



HYCHAIN MINI-TRANS Project

Torres Vedras, April 29th, 2010



Providing tomorrow's energy today

With the
support of



The Air Liquide Group



- **World's largest industrial gas supplier**
- **€ 12 bn sales in 2009**
- **More than 1 million customers ...**
- **... in more than 75 countries**
- **40 000 employees**
- **8 R&D centers (USA, Germany, France, Japan)**
- **Nearly 8,800 patents and 2,800 protected inventions**
- **360 000 shareholders**



Integrated solutions: gas, associated products,
and **value based offers**

All centered on **technological innovation**



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Air Liquide and the Hydrogen



Over 40 years experience on Hydrogen in all segments of the value chain:

- **Production:** Over 500 bn m³/yr from 200 production units worldwide, 50 of which of large capacity (6 in Iberia)
- **Distribution:** 1,800 km of H₂ pipelines (the largest H₂ network worldwide); large truck fleet
- **Application & Use:** Industrial applications (steel, refining, glass, semiconductors,...)
- **Energy Carrier:** Air Liquid works on advanced H₂ storage systems, distribution systems (refueling stations), and fuel cells (Axane), as well as applications like Space (Cryospace)



Grid network North Europe



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Context: European Projects on H2 for Transport



Buses

HyFLEET:CUTE



Cars

ZERO REGIO



Mini-Transport

HYCHAIN



Harmonization Projects

HYLIGHTS & PREMIA



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Objectives



HYCHAIN Project main goal is to **initiate a new stage in the Transport Sector**, and facilitate a **sustainable development** through H2 technologies.

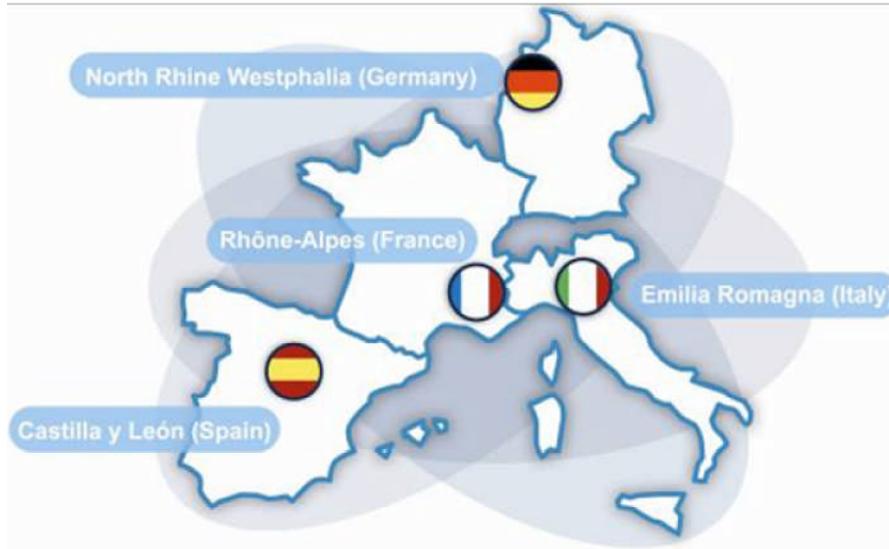


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Objectives



North Rhine Westphalia
Region de Emscher-Lippe
Agglomeration Community



Rhône-Alpes
Grenoble Alpes
Agglomeration Community



Emilia Romagna
Ciudad de Modena



Castilla y León
Ciudad de Soria



The HYCHAIN MINI-TRANS Projects **deploys** several **innovative FC-based vehicle fleets** in four European Regions (France, Spain, Germany and Italy) operating with **Hydrogen** as an alternative energy source



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Project Organization



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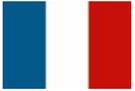
With the support of



Project Partners



The Partners belong to the private, public and academic sectors

			
AIR LIQUIDE AXANE CEA INERIS INPG PAXITECH ASCOPARG	AIR LIQUIDE WI WIN HYDROGENICS MASTERFLEX	AIR LIQUIDE DEMOCENTER- SIPE ERCOLINO VEM FAST	AIR LIQUIDE BESEL CIEMAT DERBI RUCKER CEU DOMENECH IBERDROLA



