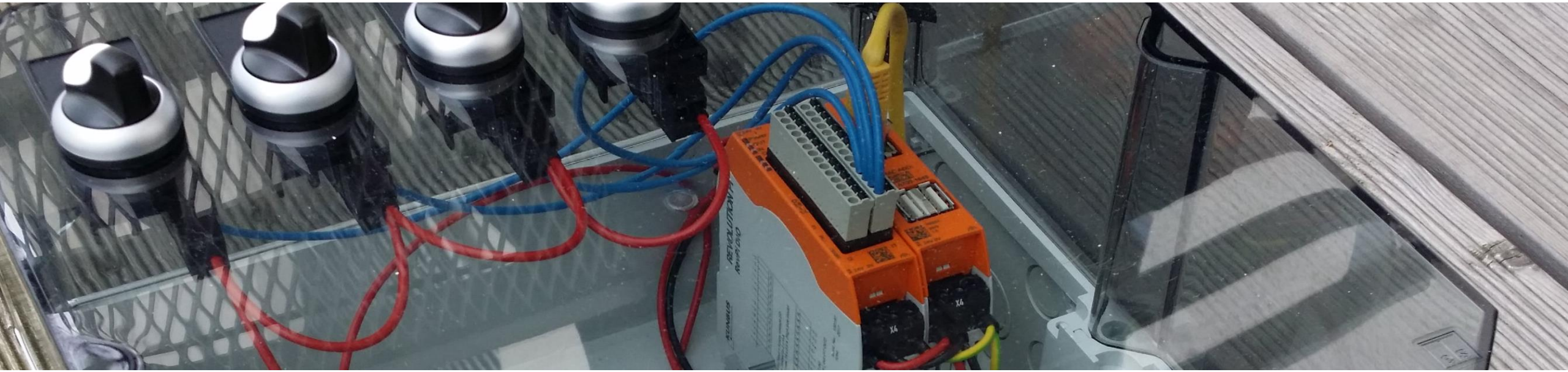


CONCEPT FOR A COMMON EUROPEAN HRS AVAILABILITY SYSTEM

Presentation on project process and results
FCH 2 JU Programme Review Days 2017, 24.11.2017

Nadine Hoelzinger, consortium leader (Spilett)

