

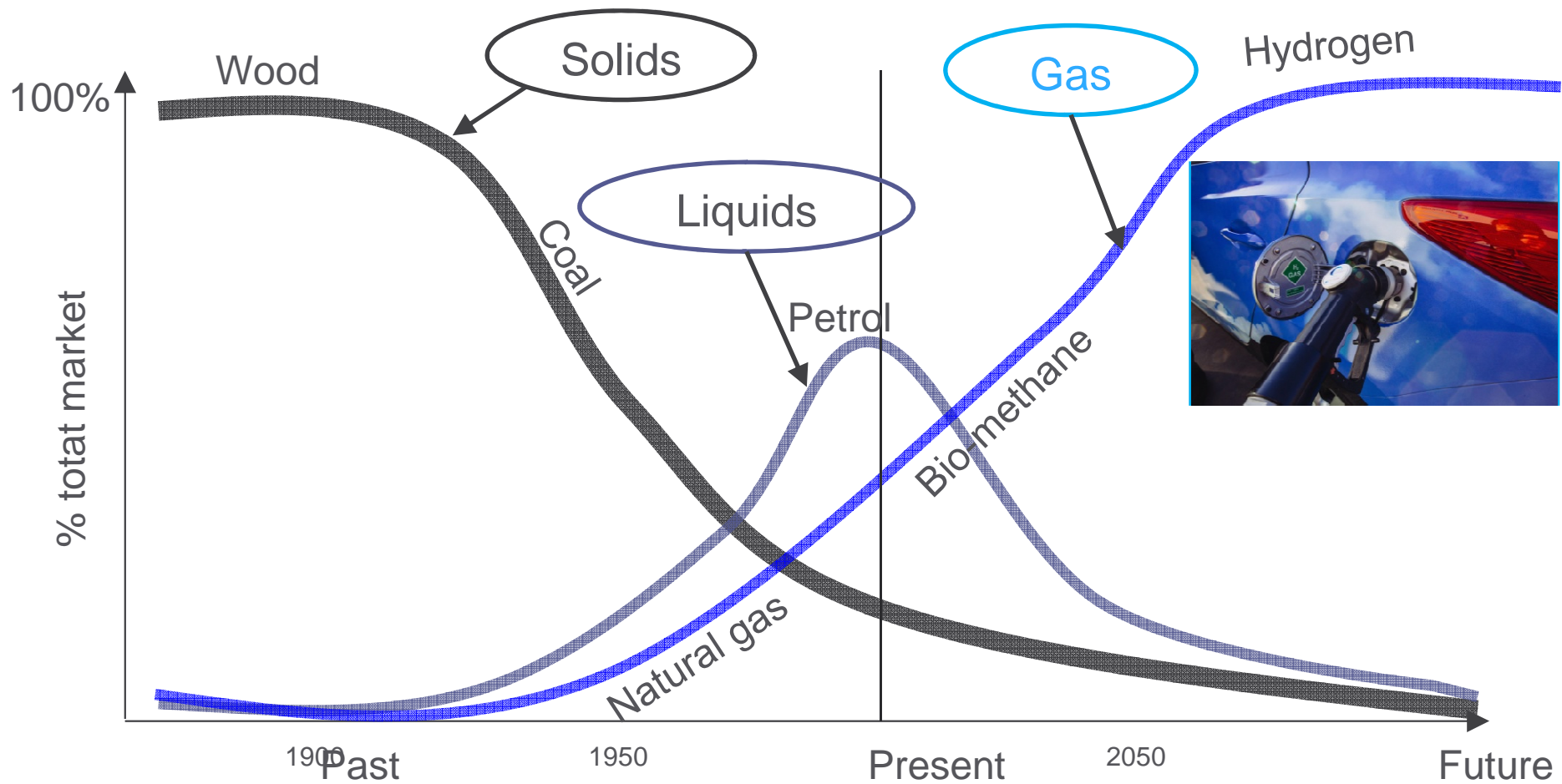
# Air Liquide 1st Public Hydrogen station in Belgium as from 22-04-2016

## WaterstofNet Congres-Mobiliteit

Antwerpen, 25-10-2016 | Christian Nachtergaele |



# Renewable gases: An energy transition



Energy transition wave according to Hefner (2007)

