groen vermogen nl | Innovatiemotor van de groenewaterstofeconomie

Welkom op het evenement: ‘Laat Waterstof Werken’

GroenvermogenNL

groenvermogen nl | Innovatiemotor van de groenewaterstofeconomie

Programma van de dag

Tijd	Programma
09:30 – 10:00	Inloop en registratie
10:00 – 10:10	Korte introductie
10:10 – 11:20	VR-experience
11:20 – 11:35	Korte pauze
11:35 – 12:15	Keynote sprekers
12:15 – 13:00	Lunch
13:05 – 13:45	Paneldiscussie
13:50 – 14:40	Workshop ronde 1
14:40 – 15:00	Middagpauze & wisselmoment
15:00 – 15:50	Workshop ronde 2
15:55 – 16:30	Afronding plenair
16:30 – 17:30	Netwerkborrel

No (time to) waste

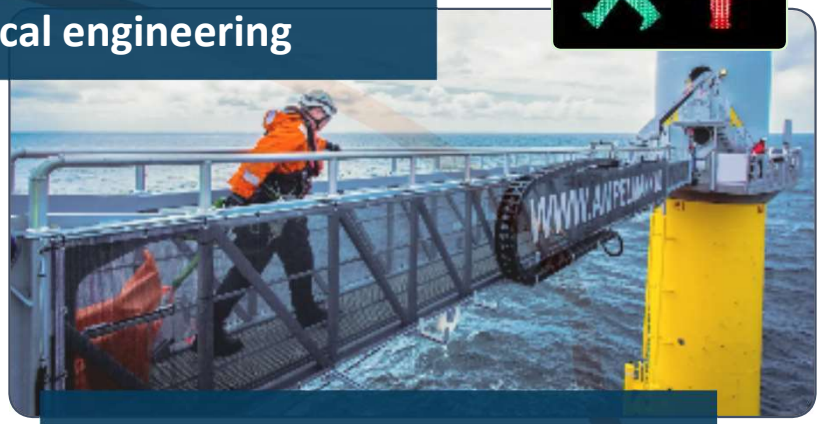
David Molenaar – Project Leider DOT

June 24, 2025

www.greenpeace.org/norway/nyheter/forbruk/dette-er-earth-overshoot-day/

Born in 1971

MSc in mechanical engineering



PhD in control engineering

ECHT
— human capital —

DOT
POSITIVE DISPLACEMENT

AMPELMANN

TKF

CALLIDUS

VLST
Van Leeuwen
Sleufloze Technieken

DOT
POSITIVE DISPLACEMENT

PLUMETT

TenneT

TATA STEEL

TU Delft

How to drive the transition towards a green hydrogen economy?

Building an adequate supply of well-trained professionals in the field of green hydrogen.

To drive the transition towards a green hydrogen economy, aside from technical innovations we also need to ensure that there is an adequate supply of professionals equipped with the requisite knowledge and skills. If innovations are to be rapidly transformed into practical skills and applications in the workplace, the education sector, businesses, government agencies and knowledge institutions must work together closely. GroenvermogenNL's Human Capital Agenda (HCA) is tackling this issue.

https://groenvermogennl.org/en/human-capital-agenda/

Green hydrogen economy will be fuelled by offshore wind

70 GW

2000

2025

2050

What can we learn from offshore wind?

- People are crucial for a successful transition and system transformation
- It takes courage to move from an individual to a collective (human capital) approach
- Investing in education & teach the teacher is a no brainer
- Apprenticeship positions are key
- Start today (as it takes 5-10 years) to see the results
- Dare to take a (baby) step! You will be rewarded and it's fun!
- Touch-the-turbine (asset-based learning) is not allowed: a missed opportunity

What can we learn from offshore wind?

Offshore wind - how did we get it so wrong?

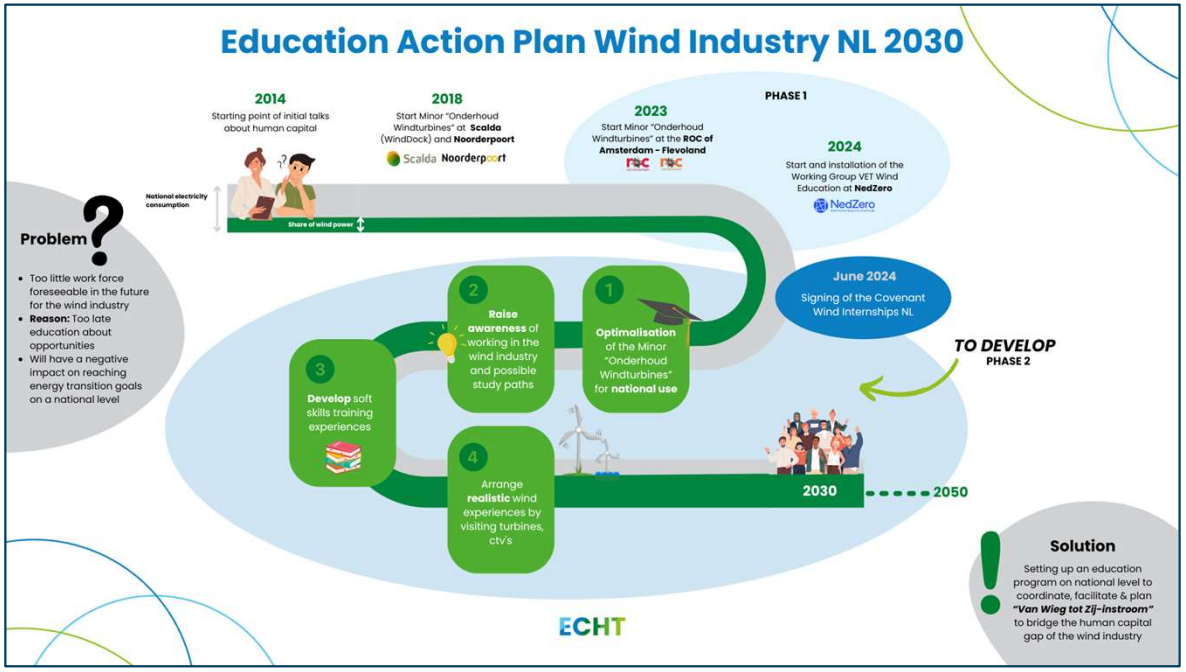
Andrew MackSeptember 11, 2017

What went wrong?

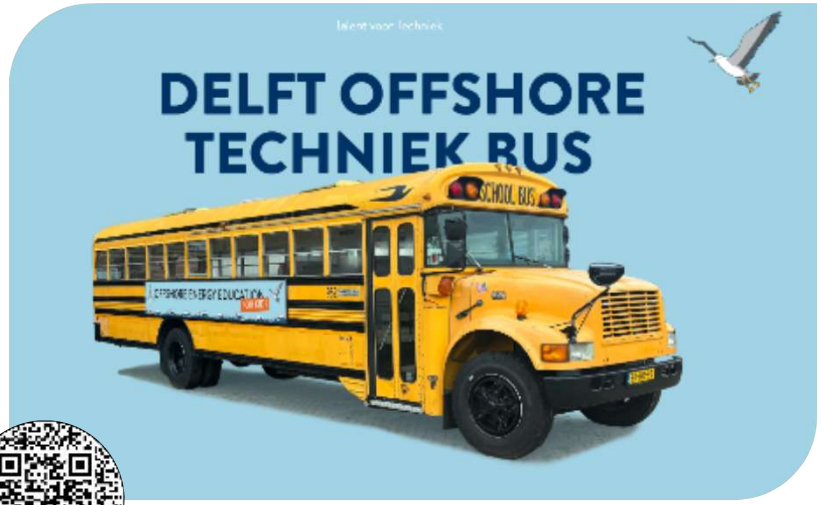
"I **underestimated** the degree of **dedication** from **people** in the industry **to bring down the cost** of offshore wind"

What can we learn from offshore wind?

- People are crucial for a successful transition and system transformation
- It takes courage to move from an individual to a collective (human capital) approach
- Investing in education & teach the teacher is a no brainer
- Apprenticeship positions are key
- Start today (as it takes 5-10 years) to see the results
- Dare to take a (baby) step! You will be rewarded and it's fun!
- Touch-the-turbine (asset-based learning) is not allowed: a missed opportunity



A baby step example: hop on the bus



Objective: visits schools, events to help and inspire teachers and kids / students

A baby step example: hop on the bus

June 13, 2025: Zeehavendagen, Amsterdam

Our asset: a 2.5 MW power hub

22 MEI 2025

Van offshore platform naar levend laboratorium op land

Angst om te delen is geen goede raadgever. ‘Zeker niet als het gaat om het versnellen van de transformatie van de Noordzee als bron van fossiele energie naar bron van groene energie. Dan is kennis verwerven, kennis delen en samen optrekken pure noodzaak’, zegt David Molenaar, projectleider bij DOT (Delft Offshore Turbine).

Our asset: a 2.5 MW power hub

We offer asset-based learning

Phynix is available for industry-wide learning

and

for (offshore) hydrogen learning
with
MBO/HBO/WO

Hands-on. Together

We offer asset-based learning

Phynix will:

- Be essential to provide operational learnings
- Boost the quality of the existing educational material
- Attract students and teachers by its visual appearance in Eemshaven

