

A graphic of several water bubbles of different sizes, rendered in shades of blue and white, floating on the left side of the slide.

Getting water to Holland Hydrogen 1

Foresight Hydrogen: 7th Feb 2023

Colin Robinson, Business Development Manager, UK & Ireland

Introducing Holland Hydrogen 1



Hollandse Kust

Holland Hydrogen 1



Electrolyser
200MW
60,000 kgH₂/d

Holland Hydrogen 2

Holland Hydrogen 3

Holland Hydrogen 4

**H₂ Transport:
Port of Rotterdam**

50 years of industrial water: Rotterdam Deminet



DWP Maasvlakte:

- 800 m³ / hour
- Networked to 26 users
- Surface water feed



Redundancy:

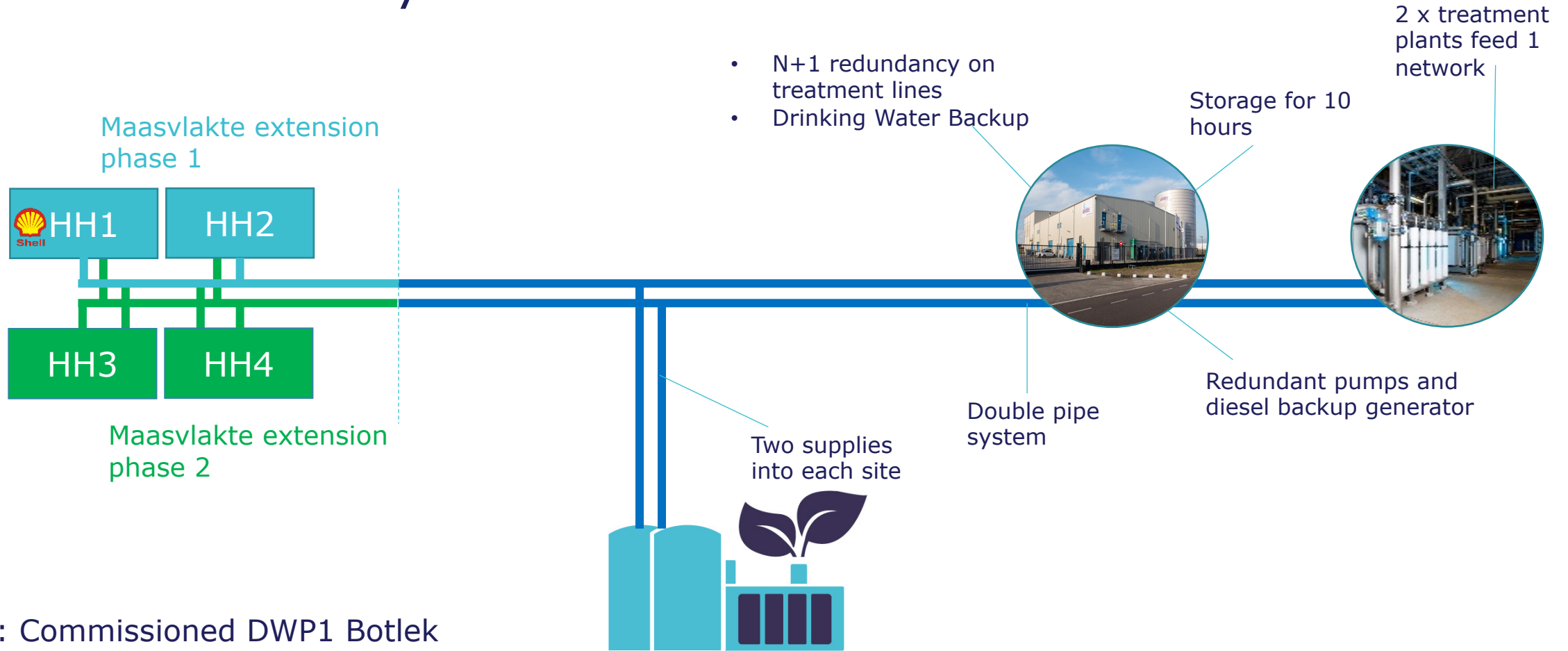
- Plants are interconnected on one network.
 - 48km demin water distribution network
- Drinking water back-up
- Containerised mobile fleet – 1,200 m³/h RO
- Double pipe system



DWP Botlek:

- 1,400 m³ / hour
- Networked to 26 users
- River water feed

Demi-net reliability



2009: Commissioned DWP1 Botlek
2017: Commissioned DWP2 Maasvlakte

No interruptions to supply at any customer since 2009.

