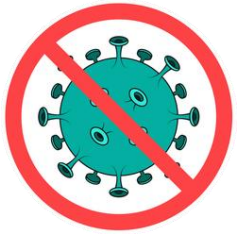
WIC MEETING DECEMBER 8, 2021

Welcome to the WIC meeting!

WATERSTOF INDUSTRIE CLUSTER
a WaterstofNet initiative

Welcome to our digital WIC meeting!



A few game rules:

- ✓ Mute yourself but you can use camera 
- ✓ Ask your questions in the chat 
- ✓ You can use mic/cam in the question round 

AGENDA

New members

10.00 -10.30: IOK, ALD, ArcelorMittal, BEP Europe, Smart Hub Brabant

Guest speakers

10.30 -10.50: The Belgian federal hydrogen strategy (An Stroobandt, cabinet vdStraeten)

10.50 -11.10: Hydrogen activities & plans in Northrhein Westfalia (Frank Koch, EnergieAgentur.NRW)

News from cluster members

11.10 - 11.40: Fluxys - Blue Gate Antwerp - Inovyn – Haesaerts – VoltH2 – Von Karman Insititute- Everfuel

WIC info

11.40 - 12.00

PRESENTATION NEW CLUSTER MEMBERS

WATERSTOF INDUSTRIE CLUSTER

Intercommunale
Ontwikkelingsmaatschappij
voor de **Kempen**

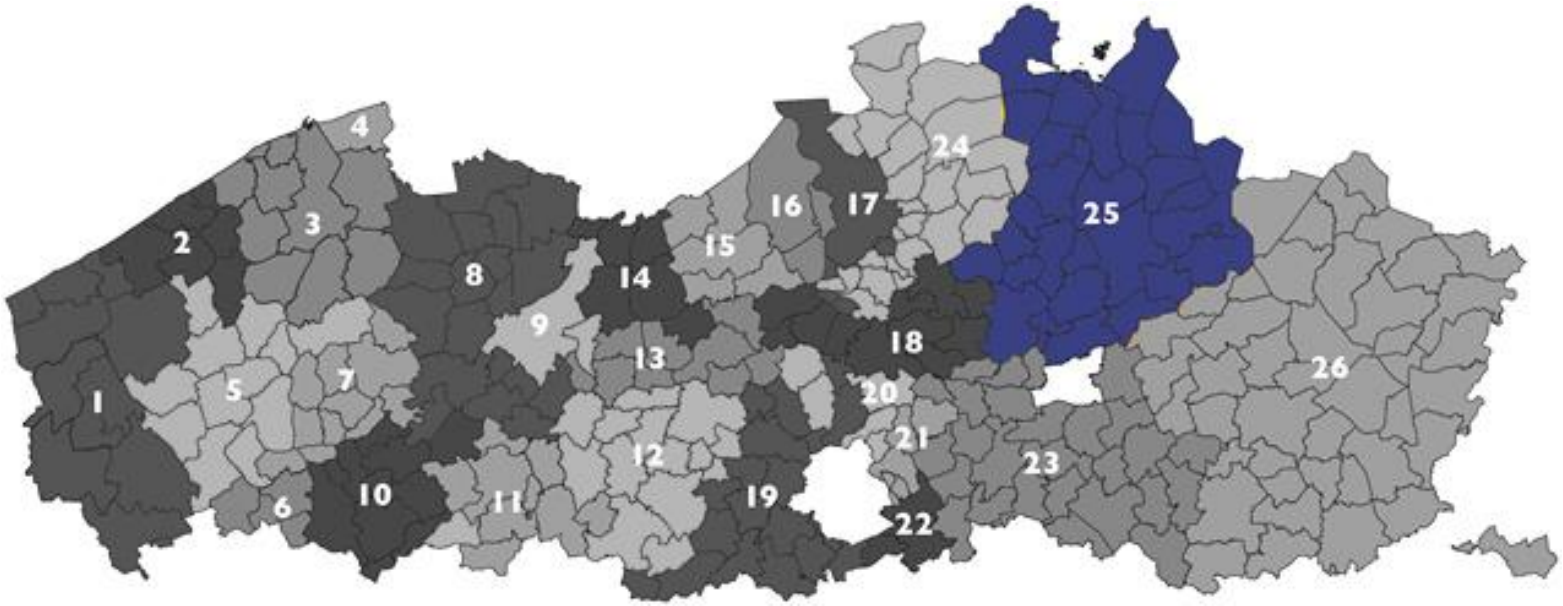
IOK Afvalbeheer

More out of less waste

Katrien Ver Elst

IOK Afvalbeheer

- geographic location : rural region

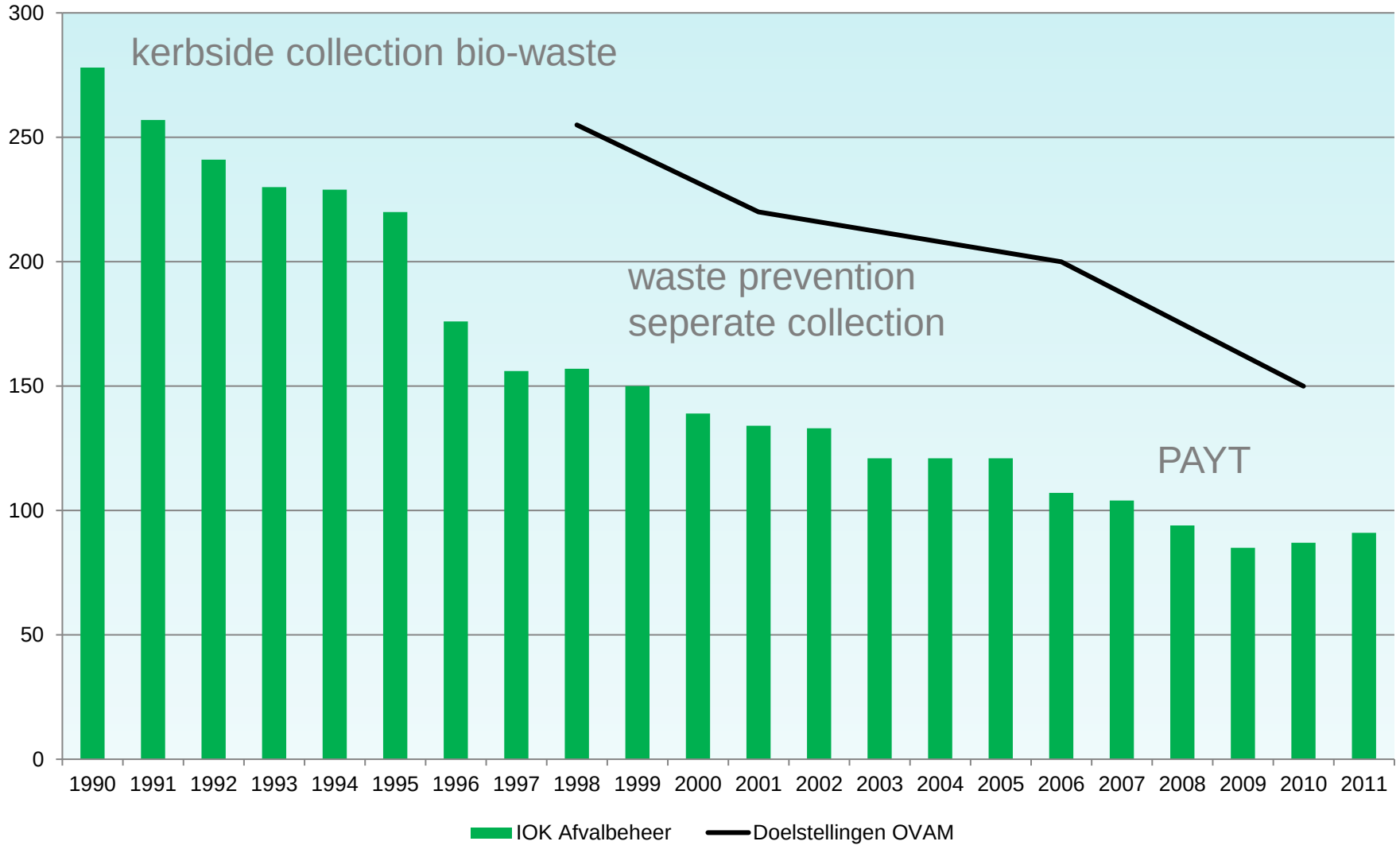


IOK: 29 municipalities - 530.755 inhabitants- 256.000 households
466 employees

Waste policy

- stimulating prevention
- separate collection
- recycling
- pay as you throw

Milestones IOK Afvalbeheer



50% collection door-to-door

43% civic amenity sites

7% bring points

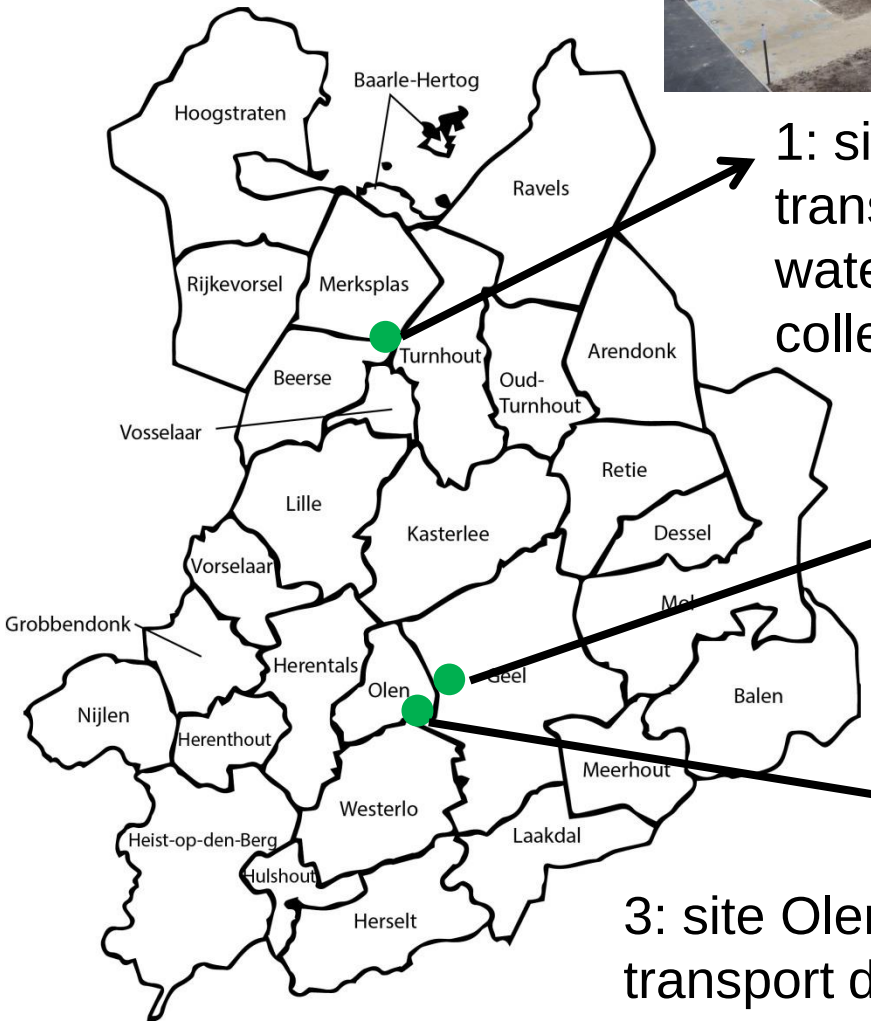
IOK afvalbeheer

logistic

5 sites

1: site Beerse-Oost: transfer, watertransport and collection depot

2: Geel: collection depot



3: site Olen: transfer, transport depot

IOK afvalbeheer

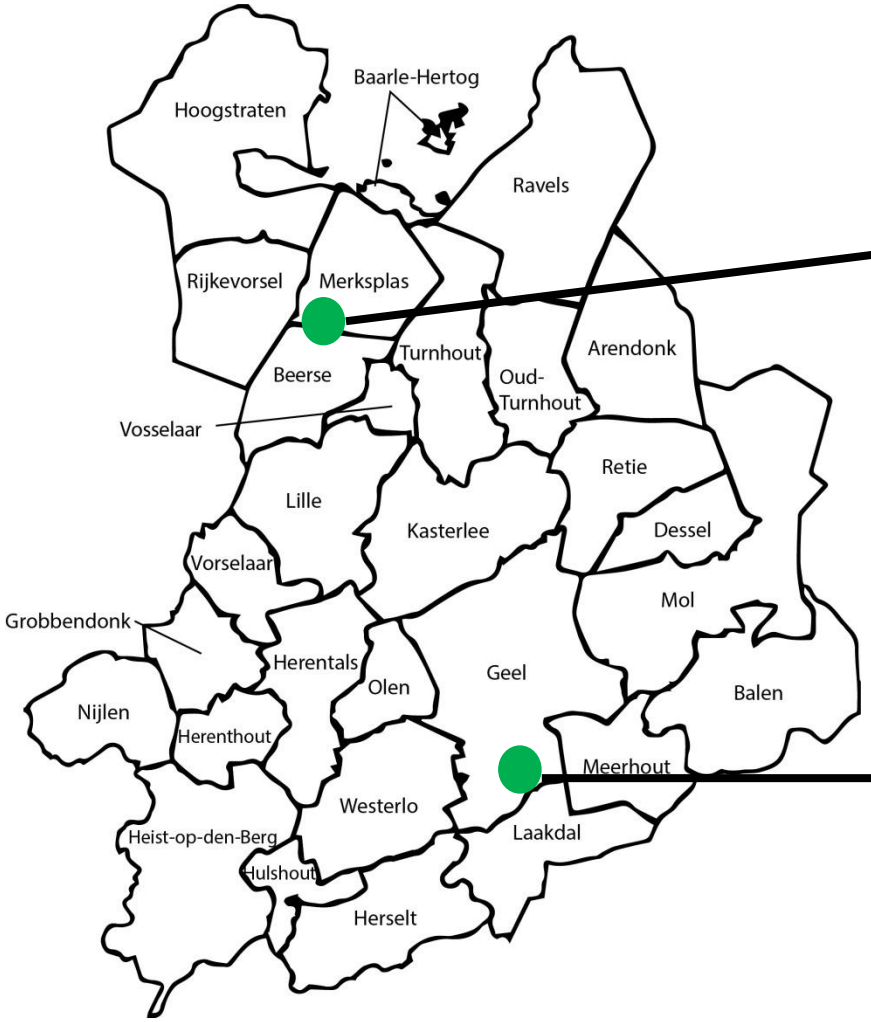
logistic

4: site Mol: transfer
and watertransport

5: site Meerhout: transfer

processing

2 sites



watertransport

- 40.000 ton/y
- 8.000 tue
- 640 transfers
- 2 ships

Participating waterstofnet

Site Beerse-Oost:

- collection trucks
- hookloader trucks
- loading cranes
- ships

- windmill

ALD Automotive

Introduction Waterstofnet

Belgium

80.000
Running fleet

2.100
Short term

3.100
Plug-in hybrid & electric vehicles

3.100
Private lease

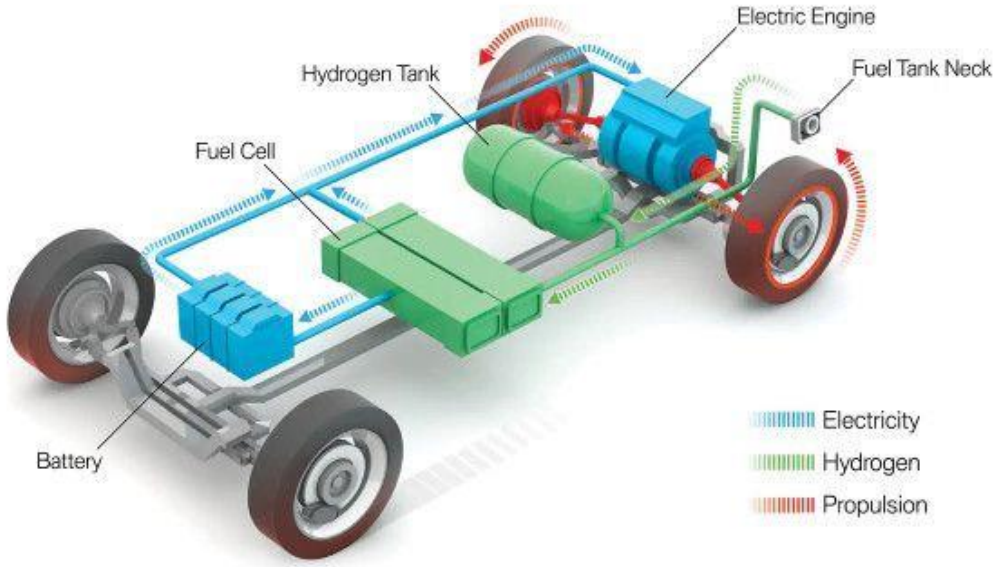
4.550
Company bike

25%
Van lease of complete fleet

H2 Product-Pilot

Why?

- Create awareness on the market
- ALD in pole position of green mobility
- Uncertainty of 100% BEV
- Electric mobility *different* (FCEV)



H2 Product-Pilot

Belgium Today

Brands & models

- Hyundai Nexo
- Toyota Mirai
- New OEM offering will be included

Hydrogen fuel partner

DATS 24

@ ALD Automotive

- Since start pilot → +/- 25 running contracts
- 6 H2 customers

DATS 24 HYUNDAI ALD Automotive

H2 Product-Pilot

What?

All the advantages of an operational lease

Maintenance | Insurance | Assistance | Tyres | Dats24 Energy Card

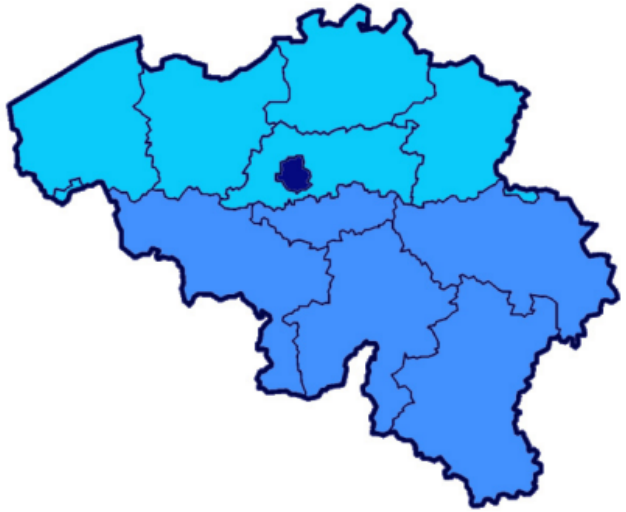
The H2 Pilot provides you with:

- Powerfull and energy efficient cars: zero carbon emmission
- Fast charging time
- High autonomy
- Fast growing H2-network

H2 Pilot powered by ALD

- Share expertise of H2
- Attractive pricing
- Consulting in greenification
- Possibility of test drives

Find available stations on h2.live



> Contact Us

H2 Product-Pilot

Reach out to us?

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BEP EUROPE

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Burkeportergroup.com

A Family of Companies

BURKE PORTER GROUP
ADVANCING THE MACHINE™

BEP EUROPE

Individually and as a group, BPG companies collaborate with their customers to engineer innovative solutions for their manufacturing and design problems. **Together, we are Advancing the Machine.™**

BEP EUROPE is located in Brugge, Belgium, and is part of the original **Burke E. Porter Machinery Company**.

