

**SET
PLAN**
Conference
2015

Research, innovation
and competitiveness
for the Energy Union

HYDROGEN IN TRANSPORT

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Coordinator H2 Mobility France

SESSION 4

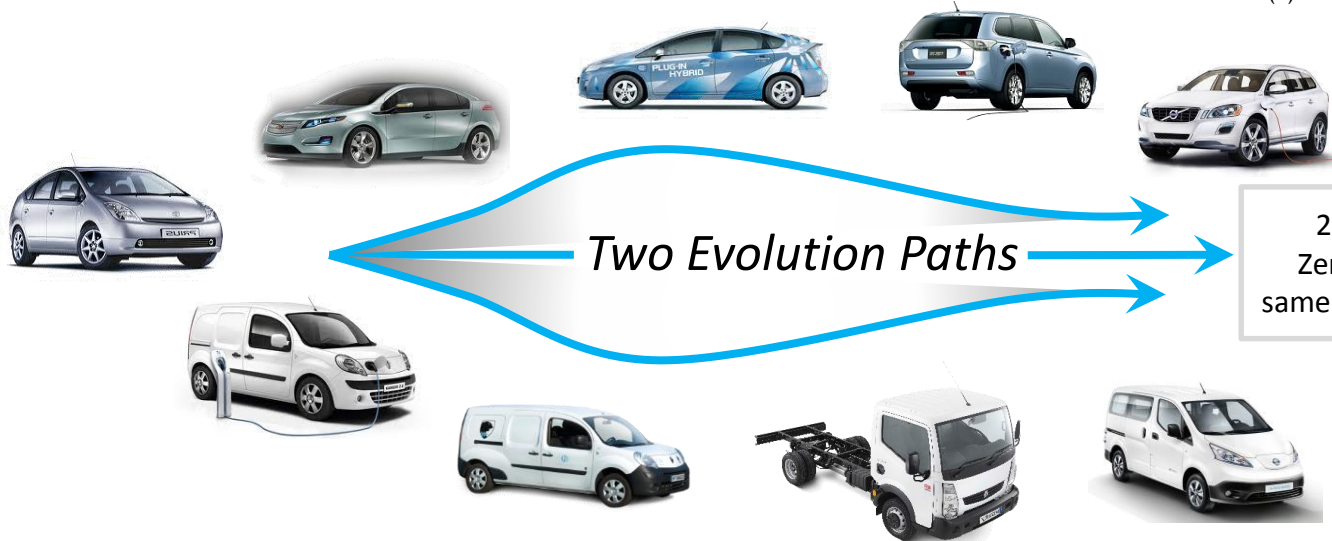
Sustainable energy for transport - and the link to
the strategic transport research and innovation agenda
Tuesday 22 September 2015

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Consumers are welcoming Electric Vehicles that fit their needs

“less polluting solutions” with same performances for consumers: Hybrid, PHEV⁽¹⁾



H₂ Full power



New batteries



“zero CO₂” Solutions for LDV: Batteries, Hybrid Fuel Cell Range Extender

Infrastructure is needed!

(1) — PHEV: plug-in hybrid electric vehicle

For Hydrogen, France defined a Ramp-up approach to minimize investments risks in the early years of infrastructure deployment

- The infrastructure roll-out first steps are focused on fleets

Vehicles and HRS are deployed once enough local clients are identified

A good HRS load factor is achievable from the beginning

Initial investment capacity and risk of under-utilisation are greatly reduced

- On suitable fleet market segments



Delivery/utility



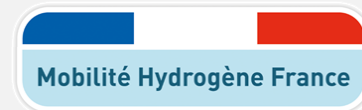
Taxis



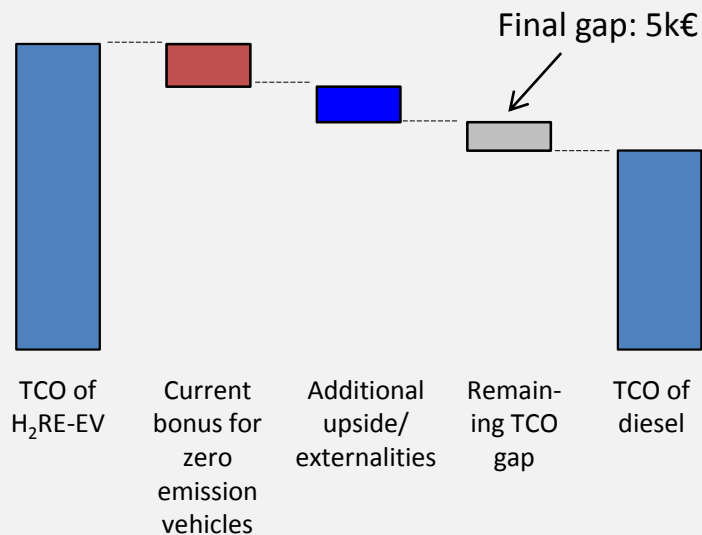
Urban duty logistics



Fleet cars



With H₂RE-EVs, the TCO₁ for Fleets are almost equivalent to diesel



- Significant upside/externalities⁽²⁾
  - Increased number of addressable duty cycles compared with battery electric vehicles
  - Reduced accident rate for electric powertrains due to lower driver fatigue
  - Increased vehicle availability due to rapid vehicle fuelling
- Restrictions in urban access with diesel vehicles anticipated
  - Increasing needs for clean vehicles
- The current 'Bonus-Malus' vehicle incentive system helps to reduce the TCO gap in the early years