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Project Schedule



2006

R+D, Manufacturing
& Homologation

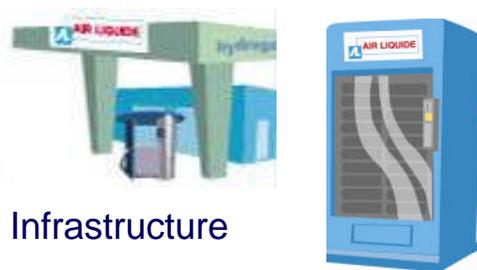
2009

Technology demonstration
& business model validation

2010-2011



Vehicles



Infrastructure



Operation



Logistics



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Vehicle Fleet



1. Deployment of a 50 vehicle fleet
2. Implementation of the H2 infrastructure
3. Launching of the Business Model
4. Public dissemination and acceptance



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Main Features:

- 1 passenger
- 250 W electric motor
- 100 km range
- Max. allowable weight: 100 kg
- Max. Speed: 18 km/h
- H2 source: 1 B3 cartridge





Main Features:

- **Medical product Class 1, Type B (as per EN-12184)**
- **550 W electric motor**
- **45 km range**
- **Max. allowable weight: 150 kg**
- **Max. Speed: 6 km/h**
- **H2 source: 1 B3 cartridge**





Main Features:

- 2 passengers
- 12 kW electric motor
- 120 km range
- Max. allowable weight: 500 kg
- Max. Speed: 50 km/h
- H2 source: 2 B20 cartridges
- 230 VAC power source (for tools)





Main Features:

- 22 passengers + wheelchair + driver
- 25 kW electric motor
- 200 km range
- Max. allowable weight: 6045 kg
- Max. Speed: 33 km/h
- H2 source: 2 on-board 174 liters tanks @ 200 bar





Main Features:

- 1 passenger
- 2 kW electric motor
- 80 km range
- Max. allowable weight: 145 kg
- Max. Speed: 45 km/h
- H2 source: 2 B3 cartridges





300 bar quick-connect cartridge (B3 & B20 cylinders): For Cargo Bikes and Wheelchairs (B3), and Utility Vehicles (B20).



Main features

- Exchangeable cartridges
- 300 bar
- 3 & 20 liter geometric capacity
- Safe, quick connect (performed by the vehicle user)



