

Hydrogen Company

FCEV: Growing momentum and challenges of mass market deployment

November 10, 2017 | Alena FARGERER, Economist & Hydrogen Energy Market Analyst
Third International Workshop: The Energy Transition in Land Transportation, Energy & Prosperity Chair



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2015 → 2017

The confirmation of a growing momentum



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2017

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World leader in gases, technologies and services for Industry and Health



2015 → 2017: Building up scale all over the world!

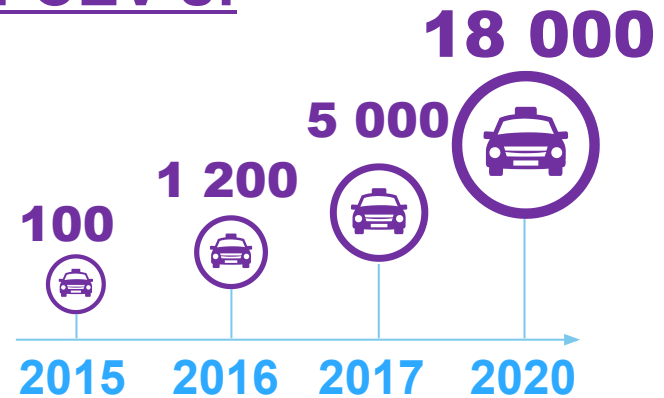


US / California – the ZEV effect



Anaheim H2 station

FCEV's:



Southern CA Hydrogen Stations

● Retail: Open

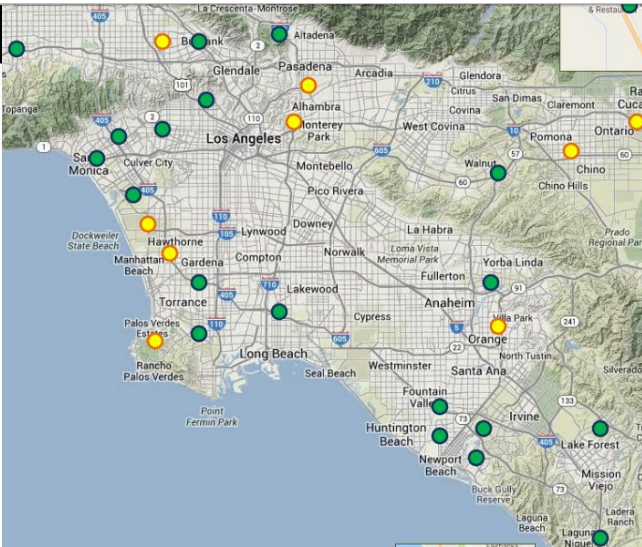
Anaheim
Costa Mesa
Del Mar
Diamond Bar
Fairfax-LA
Harris Ranch
Hollywood
La Cañada Flintridge
Lake Forest
Long Beach
Playa Del Rey
San Juan Capistrano
Santa Barbara
Santa Monica
UC Irvine
West LA
Woodland Hills

● Other: Open

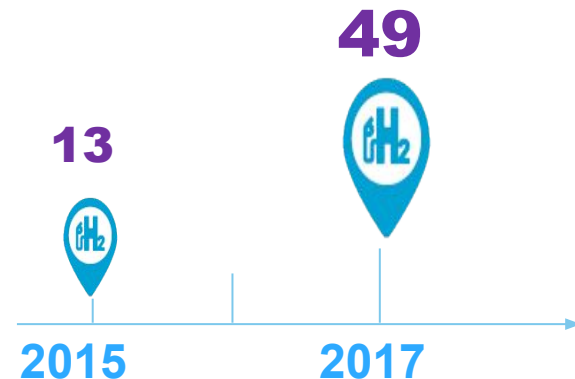
Burbank
Fountain Valley
Harbor City
Newport Beach
Thousand Palms - SunLine Transit
Torrance