We are now executing our plan in France:

- Find cities with Clean Air initiatives
- Find first 20 customers in each city
- Decide where to install the H2 station
- Sell cars and deploy H2 station



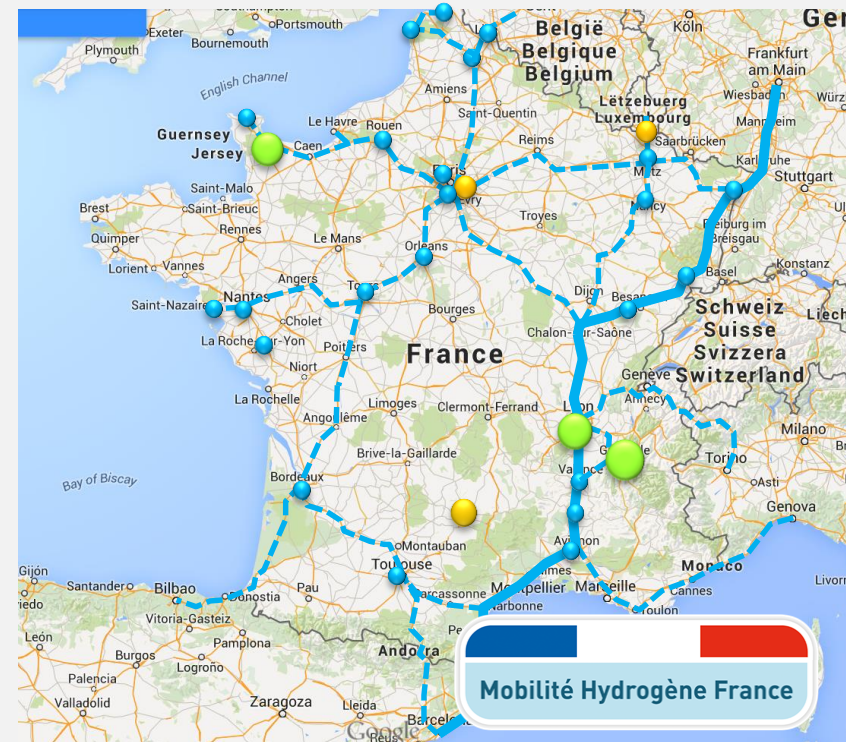
Existing HRS



Candidate for FCH-JU call 2014



Candidate for FCH-JU call 2015



Hydrogen Mobility will help France to meet its CO₂ targets and support the Energy Transition plan

Quality of life	Societal cost savings : 500million € over the 2015-2030 period Societal cost of the CO2 emissions, noise and pollutants of an ICE vehicle: 510 € per year, reduced to 160€ for a FCEV.
CO ₂ emissions	- By 2030, the fleet of FCEVs will save 1.2Mt of CO2 per year Equivalent to 780,000 diesel vehicles - Annual CO2 savings from 1.2Mt p.a. in 2030 to 10.4Mt in 2050
Energy security and Economy	- FCEVs improve the energy independence factor of France 3 TWhe of electricity used by fuel cell vehicles by 2030 - Value creation of 700M€ for H2 Sales in France
Energy transition	- H2 production through water electrolyzers offers the opportunity to integrate renewable generation as well as smooth the loading factor of nuclear plants - H2 can also be injected in the gas grid or combined with CO2 to produce synthetic methane and thus decarbonise other sectors