PROJECT MOTIVATION AND AIMS

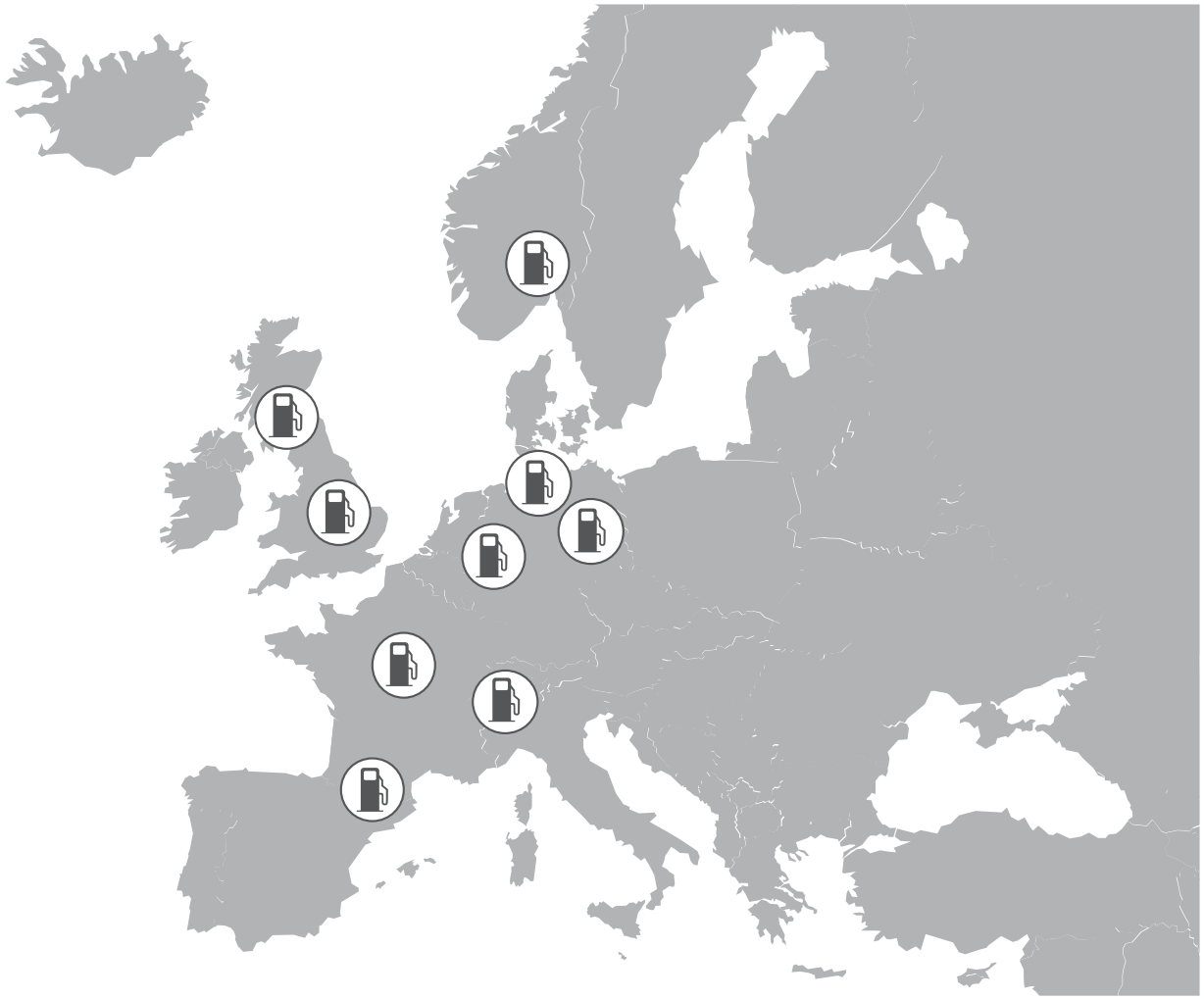
Initial situation and project context

- Despite the various on-going coordinated programs, Europe's HRS network will remain **relatively sparse** for many years.
- While various websites seek to show the extent and status of HRS by country / across Europe, there is no definitive source of reliable, up-to-date information on the **real-time availability** of HRS across all key markets.

Aim of the European HRS availability system

With a common European system on real-time availability we want to

- offer a service to the FCEV first users by providing a complete and reliable information source on their filling availabilities (real-time availability @standard definition of availability),
- show that the European grid of HRS is progressing not only by size but also by availability.



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OVERVIEW ON (SEMI-) AUTOMATED 700 BAR FCEV CUSTOMER INFORMATION SYSTEMS FOR HRS AVAILABILITY

API information from HRS suppliers
(signal changes + life signals every 15 min.)

Manual information import

SOSS-System (U.S.A)

Database

CaFCP map

True Zero app *(True Zero)*

Alternative fueling stations *(NREL)*

Hydrogen Station Finder *(Air Liquide)*

Relais information from transmitter box @ HRS
(mobile data (SIM), signal changes + life signals every 32 min.)

HIT-System (Germany)

Database + access platform

CEP map

H2.live map (H2M)

H2-Tankstellen (YellowMap)

H2.live app (H2M)

H2.operator app (H2M)

API

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PROJECT CONSORTIUM AND HRS DATA COMMUNITY

PROJECT DURATION: 28.7.2017 – 28.1.2018

Project consortium

SPILETT new technologies — **Project lead**
Overall system design

ENDA — **Technical support and realisation**

elementenergy — **Moderating discussions**
Developing business case models

Participating HRS data community

(definition of availability, concept for data acquisition and storage)

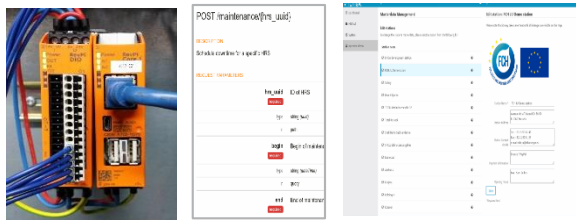
AFHYPAC, Fraunhofer ISE, HYDROGENICS, nel, Shell Germany, Air Liquide, ENGIE, Hyop, TOTAL, Air Products, infraserv höchst, OMV, Fundación para el Desarrollo de Nuevas Tecnologías del Hidrógeno en Aragón, H2 MOBILITY, ITM POWER, Westfalen, BOC, THE LINDE GROUP, PITPOINT CLEAN FUELS, McPhy

Interation of OEM and Third Parties perspectives

(definition of export)

UK H2 Mobility, TOMTOM, Hydrogen Mobility Europe, hype, BMW, DAIMLER, green tomato cars, TOYOTA, HONDA, HYUNDAI, Transport for London, Audi