● Retail: In Development

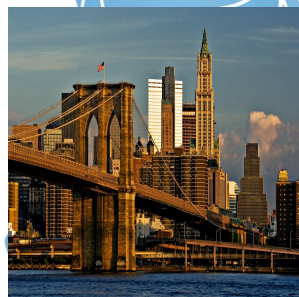
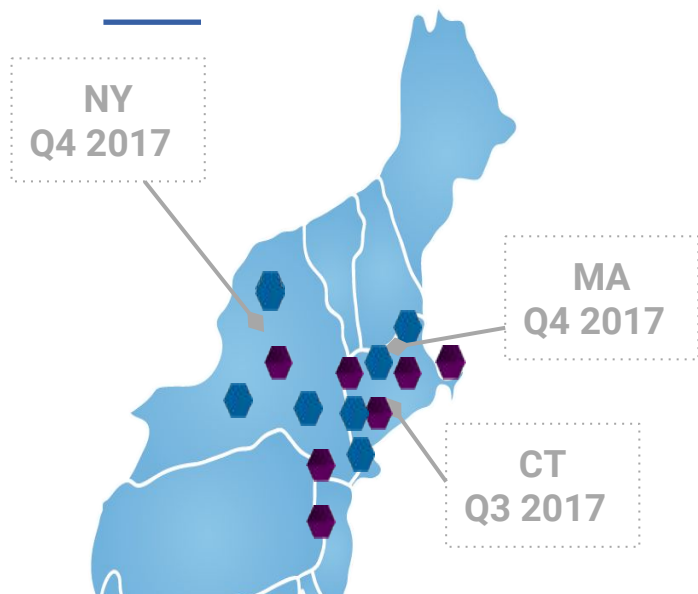
Cal State LA
Chino (upgrade)
Lawndale
LAX (upgrade)
North Hollywood
Ontario
Orange
Rancho Palos Verdes



H2 stations:



US - Conquering the Northeast



New York

Bronx, NY
Hempstead, NY
Brooklyn, NY



Connecticut

Hartford, CT



Massachusetts

Braintree, MA
Mansfield, MA



New Jersey

Site location TBA



Rhode Island

Site location TBA

Network of 12 Stations

Start-up over Q3-Q4 2017

Dedicated H₂ supply chain by



Project in collaboration with



Germany – H2 Mobility: Deploying at full speed!



Air Liquide, Daimler, Linde, OMV, Shell and Total have agreed an action plan for the construction of a Hydrogen station network in Germany

- **400 Hydrogen Stations by 2023** (100 by 2017)
- **350m €** investment
- **Max. 90 km distance between each station on motorways**
- **10 Hydrogen Stations** in each metropolitan area

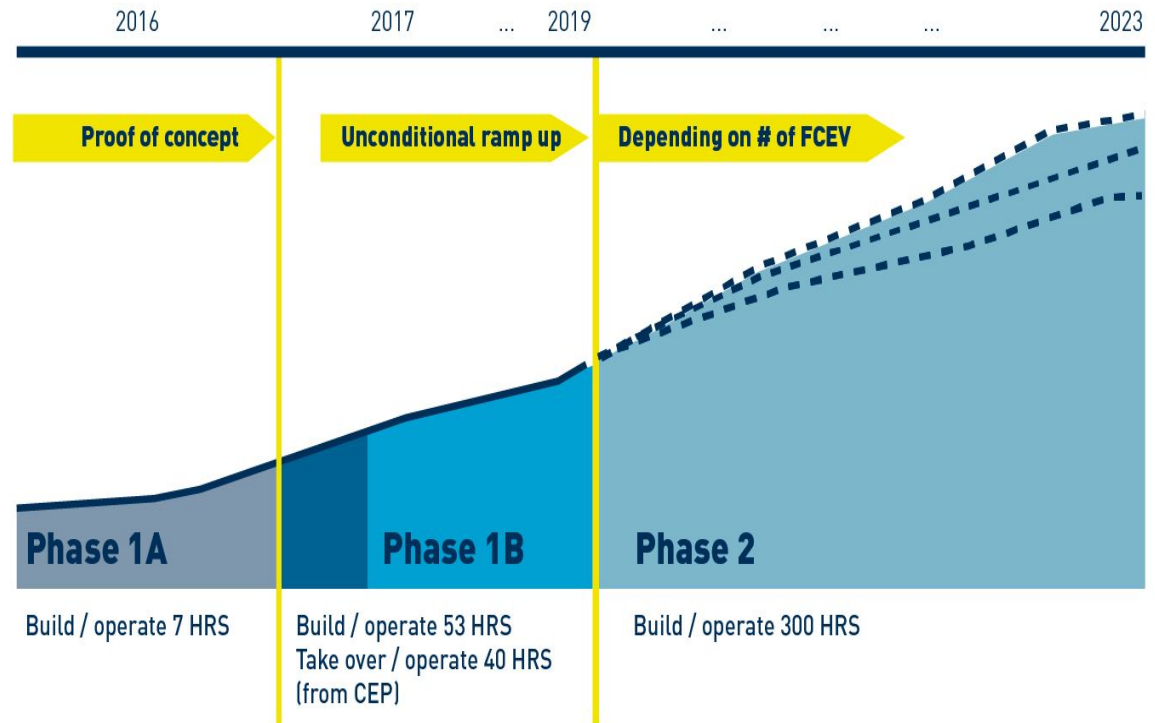


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H2 Mobility: A fully operational company