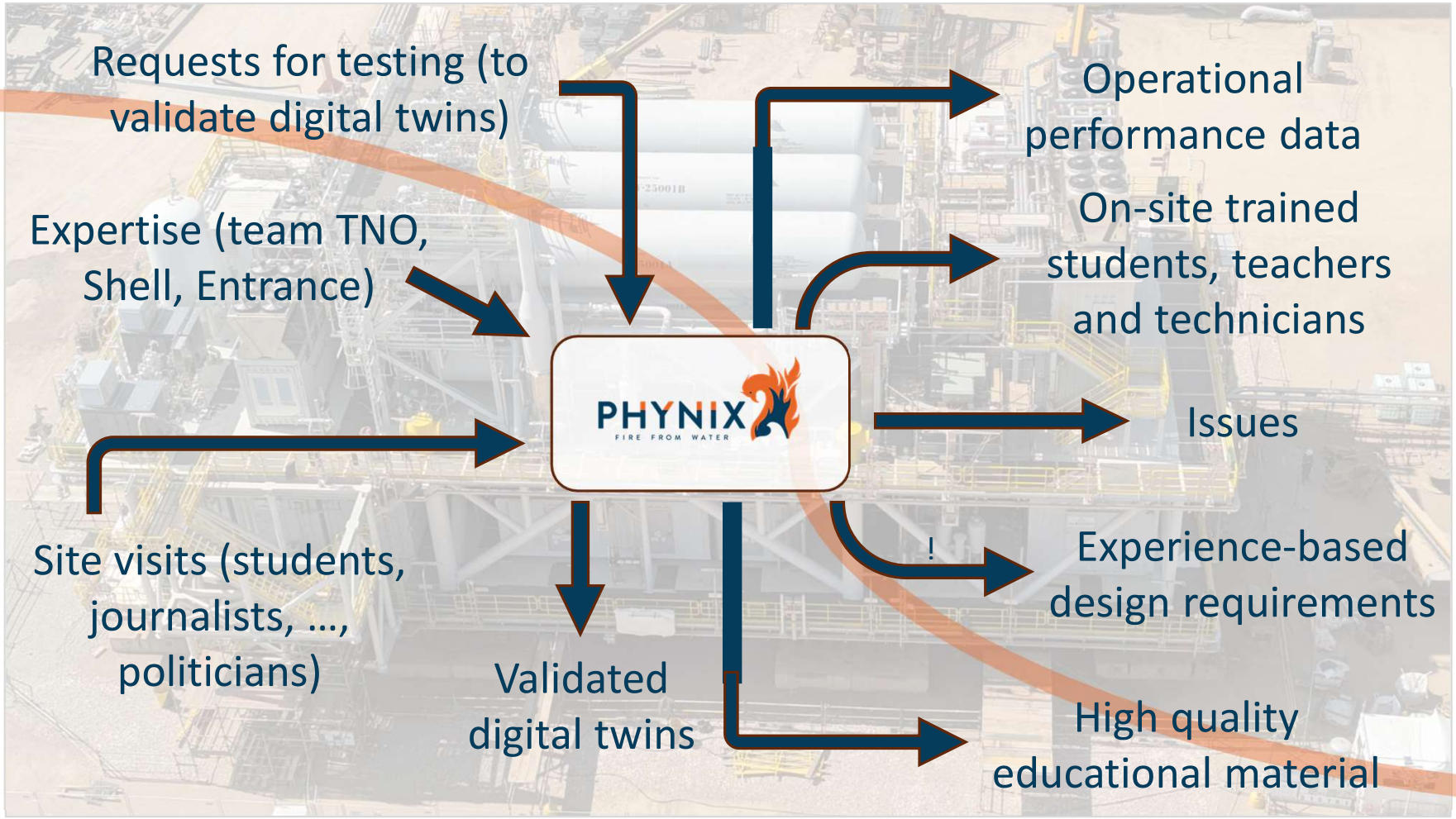
We hope that the successes of Hydrogen Value Campus Europe activities, EmmHy, the "Hydrohub MegaWatt Testcenter, Energy Hub 050 and Phynix" will enable and speed up the development and realization of sustainable energy and feedstock economy and with that completing the long wished and required "national endurance test facility" for this. We fully support DOT's DEI+ proposal and are looking forward to touch Phynix in Eemshaven and show to our students.

Sincerely,

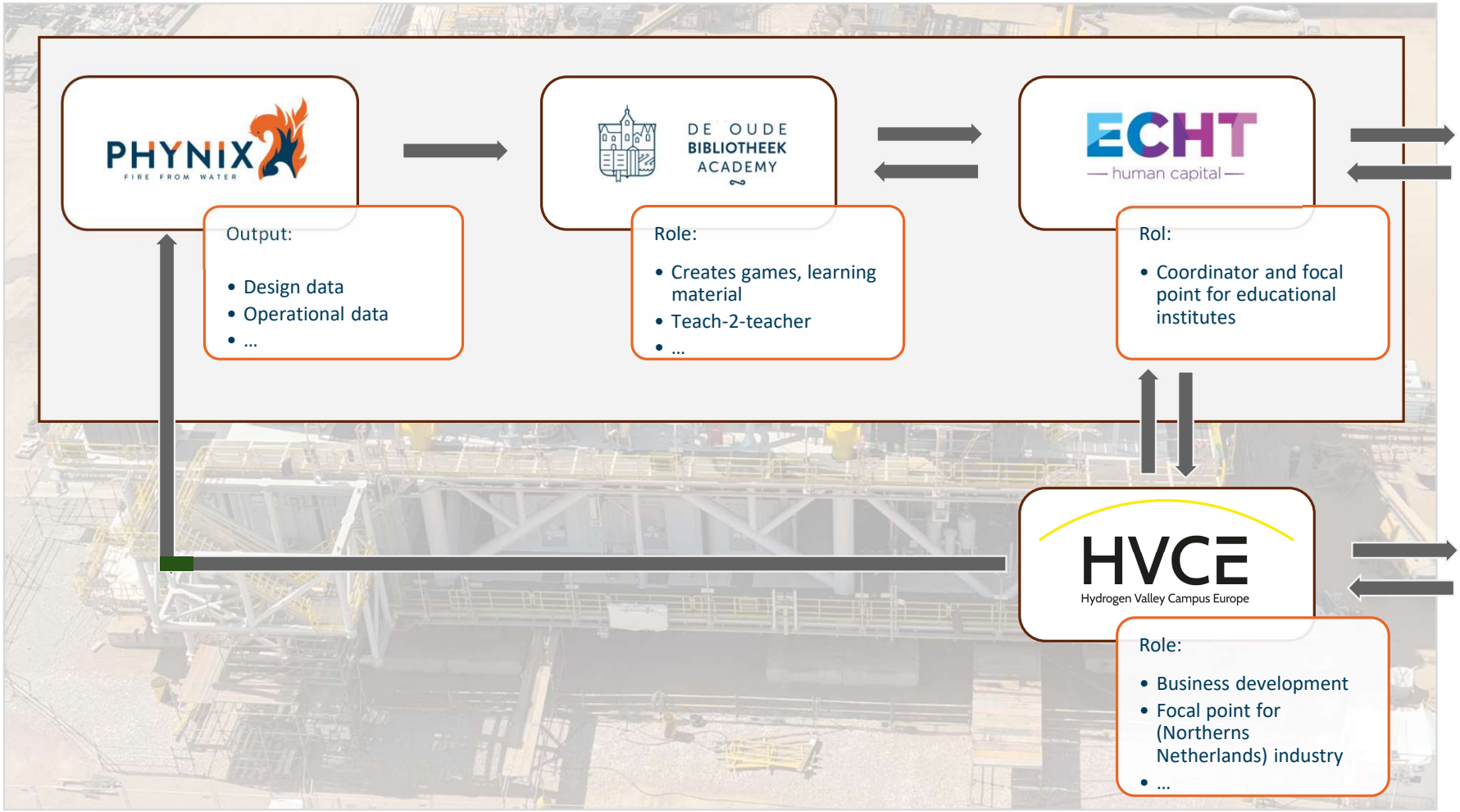
Marcel Koenis

Director Strategy & Development
ENTRANCE - Centre of Expertise Energy

We offer asset-based learning



We offer asset-based learning



And it paves the path towards a national endurance test facility

Hydrohub
Megawatt test center

2018: 2 x 250 kW

Phynix

2025: 2.5 MW

EmmHY

GroenvermogenNL and Shell to explore the development of an open innovation centre for electrolysers in Emmen (NL)

10 April 2025

202x: Multi MW component testing

Our partners

TNO innovation for life

HVCE
Hydrogen Valley Campus Europe

grow

HY NORTH

BUSS

ECHT
human capital

Letters of support

Delft Offshore Turbine B.V.
T.a.v. David Molenaar, Schieweg 15c
2627 AN DELFT

Sent via email

Delft Offshore Turbine B.V.
T.a.v. David Molenaar, Schieweg 15c
2627 AN DELFT

Dear sir or madam,

Educating for the Energy
As a regional vocational ed
students and professionals
sustainable energy sources
skilled, future-ready workfo
this context, we consider th
contributes significantly to t

Phynix as a Learning Env
Phynix offers a unique field
testing environments for ba
educational activities. This
valuable opportunities for st
industry-relevant experienc

Our Intent to Collaborate
Scalda hereby expresses it
potential future collaboratio
internships, site visits, profe
battery - related themes into
explored in alignment with

Commitment to Shared K
We also support the Phynix
sharing of developed trainin
the Netherlands and enable
coordinated national effort.

Looking Ahead
We look forward to a constr
stakeholders. Through this
preparedness of our studen
and inclusive energy transit

Kind regards,

Gerben Huiszoon MSc.

Practor Energie in de Delta
Center of Vocational Excell
Scalda Maritiem, ICT en Te
Edisonweg 4a, 4382 NW Vl

Delft Offshore Turbine B.V.
Raam 180
2611 WP Delft

Buss Terminal Eemshaven B.V.
Westlob 10
9979 XJ Eemshaven

Phone: +31 596 516330
info@buss-group.com
www.buss-terminal-eemshaven.com

Ls, Eemshaven, June 16th 2025

Buss operates Buss Terminal Eemshaven (BTE) located directly at the estuary of the Ems River. Our specialized equipment (such as reach stackers, heavy-duty cranes, and SPMTs) and direct access to the open sea make it the ideal interface for offshore logistics. Our key focus is on services for the energy industry, and we are a popular base port for offshore wind projects. Over the past years we have already handled ten large-scale offshore projects.
We have finished the expansion of our terminal area and heavy-duty quay side access. The expansion incorporates the addition of about 15-hectares of heavy-duty storage area and 200 m quayside connecting to the Beatrixhaven. This investment enables us to further enhance our role as a sustainable energy hub in the North Sea and create new opportunities for businesses and employment. Currently, we have started with the expansion of our local grid to allow for shore power connections to decarbonize port calls as well as to reduce local emissions. We also prepare ourselves to be able to charge batteries for electric ship operations.
We welcome Phynix (and the DOT team) to our terminal premises and have arranged a fenced area such that DOT can safely access the location without disturbing our operations and vice versa. We are in close dialogue with DOT to combine our grid expansion with their power needs. We are convinced that the presence of Phynix will create new business opportunities, can accelerate energy storage innovation across the industry and will kickstart the hydrogen economy in the Northern region.
We especially value DOT's pragmatic approach and dedication to bring Phynix to Eemshaven and ambition to inspire young people to be part of energy system transformation. We fully support their DEI+ application and will support DOT to make it happen.