BURKE E. PORTER MACHINERY COMPANY
XL Machine Company inc.
EPIC EQUIPMENT & ENGINEERING
NACS, Inc.
GALILEO TP PROCESS EQUIPMENT
titan
CIMAT BALANCING MACHINES
WINTERPARK ENGINEERING
Aspect AUTOMATION
primatics
Korvis
VHA Van Hoecke Automation nv
KINEMATIC AUTOMATION INC.
UNIVERSAL BALANCING
KLEINKNECHT
LISMAR

16 independent yet connected companies

> 1500 full-time employees

BPG Covering the World: 40+ locations

Covering the World – 40+ Locations

Belgium
- Bruges *
- Ghent *

Bulgaria
- Sofia

Brazil
- Sao Paulo

China
- Wuxi *
- Shanghai *
- Zhongshan *
- Beijing
- Changchun
- Wuhan
- Liuzhou
- Tianjin
- Zhengzhou
- Changsha

Germany
- Siegen *
- Laatzen
- Lohfelden
- Wilnsdorf *

India
- Jamshedpur
- Pune
- Chennai

Indonesia
- Jakarta

Italy
- Scandicci (Florence) *

Japan
- Yokohama

The Netherlands
- Ouderkerk aan de Amstel *

Poland
- Bydgoszcz *

Singapore
- Singapore

South Korea
- Seoul

United Kingdom
- Bristol *
- Stroud *

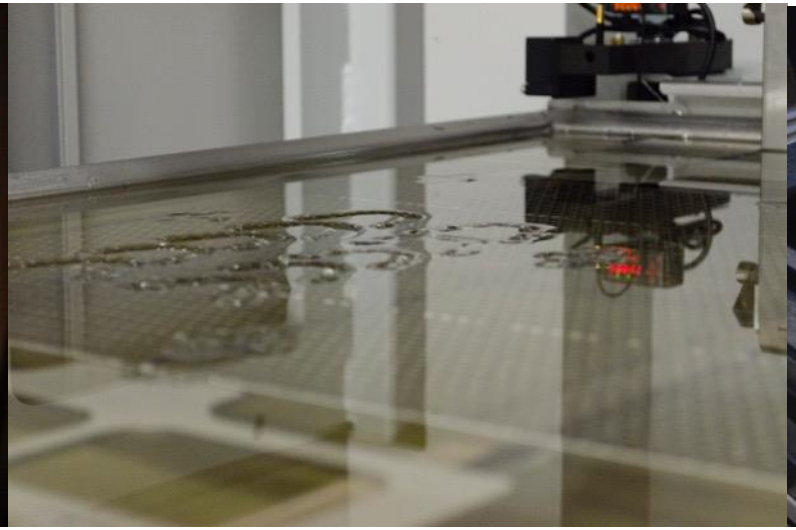
North America
- Ada, MI
- Auburn Hills, MI
- Grand Rapids, MI *
- Three Rivers, MI *
- Shelby Twn, MI *
- Sturtevant, WI *
- Shoreview, MN *
- Ham Lake, MN *
- Corvallis, OR *
- Nashua, NH
- Greenville, SC
- Chicago, IL
- Sonora, CA *

BEP EUROPE NV

Van Hoecke Automation

** Manufacturing facilities*

Market Segments



Advanced Measuring & Testing

- Autonomous Vehicles
- Advanced Powertrain (Hybrid Electrics)
- Regulatory (Emissions)
- Balancing
- Test (NDT / Hydraulics)

Advanced Manufacturing

- Additive (3D Printing)
- Consumer Products
- Other – Industry 4.0

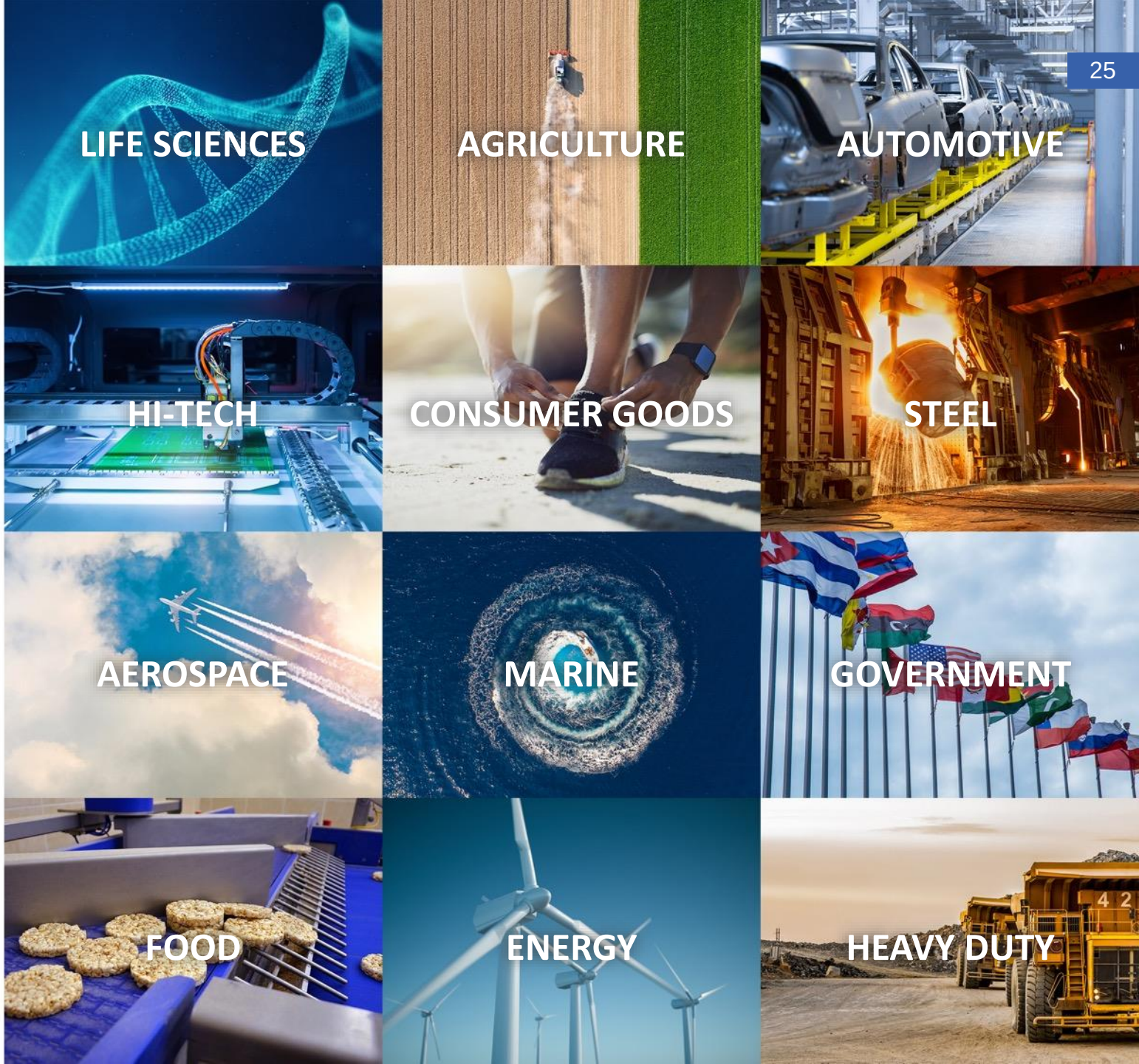
Life Sciences

- Gene Sequencing
- Automated Lab
- Imagery (X-Ray, MRI, etc.)
- Diagnostics

BURKE PORTER GROUP
ADVANCING THE MACHINE™

Industries We Serve

We design, create, and deliver highly complex solutions for OEMs, tier 1 suppliers, testing labs, aftermarket services and more for the most significant names in:



BEP EUROPE: Automotive Testing

OEM Markets in which Burke Porter Group is present…

Automotive OEM Market

Light Vehicle

Commercial Vehicle

Agriculture

Off-highway

- End-of-Line Testing
- Powertrain Assembly & Testing
- Balancing
- Battery Voltage / Leakage Test
- What can we do for Hydrogen Fuel Cell EV testing?

burkeportergroup.com/products-services/end-of-line-testing

BEP EUROPE

Joke Goethals
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Burkeportergroup.com

ArcelorMittal Belgium

A short introduction

ArcelorMittal

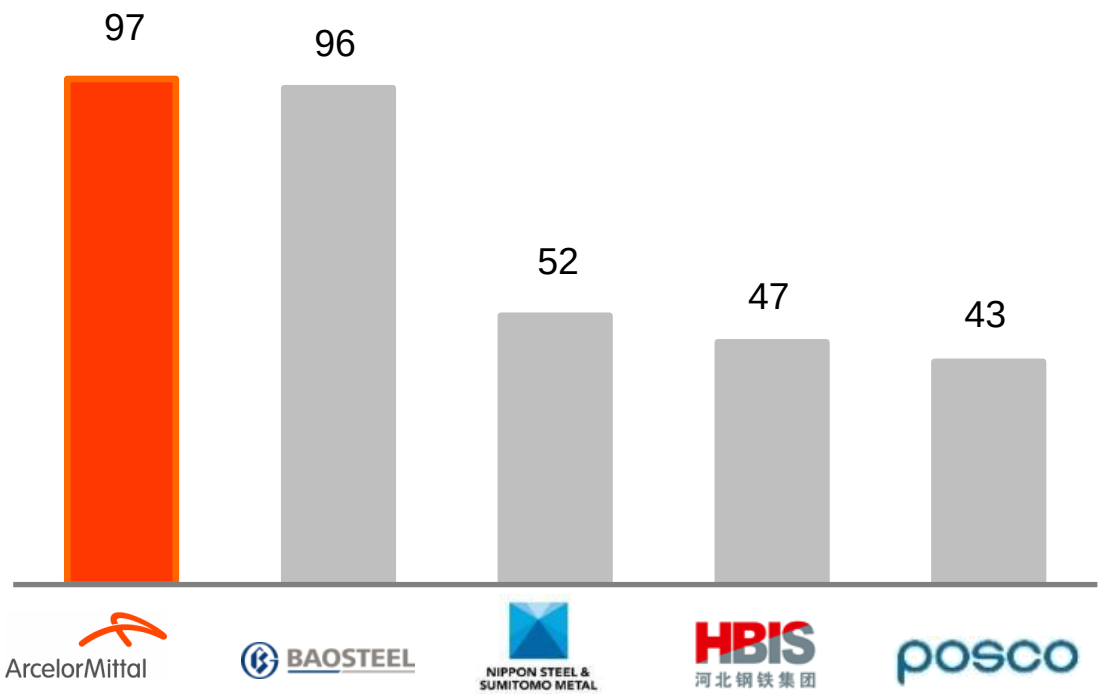
ArcelorMittal Facts & Figures

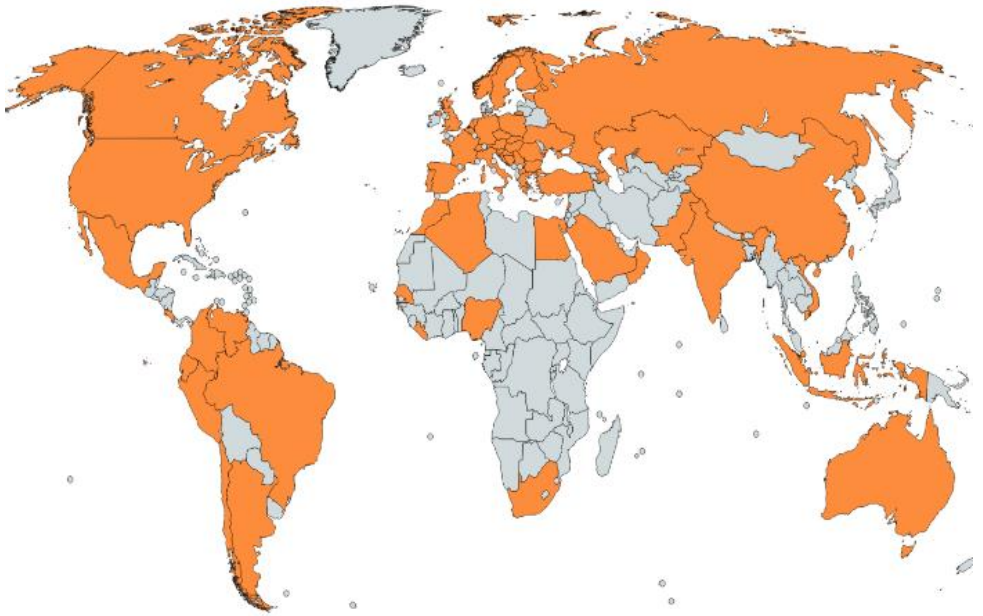
ArcelorMittal

ArcelorMittal Group – Worldwide presence

Million tons crude steel production

Source: World Steel Association & Reference year: 2019





Supported by our global R&D team:
1,500 researchers, 14 research centres

Presence in 60 countries
an industrial footprint in 17 countries
~168,000 employees

ArcelorMittal

ArcelorMittal Belgium in figures (2019, pre-COVID)

- Shipments: 5,9 mio ton steel (coils/sheets)
  - Hot Rolled & Pickled / Cold Rolled
  - Hot Dip Galvanised / Electro-Galvanised
  - Pre-paint

- Employees:
  - Internal: 5 000
  - Subcontracted: 1 300
  - Total Employment (Direct & Indirect) 13 000
- Raw Materials Usage
  - Coal: 1,6 mio t
  - Iron Ores: 4,3 mio t
  - Pellets: 2,6 mio t
  - Metallic Scrap (external): 0,7 mio t

Roadmap 2050

ArcelorMittal

Roadmap of ArcelorMittal Group

Targets

- In line with Paris Agreements
- Ambition to become carbon neutral by 2050

Challenges

- Existing production route via blast furnace and BOF (basic oxygen furnace) typically resulting in 1,8 to 2 ton of CO_2/ton crude steel (CS)
  equivalent to 9 mio ton of CO_2 for a mid size steel plant of 5 mio ton of steel
- Extremely high capex needed (> 500 EUR/t CS)
- CCUS: no mature solutions yet

ETS Framework pushing transition

- Total amount of EUA capped and decreasing with strong impact on price
- Free allowances (protecting from unregulated imports, “carbon leakage”) phase out from 2026 on
- CBAM should mitigate this risk

Climate Action Report 2 (CAR2) highlights

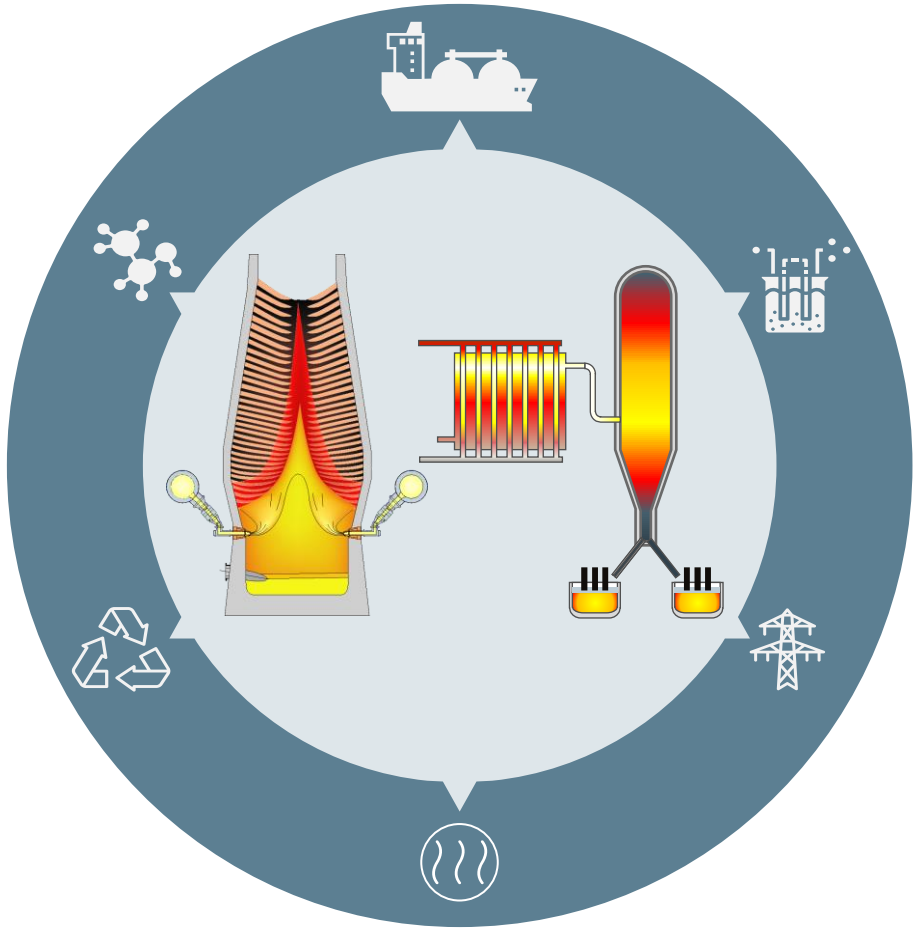
New 2030 Group target to reduce CO2e emissions intensity by **25%** scopes 1 and 2	Europe increased its 2030 CO2e emissions intensity reduction to **35%** scopes 1 and 2	World's first full-scale zero carbon-emissions steel plant in **Sestao** by 2025
Targets to be linked to **executive** remuneration	Total investment of **$10 billion** required to achieve 2030 Group target (pre Government support)	New collaboration announced with **SBTi** (Science Based Targets initiative)

Source: ArcelorMittal Corporate Climate Action Report

https://corporate.arcelormittal.com/sustainability/climate-action-reports

ArcelorMittal

ArcelorMittal Belgium: Pathways towards carbon neutrality



Pathway	Technological Solutions	CO_2 emission reduction BF-BOF	CO_2 emission reduction DRI-EAF
Electrification	SAF/EAF, Ladle furnace, plasma (IGAR)	+	++
Hydrogen	Electrolyzer, H_2-rich process gasses (RecHYcle)	++	++++
Circularity	Torero, SRF injection	++	+
CCU	Steelanol, Steel2Chemicals	+	+
CCS	Calisto, Gas-Hub, Open access CO_2 terminal	+++	+
Heat, Energy, Yield	Heat grid, windmills, TRT	+	+

Project Green | Smart Carbon | Efficiency

ArcelorMittal

Pierre Faché, innovatie & cleantechmanager

WATERSTOFREGIO VLAAMS-BRABANT

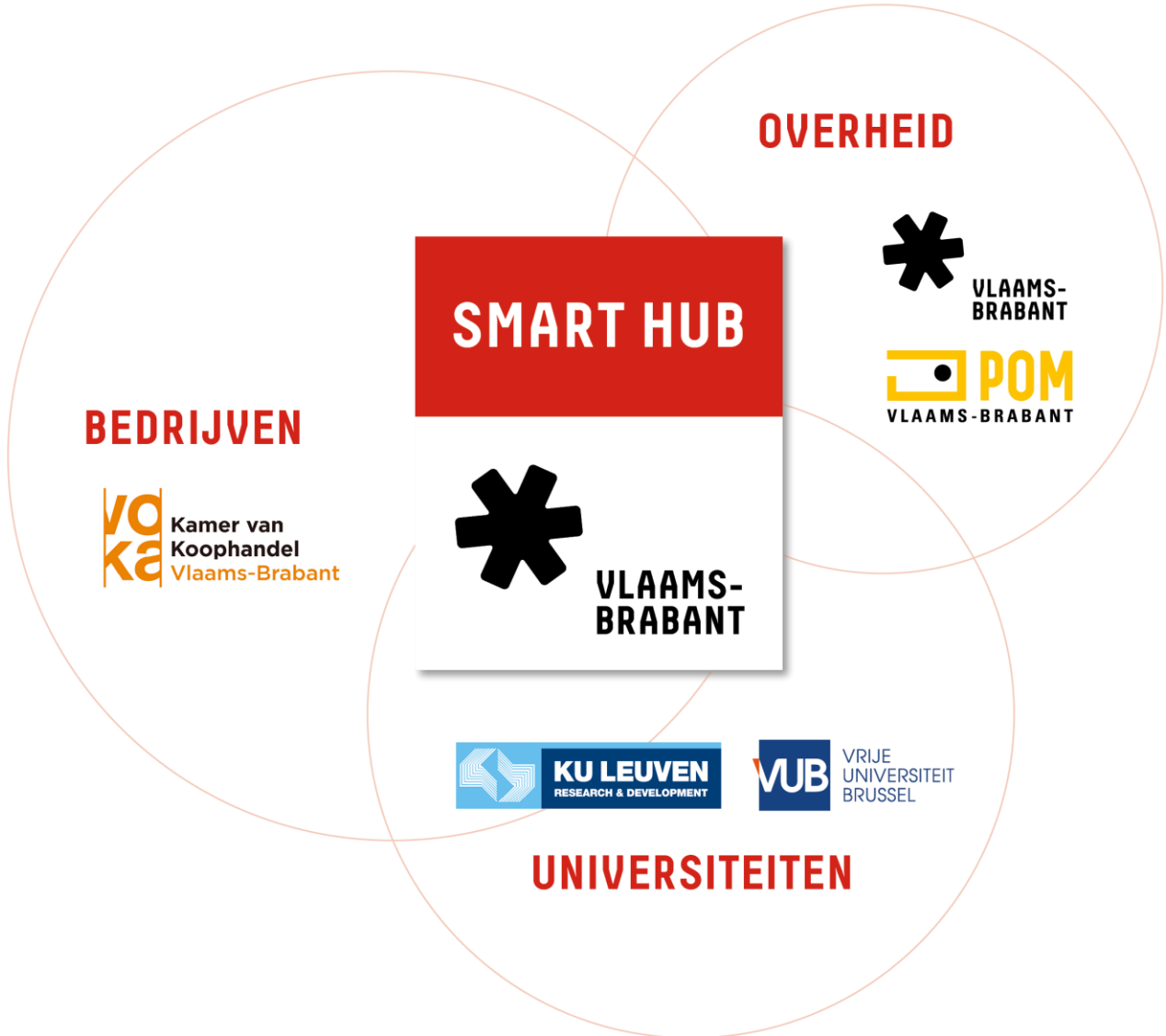
SMART HUB

VLAAMS-BRABANT

PROVINCIE VLAAMS-BRABANT

Unieke kennisregio

SAMENWERKINGSVERBAND



SMART HUB

VLAAMS-BRABANT

ACTIVITEITEN VAN SMART HUB VLAAMS-BRABANT

- Community building
- Projectwerking
- Branding
- Internationalisering

SMART HUB

VLAAMS-BRABANT

WATERSTOFREGIO VLAAMS-BRABANT

Waterstofnet:

- cofinanciering Interreg Vl-Ned Waterstofregio

DATS24:

- demonstratieprojecten in Halle-Dassenveld &
- waterstoftankstations

KULeuven COK-KAT:

- waterstofpaneel

Toyota:

- R&D centrum Europa, Mirai

Air Liquide:

- waterstoftankstation

SMART HUB

VLAAMS-BRABANT

PROVINCIALE BELEIDSACCENTEN

- Samenbrengen tot realisatie van demonstraties op basis van bewezen technologie
  - Utility, netbalancering, energiebackup
- Scale-up mogelijkheden bovenstaande
- Promotie
  - Workshops/seminaries/demonstraties
  - Publieksaandacht

SMART HUB

VLAAMS-BRABANT

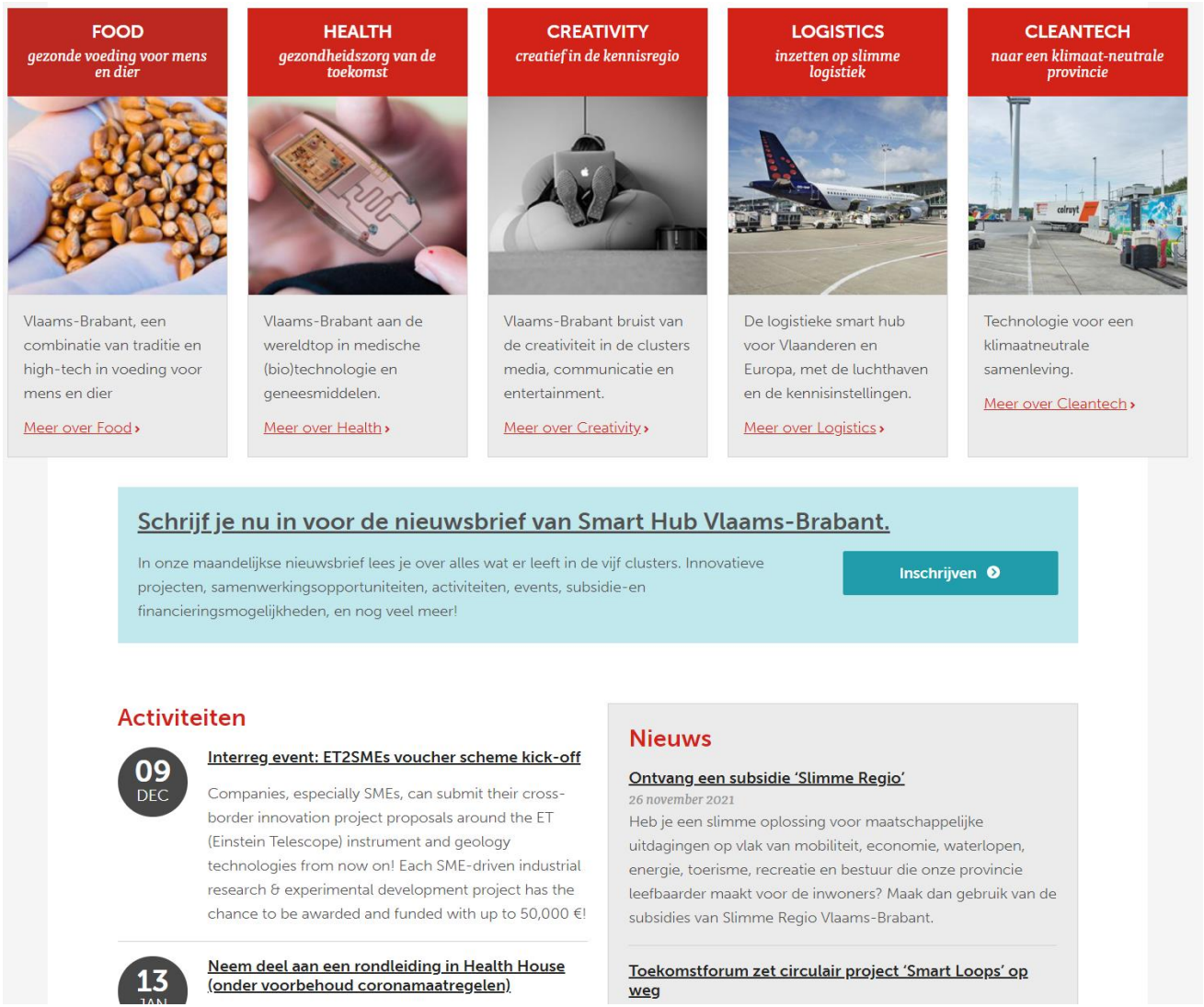
PROVINCIALE BELEIDSACCENTEN

- Smart Hub Waterstofcommunity ism WIC
- Provinciale innovatiesubsidies en cofinanciering ism VLAIO
  - Waterstofpaneel
- Samenwerking met ‘Hydrogenvalleys’ in focusregio’s ism WIC
  - MRN
- Provinciale participatie in internationale projecten
  - Stargate

SMART HUB

VLAAMS-BRABANT

MEER INFO: ABONNEER U OP ONZE NIEUWSBRIEF



FOOD
gezonde voeding voor mens en dier

Vlaams-Brabant, een combinatie van traditie en high-tech in voeding voor mens en dier

Meer over Food ›

HEALTH
gezondheidszorg van de toekomst

Vlaams-Brabant aan de wereldtop in medische (bio)technologie en geneesmiddelen.

Meer over Health ›

CREATIVITY
creatief in de kennisregio

Vlaams-Brabant bruist van de creativiteit in de clusters media, communicatie en entertainment.

Meer over Creativity ›

LOGISTICS
inzetten op slimme logistiek

De logistieke smart hub voor Vlaanderen en Europa, met de luchthaven en de kennisinstellingen.

Meer over Logistics ›

CLEANTECH
naar een klimaat-neutrale provincie

Technologie voor een klimaatneutrale samenleving.

Meer over Cleantech ›

Schrijf je nu in voor de nieuwsbrief van Smart Hub Vlaams-Brabant.

In onze maandelijkse nieuwsbrief lees je over alles wat er leeft in de vijf clusters. Innovatieve projecten, samenwerkingsopportuniteiten, activiteiten, events, subsidie-en financieringsmogelijkheden, en nog veel meer!

Inschrijven

Activiteiten

09 DEC

Interreg event: ET2SMEs voucher scheme kick-off

Companies, especially SMEs, can submit their cross-border innovation project proposals around the ET (Einstein Telescope) instrument and geology technologies from now on! Each SME-driven industrial research & experimental development project has the chance to be awarded and funded with up to 50,000 €!

13 JAN

Neem deel aan een rondleiding in Health House (onder voorbehoud coronamaatregelen)

Nieuws

Ontvang een subsidie 'Slimme Regio'

26 november 2021

Heb je een slimme oplossing voor maatschappelijke uitdagingen op vlak van mobiliteit, economie, waterlopen, energie, toerisme, recreatie en bestuur die onze provincie leefbaarder maakt voor de inwoners? Maak dan gebruik van de subsidies van Slimme Regio Vlaams-Brabant.

Toekomstforum zet circulair project 'Smart Loops' op weg

SMART HUB

VLAAMS-BRABANT

NEW CLUSTER MEMBERS SINCE LAST MEETING

WATERSTOF INDUSTRIE CLUSTER

DRIVE SYSTEMS N.V.

BEP EUROPE

SMART HUB

VLAAMS-BRABANT

uniper

KdG Expert

Karel de Grote Hogeschool

ALTREA LOGISTICS GROUP

HAESAERTS

MEMBER OF ALTREA LOGISTICS

North Sea Port

Together. Smarter.

NAVAL

INLAND NAVIGATION

VOLT H2

Developing Green Hydrogen Opportunity

Chevron Phillips Chemical Company LP

Kelvion

NEWES

WORLDWIDE ENERGY SERVICES

Presentations

Tinne Van der Straeten

Minister van Energie.

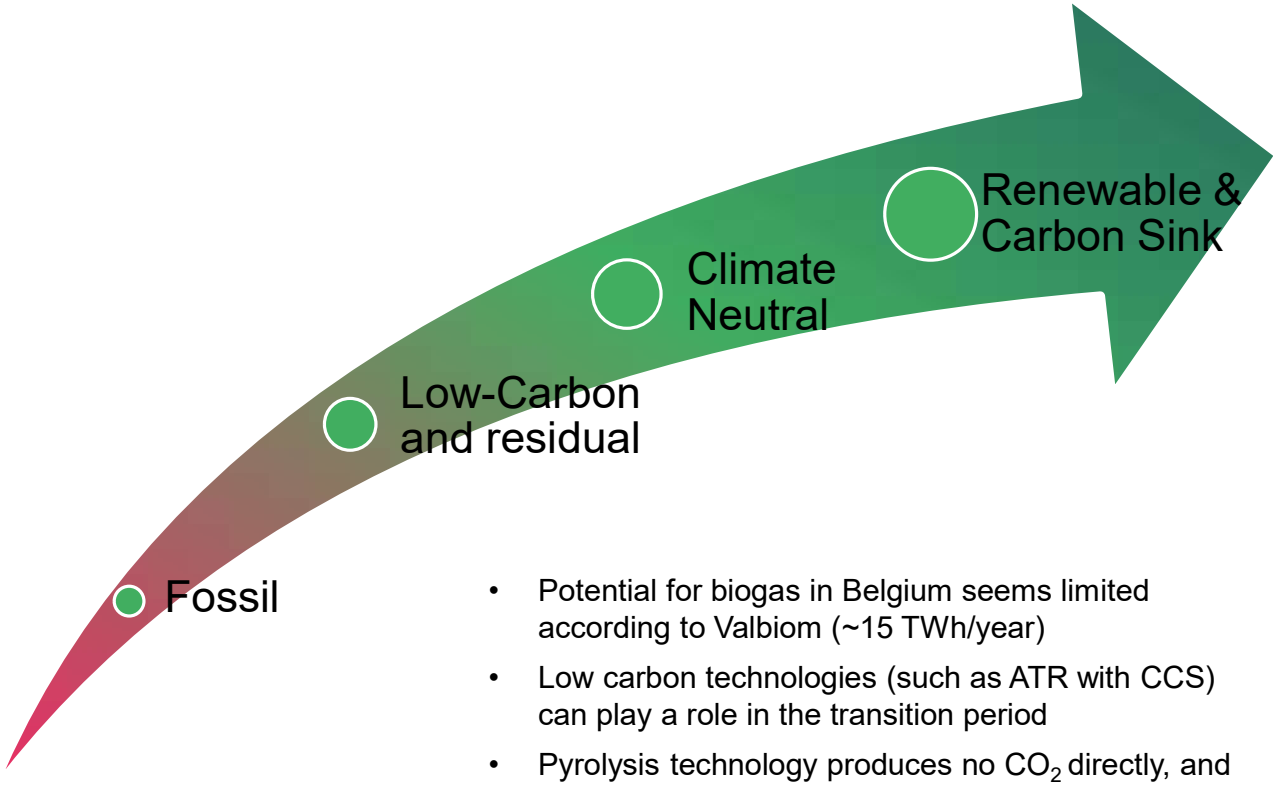
Ministre de l' Energie

H2 perspectives in Belgium

The demand for renewable molecules is expected to rise up to 125 – 175 TWh/year by 2050
(including bukering fuels)

Tinne Van der Straeten
Minister van Energie

100% renewable molecules before 2050



- Potential for biogas in Belgium seems limited according to Valbiom (~15 TWh/year)
- Low carbon technologies (such as ATR with CCS) can play a role in the transition period
- Pyrolysis technology produces no CO_2 directly, and could act as a carbon sink if run on biomethane

Tinne Van der Straeten
Minister van Energie

4 pillars of the federal H_2 strategy

1. Import and transit hub

2. Leader in H_2 tech

3. Robust H_2 market

4. Investing in collaboration

Pillar 1 –Import and transit hub for renewable molecules

Our ambition: Position Belgium as an import and transit hub for renewable molecules in Europe

Estimated import needs for national use
(lower bound, bunkering fuels included)

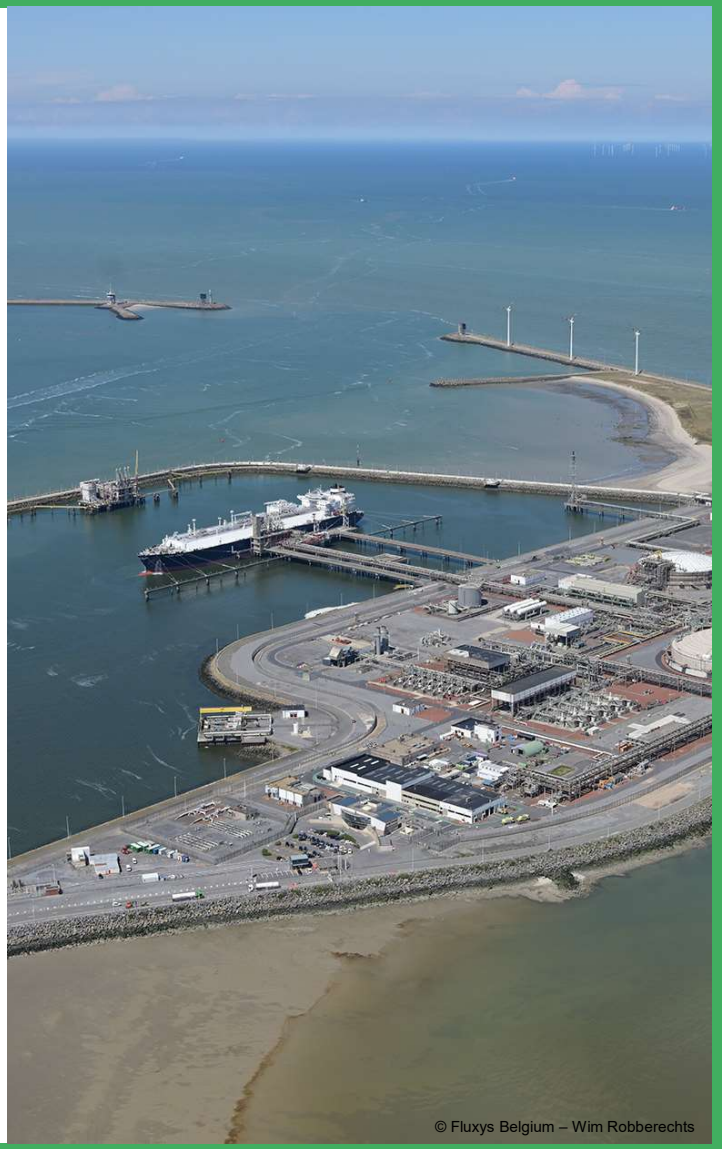
Transit activites could double these volumes

Way to go

1. Establish a trustable system for certificates for renewable fuels from non-biological origin by 2025 (RFNBO's, including green H_2)
2. Sign MOUs with third parties and other EU Member States to facilitate import of green H2 and engage our companies in this story

   Particular attention will be paid to the integration of the Sustainable Development Goals of the United Nations in these agreements

Tinne Van der Straeten
Minister van Energie



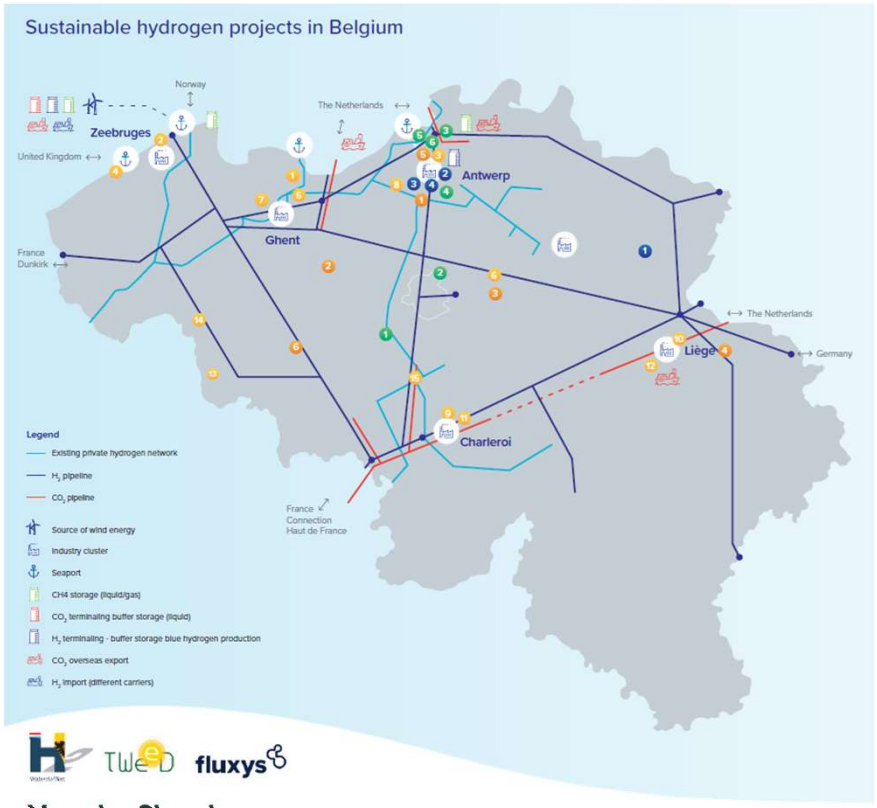
Pillar 2 – Becoming a leader in H_2 technologies

Building on existing experience of leading companies in Belgium

Means to our disposal to support the further development of the sector:

- Energy Transition Fund (ETF)
- RRF (2021-2026): call for demonstration projects on hydrogen production and its use within the offshore wind industry
- Federal Transition Plan:
  - Hydrogen Test Facility
  - Hydrogen Import infrastructure

Pillar 3 – Establishing a robust hydrogen market



A strong and open-access H_2 pipeline network is required in order to efficiently connect supply and demand

Way to go

1. Integrated planning between natural gas, hydrogen, CO_2 and electricity
2. Further development of a dedicated H2 transport infrastructure
   - First steps within RRF backbone (additional 160 km by 2026)
   - Interconnections with all neighbouring countries by 2030
3. Guarantee fair-treatment of market actors open-access to the H2 transport infrastructure
   - The envisaged regulation will be subject to public consultation beginning 2022

Tinne Van der Straeten
Minister van Energie

Pillar 4 – Investing in cooperation

The strategy is a call to partnerships and collaborations

- With Regional Governments
  - Clear division of competences
  - Structural cooperation
- With relevant Stakeholders
  - Research institutions, Companies and Citizens
  - Clear Communication on targets
  - Round Table on hydrogen
- With Europe
  - Front-running to support EU ambitions
  - In close cooperation with EU institutions and Penta countries
  - Collaboration with FCH-JU, CHA, CHP and other industry initiatives
- With the world
  - MOUs to support industrial projects and diversify supply
  - Investigate futher participation in international organisations


Merci
Dank u wel
.be

ElektroMobilität NRW

EnergieAgentur.NRW

Hydrogen Activities and Plans in Nordrhein-Westfalen

Dr. Frank Koch
EnergyAgency.NRW
Fuel Cell and Hydrogen, Electro Mobility Network

Waterstofnet Industry Cluster Meeting
8th December, 2021

EUROPÄISCHE UNION
Investition in unsere Zukunft
Europäischer Fonds
für regionale Entwicklung