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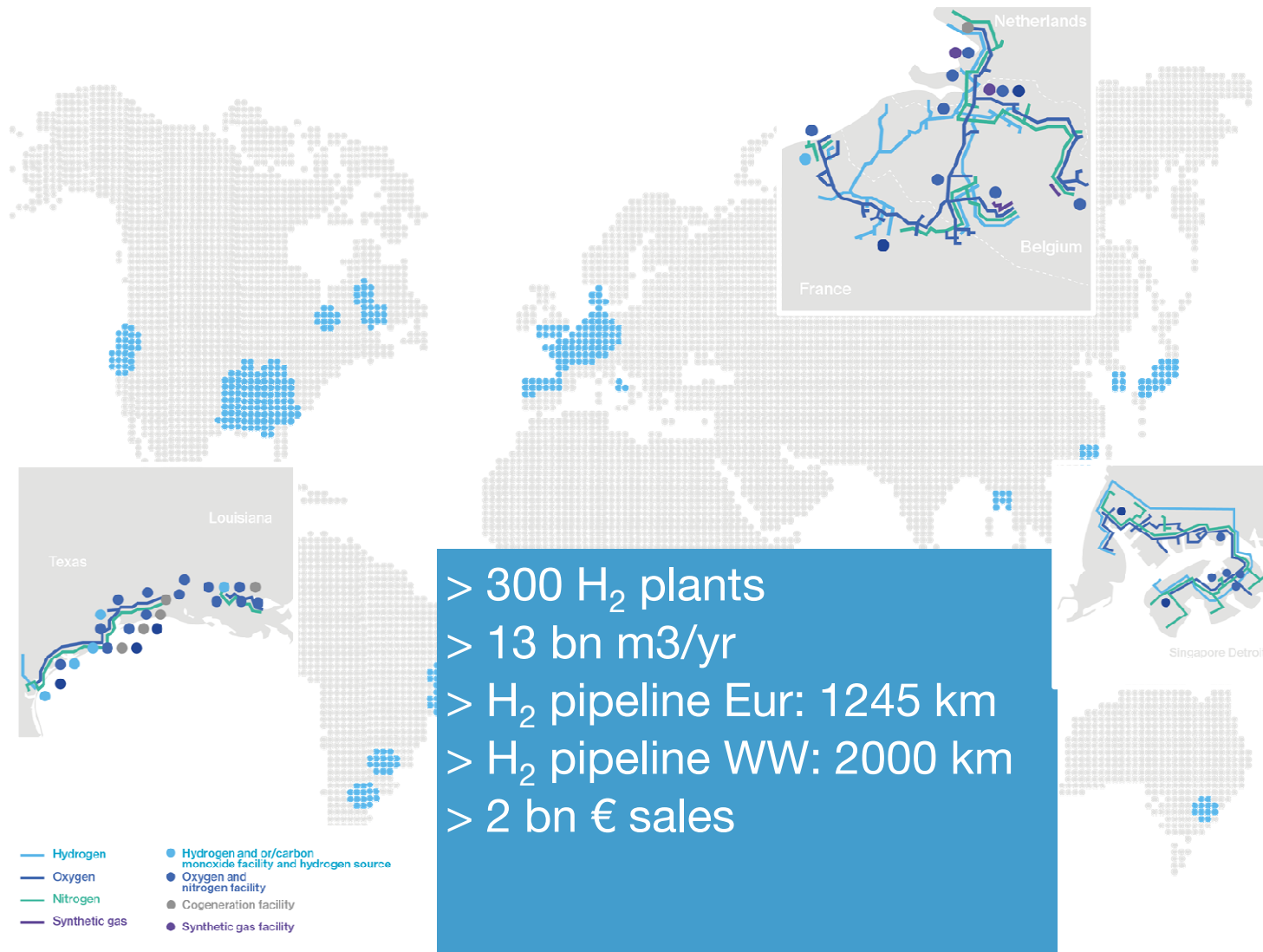


## 2. Hydrogen : a world of applications

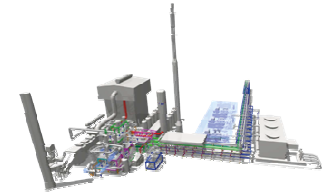


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# Air Liquide: 40 years of global investment in Hydrogen



