



**Interreg**  
North Sea Region  
AVATAR

European Regional Development Fund

Sustainable urban freight transport with autonomous zero-emission vessels



EUROPEAN UNION

## The energy use case in AVATAR Interreg North Sea Region

*“... now being presented to the public and stretches far beyond a mere vision on the energy transition “ (quote Tom Pauwels - POM Oost-Vlaanderen)*



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ICE on  
H2 pioneers since 2015  
H2 range from 10 to 100kWe  
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**Jean-Pierre Van Wingen**

E. Van Wingen NV

29th June 2023

Ghent Rigakaai



**ANGLO BELGIAN  
CORPORATION**

We power your future

## WHO WE ARE

EVW is an ABC company specialized in energy solutions and control systems for a wide array of applications. Sustainable, green energy is paramount to EVW's design and development philosophy.






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## Manufacturers of CHP and EDG

-  +1500 operational CHP & EDG in Benelux and Germany from 10kWe to 10MWe
-  In-house design, production, assembly, maintenance, overhauls
-  TEAM : 50 employees

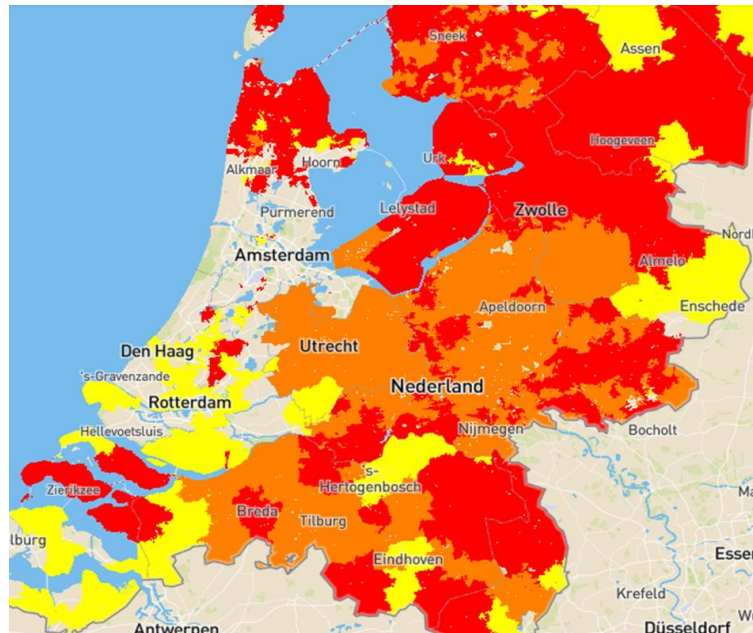
- ✓ **CHP pioneers since 1992**
- ✓ **ICE H2 pioneers since 2015**
- ✓ **H2 range from 10 to 100kWe**



The plan to deploy electric vessels for autonomous urban distribution caught the imagination. However, how do we supply this multitude of heat pumps, electric vehicles as well as electric boats with green power?

Anyone: “Surely we just get power from the socket ?”

**WRONG**, public grids are not designed for this evolution and are getting clogged up. It is called congestion.  
In the Netherlands, where much more green energy already circulates on the grid, the problem is already acute.



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Anyone : “Okay, so shall we generate power locally, like solar and wind, so we do not have to convey it on the overloaded grid ?”

**NO – Sorry**, the options for local power production in cities using solar panels and wind turbines are too limited



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Moreover, other problems arise :



**The intermittent nature of wind and solar energy creates stress on basics of public grids:**

**supply has to equal demand!**



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And,



Unfortunately, there is no green energy in excess. So we have to use it very carefully and not waste it in non-energy-efficient applications



*...look for the highest energy efficiency !!!*



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But,



**There is a SOLUTION !**

E. Van Wingen's Solution, Hydrogen powered ICE CHP, as applied in the **Interreg North Sea Region AVATAR** WP4 Use Case for instance, has been awarded the "Solar Impulse Efficient Solution" Label, a proof of high standards in profitability and sustainability.

Hydrogen powered ICE Cogeneration allows for cost-efficient conversion of stored renewable energy into a useful power source at all time.



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## Which problems did we solve @ 0 gr CO2 ? We summarize :

There are **insufficient charging** points and the structure of our grids does not allow for all-electric solutions?

**EVW's solution does not require the public grid to be adapted**



The **options for local power production in cities** using solar panels and wind turbines are **too limited** ?

**EVW's solution does not require urban building roofs or monuments to be addressed**



We do **not** have **enough green power** ?

**EVW's solution ensures maximum energy efficiency. It can even supply heat to local heating networks , such as in the city of Ghent**



The intermittent nature of wind and solar energy creates stress, possibly **Black Out** ?

**Our solution transforms excess of renewable energy stored in H2 storage tanks into green electricity that can be fed into the local smart grids,**



**even when the sun is not shining or when there is no wind, at ZERO g CO2!**



## HOW DOES IT WORK:

**CHP (Combined Heat and Power) = the most performant energy transformer**

The principle is simple:

an ICE or internal combustion engine drives a generator. The generator generates electricity. At the same time, the heat losses of the combustion engine are recovered to be fed into heating systems like in buildings

**At times when the locally produced Renewable power exceeds the local electric power demand, electricity will be stored.**

**A most interesting way to store electricity = convert water into hydrogen and oxygen using an electrolyzer.**

Consider the hydrogen carries the electricity and can be stored in gas storage tanks

If the electricity used is from a RES, the hydrogen is called green



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## EVW ICE on H2

The ICE CHP running on H2 will transform the green hydrogen into green electricity and supply power to the local smart grid, even when the sun is not shining or when there is no wind.



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**ZERO CO2 emissions!**  
**( meanwhile 4000 successful running hours on the hour counter )**

## AVATAR Interreg North Sea Region ENERGY USE CASE

The energy use case in AVATAR Interreg North Sea Region is focused on city freight distribution vessels sailing during daytime and charging the batteries at night (using a ICE CHP running on hydrogen). While the ICE CHP is charging the vessels on the quay at the hub, useful heat is released.

### FACTS & FIGURES,

- CO2 reduction of 97.528 kilograms per year compared to a diesel truck equivalent of CO2 absorption of 8,13 hectare forest surface.

**Imagine what a fleet of autonomous AVATAR vessels can do !**

- The benefits of implementing the AVATAR vessels go beyond the significant CO2 reduction, it also leads to :  
**reduced traffic, reduced noise and more safety in the city center.**



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## AVATAR Interreg North Sea Region ENERGY USE CASE

"It would be a pity if we simply looked for other "fuels" without considering if the applications we will be using them for may be up for a new mindset"

**CASE approach and total solutions pave the way of energy transition and the path to a sustainable society.**

**To anyone : "By the way, it is cost saving !"**

We have demonstrated that it is possible thanks to AVATAR Interreg North Sea Region !

**It is now up to Sustainable entrepreneurs and sustainable cities to follow our lead with more Avatar hubs !**



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Thanks for your attention  
and in particular special thanks to :

Enjoy the demonstrations !



and to our partners :



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