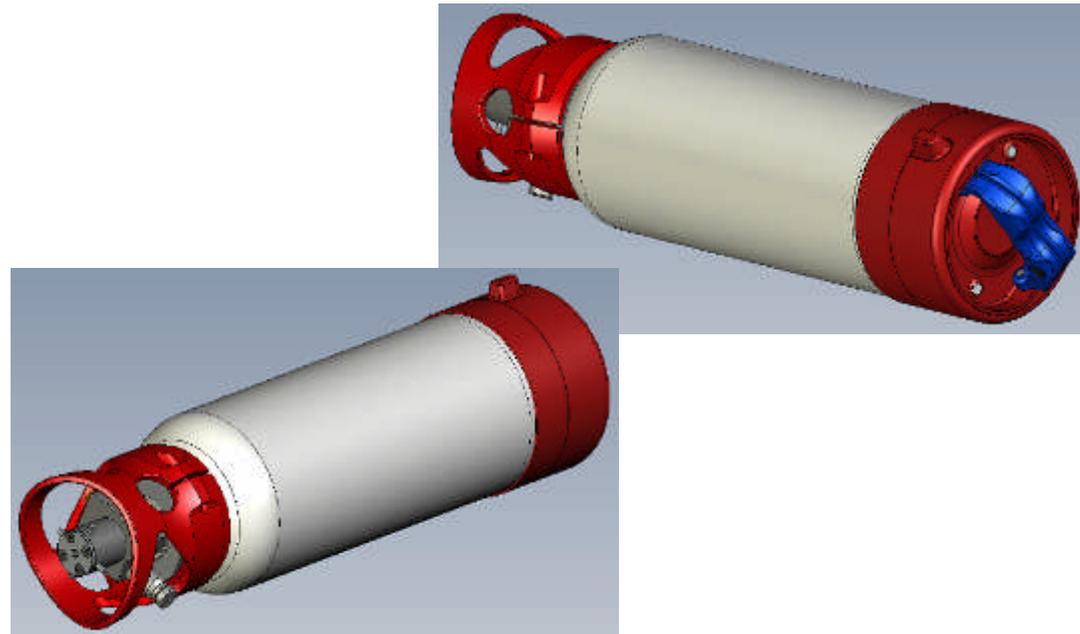


Hydrogen supply Phase 2

“Clip GS” High Pressure (500 - 700 bar): Cargo Bikes, Wheelchairs & Scooters

Main features

- 500 - 700 bar, 2.7 Liter
- Type 4 (Composite)
- Regulated outlet (4-20bar)
- Safe, quick connect
(performed by the vehicle user)





HyChain at a glance

HyChain Consortium

Press Room

Events

Contacts

Members area

Sponsorship

BRIEF DESCRIPTION OF HYCHAIN PROJECT

The HYCHAIN MINI-TRANS project is an Integrated Project funded through the 6th Framework Programme of the European Union, being one of the leading projects of the European Commission's Transportation and Energy Division. The project will last 5 years and will involve a network of 24 European partners.

HYCHAIN Project will allow citizens from four European Community regions to test a group of more than 150 small urban vehicles including small utility cars and minibuses, wheelchairs, scooters and tricycles, all powered by hydrogen fuel cells. This project will also demonstrate the use of innovative logistics for hydrogen distribution.

last projects news



HYCHAIN VEHICLES IN ZARAGOZA

The 2nd European Hydrogen Energy Conference (EHEC: www.ehec.info) took place on November 22nd-25th, 2005 in Zaragoza, Spain. On this occasion.. [+]



HYCHAIN LAUNCHING

The project HYCHAIN MINI-TRANS officially started on January 15th, 2006. During the next 5 years, a consortium of 24 partners will develop a project with a.. [+]



HYCHAIN LAUNCHING

The project HYCHAIN MINI-TRANS officially started on January 15th,



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HYCHAIN in Spain: SORIA



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SORIA

- Ancient Spanish province and town, belonging to the Region of Castilla y León
- Famous for its natural landscapes and parks, and cultural heritage
- Population less than 50,000
- Very much concerned about environmental issues



Vehicles



15 vehicles will be deployed:



4 Cargo Bikes



4 Wheelchairs



2 Scooters
(Phase 2)



4 Utility
Vehicles



1 Midibus



1 H2 refueling station



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Air Liquide in Spain takes care of:

- **Hydrogen Production, filling and conditioning** of cartridges and H2 bundles
- **Logistics and Dispatch** of cartridges to light vehicles users
- H2 supply to the Midi-Bus from a **H2 Refueling Station**



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H2 Refueling Station



H2 Refueling Station (Type M1-200)

- Full refueling in less than **6 minutes** (cascade filling)
- **Skid mounted** allowing an easy installation and portability
- 300 bar intermediate buffer
- H2 source: H2 cylinder bundles @ 200 bar (75 kg H2)
- H2 Booster