Met vriendelijke groet, with kind regards, Mit freundlichen Grüßen,

Haave Paul Ravensbergen

Operations manager

Buss Terminal Eemshaven B.V.
Westlob 10
9979 XJ Eemshaven | Harbour nr. 8480
Tel.: +31 596 516 330
Mobile: +31 6 55 345 105
h.ravensbergen@buss-terminal-eemshaven.com
www.buss-terminal-eemshaven.com

stablished as a carve-out of Copenhagen Infras
company within renewable energy. CEI is an inde
itutional investors. CEI is dedicated to early-stag
are large-scale offshore installations which will e
offshore wind deployment globally.

to lead, which allows us to create value and l
nunities, and our strategic partners from Asia Pac
our people, their expertise and agility.

go first and fast to lead with a team of driven pe
ersion of the Energy Hub use case and a stepp
plementing an Energy Hub-concept in the by co
nix learnings to underpin a robust concept se
ıy forward for the Demo-1 development.

ıam how such concepts can be integrated into
perspective. We look forward to engaging with th

To whom it may concern,

We believe that the Northern Netherlands
hydrogen ecosystem. Eemshaven has be
Netherlands and delivers about one-third c
strongly advocates the production of gree
meet the industrial demand for green hyd
the construction of electrolysers and hydr
the development of a thermoplastic compc

Growind BV
Elierweg 24
8256 PT Biddinghuizen

Bank
Triodos Bank : 1903.18.787
RvK Flevoland : 78095438
BTW nummer : NL 8161.55.161.B01

Delft Offshore Turbine B.V.
T.a.v. David Molenaar, Schieweg 15c
2627 AN DELFT

Dear sir or madam,

Educating for the Energy Transition
As a regional centre for vocational education, ROC van Amsterdam – Flevoland is strongly committed to preparing students and professionals with the practical and skills-based qualifications needed for the energy transition. The shift from fossil fuels to sustainable energy is both a technical and human capital challenge. It demands a skilled and adaptable workforce capable of driving and implementing innovation. We view the Phynix project in Eemshaven as a valuable and timely initiative that contributes meaningfully to this mission.

Phynix as a Learning Environment
The combination of applied research and workforce development makes Phynix a unique field lab. The facility provides real-life testing environments for both battery and hydrogen technologies, which can be directly linked to educational and training activities. This hands-on, practice-oriented approach fits seamlessly with our educational philosophy. It allows students and teaching staff to engage with cutting-edge technologies, gain relevant industry insights, and develop practical skills that are highly in demand.

Our Intent to Collaborate
ROC van Amsterdam – Flevoland hereby expresses its intention to collaborate with the Phynix project. We strongly believe in partnerships between education, industry, and government. In this spirit, we are open to exploring opportunities to contribute to the development of training content and the integration of hydrogen-related themes into relevant educational programs.

Open Sharing of Educational Materials
We fully support the Phynix consortium's commitment to open collaboration and the national sharing of developed training materials. This approach ensures that other schools and training providers across the Netherlands can benefit from the results and create their own hydrogen-related programs. By openly sharing knowledge and resources, we collectively accelerate the development of a national skills base for the hydrogen economy.

Looking Ahead
We look forward to a constructive and inspiring collaboration with the Phynix team and project partners. Together, we aim to strengthen the link between innovation and education, prepare students for the jobs of the future, and contribute to a resilient and inclusive energy transition.

I. v. Oosterhout

16 juni 2025

ibsi
he l

itia
g e
har

ion
ect.

DOT (Delft Offshore Turbine)
Workshop
Schieweg 15c
2627 AN Delft
The Netherlands

Utrecht, 19 June 2025

To whom it may concern,

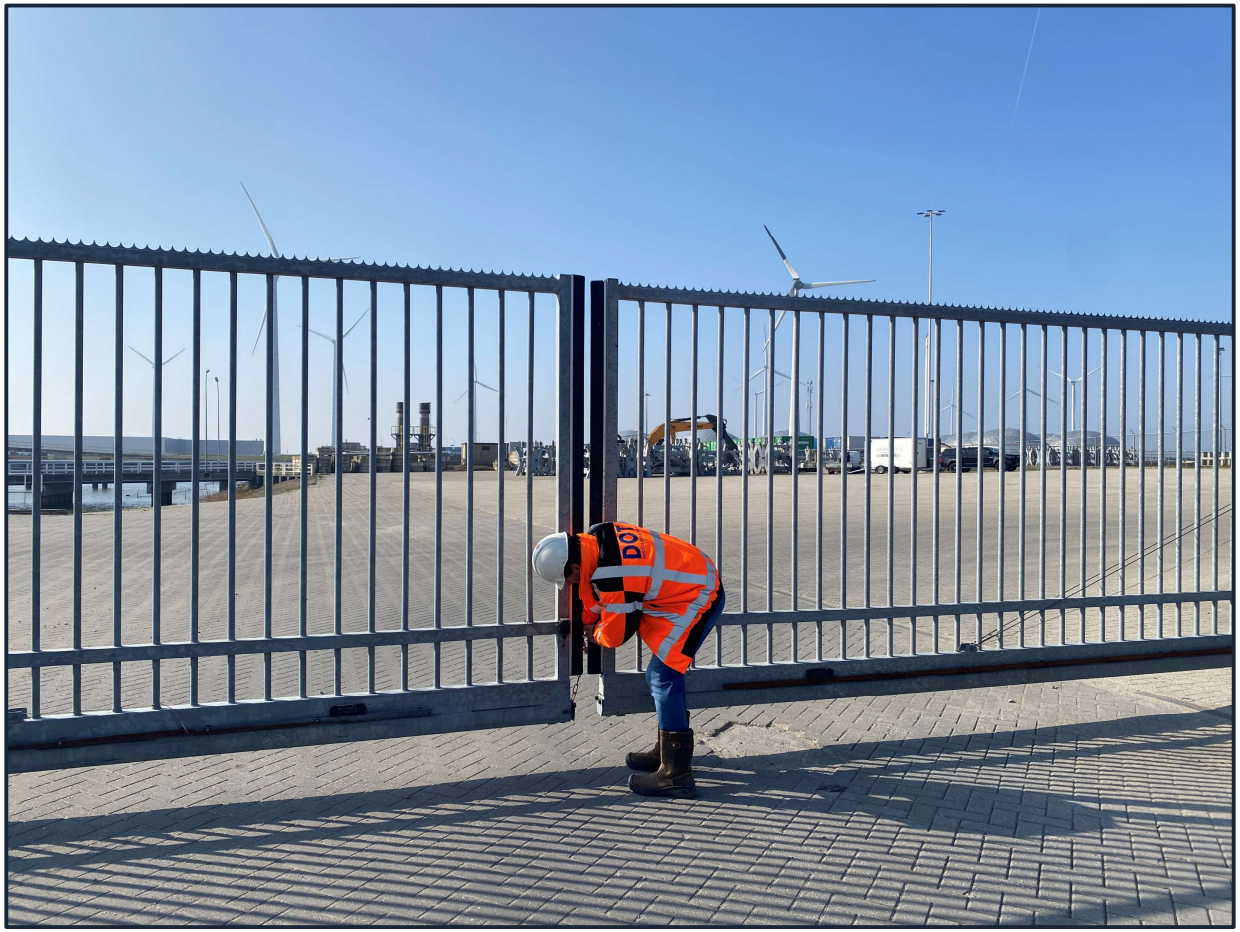
This letter is in support of DOT for their DEI+ application, which is pertaining to the "Base Load Power Hub", or "Phynix" project in Eemshaven.

Green hydrogen is a fundamental component of RWE's investment strategy, "Growing Green". With our "Growing Green" investment and growth strategy, which was launched in 2021, we are driving forward the transformation of RWE. In the coming years, we are investing billions of euros worldwide in expanding our generation portfolio, in particular in offshore and onshore wind, solar energy, storage technologies, flexible generation and hydrogen projects. This portfolio will be perfectly complemented by global energy trading. In Germany, RWE is planning to build an electrolysis capacity of 300 megawatts (MW) on the site of the Emsland gas-fired power plant in three expansion stages by 2027. The first 100 MW of electrolysis capacity is scheduled to go into operation in 2025. In summer 2024, RWE commissioned a 14-megawatt electrolysis plant in the same location. RWE intends to use the demonstration plant to gather valuable experience for the operation of future large-scale plants. In the Netherlands, too, RWE has developed a diversified project portfolio which includes Eemshydrogen and OranjeWind in the north of the Netherlands. There is much to learn from innovative projects like OranjeWind. During the development of the wind park, the program "OranjeWind Knowledge" has been started, which has as a goal to generate and share knowledge to speed up the energy transition, in close collaboration with TNO and Dutch universities. Generated insights will be made publicly available to research and education facilities, government and the market. Additionally, active collaborations are pursued with educational institutions of all levels in The Netherlands.