CEF.NRW
Cluster EnergieForschung

Agenda

1 EnergyAgency.NRW and Regional Networks

2 Hydrogen in NRW – History and Strategy

3 Projects on Hydrogen

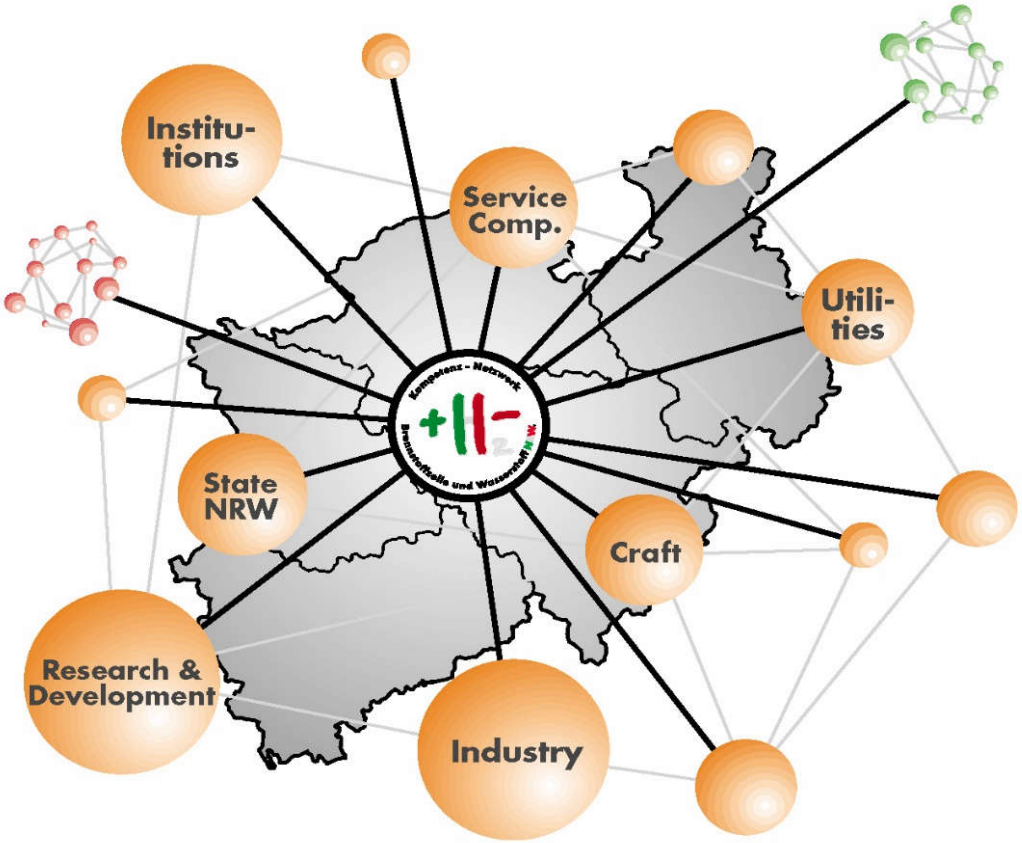
Agenda

1 **EnergyAgency.NRW and Regional Networks**

2 Hydrogen in NRW – History and Strategy

3 Projects on Hydrogen

Network Fuel Cell and Hydrogen, Electromobility

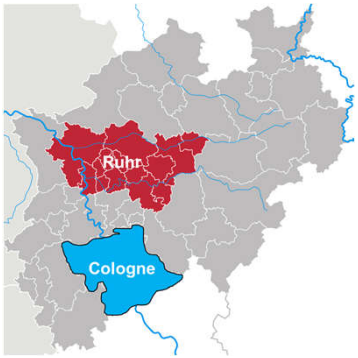


- Non-profit organization, part of EnergieAgentur.NRW
- Regional technology platform
- More than 500 members and 100 project partners
- 70% companies (SME), 20% research institutes and 10% others
- **www.fuelcell-nrw.de**

Regional Networks

h2-netzwerk-ruhr and HyCologne

h2-netzwerk-ruhr



- **Objectives**:
  job creation and climate protection
- **Tools**:
  networking, initiation of projects, public affairs, educational work, lobbying
- **Members:**
  from public institutions, companies, associations, educational and research institutions

HyCologne

Agenda

1 EnergyAgency.NRW and Regional Networks

2 **Hydrogen in NRW – History and Strategy**

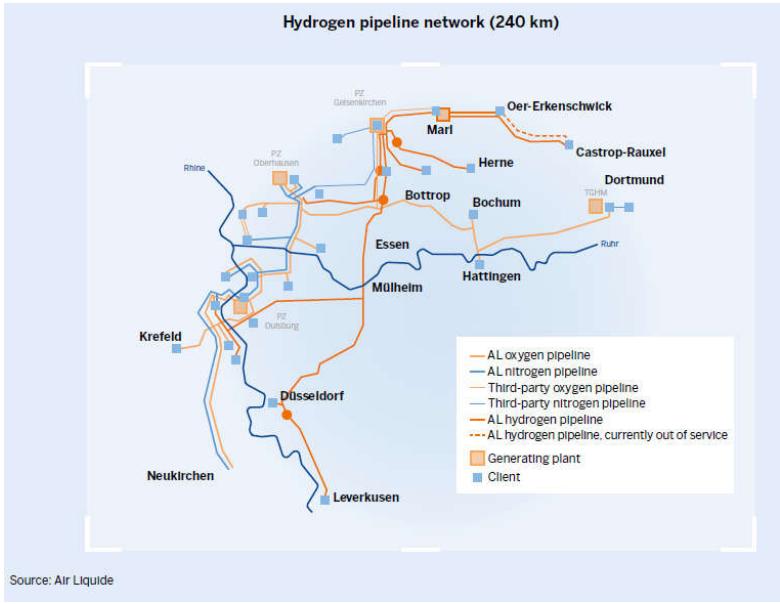
3 Projects on Hydrogen

Hydrogen in NRW - today: Industry

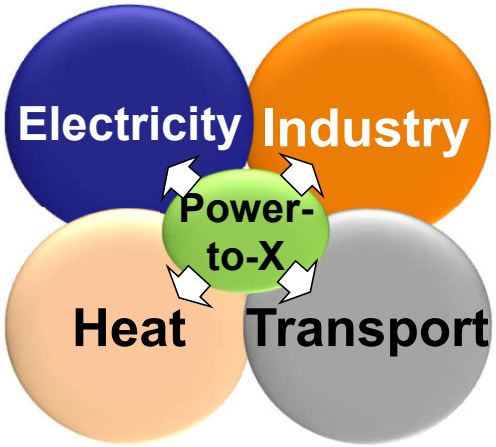
- **Chemical industry, petrochemical industry and others:**
  600,000 t/a (2 million t/a in Germany) mainly natural gas reforming

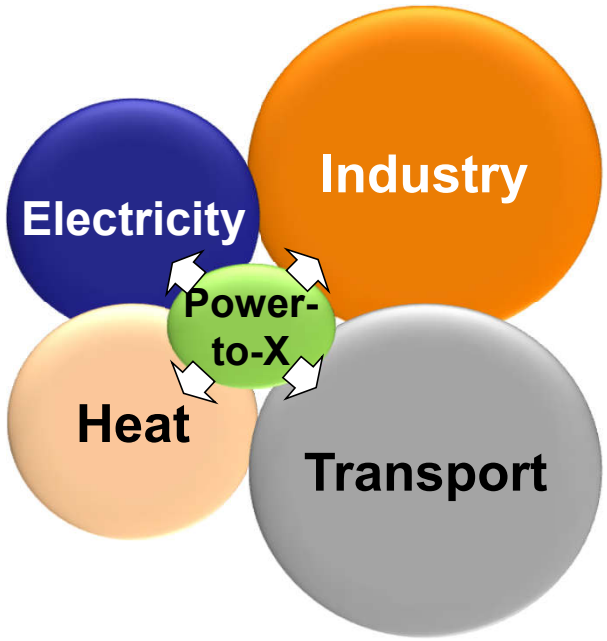
- **By-product:**
  Chlor-alkali electrolysis (potential 35,000 t/a), sufficient for 6,000 fuel cell buses

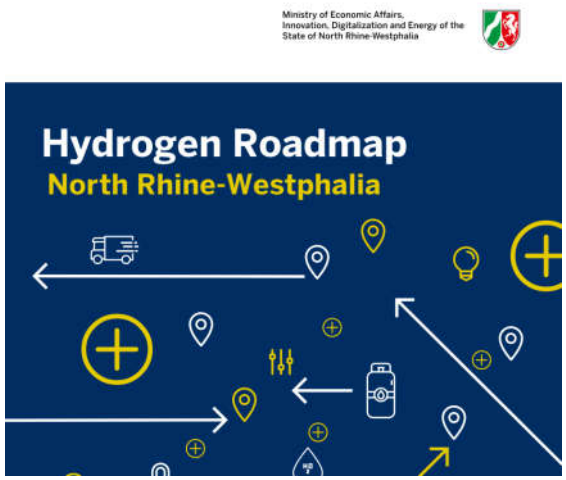
- **Hydrogen pipeline (> 200 km)**
  Length: 240 km
  Pressure: 20 bar
  Operation: since 1938
  Operator: Air Liquide



Hydrogen in all sectors



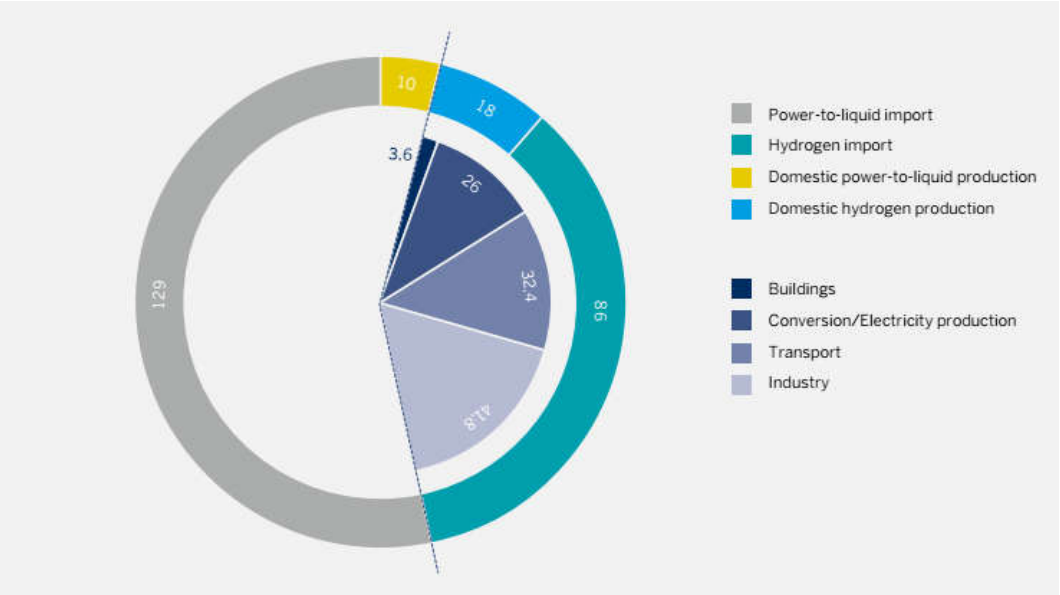




H2 Roadmap NRW

International Market for H2 and P-t-L in 2050

- P-t-L demand 139 TWh (129 import)
- H_2 demand NRW in 2050 104 TWh/a
  - 42 TWh/a industry
  - 33 TWh/a traffic
  - 26 TWh/a re-electrification
  - 4 TWh/a buildings
- of which:
  - 18 TWh produced in NRW
  - 86 TWh imported



https://www.wirtschaft.nrw/sites/default/files/asset/document/mwide_br_wasserstoff-roadmap-nrw_web-bf.pdf

Agenda

1 EnergyAgency.NRW and Regional Networks

2 Hydrogen in NRW – History and Strategy

3 **Projects on Hydrogen**

Agenda

1 EnergyAgency.NRW and Regional Networks

2 Hydrogen in NRW – History and Strategy

3 **Projects on Hydrogen – Transport**

Objectives and Activities NRW – Transport (1)

2025:

- **500 FC buses for public transport**

2030:

- **3,800 FC buses for public transport (45%)**

Quelle: RVK

Projects JIVE: Regional Transport Cologne

- 50 buses in operation or ordered
- Involved in the test for many years since 2011
- Starting point by-product hydrogen

Quelle: WSW

Projects JIVE: Public Utility Wuppertal

- 20 buses in operation or ordered
- Green H2: electrolysis with power from waste
- Special approach finds many followers

Bus initiative by VDV and NRW Ministry about 250 buses

Objectives and Activities NRW – Transport (2)

2025:

- **More than 400 fuel cell trucks**

2030:

- **11,000 fuel cell trucks over 20 t (25%)**
- **1,000 FC waste collectors (30%)**

Quelle: Stadt Düsseldorf

Project H2Share

- 1st test of a FC truck at ABC Logistik in Düsseldorf
- Mobile H2 filling station by Wystrach

Truck initiatives by VCI/HDE/VVWL and HyTruck

Quelle: Faun

Project HECTOR

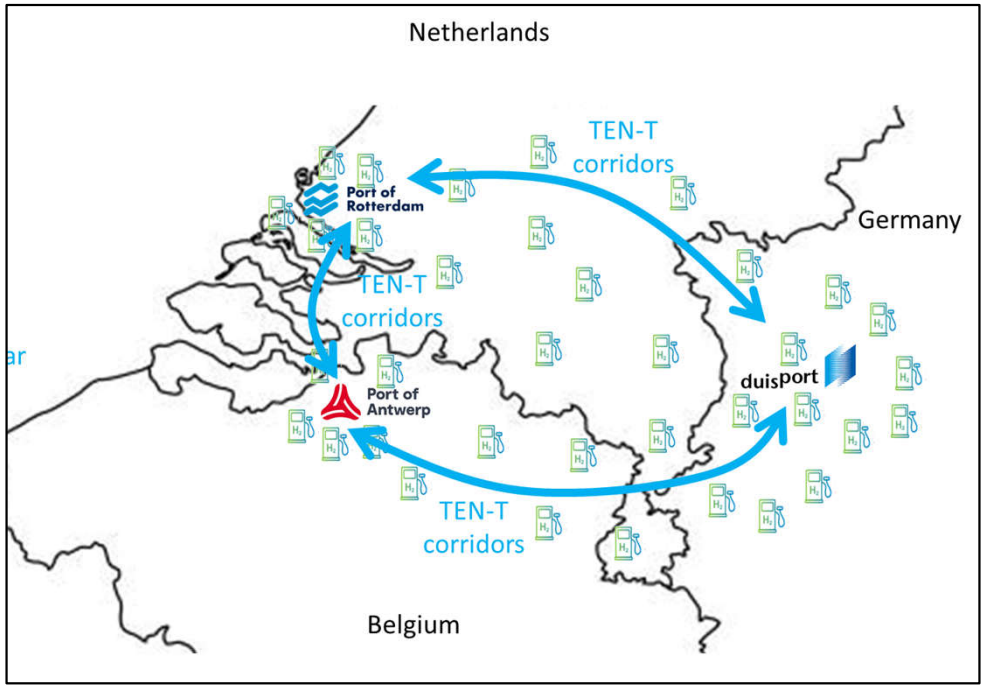
- 1st Faun series vehicle at Wirtschaftsbetriebe in Duisburg

Procurement initiative of 40 vehicles by 7 waste management companies

NRW FC Truck Initiative

HDE Handelsverband Deutschland
KLIMA-SCHUTZ-OFFENSIVE DES HANDELS
VCI nrw
VVWL NRW

- 3 workshops on FC trucks, filling-stations, expectations of operators, involving 130 participants
- 43 LoI of operators collected, showing demand for
  - 500 tractor trucks
  - 110 rigid trucks
- Co-operation with HyTrucks in preparation



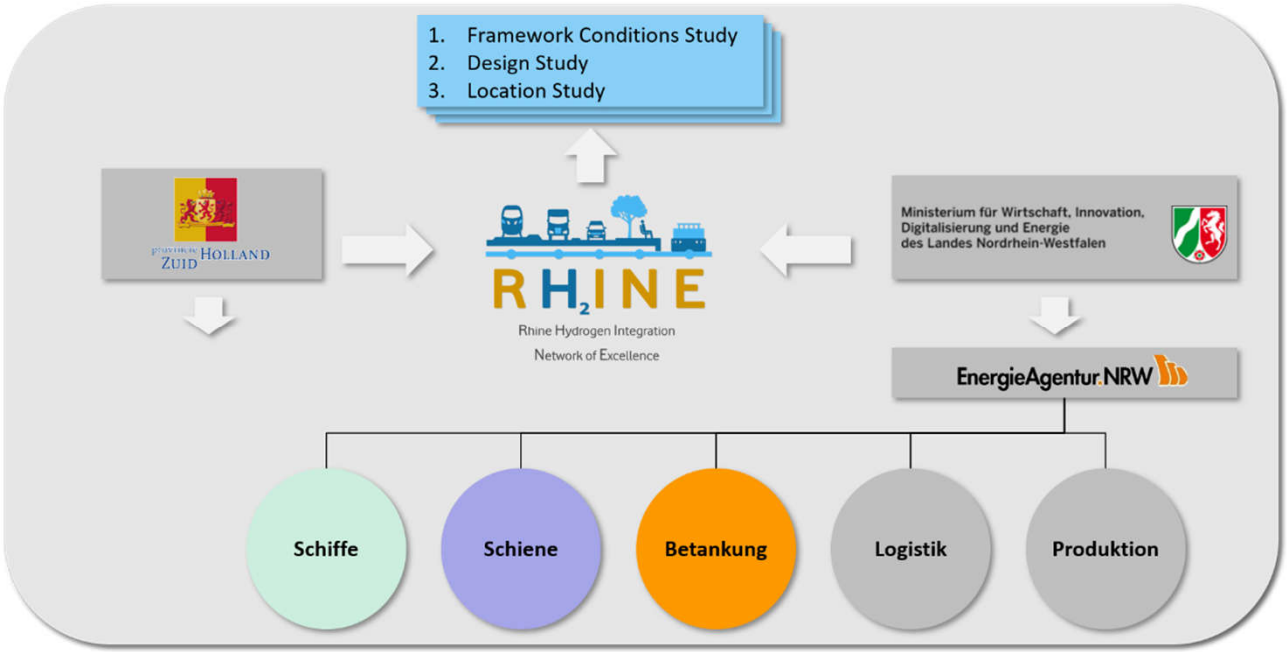
Objectives and Activities NRW – Transport (3)

2025:

- **First fuel cell inland waterway vessels (10)**

2030:

- **Fuel cell inland waterway vessels on the market, comprehensive H2 infrastructure**



Project RH_2INE with The Netherlands until 2025:

- 3 H2 filling stations in ports
- 10 FC inland waterway vessels
- 12 H2 freight locomotives and 6 H2 reach stacker

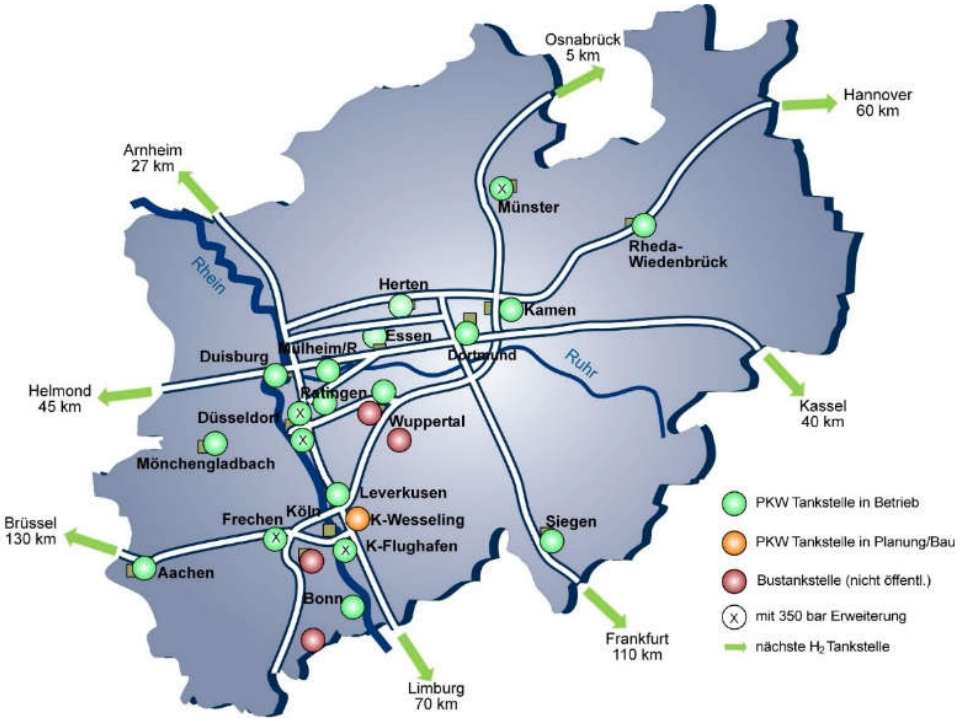
Objectives and Activities NRW – Transport (4)

2025:

- **60 car and at least 20 truck filling stations**

2030:

- **200 car and truck filling stations**



H2 filling stations currently:

- **20** x 700 bar for passenger car
  - Of which 3 x 350 bar
- **4** x 350 bar for buses (depot)
- In Germany: **90**

Approach: **Green Energy Hubs**

Agenda

1 EnergyAgency.NRW and Regional Networks

2 Hydrogen in NRW – History and Strategy

3 **Projects on Hydrogen – Infrastructure and Industry**

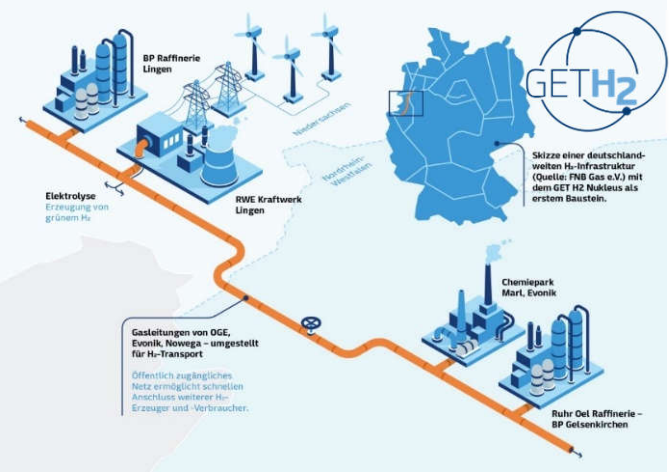
Objectives and Activities NRW – Energy and Infrastructure