## Production



## Distribution



## Applications



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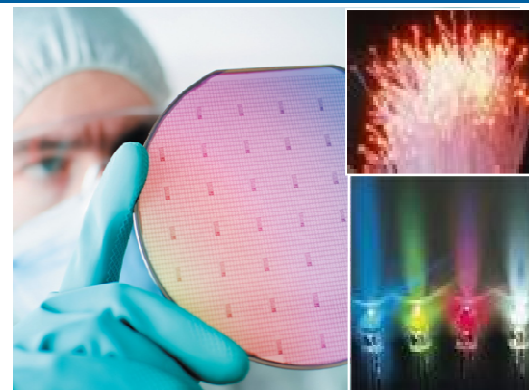
# Hydrogen, a core expertise of Air Liquide Group...



**Heat Treatment**  
10 m<sup>3</sup>/h (batch)  
1000 m<sup>3</sup>/h (continuous)



**Glass**  
80 to 500 m<sup>3</sup>/h



**H<sub>2</sub> Ultra pure <1ppb**  
50 to 500 m<sup>3</sup>/h



**Chemicals** ex: 0,067 t/ton Anilin  
**Petroleum refining**  
(desulfuration & hydrocracking)  
10-100 km<sup>3</sup>/h



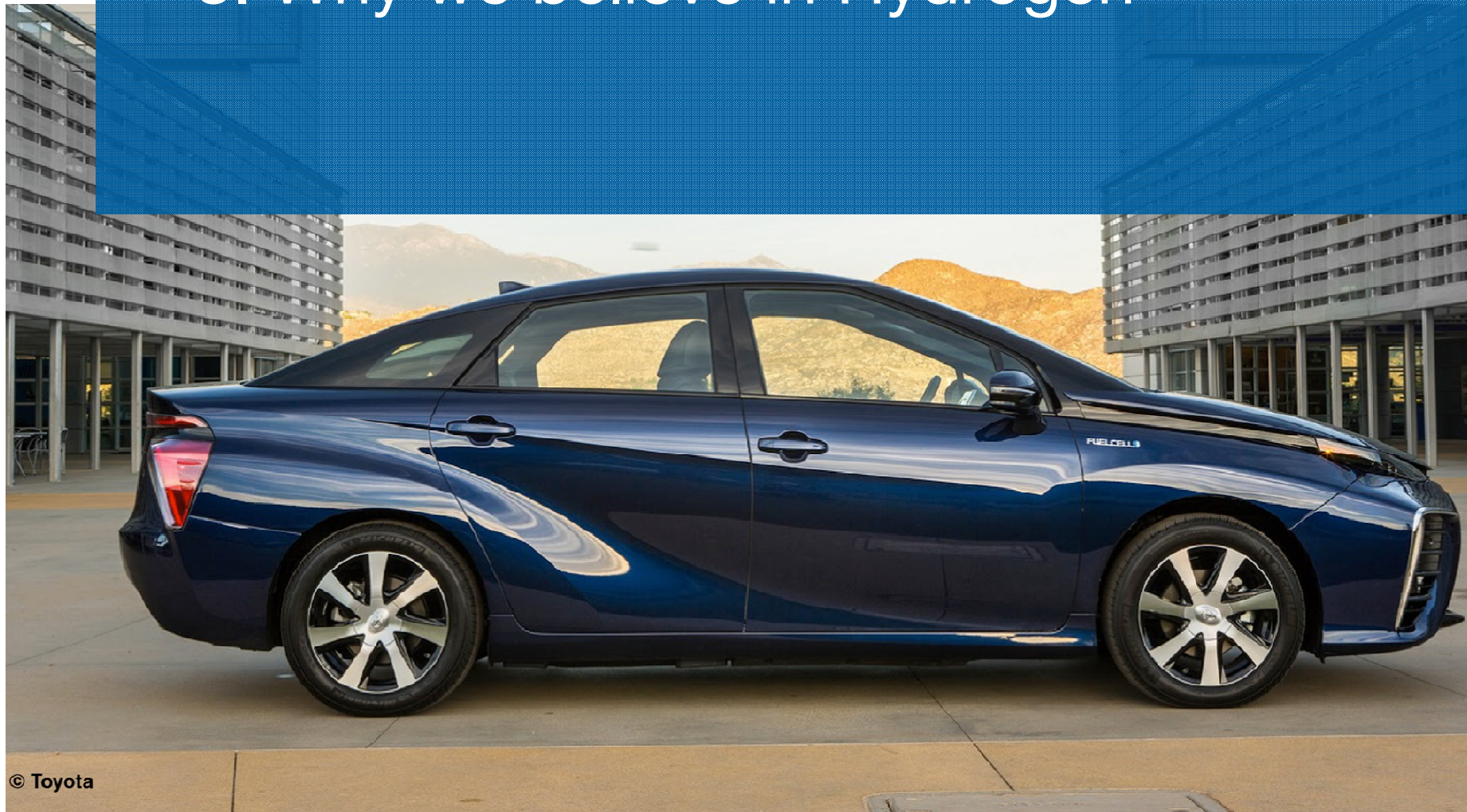
**Ariane 5**  
28 t/launch



**Fuel cell vehicle**  
1 kg for 100 km

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### 3. Why we believe in Hydrogen



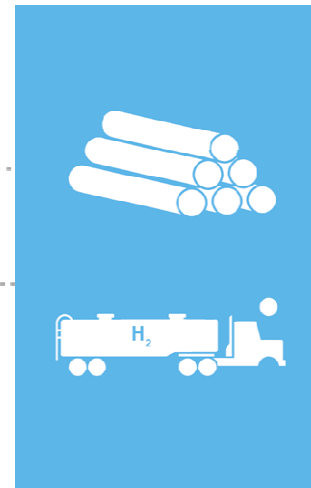
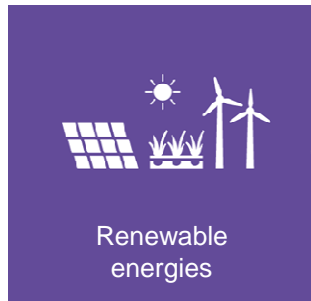
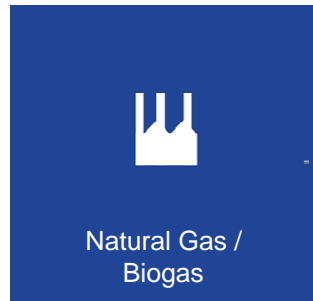
© Toyota