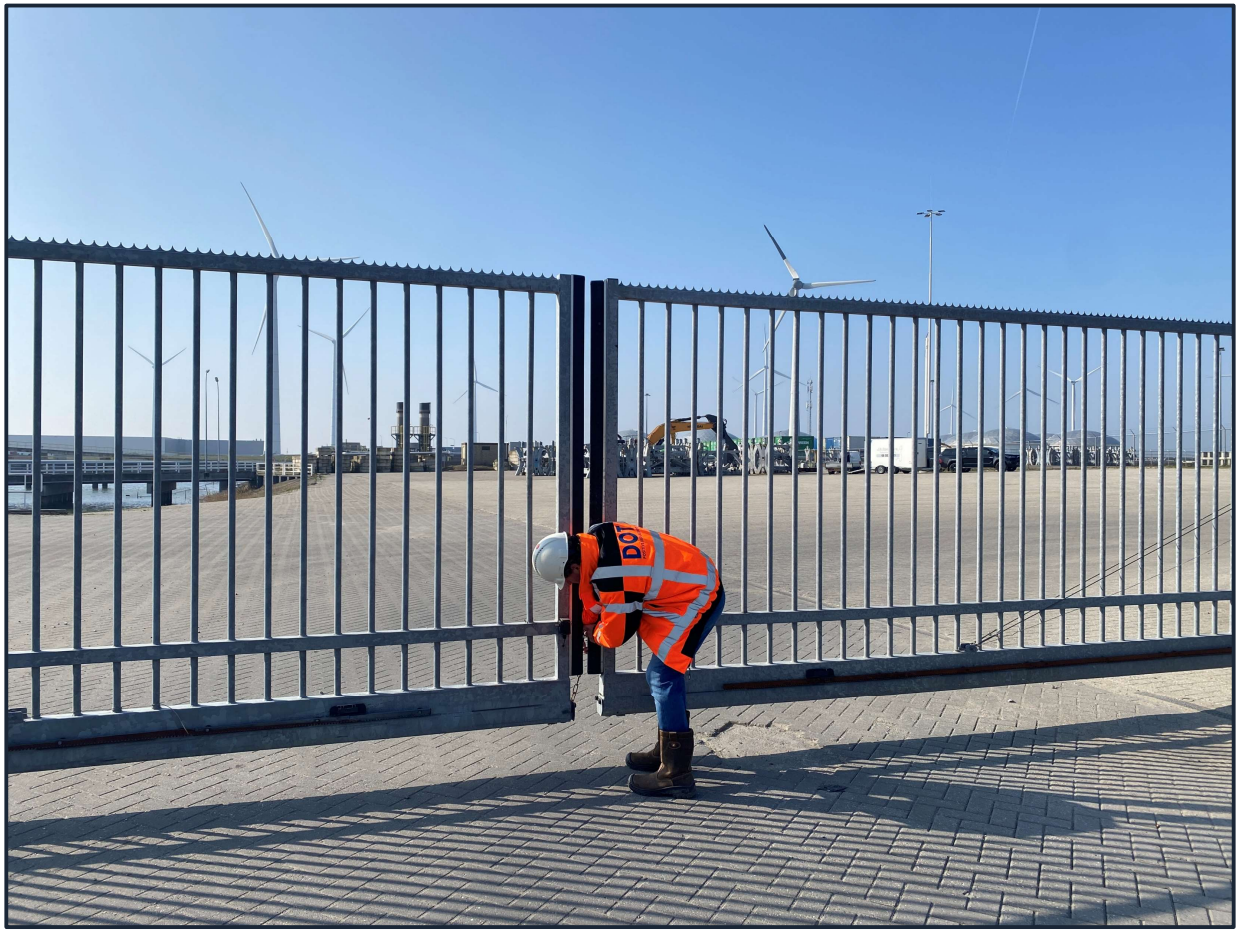
Sincerely,

Marcel Koenis
Director Strategy & Development
ENTRANCE - Centre of Expertise Energy
Hanze University of Applied Science Groningen

We have the key to unlock the gate …



… do you want to help / support us?



Yes, I do!
Let’s convert  hydrogen

DOT

POSITIVE DISPLACEMENT

Connect

HOLTHAUSEN
CLEAN TECHNOLOGY

HOLTHAUSEN
GASSEN

HOLTHAUSEN
ENERGY POINTS

Holthausen Clean Technology

Holthausen Energy Points

Holthausen Gassen

Aldwin Oechies: Algemeen Manager Energy Points

Onze pioniers Missie: Zero emission

HOLTHAUSEN
GASSEN

HOLTHAUSEN
ENERGY POINTS

HOLTHAUSEN
CLEAN TECHNOLOGY

Missie: Waterstof als energiemolecuul in 2025 en volgende jaren toepasbaar en inzetbaar maken.

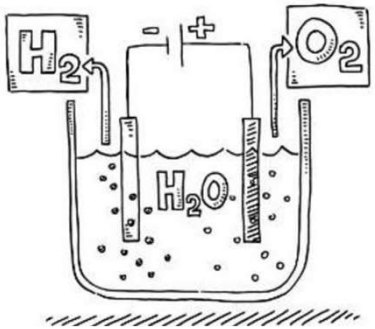
Hiermee:
Kennis delen en de maatschappelijke acceptatie bevorderen.
Om naast alle andere duurzame oplossingen waterstof in te zetten!

Dit om de uitstoot waar mogelijk te verminderen en fossiel sneller af te kunnen bouwen.

Centraal:

Electrolyser en Brandstofcel.

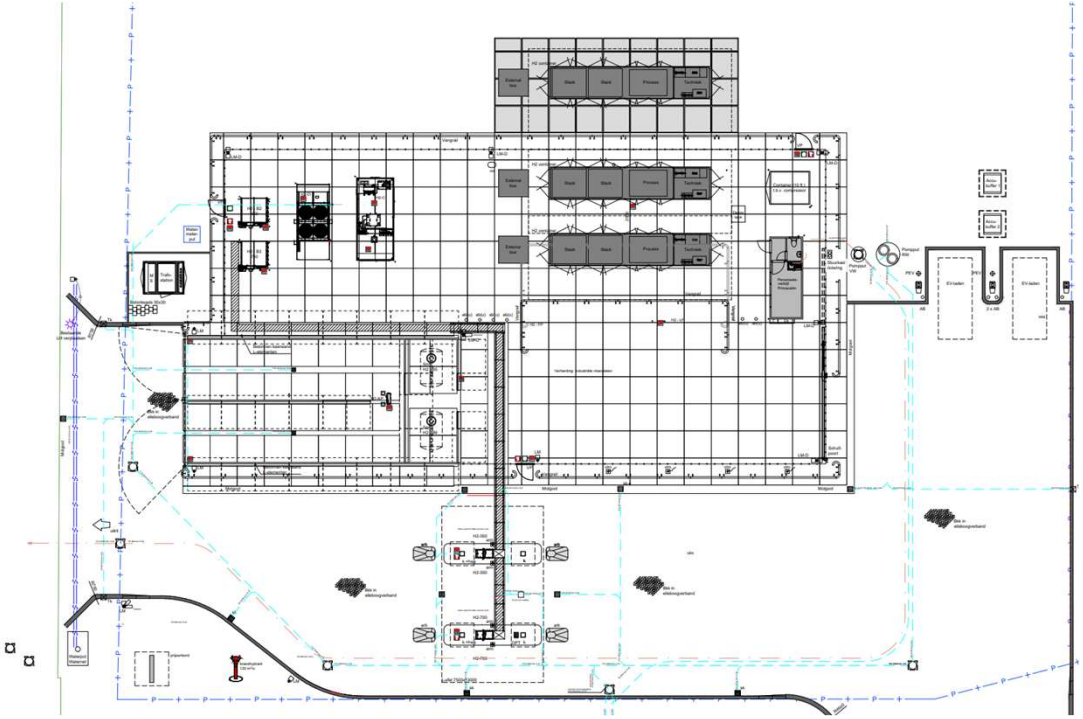
Wat is elektrolyse?

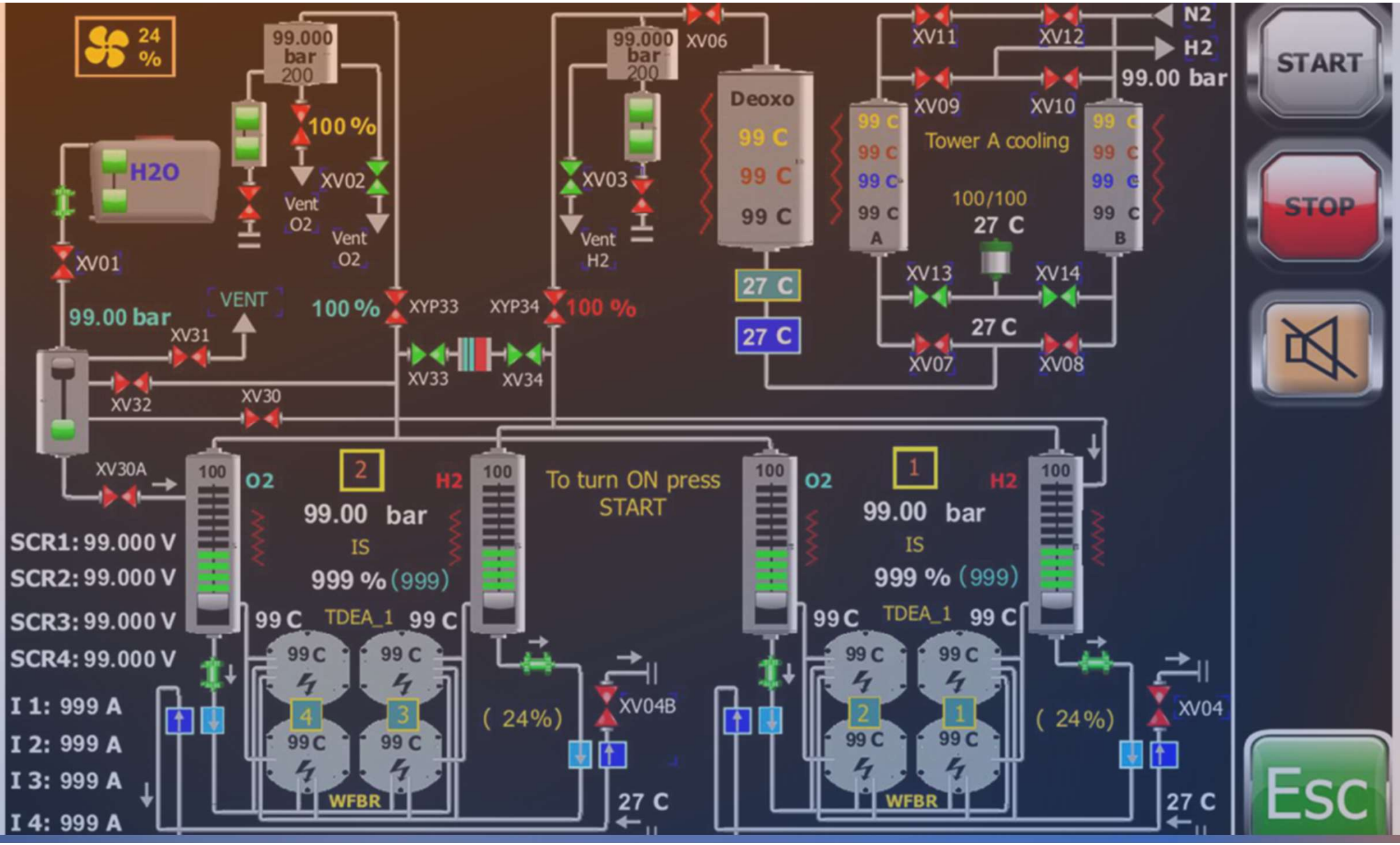


En wat is een elektrolyser?

Beiraweg 3A Amsterdam 2025

2.5MW geeft 800kg H2 per dag!