2025:

- **500 km of H2 pipelines, 120 km in NRW**
- **> 100 MW electrolysis capacity in industry**

2030:

- **H2 pipelines 240 km in NRW**
- **1 to 3 GW electrolysis capacity in NRW**



GET H2 Nucleus in Lingen and Ruhr

- 130 km grid with 100% H2 to Ruhr area
- > 100 MW electrolysis for green H2
- Production start: end of 2024

Source: GET H2

REFHYNE, Shell at Cologne refinery

- Use of green H_2 for refinery process & refuelling
- 10 MW electrolyser: 1,300 tonnes of H2/a
- In operation since July 2021

Source: Shell

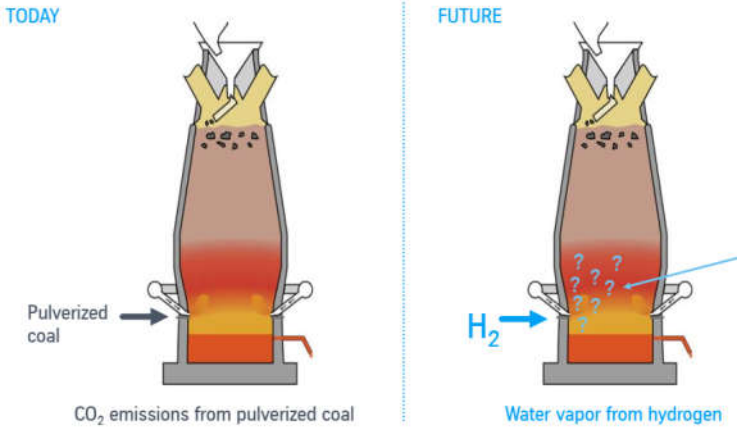
Objectives and Activities NRW – Industry

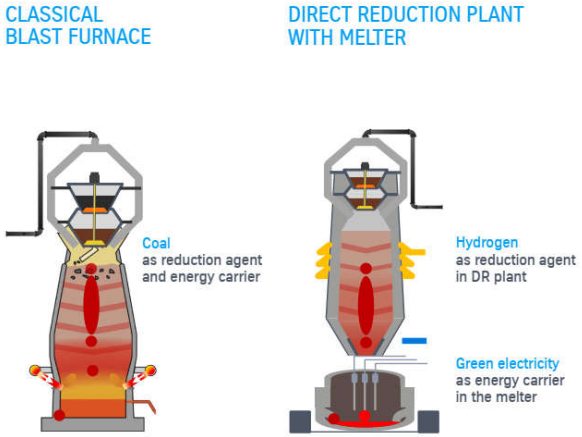
2025:

- **First DRI plant steel production in DU**
- **PtL plant (several 100 t/d), plant for NH3/MeOH**

2030:

- **Expansion of H2-based steel production**
- **Pilot plant 100% H2-based glass production**





Step 1: H2 injection in an existing blast furnace
H2BF: ThyssenKrupp Steel in Duisburg

- Objective: substituting coke by H2 injection
- Partner: Air Liquide
- Next step: **H2Stahl** (Reallabor):
  10,000 m^3/h H2 injection, 6.5 km pipeline

Step 2: Direct reduction plant with melter (DRI)

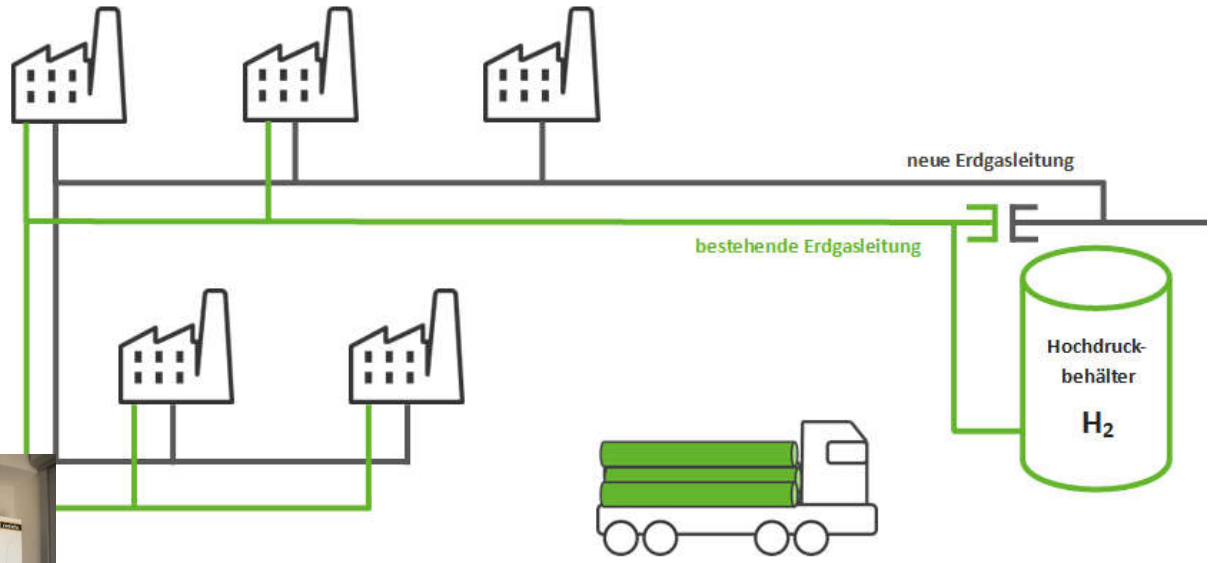
- Objective: substituting blast furnace
- First plant in 2025: 90,000 tons H2/a
- Total demand for complete steel production:
  720,000 tons H2/a (in 2050)

Objectives and Activities NRW – Industry

H2 supply of business park near Dortmund

- Length: 500 m, MOP 1, DN 150
- NG pipeline as backup
- H2 burners by remeha 25 kW
- Storage
  - DP 40
  - 440 kg
  - Weekly refilling

Quelle / Fotot: BDR Thermea Group



Quelle: Westnetz

Agenda

1 EnergyAgency.NRW and Regional Networks

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3 **Projects on Hydrogen – Regions and Cities**

Hydrogen model region/municipality in NRW

- Call for competition in 2018
- Funding for feasibility studies
- **Winner Düsseldorf „Düssel.Rhein.Wupper“**
- More than 30 municipalities with concrete hydrogen activities, e.g. **HyExperts** in national program NIP

Foto: MWIDE NRW

H2 Rhineland	Industry-H2	FC buses, municipal fleets, logistics
Düssel.Rhein.Wupper	H2 by electrolysis from waste-to-energy plants	FC buses, commercial vehicles, municipal fleets
HYMAT: Steinfurt district	Wind-H2 by electrolysis	FC buses, FC cars, waste collection vehicles, logistics

NRW regions in HyLand

HYLAND
WASSERSTOFFREGIONEN IN DEUTSCHLAND

HYEXPERTS
REGION EMSCHER-LIPPE

- **HyLand** Programme within National Hydrogen Programme (NIP)
- **5 HyExperts**: Emscher-Lippe, Essen, Ostwestfalen-Lippe, Kreis Düren and Hagen; **HyStarter**: Kreis Soest
- **Objective:** Development of technical concepts, feasibilits studies, preparing of real hydrogen applications
- **Results for Emscher-Lippe:**
  - 65 projects and activities, over 30 projects for mobility, e.g. procurement of FC waste collectors and FC buses
  - H2 generation potential around 3,000 tons/a
  - Next step: linking of projects along the H2 value chain
  - Integration of component suppliers as well as qualification and further training

Hydrogen Application Center in Herten

Agenda

1 EnergyAgency.NRW and Regional Networks

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3 **Projects on Hydrogen – Research Institutes**

Technology and Innovation Centre Hydrogen Technologies (TIW) in Duisburg

Competiton of National Ministry of Transportation (BMVI)

- Centre for Fuel Cell Technology (ZBT) as lead institute
- Inspection, test and know-how center for fuel cell-based propulsion systems
- Applications: commercial logistics (shipping, rail, road and public transport)
- NRW state government supports with up to 50 million euros, BMVI with 60 million Euros
- Over 100 companies, research institutions and associations involved

Thank you

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Senior Consultant

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ENERGY ENGINEERS

TÜV NORD GROUP

Wissenschaftspark, Munscheidstr. 14,
45886 Gelsenkirchen

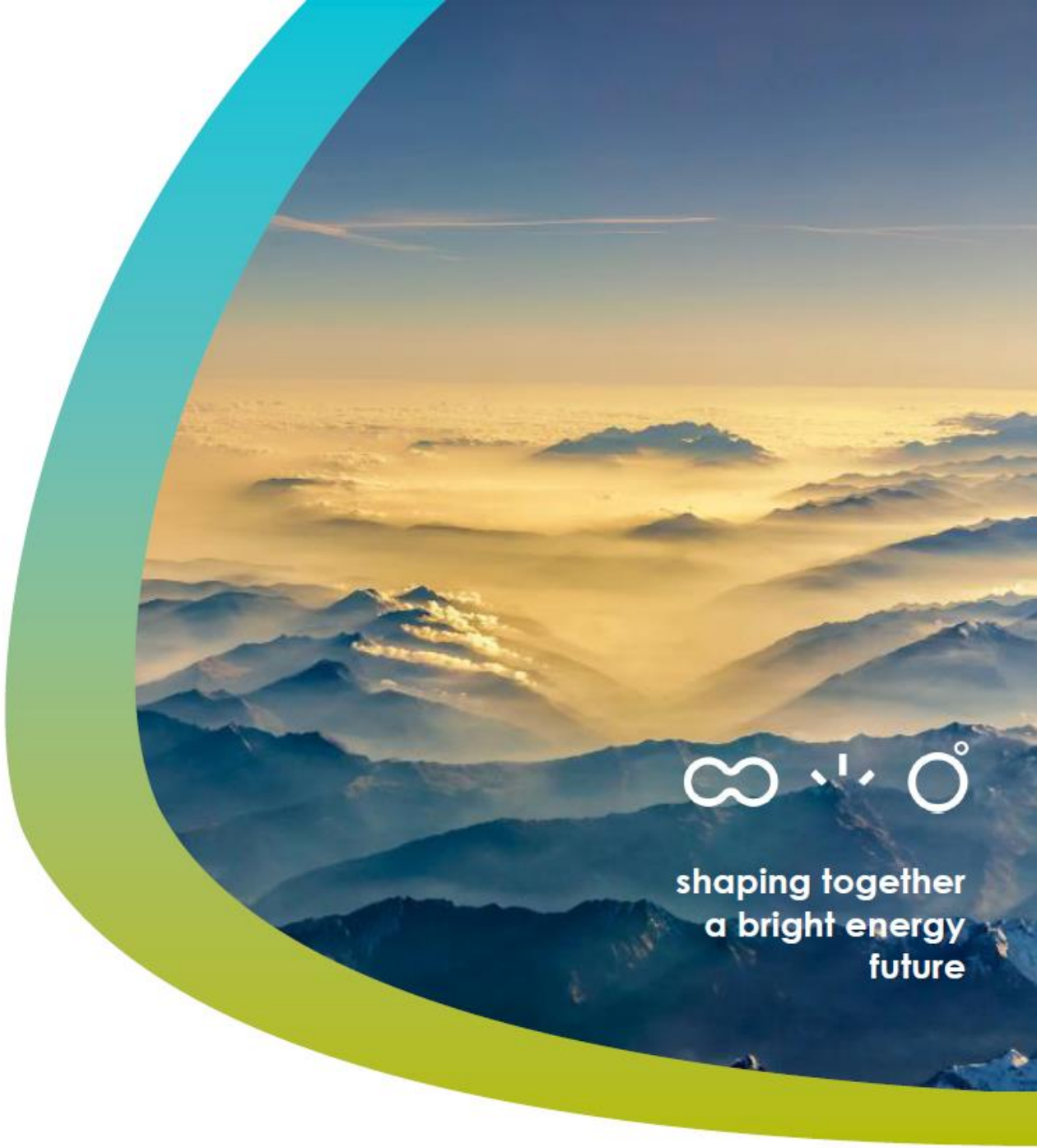
News from cluster members

- Fluxys market study (Cedric Van Hoonacker)
- Blue Gate Antwerp, RFI (Maarten Bettens)
- Inovyn hydrogen investment plans (Matthias Schnellmann)
- Trucks from CMB @ (Delhaize and) Altrea/Haesaerts (Luc Haesaerts)
- VoltH2 Vlissingen project (Bas Lavalaye)
- Von Karman Institute: CHypPS project & BEHyFE project (Peter Simkens)
- Everfuel: Project Heinenoord (Wouter Van der Laak)

Shaping H_2 infrastructure for Belgium

Waterstof Industrie Cluster

08/12/2021

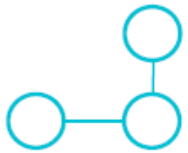


fluxys

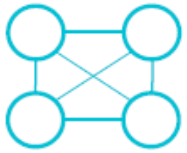
WATERSTOF INDUSTRIE CLUSTER

Fluxys proposal: develop progressively H_2 & CO_2 infrastructure

Local clusters



Connecting clusters

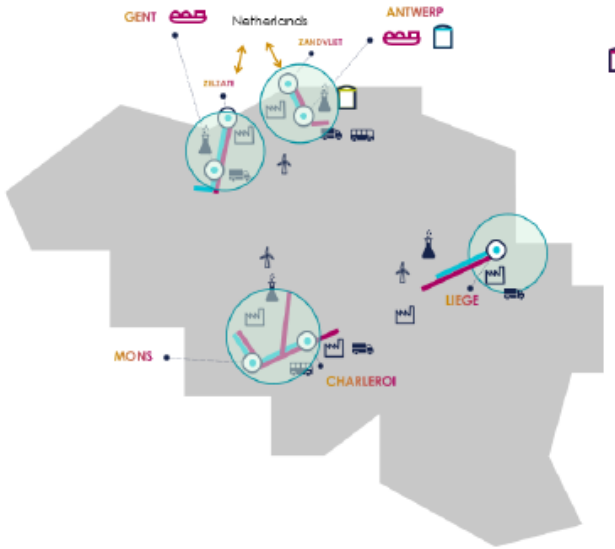


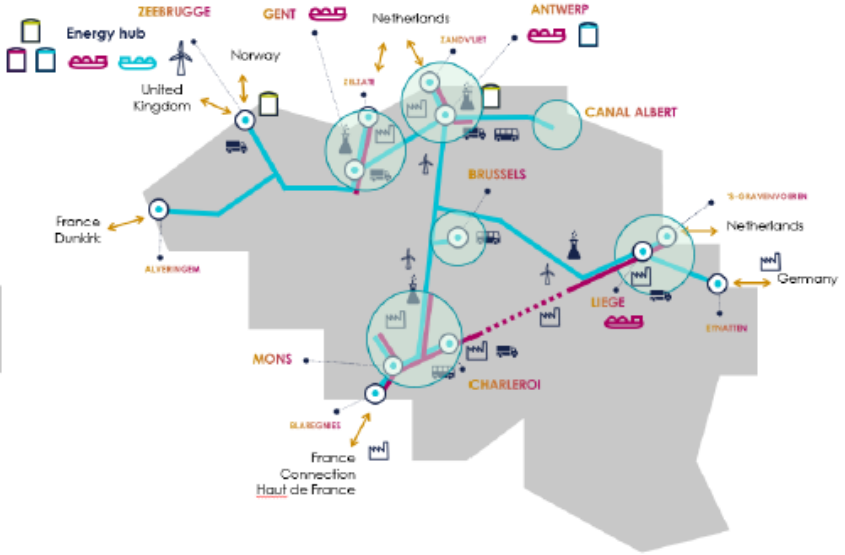
Mature backbone

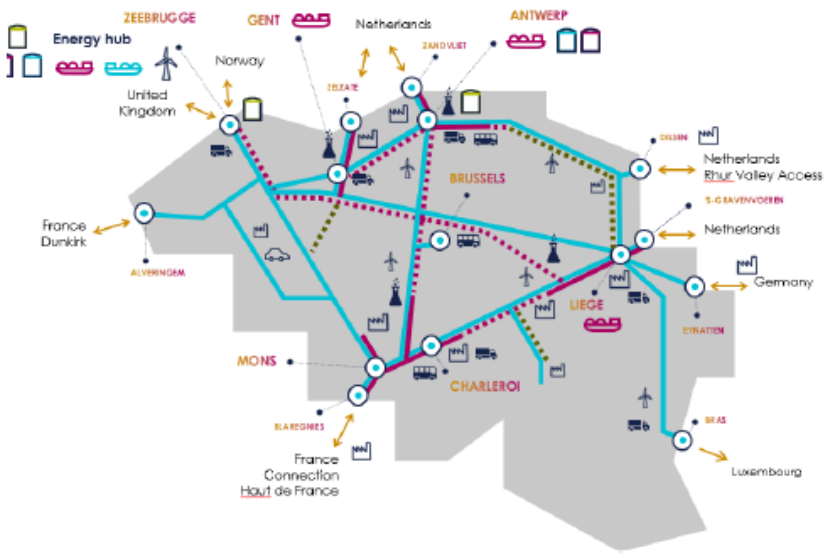
Phase 1
2020 - 2024

Phase 2
2025 - 2030

Phase 3
2030 onwards

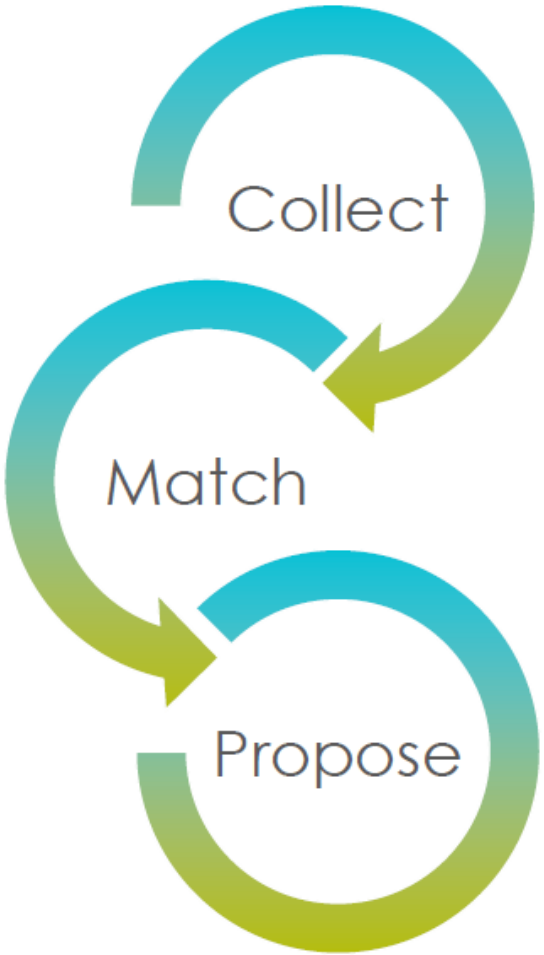






In line with EU strategy

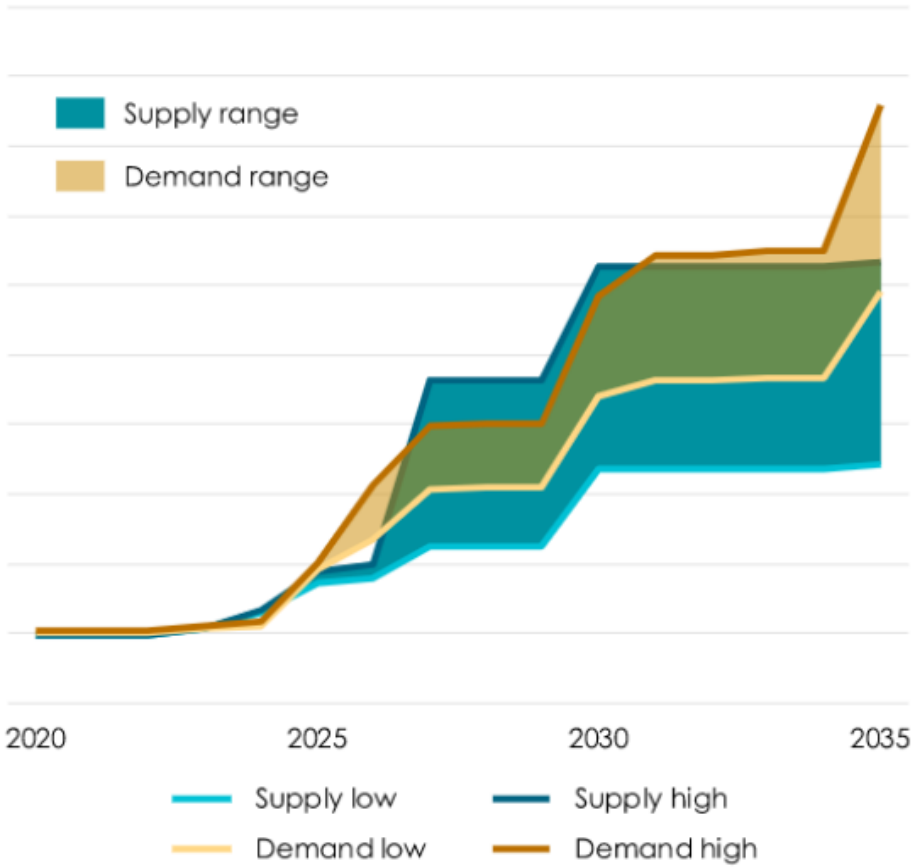
Fluxys to act as a market facilitator



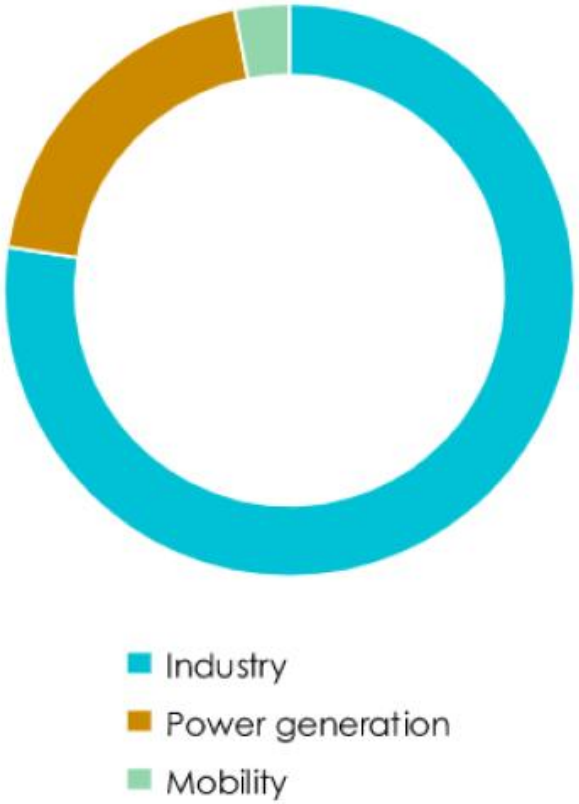
Request for information : strong market response