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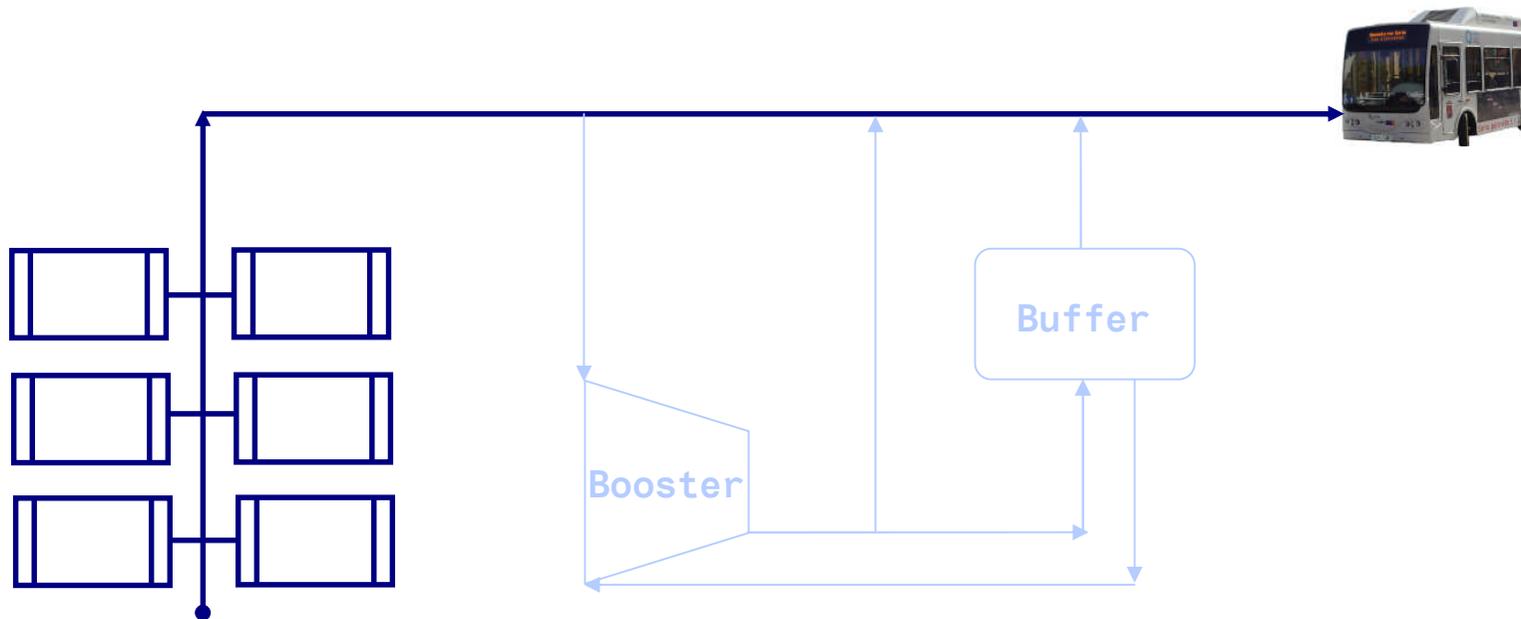


H2 Refueling Station



Operating Principle

Stage 1: Pressure balancing between Source and Bus



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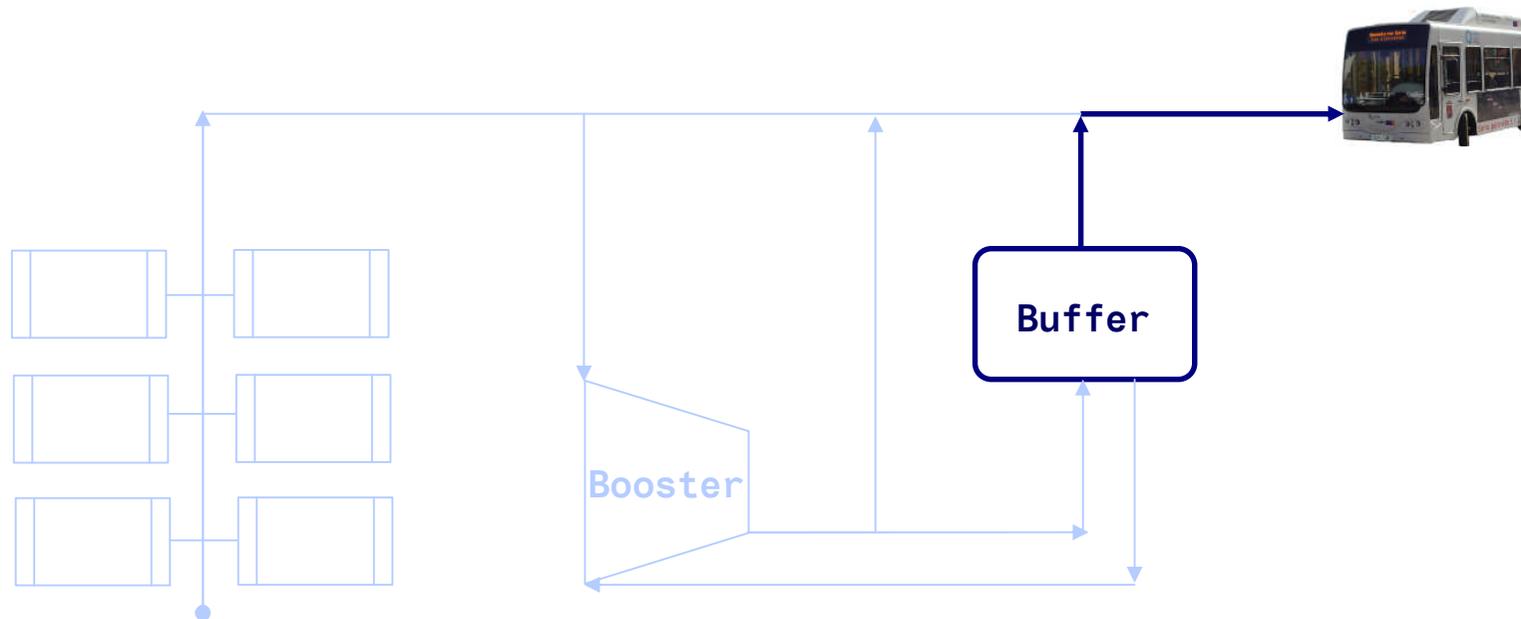