 **17 BERLIN**



100 stations by 2018

20 stations in 2015



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H2 Mobility: Actively executing Phase 1

Deployment status of 53 new stations as of Dec 2016:

3 // in operation



3 // under construction



7 // permitting



15 // planning

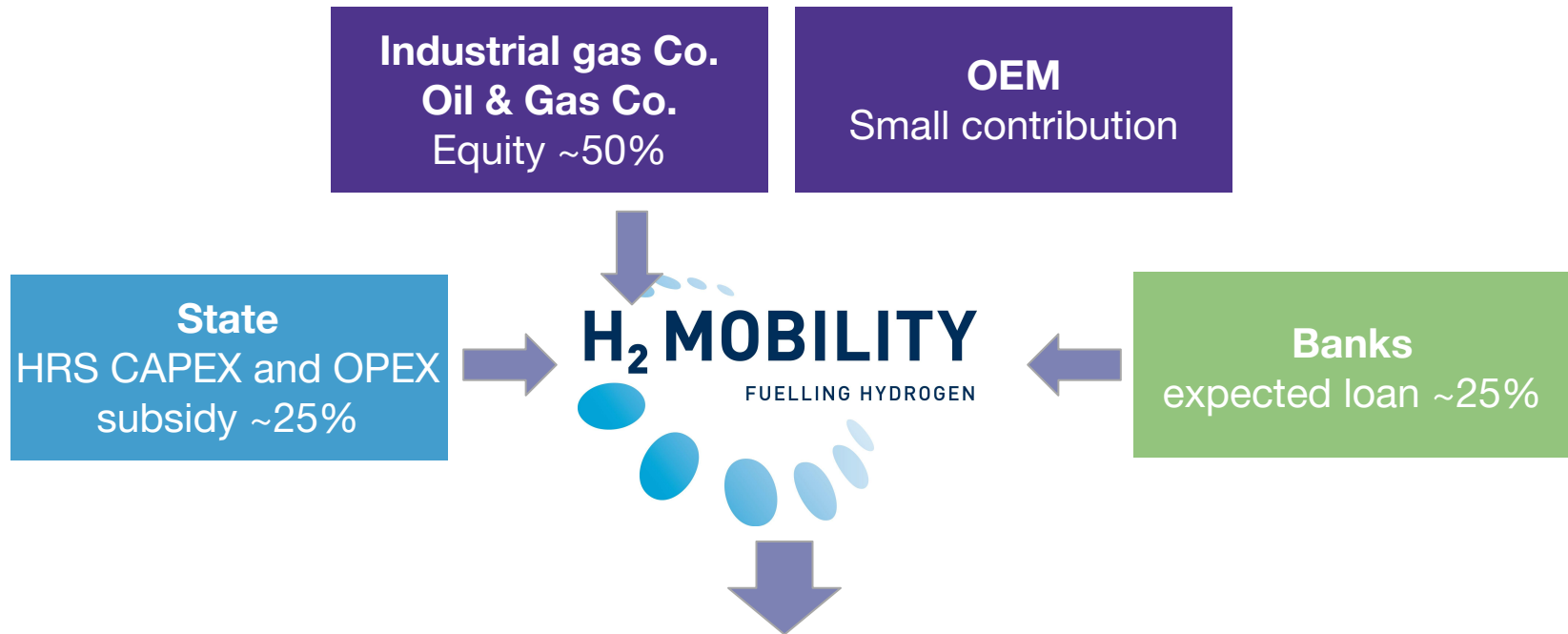


25 // identified



Offenbach H2 station

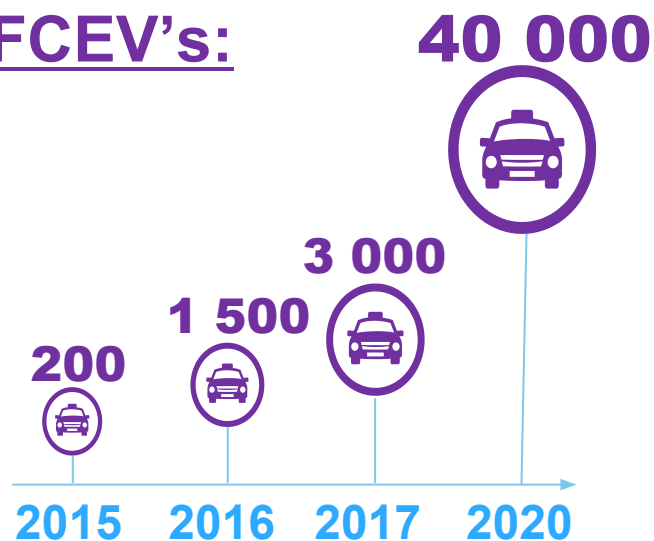
Germany infrastructure: Joint Venture H2 Mobility