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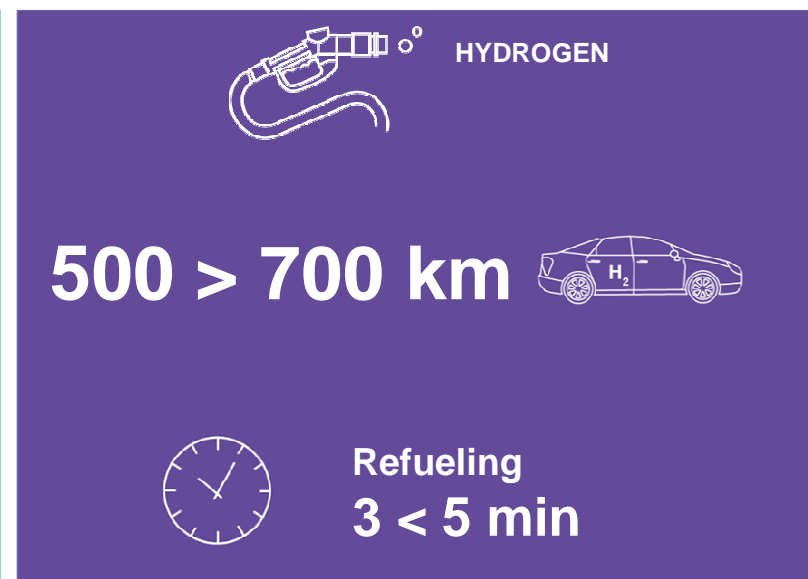
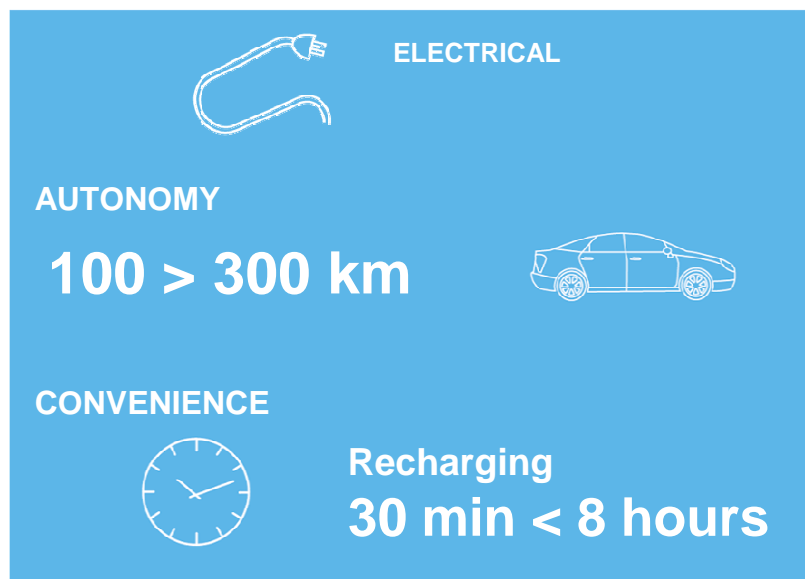
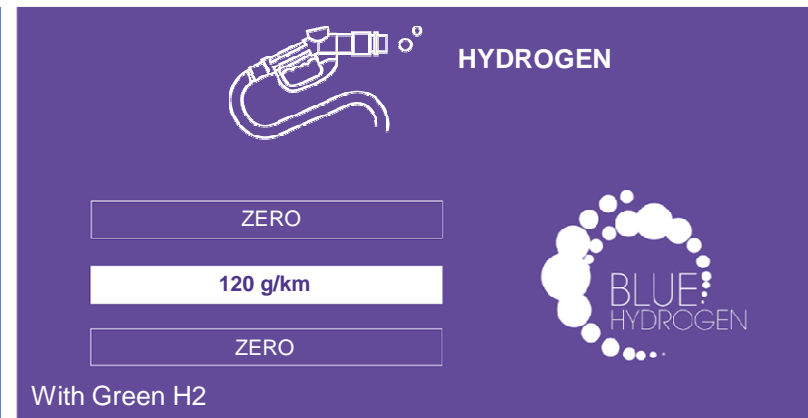
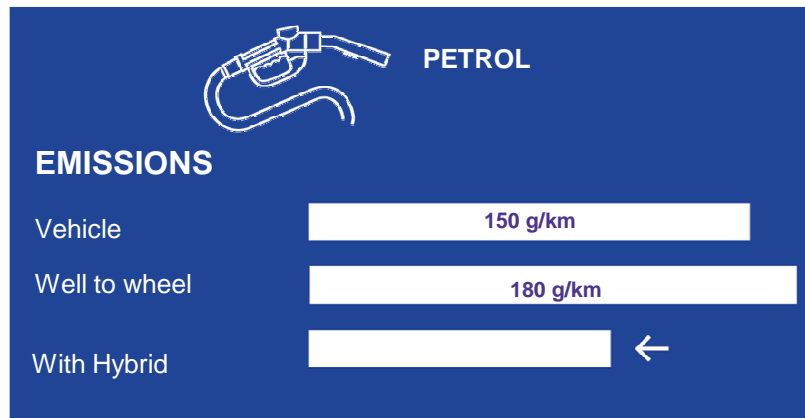
# Hydrogen delivers clean transportation solutions

- ▶ Hydrogen is everlasting and is the most abundant element in universe
- ▶ H<sub>2</sub> produces zero emissions, just water
- ▶ Out performs electric battery solutions



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# Hydrogen out performs all alternatives



Source : Mc Kinsey, 2011, EU Powertrain Report

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## 4. Air Liquide's Hydrogen strategy to 2020



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# Our ambition: leadership in H<sub>2</sub> Mobility

- Lead **activation of H<sub>2</sub> Energy Markets** in particular H<sub>2</sub> Mobility
- **Be a major Mobility player**  
Maintain leadership across the full value chain from H<sub>2</sub> production to delivery at the pump



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# Technology leveraged at every step in the chain