H2 Refueling Station



Operating Principle

Stage 2: Pressure balancing between Buffer and Bus



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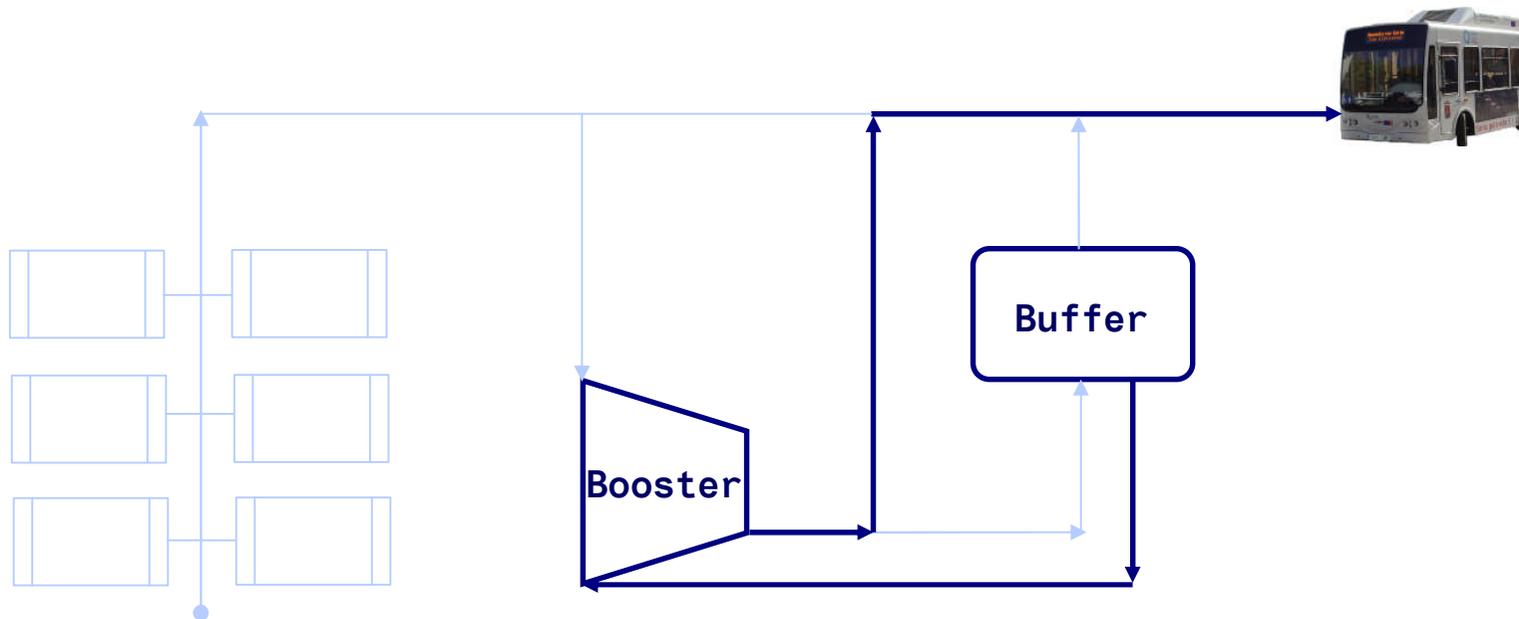