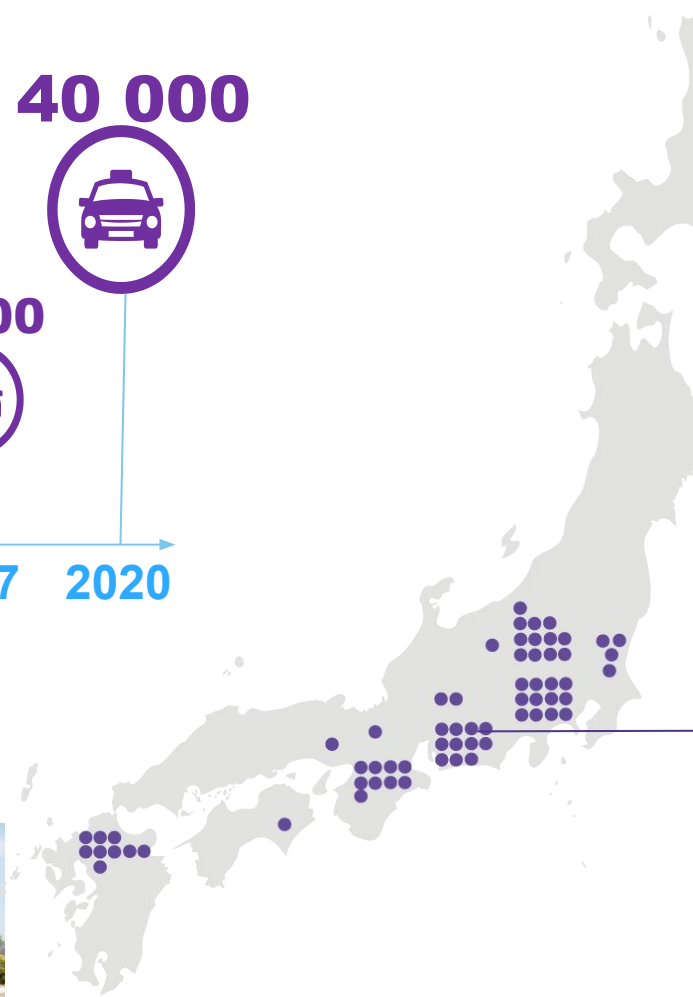
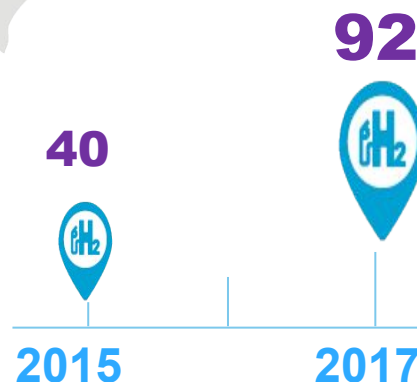
- **Network Planning**
- **HRS Procurement, Ownership & Operation**
- **H2 Procurement & Sales to end customer**
- **Customer value proposition & Branding**

Japan: Largest H2 station infrastructure in the world

FCEV's:

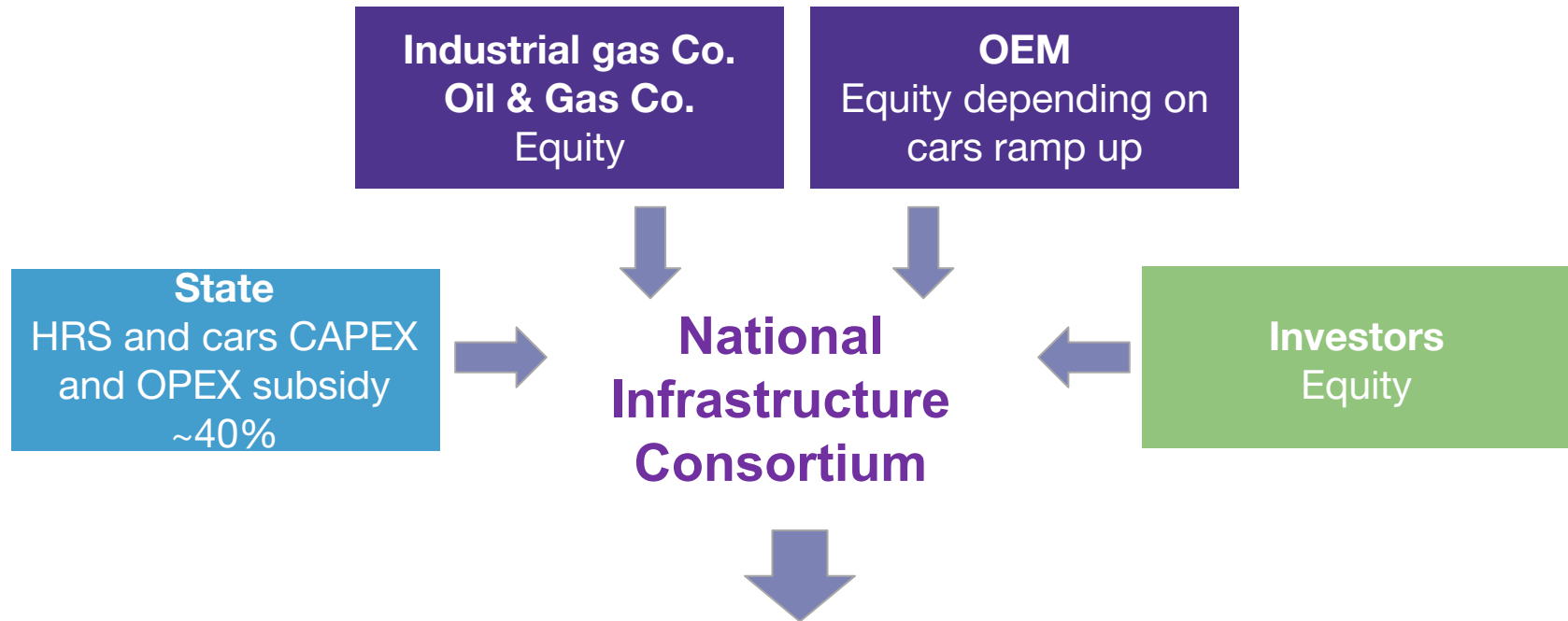


H2 stations:



Nagoya Atsuta

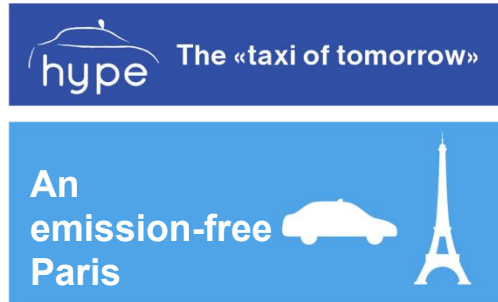
Japan infrastructure: Joint Venture under construction



- Network Planning
- HRS Procurement, Ownership; Operation outsourced
- Search for external stakeholders to secure financial support