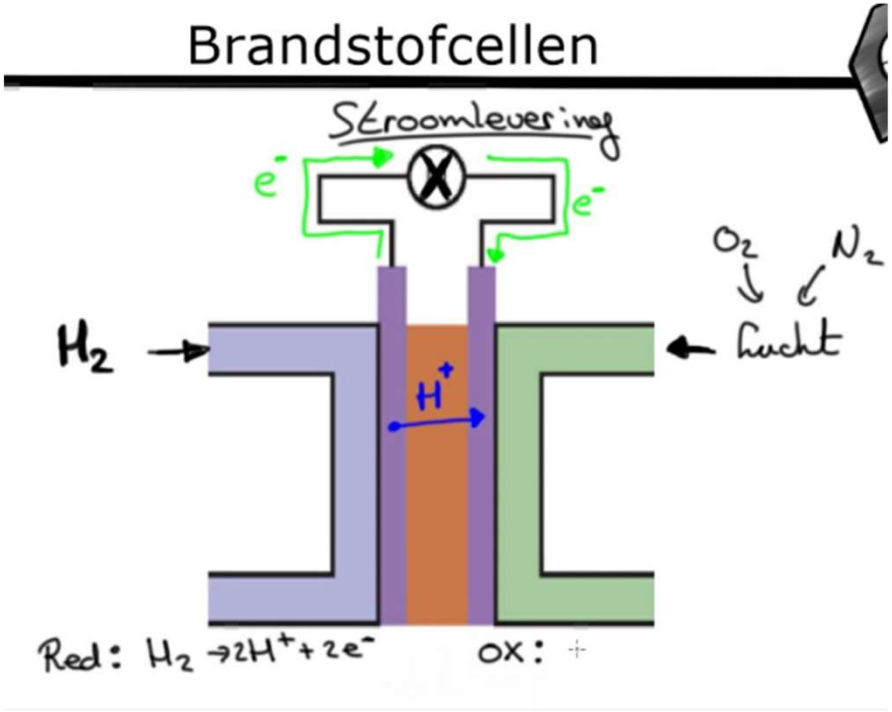


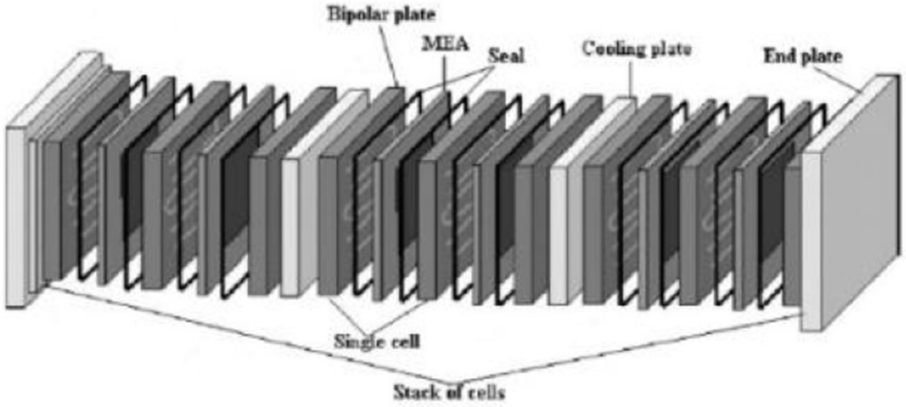

24 %
99.000 bar 200
100 %
XV02
Vent O2
Vent O2
H2O
XV01
VENT
99.00 bar
XV31
XV32
XV30
XV30A
100 %
XYP33
XYP34
100 %
XV33
XV34
99.000 bar 200
XV06
XV03
Vent H2
Deoxo
99 C
99 C
99 C
27 C
27 C
XV11
XV12
N2
H2
99.00 bar
XV09
XV10
Tower A cooling
99 C
99 C
99 C
99 C
A
100/100
27 C
99 C
99 C
99 C
99 C
B
XV13
XV14
27 C
XV07
XV08
START
STOP
Esc
100
O2
2
H2
100
99.00 bar
IS
999 % (999)
99 C
TDEA_1
99 C
To turn ON press START
100
O2
1
H2
100
99.00 bar
IS
999 % (999)
99 C
TDEA_1
99 C
SCR1: 99.000 V
SCR2: 99.000 V
SCR3: 99.000 V
SCR4: 99.000 V
I 1: 999 A
I 2: 999 A
I 3: 999 A
I 4: 999 A
99 C
99 C
4
3
99 C
99 C
WFBR
(24%)
XV04B
27 C
99 C
99 C
2
1
99 C
99 C
WFBR
(24%)
XV04
27 C

De eigen produktie van groene waterstof met eigen electrolyser plaatsing in Amsterdam 2,5MW en plaatsing Groningen 2,5MW.

Met als doel:

- **Leveren van groene waterstof met tubetrailer of pakketten bij eindgebruikers in Noord Nederland en regio Amsterdam voor industrie of H2 generatoren.**
- **H2 Tanken in Groningen 350 en 700 bar aan de Bornholmstraat 35 Groningen.**
- **H2 Tanken in Amsterdam 350 en 700 bar aan de Beiraweg 3a Amsterdam.**

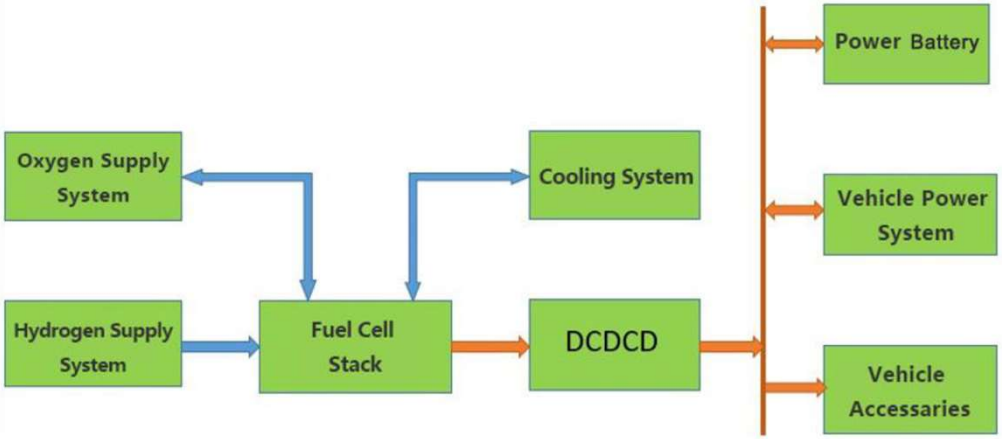




Wat is een brandstofcel?