CO2 capture/offtake

Hydrogen supply/demand

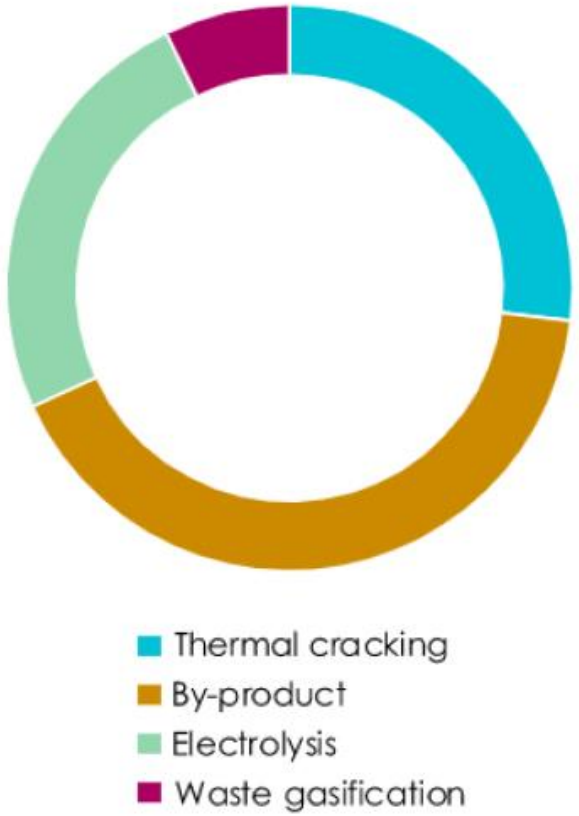


2035 demand breakdown

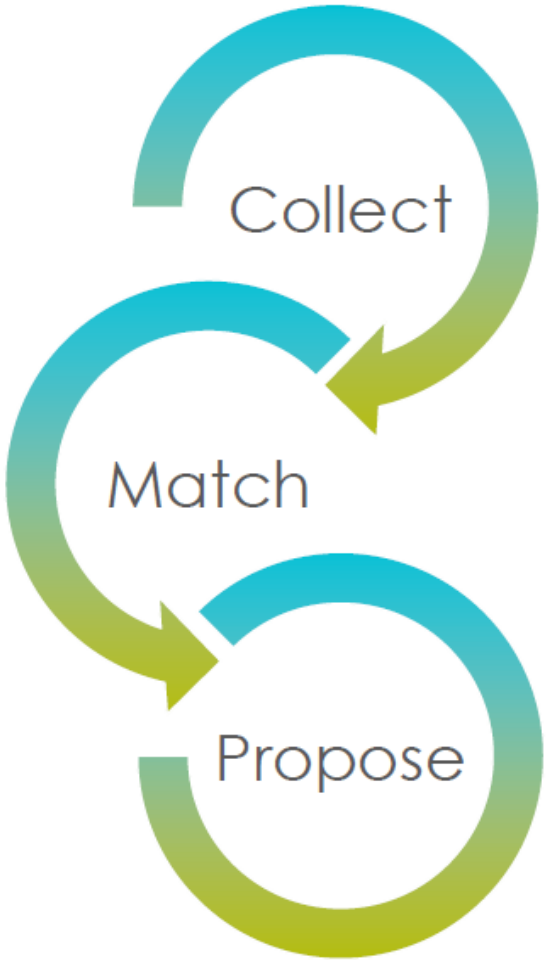


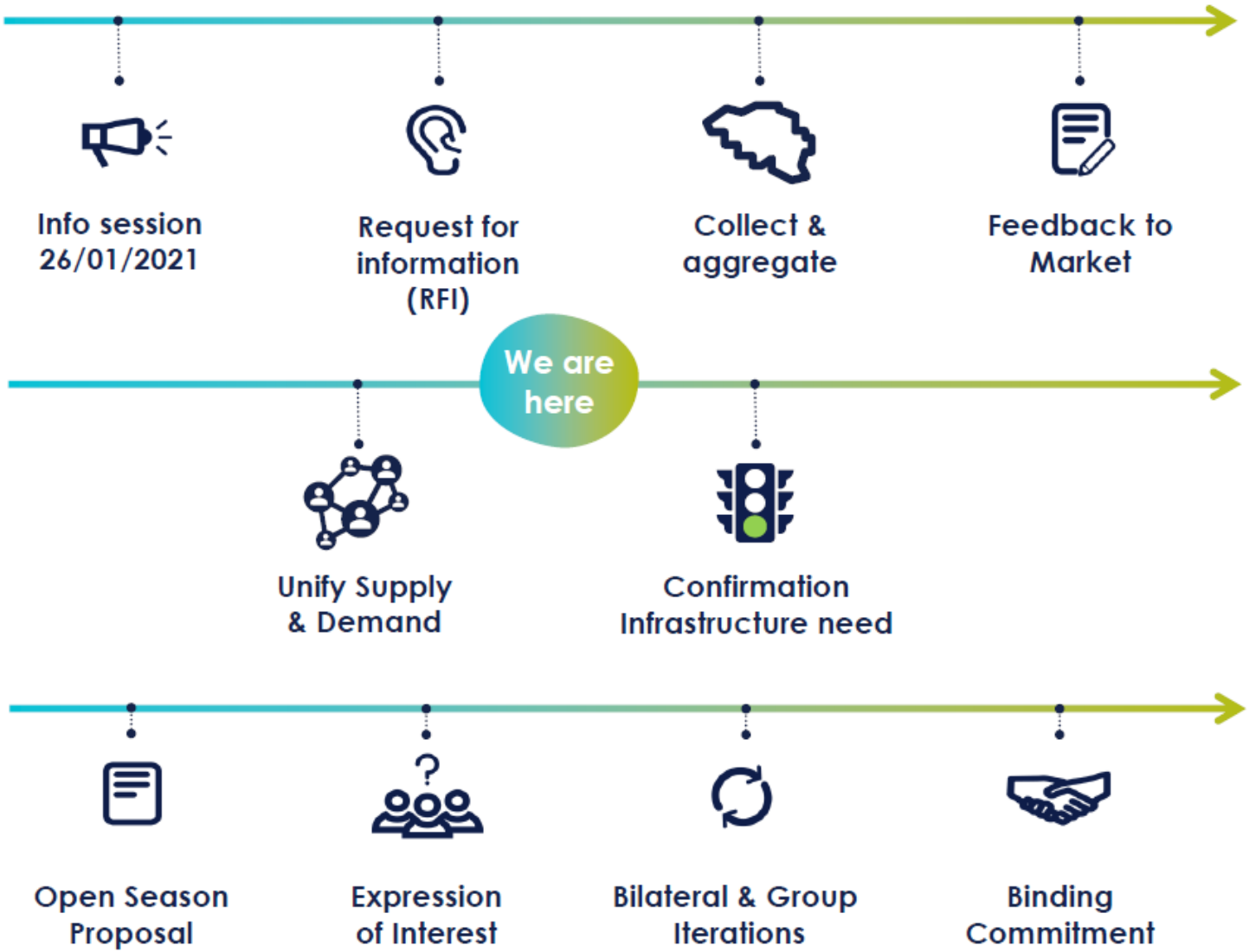
H2

2035 supply breakdown



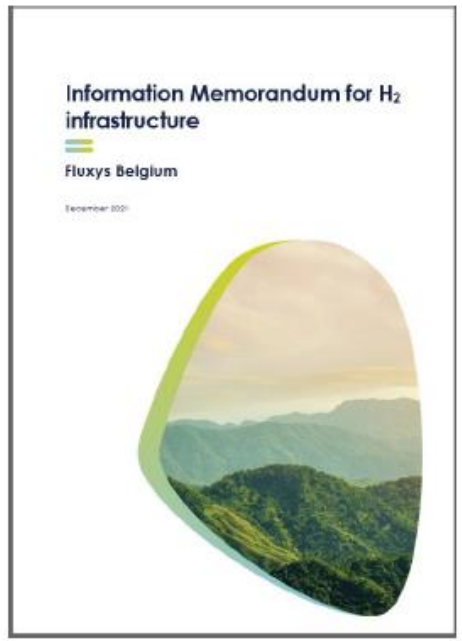
Cooperative Commercial Process: matchmaking & next steps

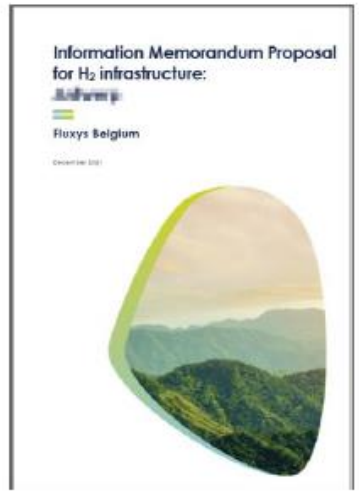


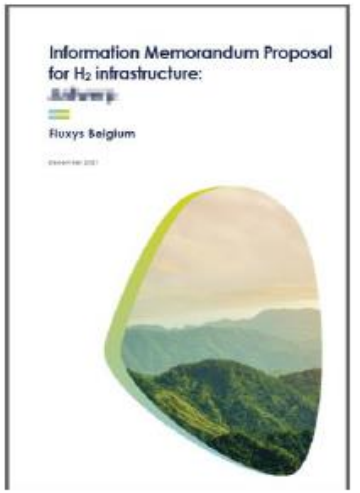


Information Memorandum H_2

- Inform market on ongoing developments
- RFI – remaining open on rolling basis
- Specific Cluster Proposals in mature clusters







Specific Infrastructure Proposal

Expression of Interest

Van Hoonacker Cedric
T +32 2 282 71 50
Cedric.vanhoonacker@fluxys.com
info.hydrogen-carbon-transport@fluxys.com

shaping together
a bright energy
future

Blue Gate Antwerp

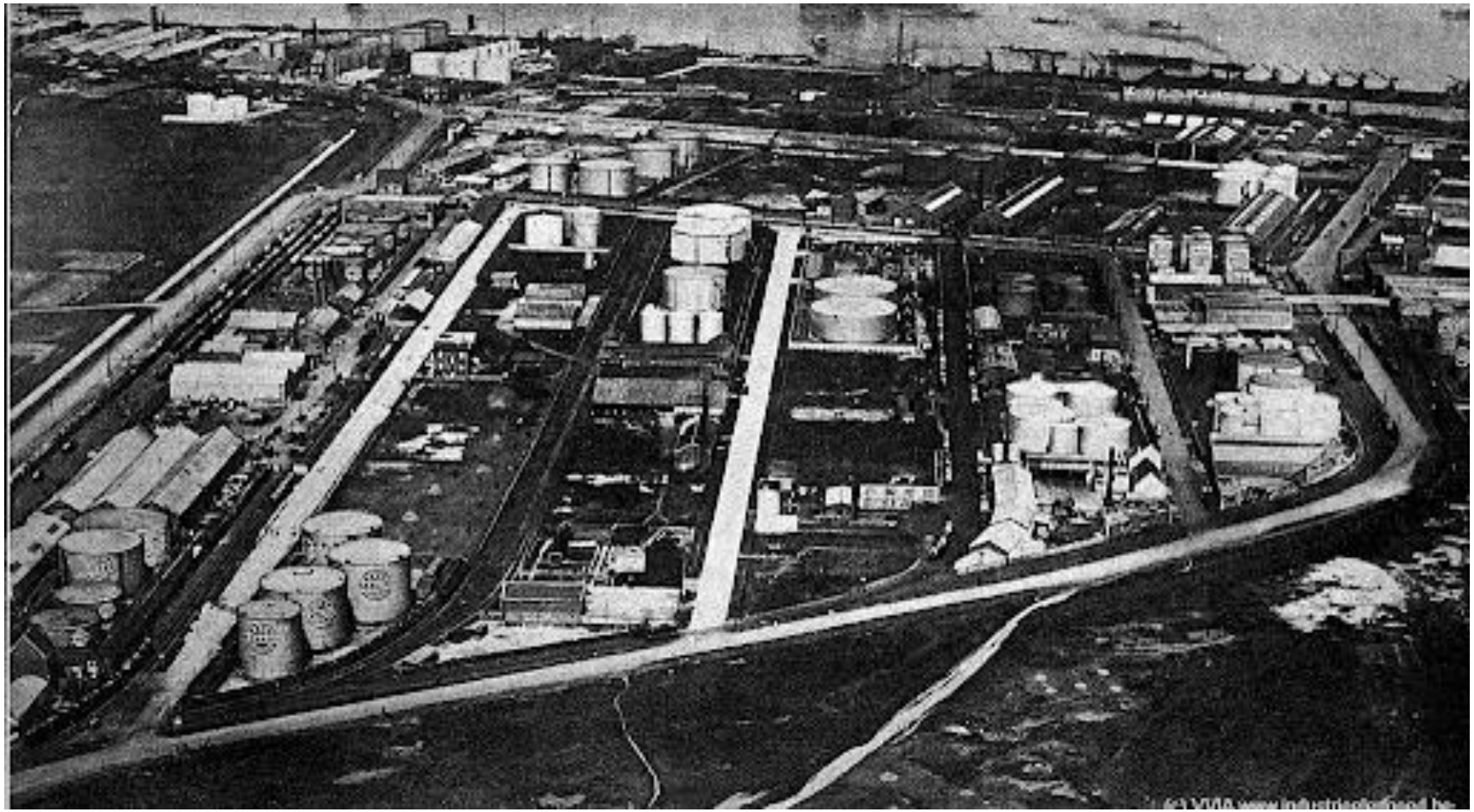
RFI alternative e-HUB

WIC, 8/12/2021

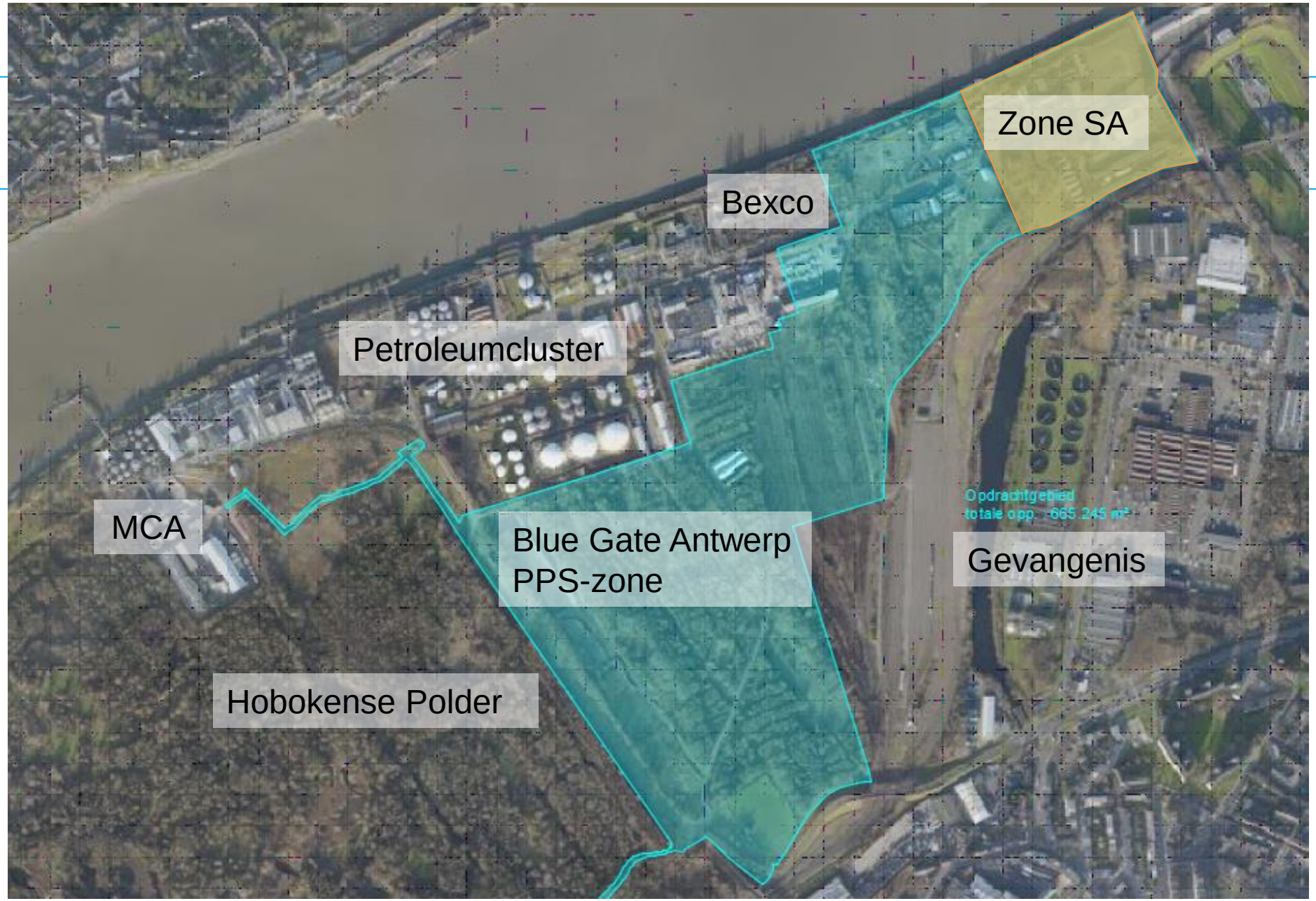
the future in mind

BLUE GATE ANTWERP

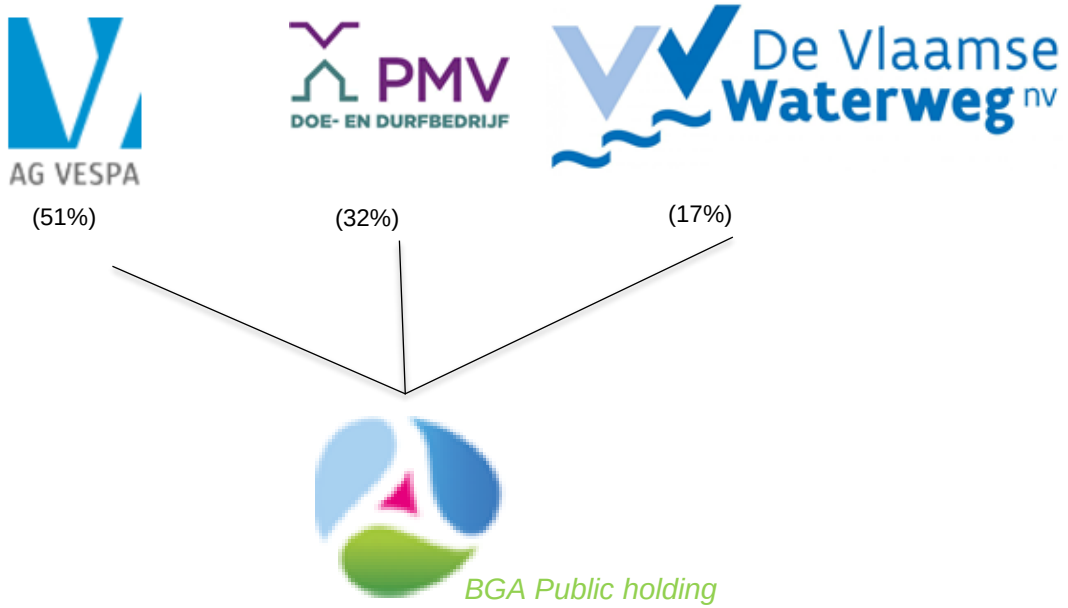
e-Port (1902-today)



BLUEGATE ANTWERP


Zone SA
Bexco
Petroleumcluster
MCA
Blue Gate Antwerp
PPS-zone
Gevangenis
Hobokense Polder

Structure


AG VESPA
PMV
DOE- EN DURFBEDRIJF
De Vlaamse Waterweg nv
(51%)
(32%)
(17%)
BGA Public holding

Maritime Campus Antwerpen (MCA)

- Project CMB
- R&D hydrogen engines

Q8Oils

- Q8Oils develops, blends and supplies high-tech lubricants
- Q8Oils aims to make site more sustainable
- Q8Lubricants, member of the power-to-gas business cluster and WatersofNet

Alca Petroleum

- Alca is active in storage, transhipment and distribution of fuels.
- Seveso II facility
- Future vision is unclear (concession until 2035, permit until 2025)

IKO

- IKO waterproofing and insulation for flat roofs
- Production and R&D in Antwerp
- IKO aims to make site more sustainable

PPP zone

- DHL and logistics zone (10ha): CO2 neutral last mile city logistics
- BlueChem: incubator for green chemistry (AirLiquide, Vopak, BASF, Ineos, etc.)