France: Innovative business models for clean mobility

HYPE Taxi Fleet Project - Paris



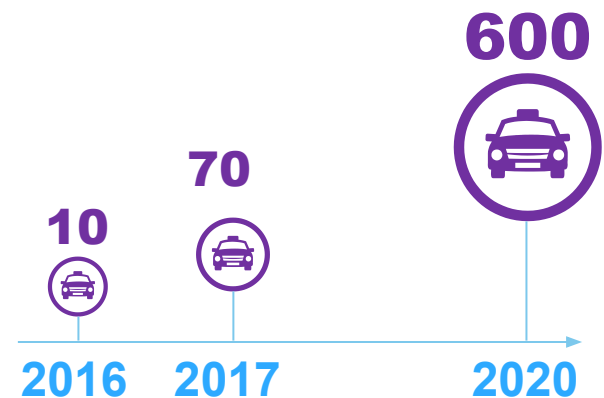
Air Liquide

**Key Enabler
of the project**

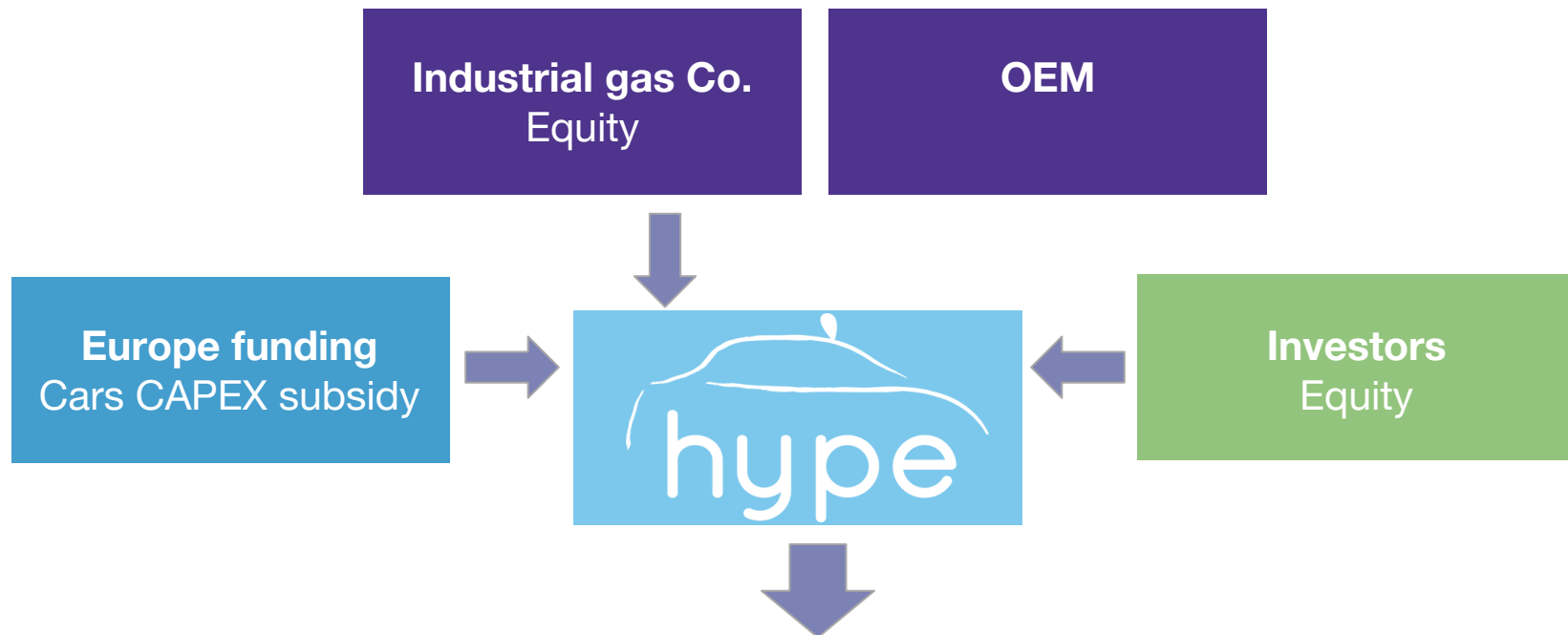
Launched in Dec. 2015,
during COP 21



FCEV taxi fleet

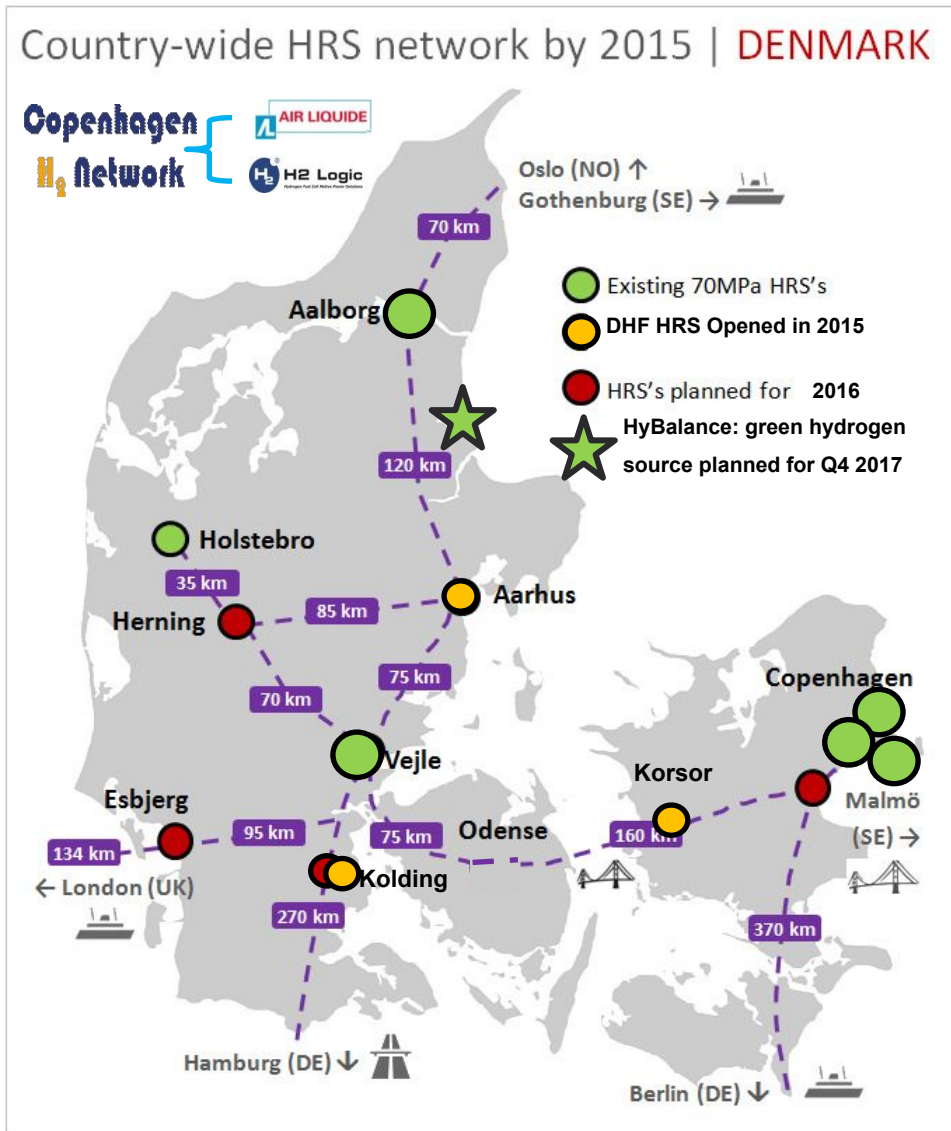


France infrastructure: Captive fleet within taxi business



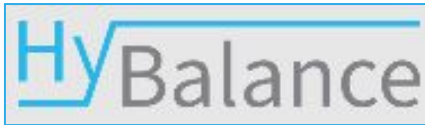
- Cars ownership & operation
- Fast and significant HRS charge from D1
- Aligned deployment of cars and infrastructure
- External stakeholders secure financial support

Denmark – A nationwide H2 network powered by wind

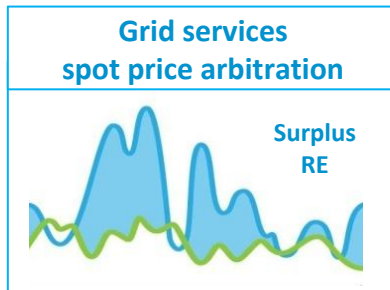