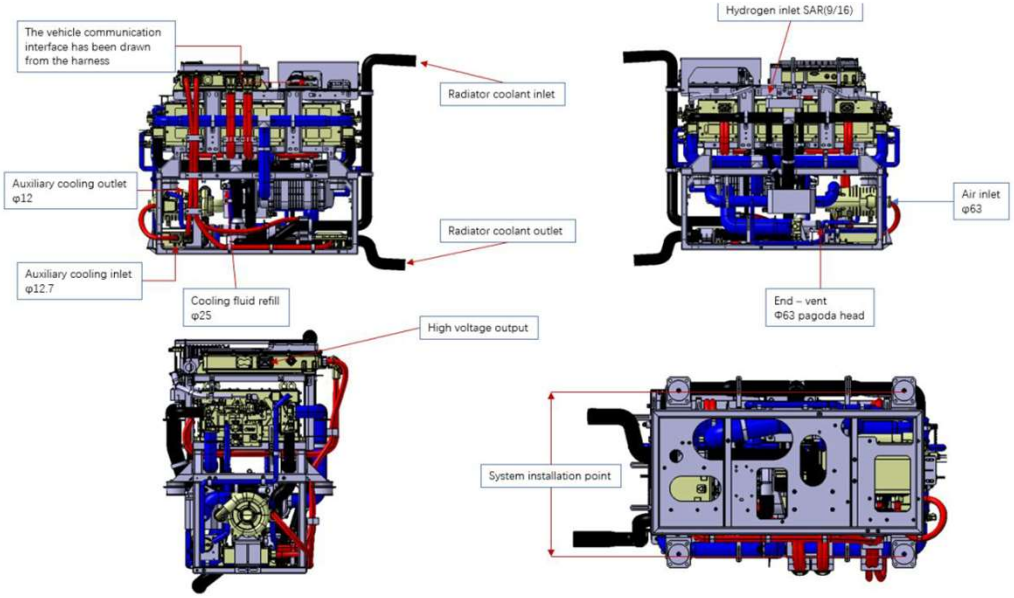
Balance off plant

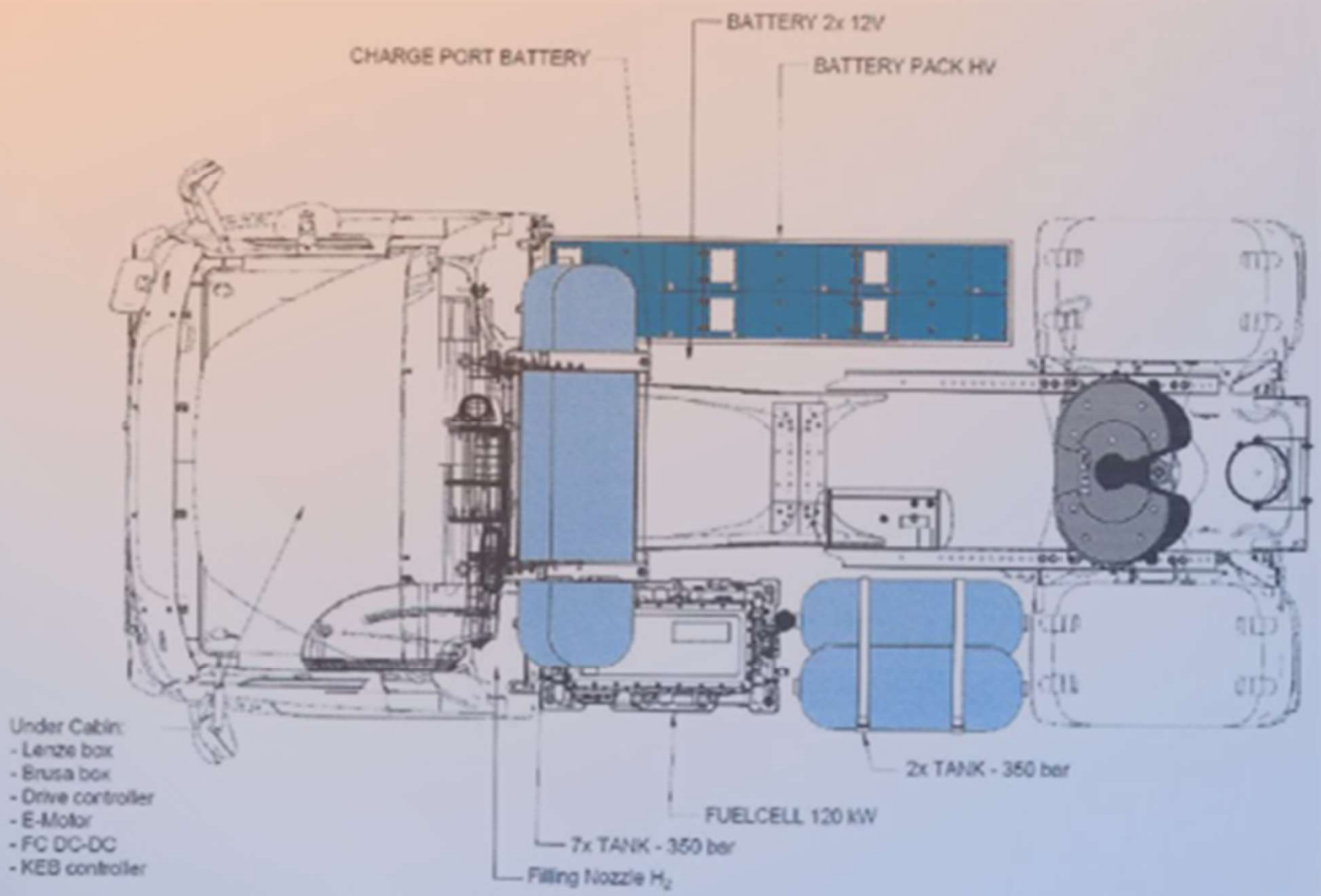
Integratie in voertuig of machine

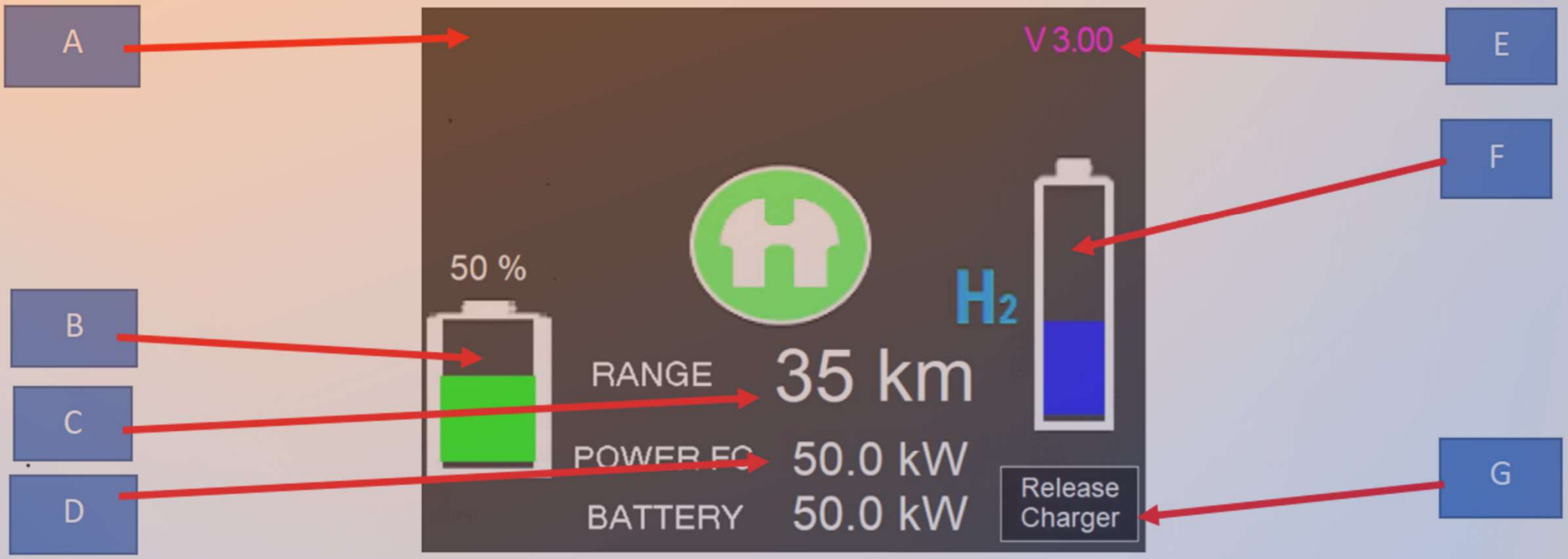


Brandstofcell systemen

10kW, 40kW, 80 kW, 120 kW en 200kW




CHARGE PORT BATTERY
BATTERY 2x 12V
BATTERY PACK HV
Under Cabin:
- Lenze box
- Brusa box
- Drive controller
- E-Motor
- FC DC-DC
- KEB controller
2x TANK - 350 bar
FUELCELL 120 kW
7x TANK - 350 bar
Filling Nozzle H_2



A. Statusbalk zie Pictogrambalk

B. De Laadtoestand (SOC) van de batterij, in procentuele waarde

C. Theoretisch bereik op waterstof (batterijbereik niet inbegrepen)

D. Werkelijk vermogen van de brandstofcel

E. Pictogrambalk 2 zie Pictogrambalk

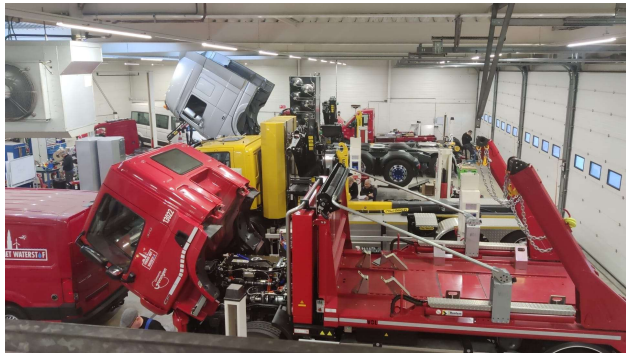
VERDER MET WATERSTOF

HOLTHAUSEN
CLEAN TECHNOLOGY

Project Gemeente Groningen tot en met 2025.

HOLTHAUSEN
CLEAN TECHNOLOGY

Ontwikkeling van aandrijflijn technologie speciale vrachtwagens.



HOLTHAUSEN
CLEAN TECHNOLOGY

Engineering van Fuel cellen electrolyser technologie.

Vragen?

HOLTHAUSEN
CLEAN TECHNOLOGY

Namens Holthausen uit Hoogezand.

Aldwin Oechies

groen vermogen nl | Innovatiemotor van de groenewaterstofeconomie

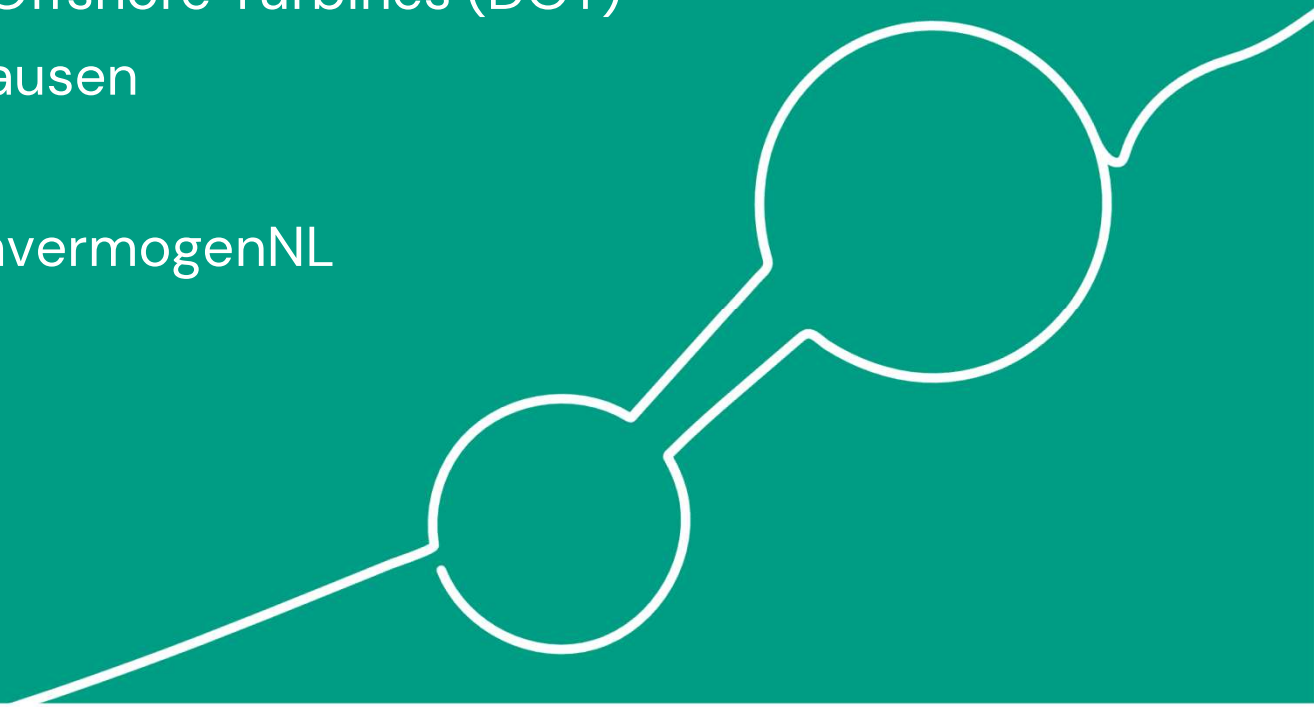
Lunch break

We zien jullie graag om **13:00** terug in de plenaire zaal!

groen vermogen nl | Innovatiemotor van de groenewaterstofeconomie

Paneldiscussie

David Molenaar	Delft Offshore Turbines (DOT)
Aldwin Oechies	Holthausen
Dave Beijer	CHILL
Marsha Wagner	GroenvermogenNL



AGENCY

Wat kan jij nu al concreet doen vanuit jouw rol?

INTENTION

Wat voel je dat er aankomt/wat nodig is om de waterstoftransitie succesvol te laten zijn?