Application



Efficient  
Sustainable  
Safe  
Reliable  
Competitive

Delivery



Technology covering the whole Hydrogen Energy value chain

Storage & Transport



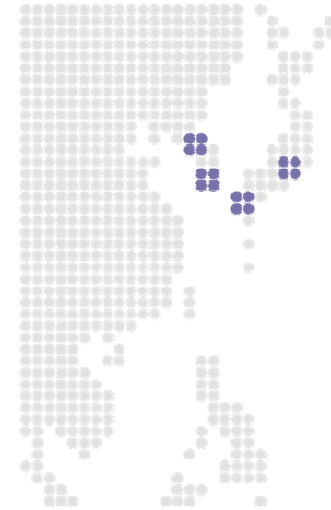
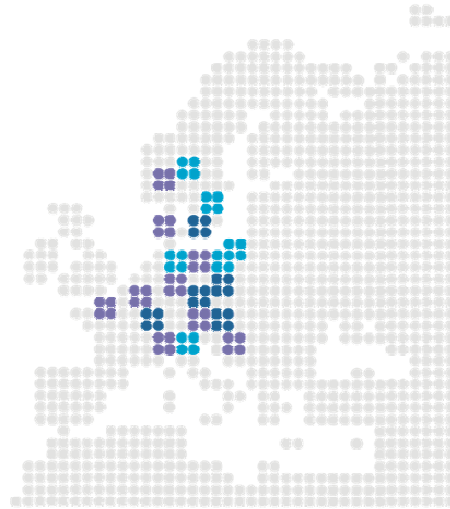
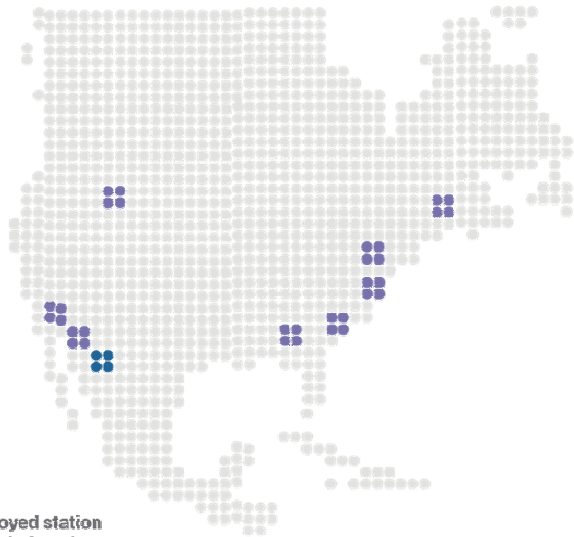
Production



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# Pioneering innovative H<sub>2</sub> mobility projects worldwide

## 75 Hydrogen Stations worldwide



- Deployed station
- Intended station
- Station for special use (R&D, show...)

### Americas



### Europe



### Asia



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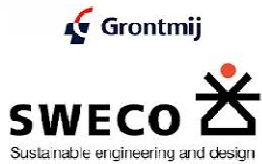
# Good collaboration with strong partners from the start ...



H2 Station ZAVENTEM



TOYOTA



# The first public H2 station in Belgium



# Air Liquide Blue hydrogen certificates



NV AIR LIQUIDE INTERNATIONAL SA  
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 Company number BE 0845.913.222  
 Laboratoire, Bruxelles • Laboratoriumweg 248 • 1800 Vilvoorde • Belgium  
 tel. +32 (0)2241 57 11 • fax. +32 (0)2247 58 59 • info@vincotte.be • www.vincotte.be  
 Registered office: Chemin d'Alain • 10500 Aarschot • Belgium

YOUR REPUTATION IS MINE.

## Validation of claim methodology "Green Origin<sup>1st</sup>"

On behalf of AIR LIQUIDE Vincotte performed a validation of the methodology used to establish a type II environmental claim of a net direct zero carbon footprint for the energy consumption from production to delivery (production, purification, compression, filling, transport and delivery) of its labeled "Module Green Origin".

### Validation procedure

The validation was performed by Vincotte in accordance with the methodology and procedures set out in the Claim Protocol Validation Report and the Verification Protocol Report. The Claim Protocol and the Verification Protocol were developed according to the ISO 14020:2000 "Environmental labels and declarations - General principles" and ISO 14021:2001 "Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)".

### Declaration of independence

The validation was carried out by Vincotte as an independent third party.