Denmark – A nationwide H2 network powered by wind

Industrial Power-to-H2 demonstrator



<http://hybalance.eu/>

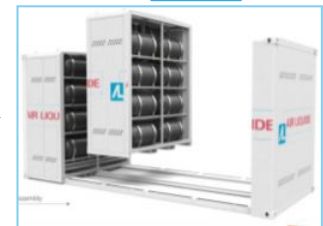


**1,25 MW PEM
Electrolyser**

H2



H2



Filling center

Local
industrial
customer

H2

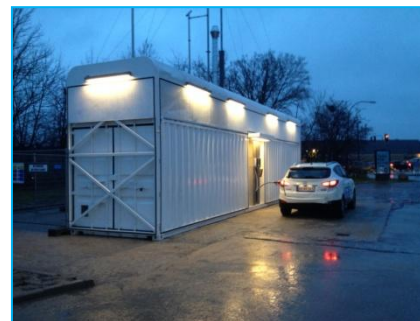
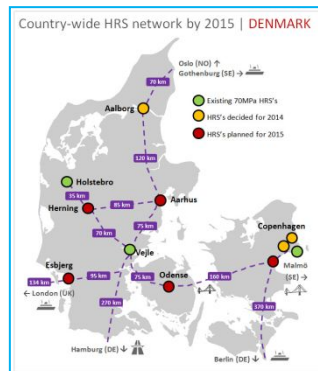
Industrial
off-takers

H2 @
200b

H2 @ high
pressure

**Complete
Wind-to-H2
supply chain**

Start-up in October 2017

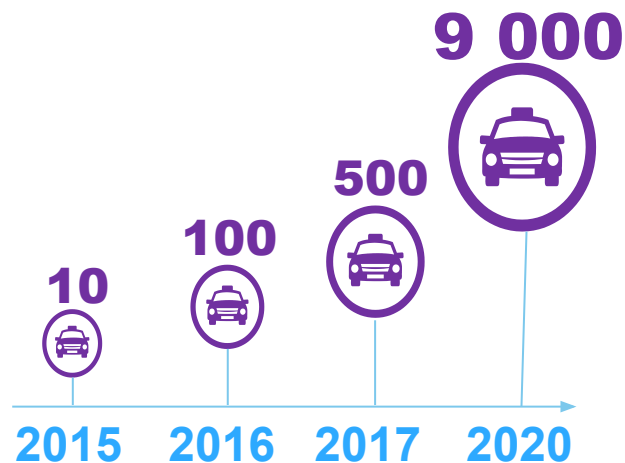


Refueling stations

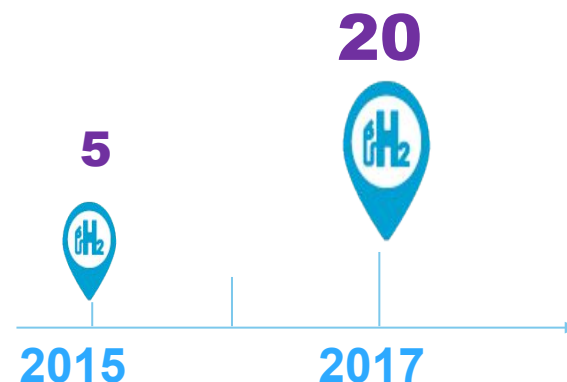
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Korea – Rolling out an ambitious roadmap!