1

42 / 49

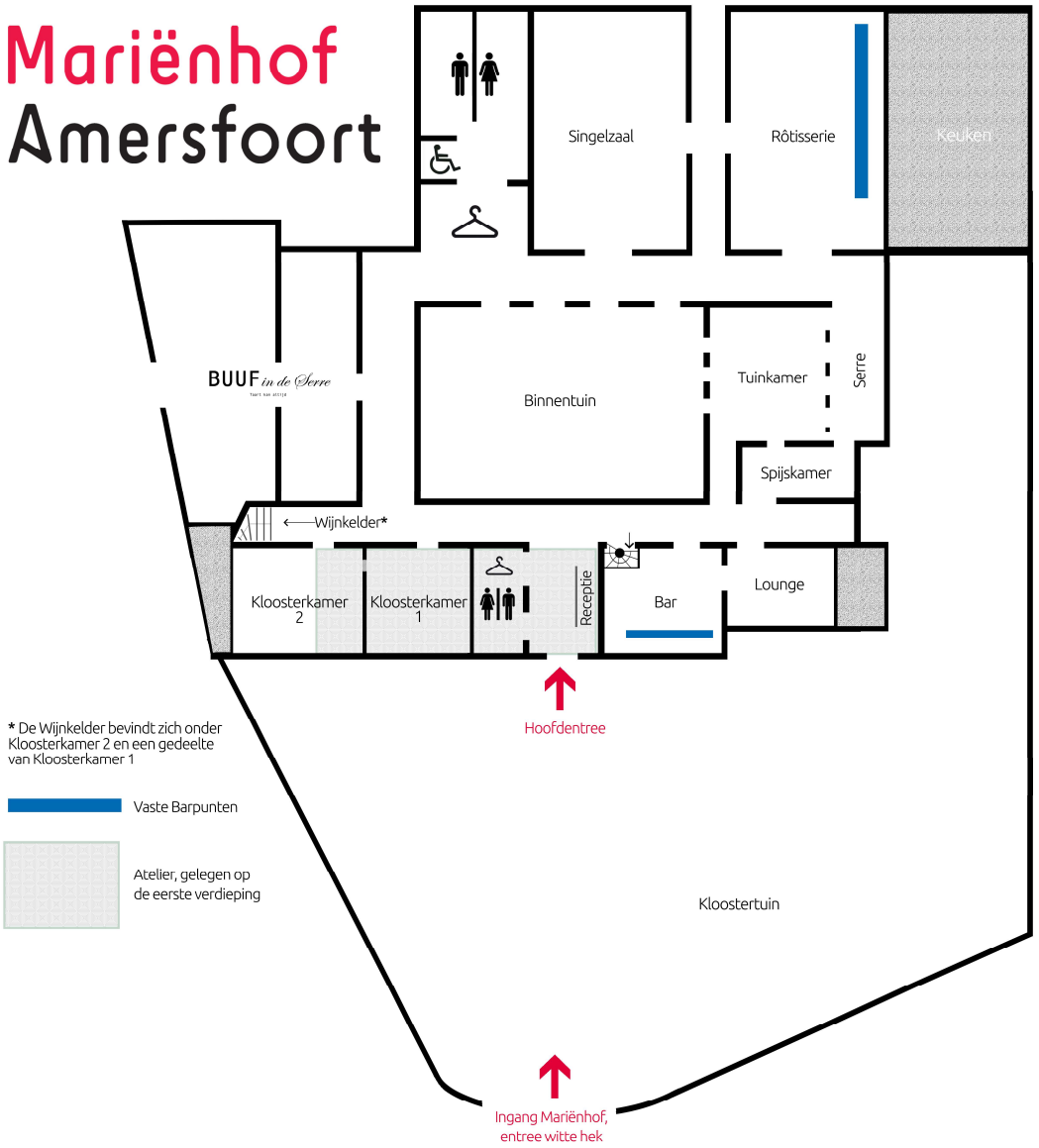
Vervolg dagprogramma

Tijd	Programma
13:50 – 14:40	Workshop ronde 1
14:40 – 15:00	Middagpauze & wisselmoment
15:00 – 15:50	Workshop ronde 2
15:55 – 16:30	Afronding plenair
16:30 – 17:30	Netwerkborrel

Workshop rondes (1 & 2)

Workshop #	Titel workshop	Kamer
Workshop 1	Skills & kwaliteitsframework MHW	Tuinkamer
Workshop 2	Versnel de energietransitie in jouw regio met Make Hydrogen Work	Kloosterkamer 2
Workshop 3	Jongeren enthousiasmeren voor een toekomst in de energietransitie	Bar & Lounge
Workshop 4	Arbeidsmatchplatform: samen meer mensen op basis van skills	Kloosterkamer 1
Workshop 5	CHILL: zo werkt een succesvolle regionale PPS in de praktijk	Singelzaal

Mariënhof
Amersfoort



groenvermogen nl | Innovatiemotor van de groenewaterstofeconomie

Workshop rondes

Ronde 1

→ 13:50 – 14:40

Middagpauze & wisselmoment

→ 14:40 – 15:00

Ronde 2

→ 15:00 – 15:50

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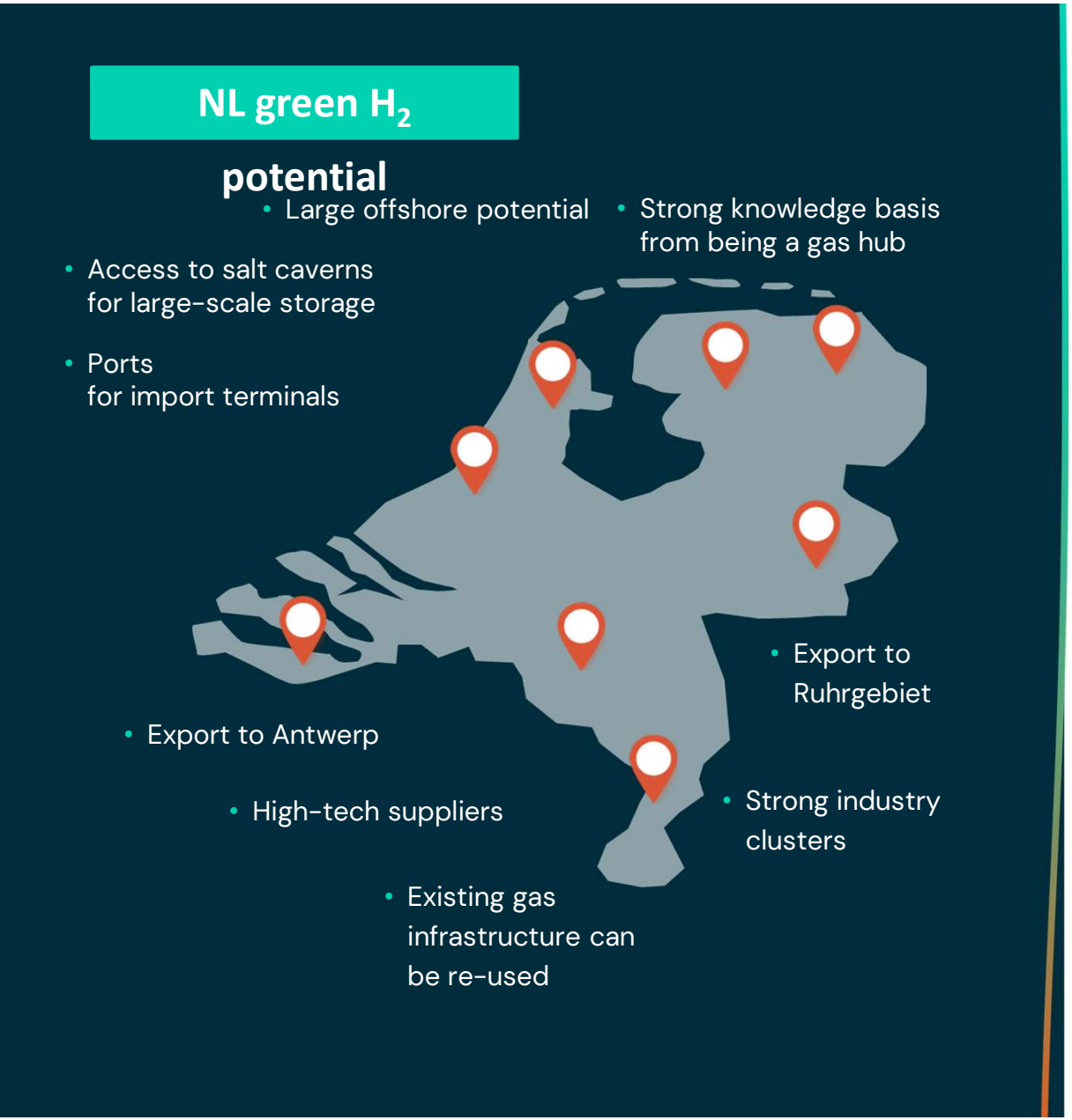
Zet Waterstof aan met Skills!

Marsha Wagner
Programmadirecteur Human Capital Agenda
24 juni 2025



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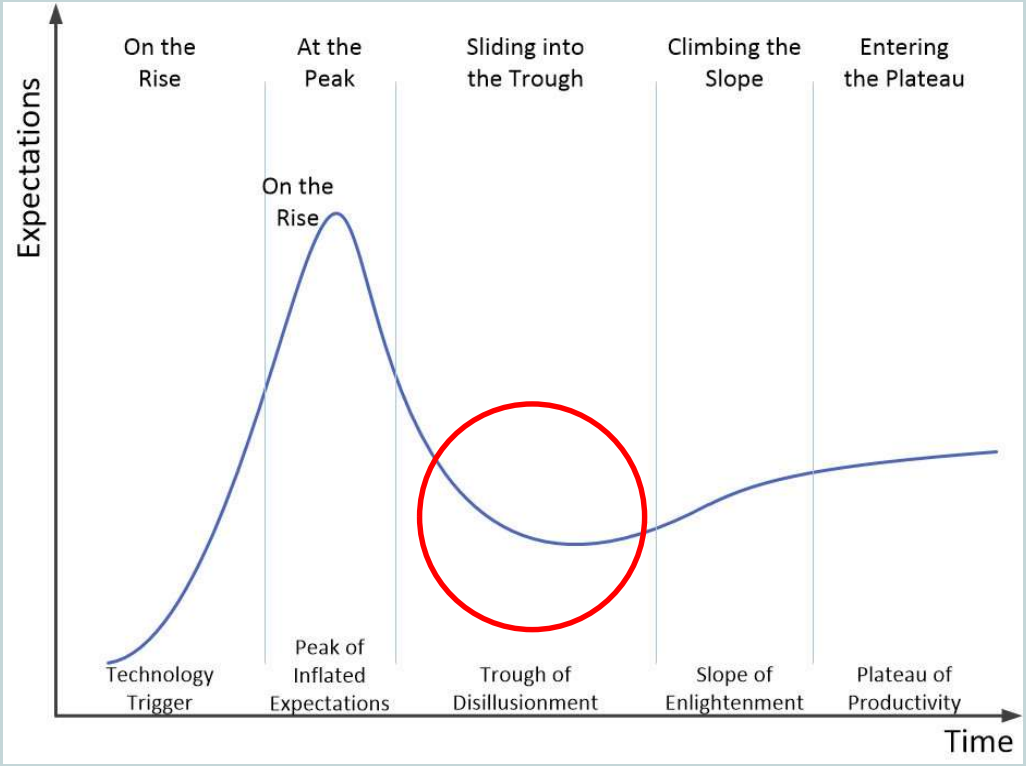
Kansrijk en geweldige uitgangspositie

1. **Fight climate change**
   achieve net-zero in 2050 by reducing greenhouse emissions in non-electrifiable applications using green H_2
2. **Boost earnings power**
   become a significant international player in the green H_2 & chemistry economy, unlocking potential of NL high-tech sector
3. **Retain key industries**
   within the Netherlands by facilitating their transition to net-zero in a sustainable way using green H_2 & chemistry
4. **Improve business climate and energy security**
   by creating national green H_2 production capacity in parallel with import infrastructure