The are European Key technology players for Hydrogen

Fuel Cell System



AD-VENTA



TRONICO
ALCEN



Symbio FCell



Vehicles



Electrolyser



AREVA H₂Gen



Production



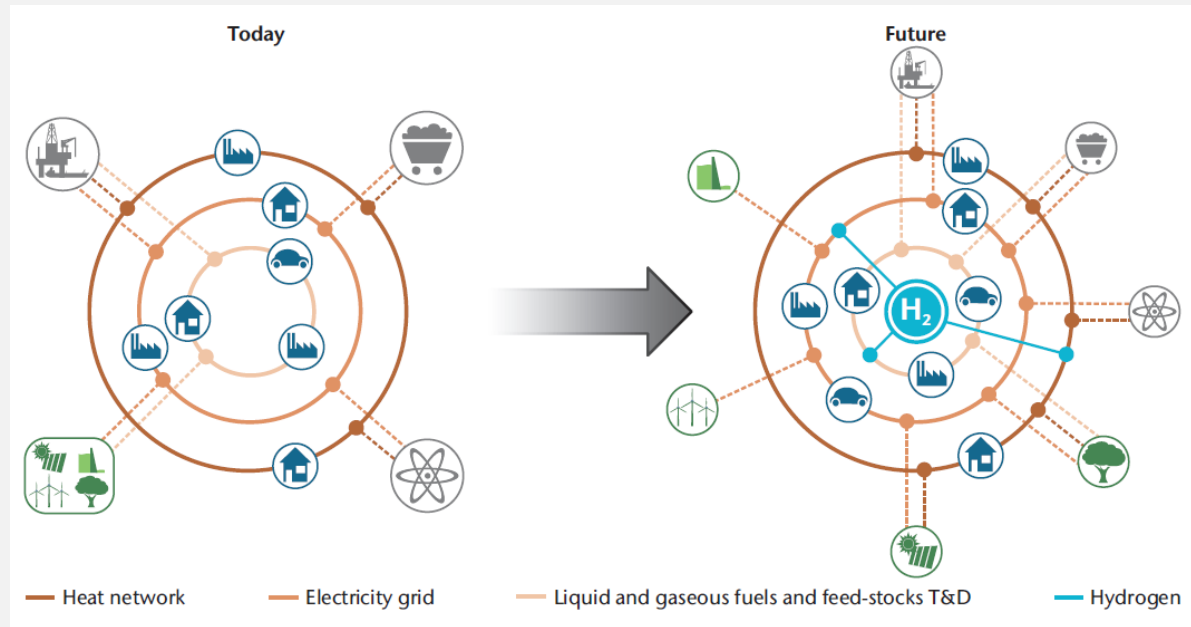
Stations



Operators



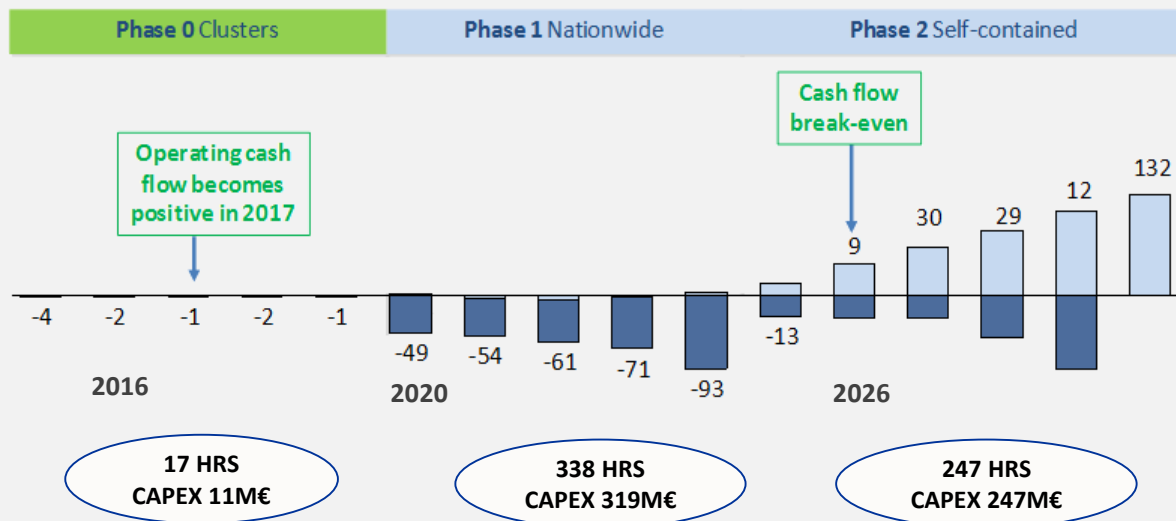
Hydrogen can link different energy sectors and energy T&D networks and thus increase the operational flexibility of future low-carbon energy systems (IEA 2015)



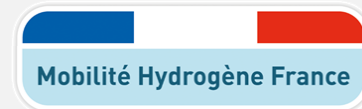
Valley of death must be passed to reach the infrastructure economic viability

Free cash flow of passenger car led HRS rollout
Million EUR

■ Capex ■ Operating cashflow



- Losses in the early years are reduced by 75% with the fleet approach
- HRS investments after 2020 expected to be NPV positive
- TCO premium is ~EUR 15,000 per vehicle before incentives in first 5 years



European collaborations aim at accelerating market adoption

Focusing on costs reduction, clean production path improvements and better hydrogen storage

FCH-JU: 646 M€ (2014-2020 budgets)

Funding	Research & Innov.	Innovation	Total
Transports Systems	94 M€	213 M€	307 M€
Energy Systems	94 M€	213 M€	307 M€
Cross Cutting			32 M€

DG-Move/TEN-T: 63 M€ (2015 hydrogen projects)

Project Name	Costs	Funding	Description
COHRS	26 M€	13 M€	Funding for 17 H ₂ stations + 3 in Austria
H2Nodes	29 M€	14,5M€	H ₂ stations + some trolley bus funding in 3 cities
EAS-HyMob	8 M€	4 M€	10 H ₂ stations

Hydrogen is now part of the energy paradigm and will contribute to the European objectives for low carbon, air quality and energy security

We have a plan, we have the will, we have the partners, we need you to continue supporting this pan-european effort



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LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère du Développement durable
et des Infrastructures

Département de l'environnement



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