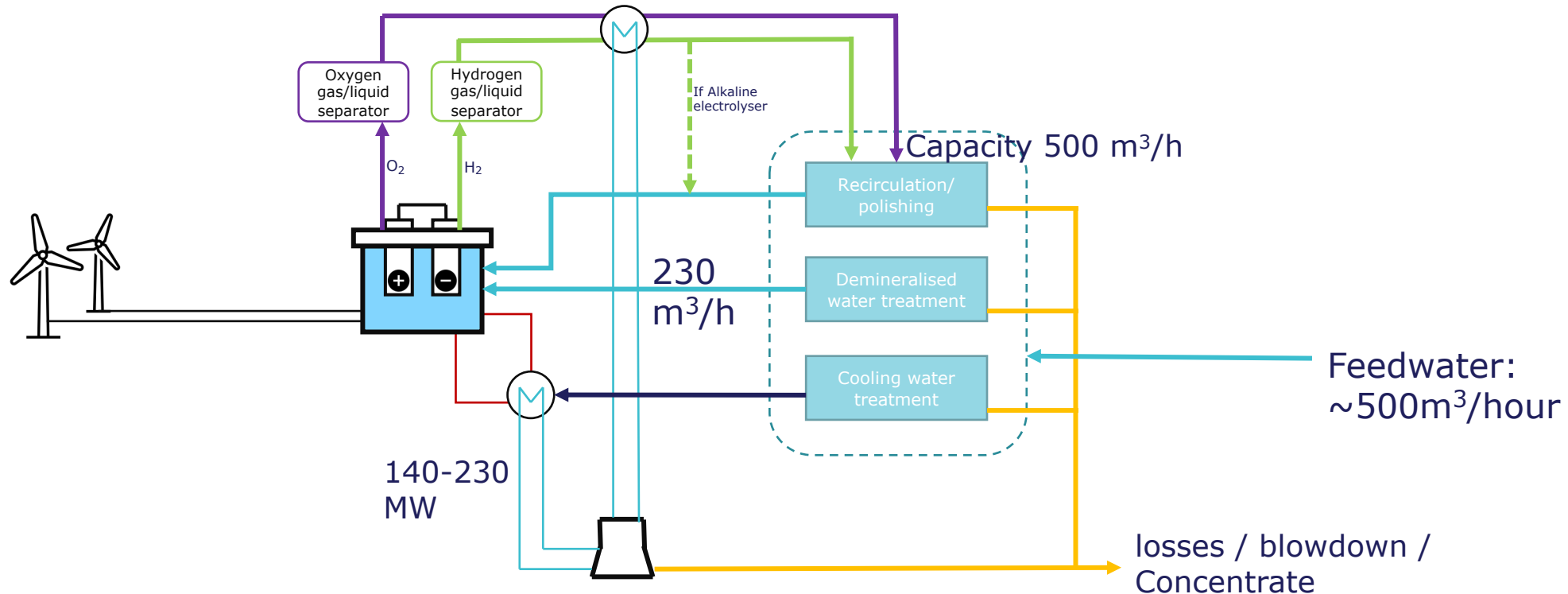
Demi-net Quality

Parameter	Produced and Guaranteed by Demi-net	Requested by Shell	Comments / Mitigations
pH	6-9		
Temperature / °C	0-40		
Iron / mg/l	0.10	<0.01	Installed analyser on DWP, achieving average 0.00008 mg/l Fe ²⁺
Copper / mg/l	0.05	0.0006	Installed analyser on DWP, achieving average 0.0002 mg/l
Hardness / mmol/l	0.04		
NH ₄ ⁺ / mg/l	2		
E.C. @ 25°C / µS/cm	0.05 – 2	<0.1	Normally 0.06 but can rise due to tank level fluctuation
Silica SiO ₂ / mg/l	0.03	0.02	Installed analyser on DWP, achieving average 0.005 mg/l SiO ₂
TOC / mg/kg		<0.1	Installed analyser on DWP, achieving average 0.005 mg/l
Free Chlorine		NIL	Not used
Chloride concentration / mg/l		0.00003	

0.05 mg/l Cu
X 2,200 m³/h

2.64kg Cu per day
in network

Water requirements of Green Hydrogen



NB. The schematic represents the requirements for a **1GW** PEM electrolyser. Water quality and recirculation requirements vary for Alkaline electrolyser.

Optimisation

The large-scale deployment of Green Hydrogen is yet to be realized. We can hypothesise the requirements, but the rest needs to be tried, learned and optimized.

- **Necessity and impact of recirculation:**
- **Key fouling parameters**
- **Feedwater fluctuations**
- **Actual capacity requirements**
- **Modular / Scalable Solutions**
- **Use of Oxygen locally for wastewater treatment**



Key Performance Indicators

Water quality

- Evides can guarantee the feedwater meets the specification for your electrolyser. This is a key performance and safety metric.

Water quantity

- In addition to the water quality you also get the guarantee that the flow rate delivered will meet the demands of your project.

Up time / availability

- Redundancy is designed in and backed up by our comprehensive mobile fleet so 99.9% up time is guaranteed.

Water efficiency

- Water treatment creates losses so the overall water consumption is always greater than the H₂ production requirement.
- Through our experience we maximise the efficiency so water is never wasted.

Chemical consumption

- Evides has led the industry on many of the current modern standards of operation and best available techniques.
- We can guarantee levels of chemical consumption used in the process, which keeps costs and environmental footprint low.

Energy consumption

- Green energy, alongside water, is the other key ingredient in H₂ production so you want don't want to waste any on inefficient water treatment.
- Evides can guarantee energy consumption is kept low and within agreed levels.

Effluent quality

- If wastewater treatment is required, Evides can guarantee the effluent quality for discharge.
- Under Design, Build, Finance and Operate Evides can own the discharge permit and take full responsibility for environmental regulation.

About Evides Industriewater



Water



Waste
Water



Water
Re-use



Turnkey Vs DBFO

Evides' clients enjoy the benefits of Design, Build, Finance and Operate.

- **Guarantee:**
 - Operating costs,
 - Technical standards,
 - Lifetime,
 - Quality,
 - Availability
- **No pre-financing by the client**
- **Costs based on Totex**
- **Proven experience:**
 - Operation
 - Optimisation
 - Asset management
 - Shared infrastructure





Colin Robinson
c.robinson@evides.nl