### Conclusion

Based on the review undertaken, Vincotte validates:

- The fact that the Claim is conforms to the general principles set out in ISO 14020:2000 "Environmental labels and declarations - General principles" and the requirements in ISO 14021:2001 "Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)";
- The methodology for calculating the amount of renewable energy which should be purchased for production, purification and compression;
- The approach for overcompensating emissions generated by distribution (filling, transport and delivery) to make sure all emissions are accounted for and the methodology for calculating the amount of renewable energy for offsetting these emissions.

Vilvoorde,

25/05/2016

Evert Vermaat  
 Product Manager Eco-claim Validation  
 Business Unit Environment Safety and Sustainability

## Hydrogen from SMR + CCS in Port-Jérôme (FR) – to be certified by E&Y

## Hydrogen from chloralkali electrolysis with renewable electricity in Zaventem (BE) – certified by Vincotte

## Hydrogen from bio-methane in Dormagen (DE) – certified by TÜV

### ZERTIFIKAT

Zertifikats-ID: C05-2016-06-21220318

Zertifikat für: **Teilkompensierter Product Carbon Footprint „Blue Hydrogen“ (GH2 Wasserstoff)**

---

Zertifizierhalter: AIR LIQUIDE Deutschland GmbH  
Hens-Güther-Sohl-Str. 5  
40285 Düsseldorf

Ergebnis: 432 kg CO<sub>2</sub>e / t.000 m<sup>3</sup> Blue Hydrogen (H<sub>2</sub> Wasserstoff (1.0°C, 1bar))  
Teilkompensiertes Ergebnis: + 34,9 gemäß TÜV SÜD Standard CWS 70 gegenüber dem durchschnittlichen Referenzwert

Bericht: EcoOrigin, Product Carbon Footprint Report

Normgrundlage: TÜV SÜD CWS 70 Standard (Version 1/2011)

Bilanzjahr: 2016

Bilanzierungsmethode: Retrospektiv

Neutastung/Registrierung: • Biomethan: Fa. Wemming Biogas GmbH & Co. KG  
• Indirekte Energieemissionen: RKN NEU 100

Prüfberichte: C05-2016-06-21220318

Der TÜV Rheinland bestätigt, dass der Anbieter für sein Produkt die folgenden Bedingungen erfüllt:

Die Prüfkörper des gesamten Produkts bis ins Jahr 2010 zurück und die Daten bis dahin gemäß Standard CWS 70 eingehalten. Es wird bestätigt, dass der Zertifikatshaber seine geprüften CO<sub>2</sub>-Emissionen durch die oben genannten Maßnahmen reduziert hat. Dem Zertifikat liegen die Einleitungen des Product Carbon Footprint zugrunde. Spezifikationen und Bilanzierungsgrenzen können dem Prüfbericht entnommen werden.

Die Richtigkeit kann anhand der Zertifikats-ID unter [www.carbonpass.com](http://www.carbonpass.com) eingesehen werden.

Vom 23.05.2016

Norbert Heidehann  
TÜV Rheinland Group Carbon Services

**TÜVRheinland®**  
 Genau. Richtig.

**TÜVRheinland®**  
 Genau. Richtig.

www.tuv.com





## 5. What are the next steps?

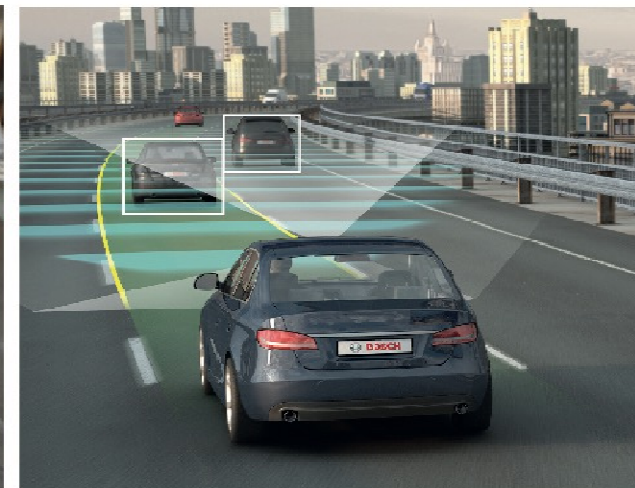
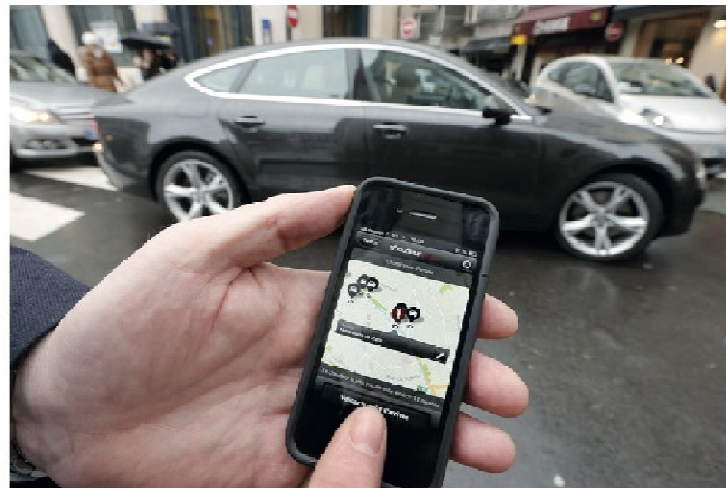