Groenvermogen - Groenvermogen (groenvermogennl.org)

Helaas afschaling, vertraging, opschorting, annulering

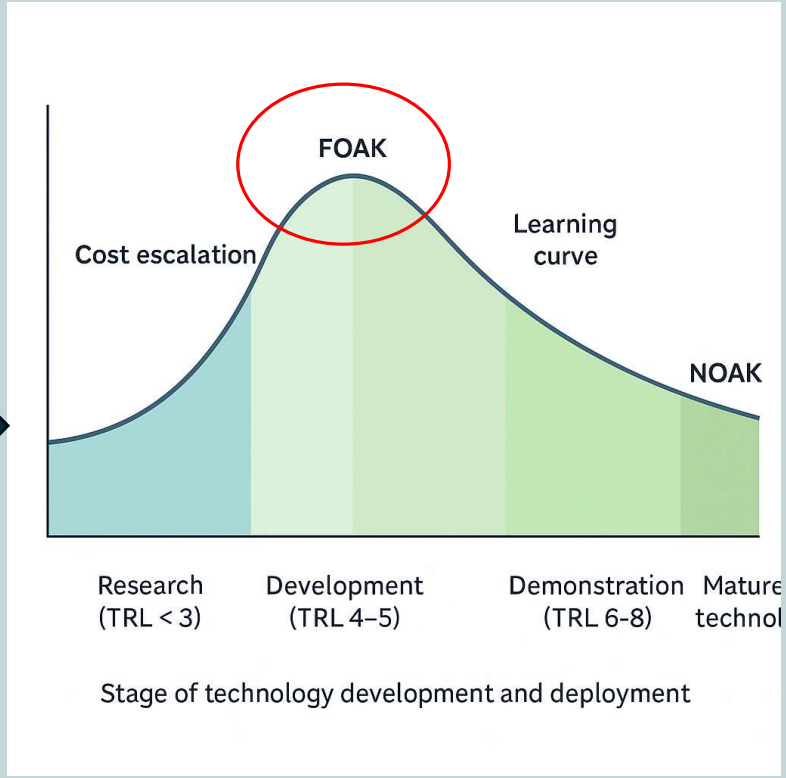


Huidige productie emissiearme H_2 wereldwijd → 0,8 Mtpa (voornamelijk fossiel + CCUS)
Geplande capaciteit in 2030 → 45 Mtpa, maar **slechts fractie daarvan "bijna zeker"**

Bron: TNO Vector

Diverse en aanzienlijke uitdagingen houden aan

Uitdagingen	Toelichting
Trage implementatie	Projecten komen langzamer van de grond dan gehoopt
Kostenreductie te traag	H2-productie blijft duur zonder schaalvoordelen
Regelgeving niet helder	Definities en kaders zijn nog in ontwikkeling
Geen geharmoniseerde certificering	Belemmering voor internationale handel
Tijdrovende vergunningen en subsidies	Lange doorlooptijd maakt projecten risicovoller
Vraag zwak / geen afnamecontracten	Producenten kunnen geen zekerheid krijgen
Infrastructuur ontbreekt	Nog geen netwerken voor transport en opslag
Te ambitieuze aannames	Verwachtingen blijken vaak niet haalbaar



Bron: TNO Vector

Ondertussen groeit Resato HIGH PRESSURE TECHNOLOGY als kool

Ambitie: oplossen van "kip-en-ei-probleem": ze bouwen de infrastructuur die transportbedrijven motiveren om over te stappen—en vice versa.

Resato's snelle groei komt o.a. voort uit:

1. Een **onderscheidende technologische oplossing** waar de markt behoefte aan heeft (geïntegreerde compressie- en tankoplossingen voor hoge druk)
2. Precieze focus op **snelgroeiende markten** (vrachtwagens, bussen)
3. **Financiële ruimte** voor opschaling en productie (€25m venture debt-faciliteit EIB, 1.000 tankstations voor 2030)
4. **Sterke partnerships** binnen Europa (Total Energies, Hypion, Qair, etc, 'See Hydrogen Mobility' Consortium)

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En groeit de behoefte aan kennisdeling en skillsontwikkeling: snel en op schaal

Resato
HIGH PRESSURE TECHNOLOGY

Resato Hydrogen Technology: Een spannend, gedurfd en duurzaam avontuur

Make Hydrogen Work

Nationaal Kennisplatform

Regionale ecosystemen leren, innoveren en werken!

Hydrogen Valley Campus Europe: een waterstofecosysteem in wording

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Make Hydrogen Work: Zet Waterstof aan met Skills!

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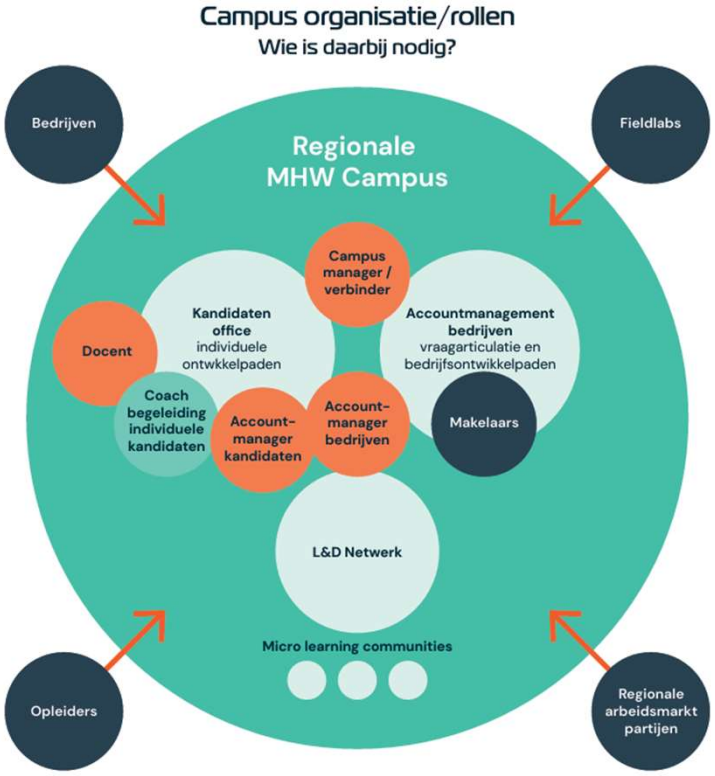
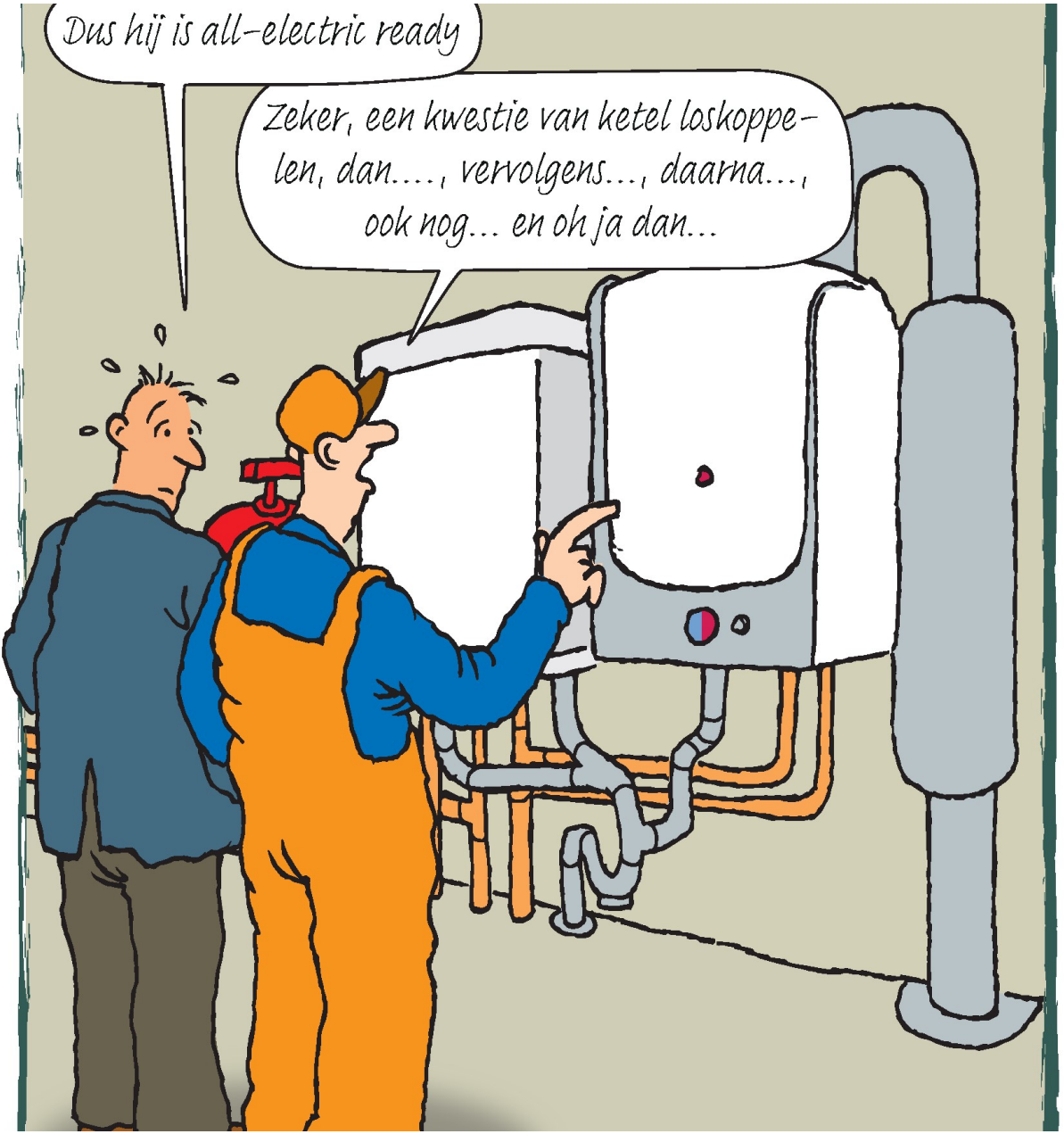
Make Hydrogen Work

Werkwijze toolbox

Februari 2025





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Marsha Wagner
Programmadirecteur Human Capital Agenda
24 juni 2025

Bedankt voor jullie aandacht!

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Hartelijk dank!

We nodigen je graag uit om na te praten met een drankje en een hapje!