Programme

- Current activities (2035/2050)
  - Waterrelated
  - Oil (IKO, Alca, Q8Oils)
  - Seveso-activities
- Alternative e-hub (Hydrogen)
  - Concept
    - no production
    - storage and distribution (B2B, B2C) and bunkering
  - Timeline
    - feasibility study (Vlaio, April 2020)
    - RFI (deadline 14/01/2022)
    - tendering (2022-2023)

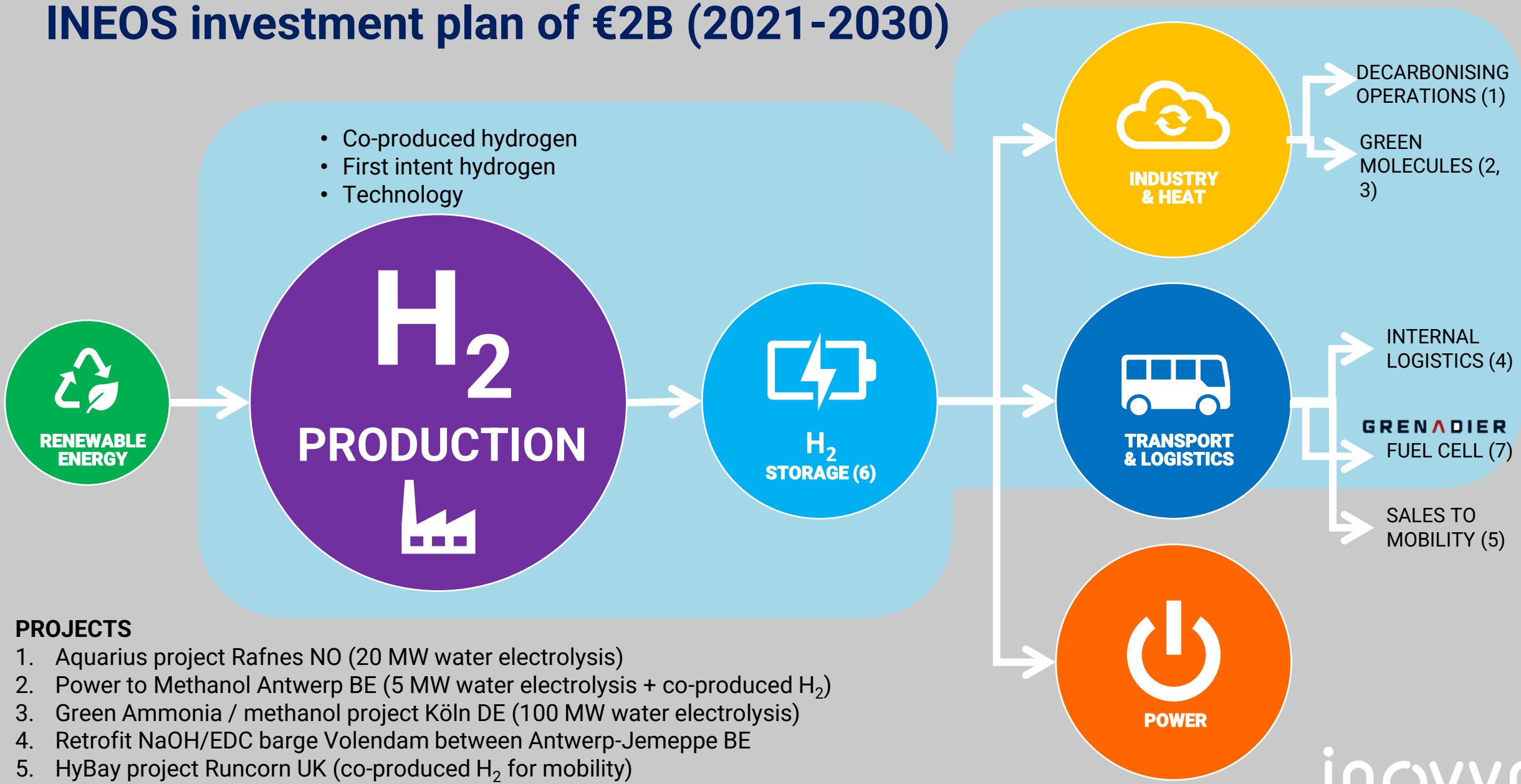
BLUEGATE ANTWERP

USP e-HUB (VLAIO study)

- Strength
  - trimodal access
  - located at the river Scheldt (jetty) (
  - heat network
  - Elia 150kV post (1.8km)
- Weakness
  - no production, only storage and distribution
  - offtake (in phases)
- Opportunity
  - business park / industrial site Blue Gate Antwerp (113ha, 6000 employees)
  - depot De Lijn site Lage Weg (2.8km)
  - depot rubbish trucks (2.6km)
  - nearby industry (MCA, Umicore, Lamifil, etc.)
- Threat
  - [port of Antwerp-Zeebrugge]

BLUEGATE ANTWERP

INEOS investment plan of €2B (2021-2030)



PROJECTS

1. Aquarius project Rafnes NO (20 MW water electrolysis)
2. Power to Methanol Antwerp BE (5 MW water electrolysis + co-produced H_2)
3. Green Ammonia / methanol project Köln DE (100 MW water electrolysis)
4. Retrofit NaOH/EDC barge Volendam between Antwerp-Jemeppe BE
5. HyBay project Runcorn UK (co-produced H_2 for mobility)
6. HyNet hydrogen storage UK
7. Grenadier fuel cell demonstration model with Hyundai

inovyn
An INEOS company

Trucks from CMB @ Altrea/Haesaerts (Luc Haesaerts)

De waterstoftrucks van CMB die Haesaerts zal inzetten. - © Haesaerts (Altrea)

VOLT H2

CORPORATE PRESENTATION

VOLTH2

Clean Hydrogen Production Infrastructure in Western Europe

INTRODUCTION: Developing Clean Hydrogen Production Facilities in Western Europe

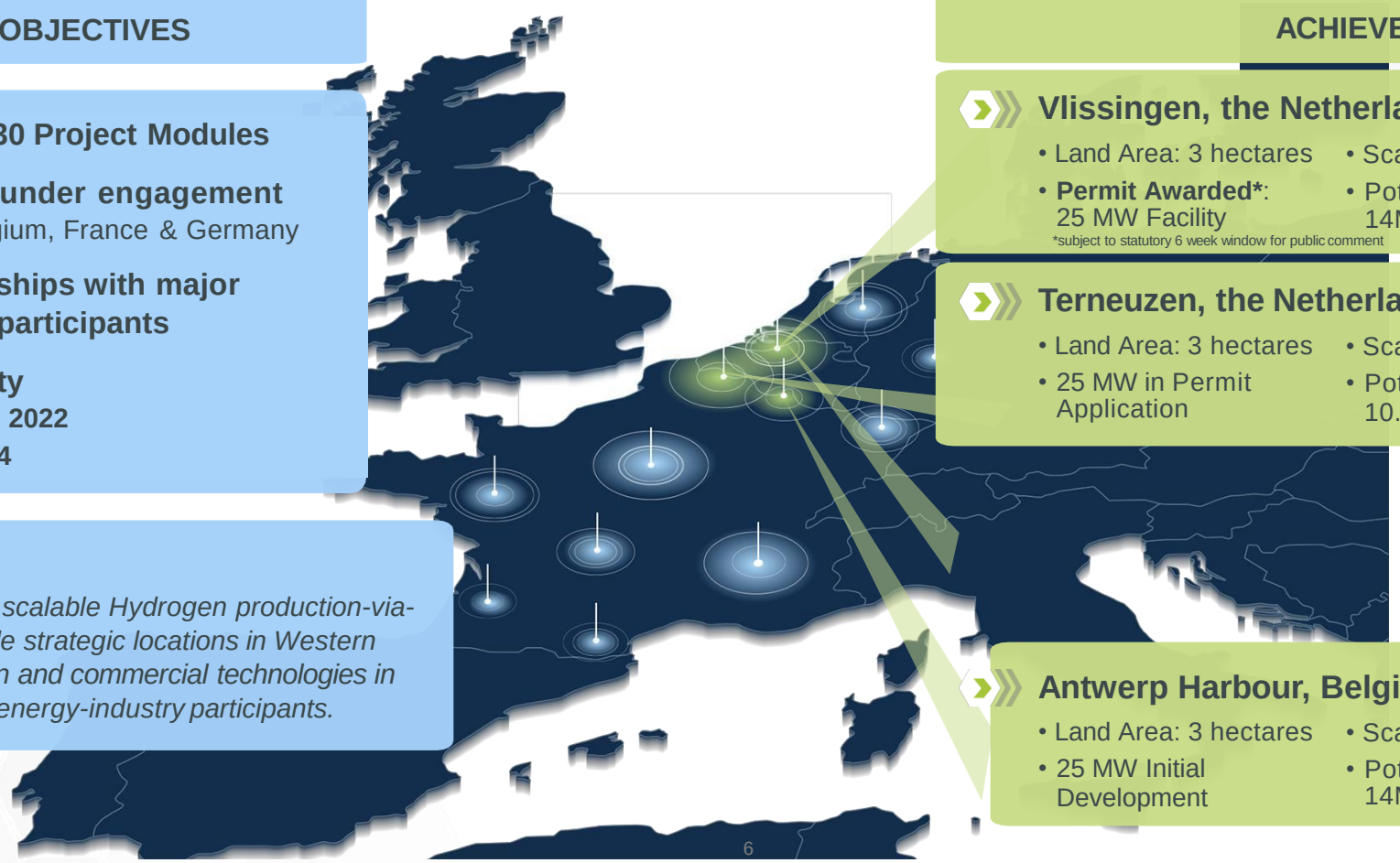
VOLT H2

TARGETS & OBJECTIVES

- **10 Sites holding 30 Project Modules**
- **Numerous Sites under engagement**
  - Netherlands, Belgium, France & Germany
- **Strategic partnerships with major energy-industry participants**
- **Total Site Capacity**
  - **> 500 MW by Q4 2022**
  - **1 GW by Q4 2024**

MISSION

To design, develop and build scalable Hydrogen production-via-electrolysis facilities at multiple strategic locations in Western Europe deploying only proven and commercial technologies in partnership with established energy-industry participants.



ACHIEVEMENTS

Vlissingen, the Netherlands

- Land Area: 3 hectares
- **Permit Awarded***: 25 MW Facility
- Scalable to 100 MW
- Potential H2 Output 14MM kgs p.a.

*subject to statutory 6 week window for public comment

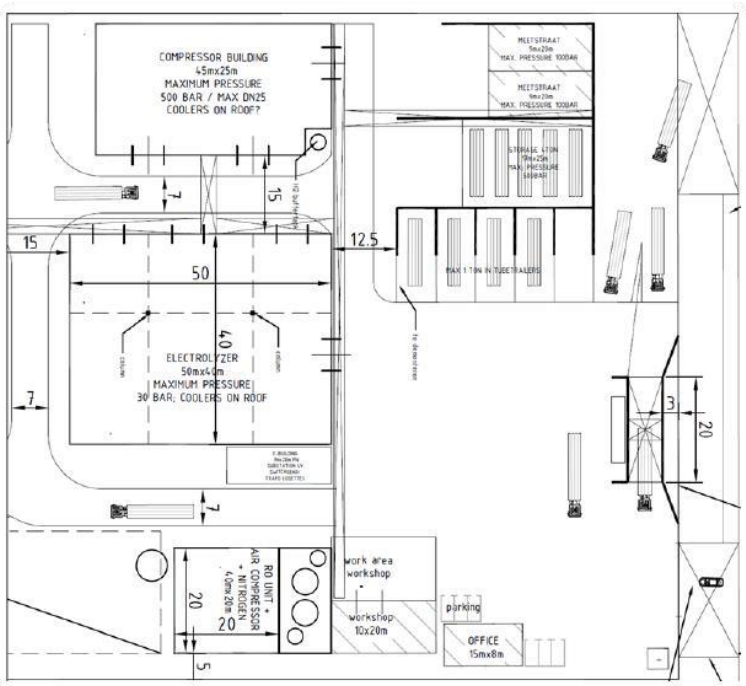
Terneuzen, the Netherlands

- Land Area: 3 hectares
- 25 MW in Permit Application
- Scalable to 75 MW
- Potential H2 Output 10.5MM kgs p.a.

Antwerp Harbour, Belgium (Oct 2021)

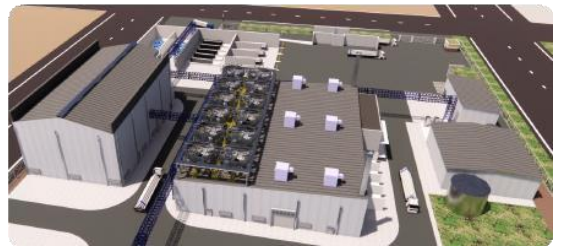
- Land Area: 3 hectares
- 25 MW Initial Development
- Scalable to 100 MW
- Potential H2 Output 14MM kgs p.a.

VLISSINGEN 1: 3D Visualisations of Phase 1, 25 MW



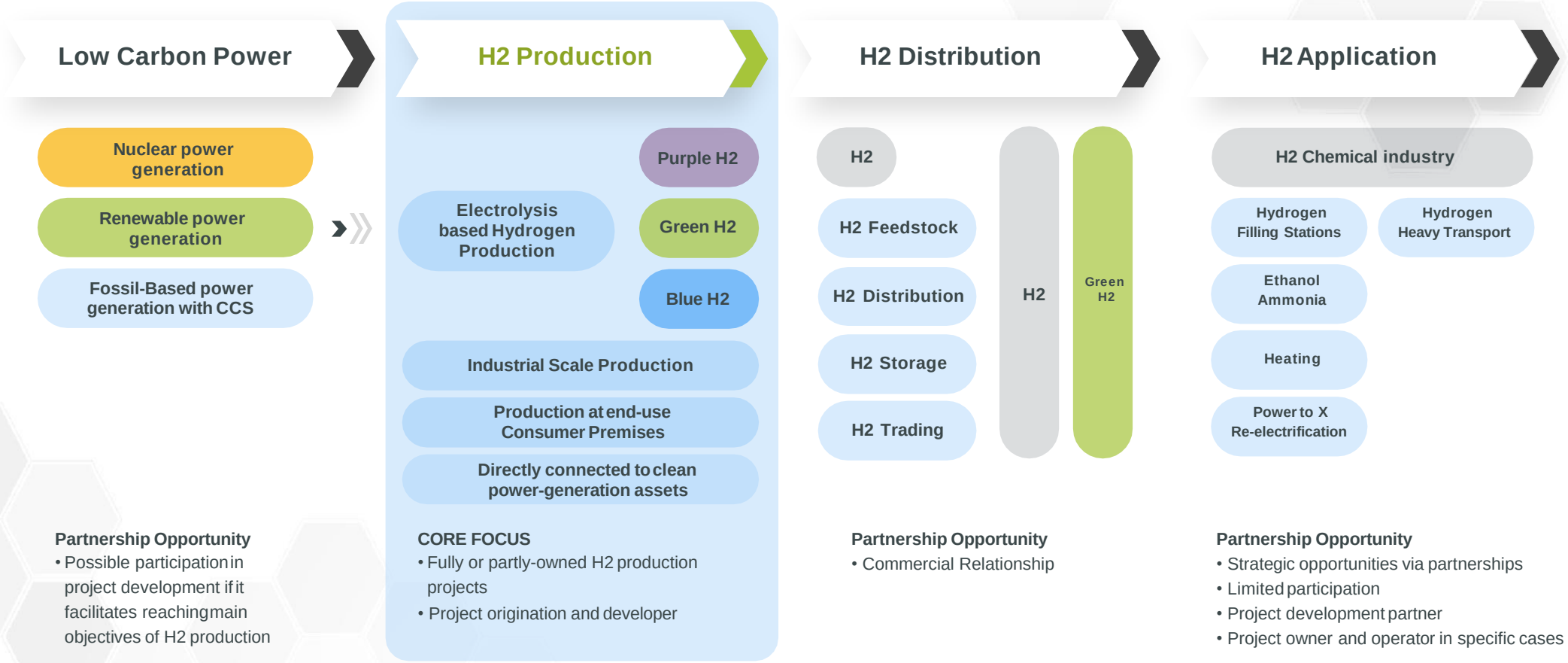
Phase 1 Schematic *(above)*
Electrolyser, storage and loading Area

Phase 1 Aerial Illustration *(above)*
Buildings, storage and loading area



3D Artist's Impression
(above right) Future plant

CORE FOCUS: H2 Production



Partnership Opportunity
- Possible participation in project development if it facilitates reaching main objectives of H2 production

CORE FOCUS
- Fully or partly-owned H2 production projects
- Project origination and developer

Partnership Opportunity
- Commercial Relationship

Partnership Opportunity
- Strategic opportunities via partnerships
- Limited participation
- Project development partner
- Project owner and operator in specific cases

CONTACT INFORMATION

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4611EL Bergen-op-Zoom
The Netherlands.