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# Sustainable mobility is within our grasp

Transition evolving at unprecedented pace

- **Car electrification** (hybrids, battery electric, FCV, e.g. Prius, Mirai...)
- **New mobility models** (Uber, car sharing...)
- **Autonomous vehicles**

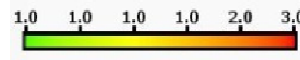
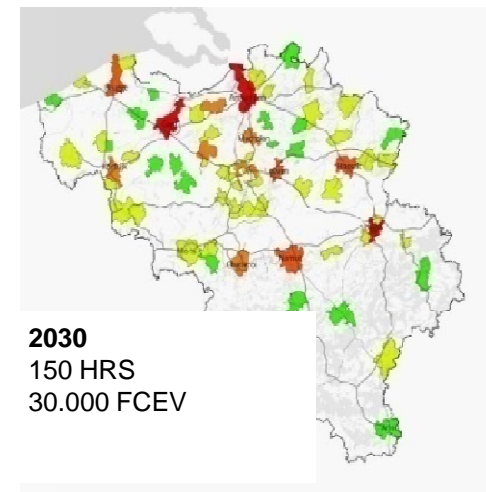
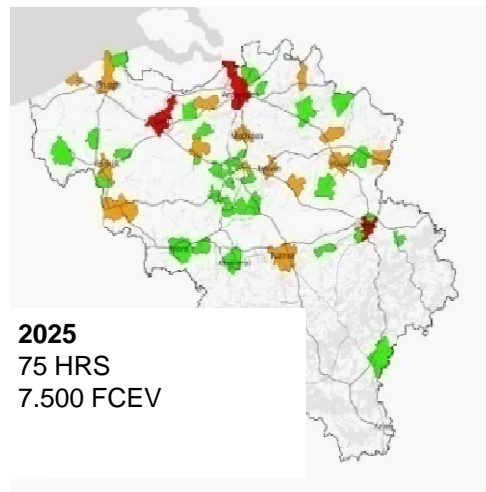
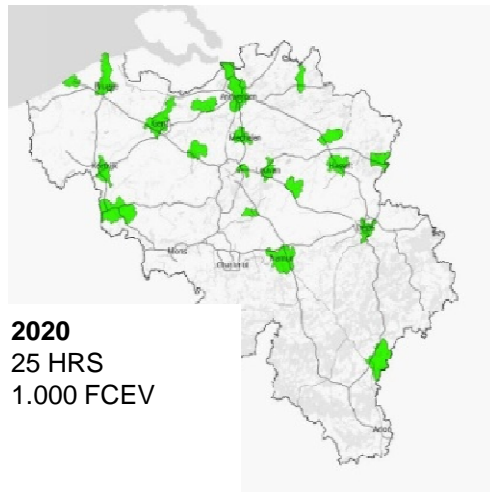


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# H<sub>2</sub> mobility in Belgium : next steps



**NIP: 25 H<sub>2</sub> stations in Belgium by 2020  
20 in Flanders and 5 in Wallonie**



**Create market conditions:**

- > vehicles (cars, taxis, buses, ...)
- > tax incentives, subsidies, modalities

Thi



End of presentation  
Thank you for your attention

