Trucks
  - > Shippis
  - > Pipelines
- > Seasonal and Backup Storage

### Renewable Energy Production

- > Solar Power
- > Wind Power
- > Hydro Power
- > Biogas

# DEKRA Service Packages

## Production & Distribution



### HRS Conformity Testing

Hydrogen Refueling Station

New Services : CEP Training

- > Fueling algorithm: EN 17127
- > Connection devices: EN ISO 17268

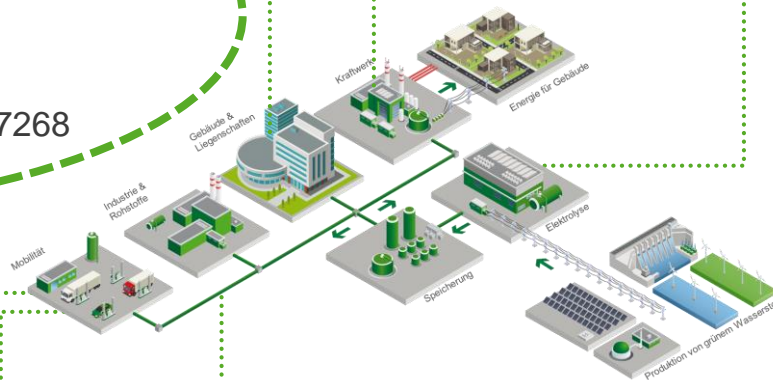


### Hydrogen Systems

BlmSch/TRBS

ZÜS EX/ZÜS DG

- > Plant design audit report
- > Safety Consulting
- > Inspection during construction
- > Initial Commissioning
- > Periodic Inspection



### Green Hydrogen Certification

- > CertifHy: Green Schemata
- > Guaranties of Origin
- > DEKRA Audit Setup

### Hydrogen Mobility

- > Crash Tests
- > Homologation
- > Mobility FC
- > Pressure Vessels (ADR)



### Hydrogen Pipelines

- > New & Retrofit
- > NDT & DT
- > Parameter Testing



### Product Testing

- > Pressured Vessels
- > Electrolyzer (ELY)
- > Fuel Cells (FC)
- > Compressors



### Hydrogen Quality Testing ZSW

- > New Service : Cooperation with
- > H2 Quality Specifications: EN 17124
- > Online Monitoring (Sensor)

# DEKRA Germany Hydrogen Customer Projects

Joint Development of services packages / standards via pilot projects and with customer requirements

**HRS Conformity**  
Services Analysis

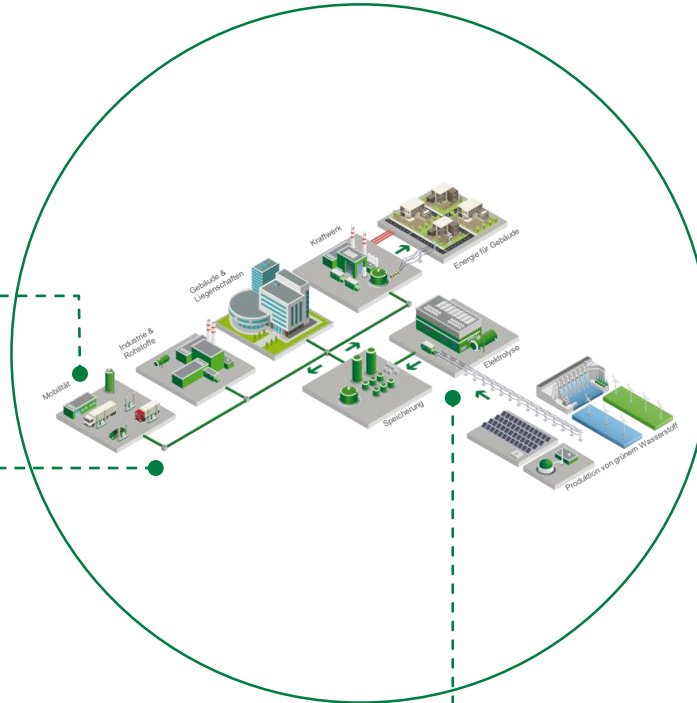


**MAXIMATOR**  
Maximum Pressure.



**GP JOULE**  
TRUST YOUR ENERGY.

**Pipelines + First valve test in Klettwitz**  
Target: Establishment of a professional test bench



**energiequelle**

TOMORROW'S ENERGY.



**Example: Reference power plant Lausitz**  
Compilation and offer of all currently possible services + Analysis of new services