Bas.lavalaye@volth2.com

+31 6 273 69 017

www.volth2.com

Clean Hydrogen Propulsion for Ships (CHyPS)

Clean Shipping Toolbox

Models & Model Libraries

Existing Model Libraries

- Piping Components Library (valves, pipes, heat exchanger, pumps…)
- Electrical Power Library
- Fuel Properties Library
- Mechanical Components Library
- Other Model Libraries

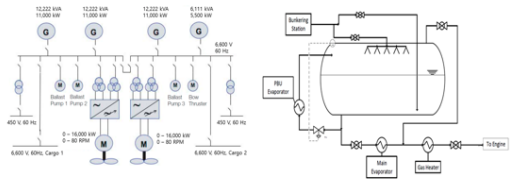
New Models from CHyPS

- Fuel Tank Model
- Internal Combustion Engine Model
- Transfer learning & on-line learning module

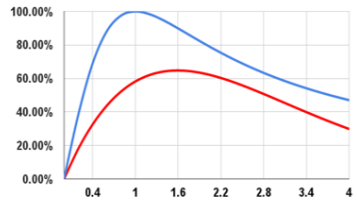
0D/1D Simulation Platform

Ship types & Sailing Profiles

Configurations & Layouts



Simulation Results

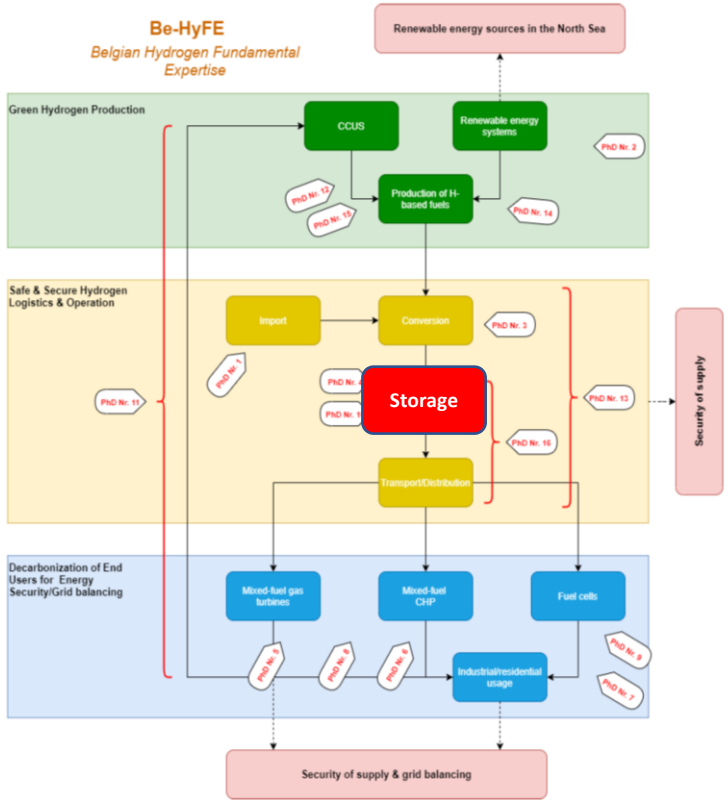


GHENT UNIVERSITY

von KARMAN INSTITUTE FOR FLUID DYNAMICS

Intercluster Project (BC + VIL)

Be-HyFE / Belgian PhD Network for Hydrogen



- Set up a Belgian PhD network on Hydrogen research, over the full hydrogen value chain
- Coordinate Belgian Hydrogen research
- Build an academic research backbone for innovation in hydrogen technology & applications
- Disseminate research results to 30 industrial partners in advisory board
- **PhD @ VKI: Storage with densified cryogenic e-fuels**

GHENT UNIVERSITY · imec · KU LEUVEN · TWEED · Universiteit Antwerpen · UCLouvain · UHASSELT

ULB Université Libre de Bruxelles · LIÈGE université · UMONS Université de Mons · vito · von KARMAN INSTITUTE FOR FLUID DYNAMICS · VUB · WATERSTOF INDUSTRIE CLUSTER

ETF Project (FPS Economy)

Waterstof Industrie Cluster – news (dec. 2021)

Wouter van der Laak
Business development & sales BeNeLux
wl@everfuel.com ;

Everfuel

338,7 x 190,5 mm

Unlocking hydrogen at scale

Everfuel at a glance

- Hydrogen is the new heavy-duty fuel – **100% clean and reaching diesel parity**
- The technology is proven and require a **dedicated fuel company** to commercialize green hydrogen
- Everfuel is **Europe's new integrated fuel company** – providing green hydrogen for larger vehicle fleets
- HQ in Herning, Denmark, listed as **EFUEL** on Euronext Growth Oslo
- Everfuel is asset owner and operator of the complete H2 value chain
  Currently activities in **N, S, DK, D, NL**

Power generation
Strategic integration potential

Hydrogen production
Can be owned by Everfuel or partners

Hydrogen distribution
Always owned/controlled by Everfuel

Hydrogen stations
Can be owned by Everfuel or partners

Hydrogen fueled vehicles
Strategic opportunities via partnerships and services

Everfuel

Key events

- Roll-out of Scandinavian hydrogen fuelling network progressing to plan
- Opening of H2 stations near Oslo and in Copenhagen, site selections progressing in Sweden with strong partners
- Signed strategic cooperation agreement with TECO 2030 for the delivery of green hydrogen
- Construction of HySynergy Phase I electrolyser underway with first hydrogen expected late in H2 2022
- HySynergy Phase II development on track and selected for potential EU IPCEI funding
- Taxi roll-out progressing in Denmark with vehicles filling at H2 stations in Copenhagen and Aarhus
- End of September cash position of EUR 69.5 million

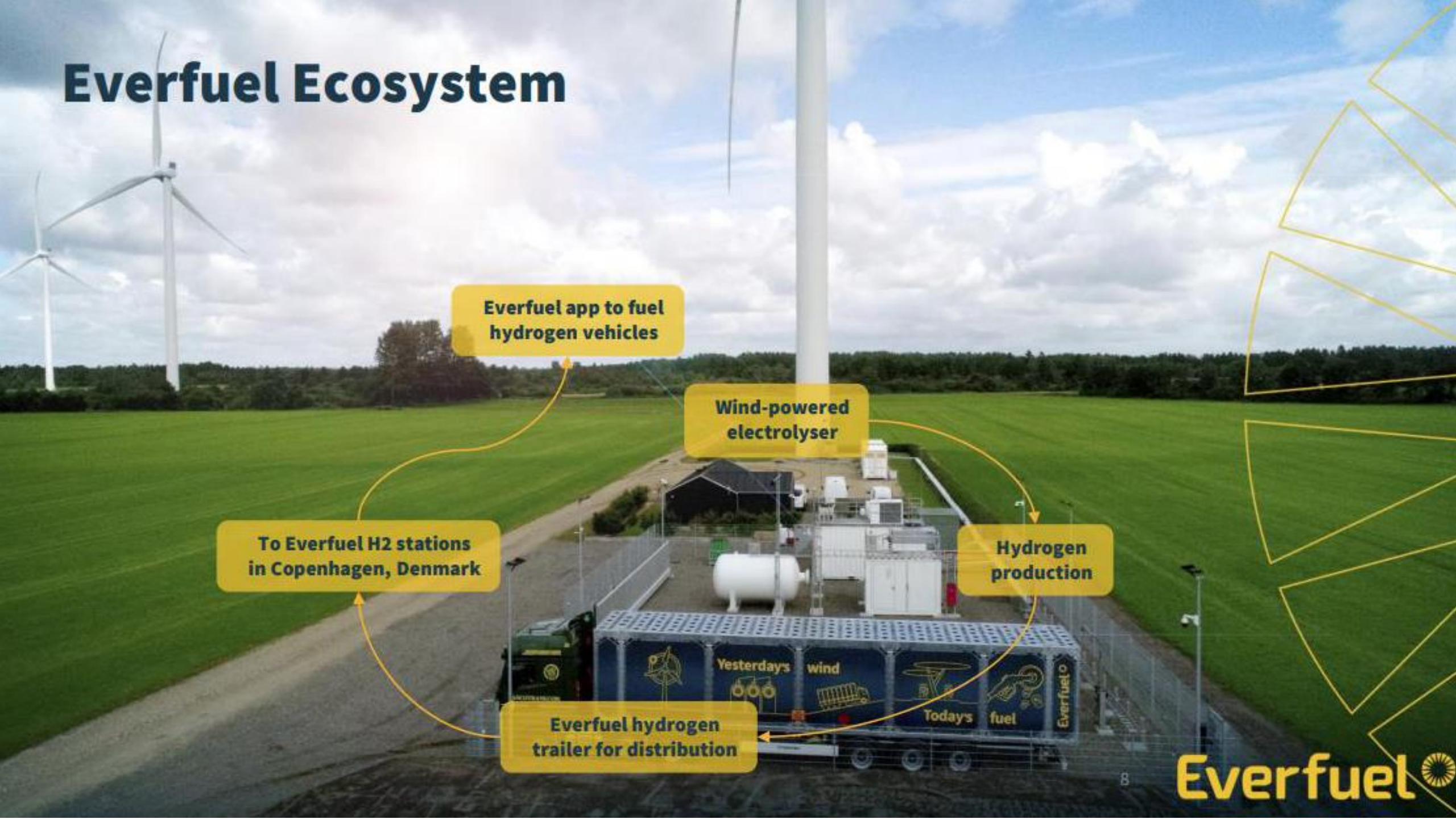
#MakingHydrogenHappen

- **Everfuel in execution mode and is rolling out a Scandinavian hydrogen refuelling network according to plan**
- **A team with extensive industry experience - currently executing the construction of a large PtX facility**
- **Progressing in making green hydrogen commercially available with increasing number of intensive transportation vehicles transitioning to zero-emission hydrogen**

Power generation	Hydrogen production	Hydrogen distribution	Hydrogen stations	Hydrogen fueled vehicles
Dependent on RED-II in Q4 2021	Started construction of Europe's largest electrolyser in Q3 2021	4 trailers in operation, 4 more to come in Q4 2021	7 stations in operation, with secured location for additional 5 stations	Start-up of H2 fuelling plan - Everfuel App and first pieces of Helios is operational

Everfuel

Everfuel Ecosystem




OK
Everfuel
Everfuel
Beyond Renewables
01
02
OK
Everfuel
Everfuel
Everfuel
DRIVR
DRIVR

H2 refueling station for buses in The Netherlands

Status December 2021

Everfuel

WN/WIC News

Disclosing the world of H_2 to the broader public

Two main ideas:

- Short **animated video** on what hydrogen is
  → will be completed soon in collaboration with the Waterstofregio project

- A serie of **podcasts** on different aspects of the hydrogen economy
  → First three episodes online next week! 16/12/2021
  → New episode every month from January

H2 COMBUSTION

Knowledge exchange H2 combustion

- Started on request of a number of WIC partners active in H2 combustion
- Kick-off meeting 1 dec
- Aim
  - Exchange info & experiences on
    - ✓ Legislation, permitting, CE approval …
    - ✓ Technical aspects (e.g. component lifetime behaviour)
  - One voice towards policy makers
  - Promotion/clarification of H2 combustion technology towards de larger public

WORKING GROUP MOBILITY

Monitoring and facilitating H2 refuelling stations in Benelux.
Increase utilisation.

- Group of 25 companies
- Meeting on 6 dec
- Five goals/objectives:
  - H2 Roadmaps for Belgium and the Netherlands ➔ developments different strategies
  - Monitoring, exchanging “data and experiences ” of HRS and FCEV ➔ quarterly updates
  - Short, uniform and transparent approach of opening an HRS ➔ further development
  - Increase utilisation HRS ➔ involvement WIC
  - Communication and lobby

SHIPPING

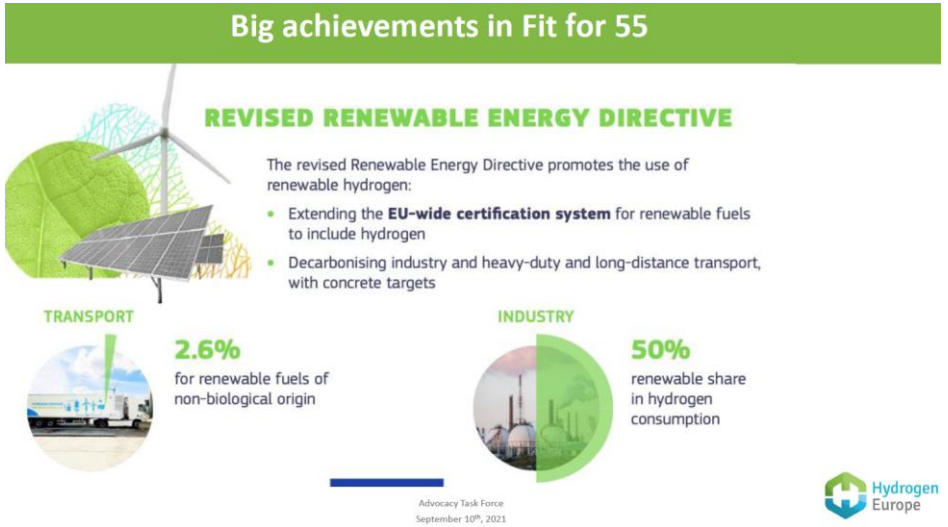
Development of H_2 pilots & infrastructure for shipping;
(in collaboration with De Blauwe Cluster)

- Monitoring technology and initiatives of WG members
  - ✓ Technology CMB, VDL, Nedstack
  - ✓ Ferry Vloot DAB Gent (Channel Gent-Terneuzen)
  - ✓ …
- Connection with RH2INE initiative South-Holland/Germany
  - ✓ https://www.rh2ine.eu/rh2ine-kickstart-study/
  - ✓ Find pilots in Belgium: Inland navigation barge, flexible containerized solutions for propulsion, H2 storage
  - ✓ Joint proposal with NL/DE projects, e.g. in CEF call

POLICY

Evaluation & statements
Related to EU or national legislation

- Policy recommendations on REDII / additionality
  - ✓ Discussion with BE representatives involved in delegated act
- Analysis of CCfD-type of support mechanisms
  - ✓ With H2-import coalition => discussion with FL/Fed cabinets
- Analysis ‘Fit for 55’, consequences for H2 , using Hydrogen Europe analyses
  - ✓ Questions on proposed target: 50% of H2 in industry to be green
  - ✓ Role of byproduct hydrogen/low carbon hydrogen?



- Next steps:
  - ✓ Further dialogue with FL/BE representatives, prepare recommendation from WIC,
  - ✓ Exchange info with H2 Platform NL

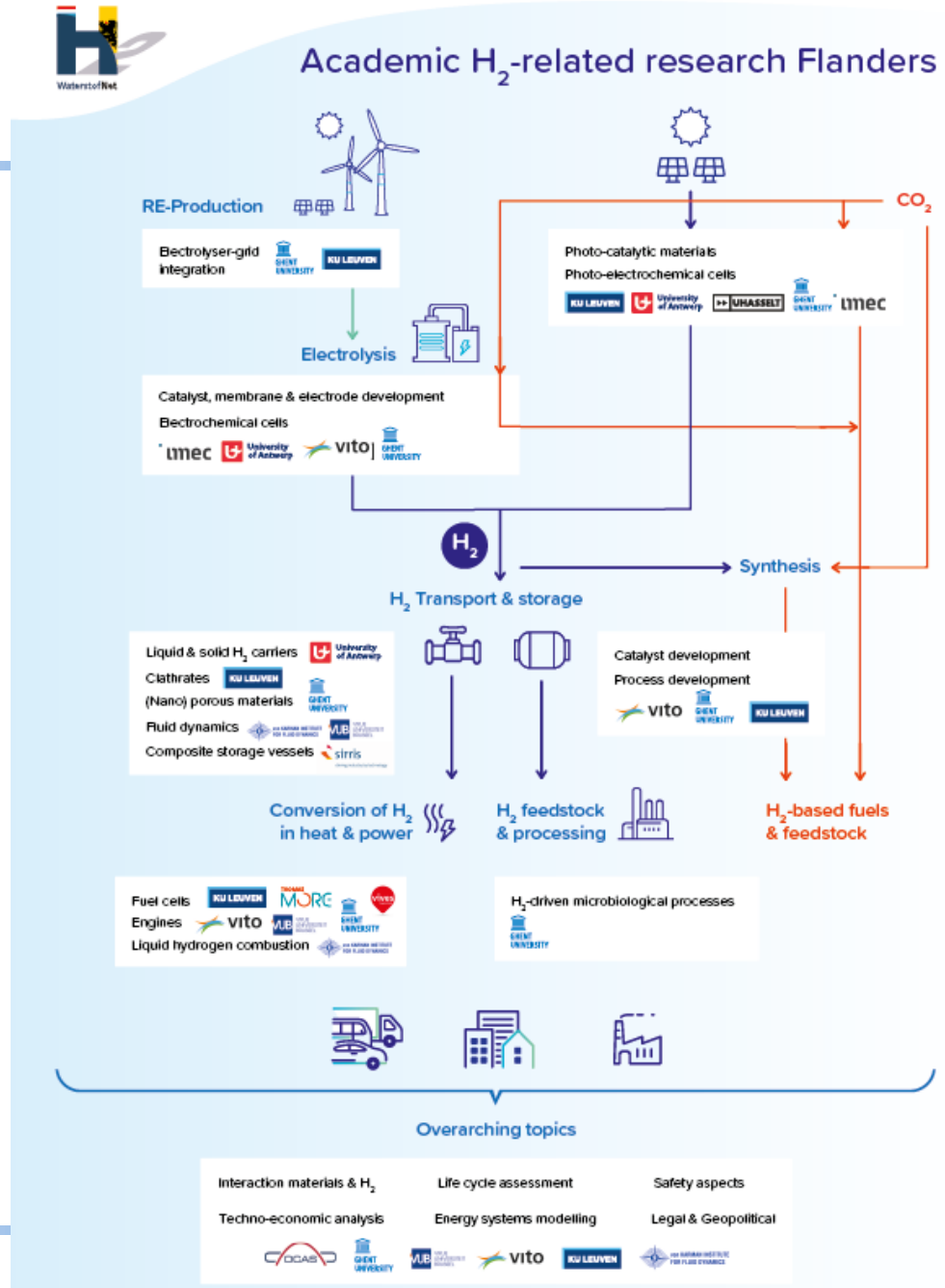
INVENTORY H2 RESEARCH FLANDERS

- Research groups in Flanders active on H2 related topics

- Per research group:
  - General expertise
  - Specific hydrogen activities
  - Main relevant publications
  - Projects FL/B/EU in partnerships
  - Available equipment & tools

- Kick-off (14/10) & Matchmaking (9/11)
  - Big gap between academic research and interests industry

- Follow-up
  - Last update catalog will be sent to all cluster members
  - Call for further 1 on 1 matchmaking



NEWS FROM EU

Clean Hydrogen Partnership launched on Nov 29 (Hydrogen Week)

- Takes over all the activities of the existing Fuel Cell and Hydrogen Joint Undertaking (FCH JU)
- Partnership aims to bring together the European Commission, the hydrogen industry, researchers and innovators as well as policy-makers from the Member States.

Green Deal being rolled out

- Fit for 55 package
- Clean hydrogen and decarbonised gas market package

GREEN DEAL ROLL-OUT

Fit for 55

Proposal presented by European Commission

Highlights:
https://www.hydrogeneurope.eu/wp-content/uploads/2021/11/Hydrogen-Europe-Position-Paper-on-the-Fit-for-55-Package.pdf

14/07/2021

Fit for 55 review and ammendments

-Public consultation (completed) through the "have your say" website

-Proposals Fit for 55 now under revision by the parliament and the council

Hydrogen & decarbonised gas market package

Proposal to be presented by European Commission

Expected: 14/12/2021

Gedelegeerde handeling RED artikel 27.3 m.b.t.het gebruik van groene netstroom voor de productie van waterstof

EU FUNDING

- Innovation Fund: large-scale (Funding & tenders (europa.eu))
  - Intended for demonstration of innovative low-carbon technologies of more than €7,5 million CAPEX.
  - The funds set aside for this call are € 1,5 billion for grants and € 2 million for the project development assistance (PDA).
  - The submission **deadline is 3 March 2022**

- The Alternative Fuels Infrastructure Facility (AFIF) under the Connecting Europe Facility (CEF) (2021 CEF Transport call for proposals (europa.eu))
  - A variety of infrastructure projects can be funded, including hydrogen refuelling stations for a wide range of transport modes.
  - €1.5 billion in EU grants available by the end of 2023 for alternative fuels infrastructure along the TEN-T road network.
  - Five cut-off dates for the submission of proposals until end 2023. The **first cut-off date will be 19 January 2022.**

- The European Maritime, Fisheries and Aquaculture Fund (EMFAF) call (Funding & tenders (europa.eu))
  - The call includes a topic of EUR 1.87 million
  - The focus is on the Atlantic and seeking innovative multi-use integrated solutions to offshore renewable energy developments combined with other blue economy activities and/or with nature protection
  - The submission **deadline is on 12 January 2022**

- the CEF Energy call for Cross-border Renewable Energy Projects (CEF Energy Call)
  - Budget is EUR 1 million to fund
  - Focus is on preparatory studies to assist project promoters in selecting the best project concept and setting up the cooperation agreement.
  - The first call **is open until 1 February**
  - A second call will be published at the beginning of 2022 for projects to be selected for the Union list (the so called “status”).

FUNDING IN BELGIUM

- The Energy Transition Fund call, within the Belgian federal energy competences

In the context of energy transition, the powers of the federal state are presented and divided into three thematic axes:

- Thematic axis 1: renewable energy sources in the Belgian exclusive economic zone of the North Sea and biofuels
- Thematic axis 2: nuclear energy applications
- Thematic axis 3: security of supply and net balance

In this call for projects, preference is given to projects within **the thematic axes 1 and 3**.

The main characteristics of the projects are:

- The subsidy rate depends on the level of technological maturity. Fundamental research projects are funded at 100%.
- The public aid granted per project is a minimum of EUR 100 000 and a maximum of EUR 5 million (after application of the relevant aid rates).
- Maximum term of 3 years (This is an adjustment compared to previous calls, where this was 5 years!)

Detailed information about the call be found on the WEBSITE of FPS Energy via: Energietransitiefonds | FOD Economie (fgov.be)

The **deadline for the first step** in the procedure, a mandatory pre-proposal: **14 December 2021** via ETF.FTE@economie.fgov.be. This is a new step compared to previous calls!

The **deadline for submission of the full proposals is 18 January 2022** via ETF.FTE@economie.fgov.be.

UPCOMING EVENTS

- The WIC meetings in 2022
  - ❑ Feb3
  - ❑ May 12
  - ❑ Sept 8
  - ❑ Dec 1

- Webinars
  - ❑ To be planned → suggestions for the topics are welcome

- Meet & Greet
  - ❑ To be planned → participation is mandatory once you're registered ☺

- WIC conference (postponed from 22/11)
  - ❑ To be planned; second half March?