H2 Refueling Station



Operating Principle

Stage 3: Top Filling (Optional)



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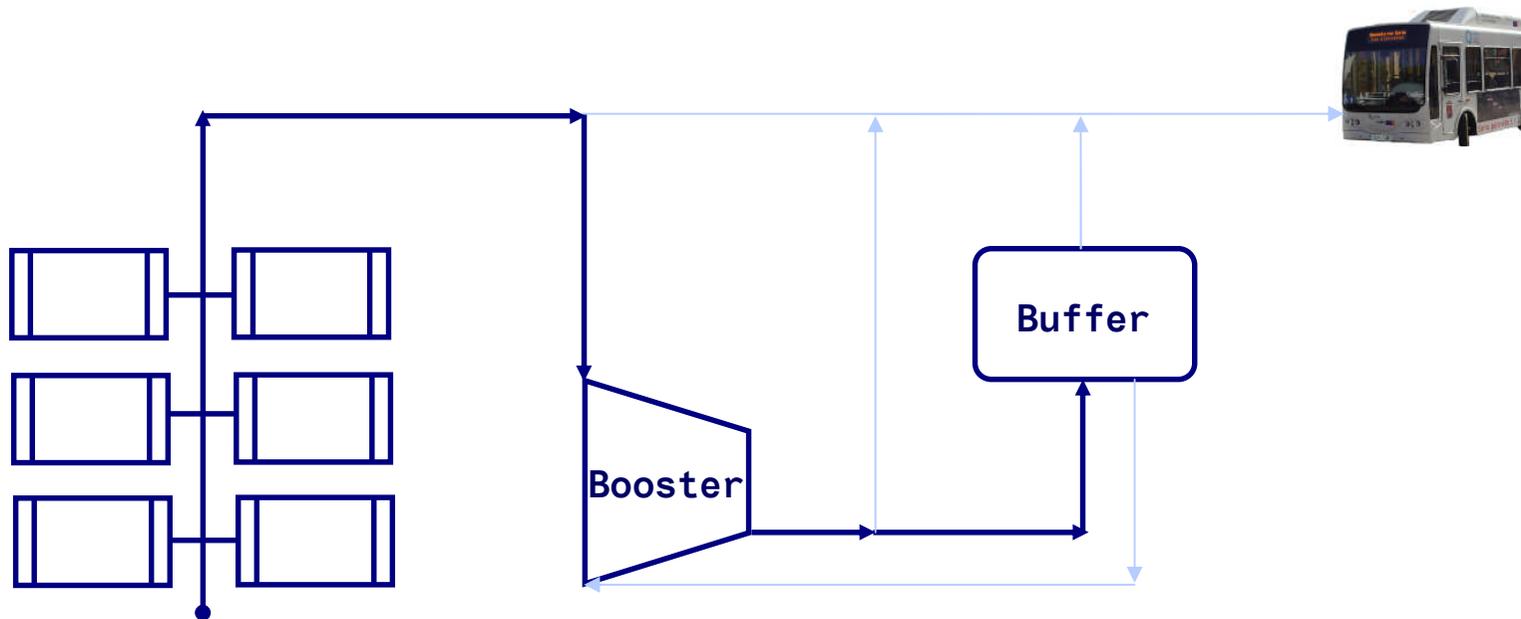


H2 Refueling Station



Operating Principle

Stage 4: Buffer reloading



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Besel takes care of:

- Base level Vehicles Maintenance
- Maintenance of de H2 technology elements (Fuel cells, on-board H2 Storage & Distribution Systems -HSDS)
- Vehicles storage





Global Project Training Center in Soria

A. IN PROJECT- Internal training for vehicle fleet deployment (April - May 2009)

B. OUT OF PROJECT- Training & dissemination activities for several audiences and general public, extrenal to Project scope.

OBJECTIVE: Make Soria an European reference for training, dissemination and demonstration of H2 technologies



See you at the HYCHAIN District!



Welcome to the Deployment Stage of the HYCHAIN PROJECT!



Thanks for your attention

Visit us at www.hychain.org



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