FCEV's:



H2 stations:



- Green Car roadmap being actively implemented
- Innovative fleet business models
- Creation of H2 Korea to accelerate infrastructure investments



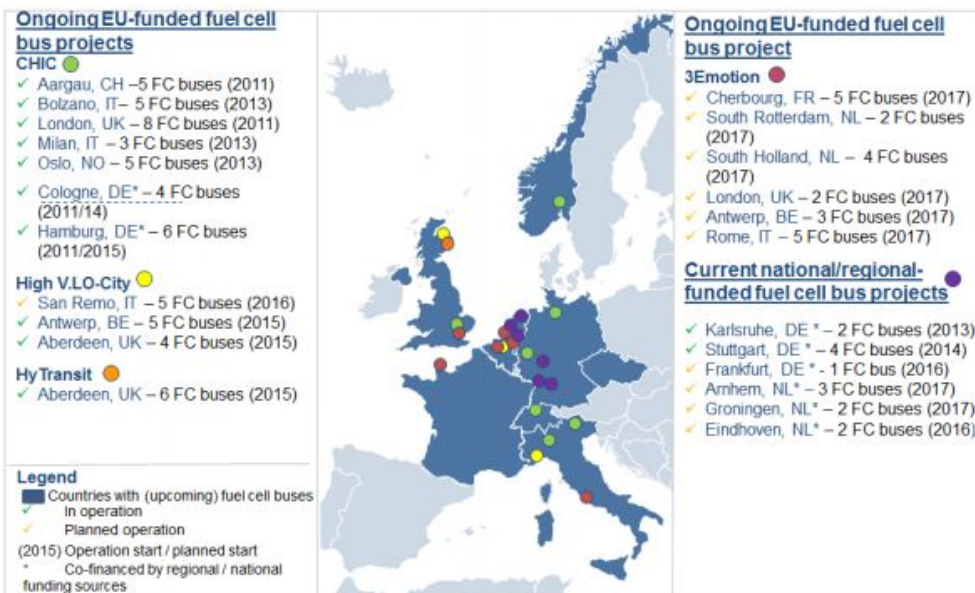
Middle East – 1st H2 station in Dubai!



- 1st H2 station started in September 2016, with first Mirais deployed
- Scale-up of FCEV deployment in Dubai until 2020 World EXPO
- Collaboration between Air Liquide, ADNOC, Al Futtain Motors / Toyota & Masdar (green power provider) to develop a H2 mobility roadmap in the USA



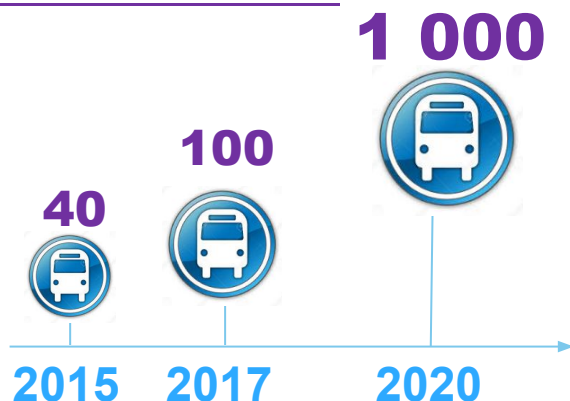
FC Buses: EU and China showing the way



Next steps:



FC Buses in EU:



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Looking beyond 2017...

- Hydrogen and Fuel Cell Electric Vehicles are at the **Tipping Point** !



- Early movers have proven that **it is sustainable!**
- **More players need to join the game** to further increase the momentum:
Car OEM's, Energy companies, financial investors, governments...

January 17, 2017 – Davos – Launching of the **Hydrogen Council**

13 Companies and their CEO's joining forces to voice the vision and the ambitions of the Hydrogen industry

Hydrogen acknowledged as a key solution to empower the energy transition

A further lever to accelerate
H2 infrastructure & FCEV deployments!



2015 → 2017: Building up scale all over the world!