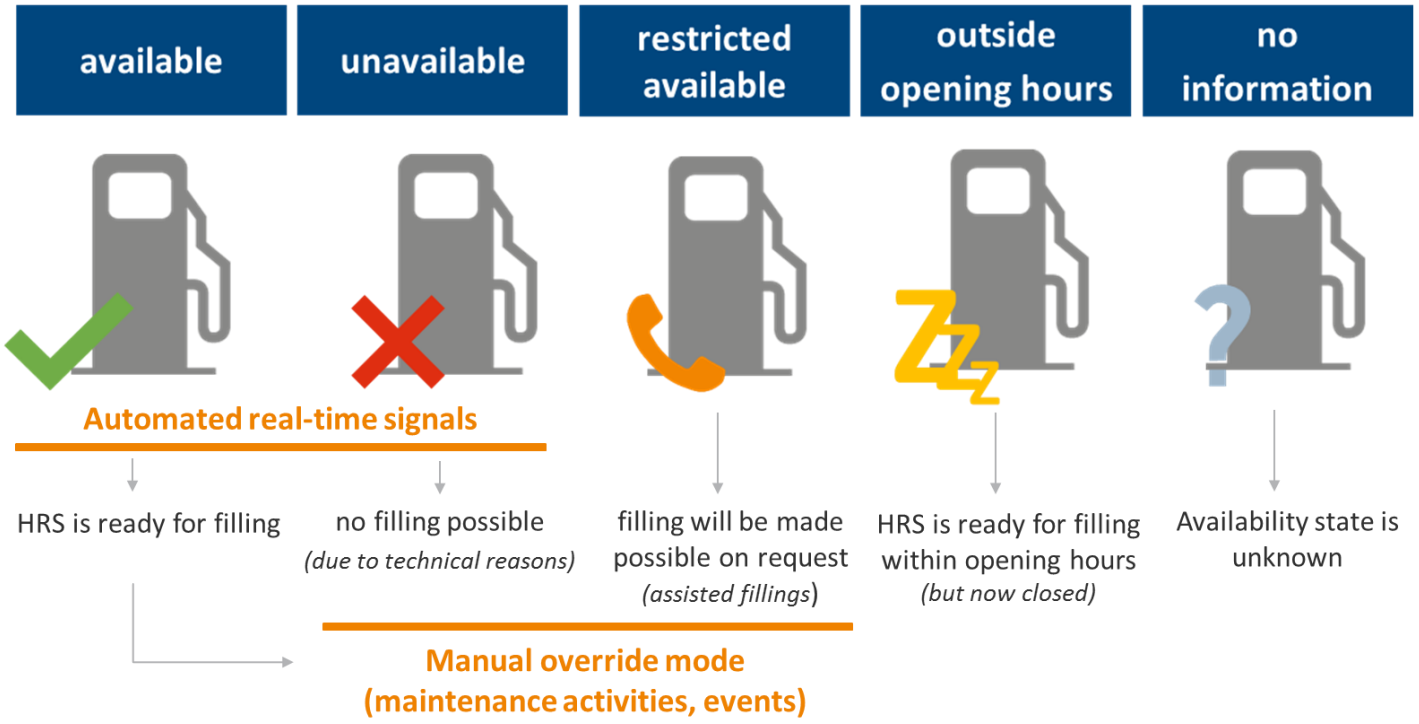
PROJECT PROCESS AND ACTIVITIES

	Q3 2017	Q3 2017	Q4 2017		2018
	Define a common standard	**Find a technical solution**	**Test the concept**		**Implement the system**
Activities	• Engage with the HRS data community to agree on a common definition • Draft a „strawman document“ to ease discussions • Organize a workshop (21.9.17)	• Identify and customize hardware to transmit signals for type A HRS (no API interface from plant monitoring) • Define standard API interface (open source based)	• Identify trial site and organize the test campaign • Customize, ship and install transmitters to type A sites • Integrate individual APIs for type B sites • Prepare map for trial	• Analyze cost of roll-out • Develop business models • Discuss financing ad business modells with all stakeholders • Recommend roll-out strategy for FCH 2 JU	
Results		**Type A HRS** **Type B HRS** 			

End of project phase 1

RESULTS: STANDARD DEFINITION ON AVAILABILITY

Define a common standard → Find a technical solution → Test the concept → Implement the system



- **Fully-automated system** with option to override by operator *(from „available“ to „not available“ or „limited available“)*
- **Signal to be used:** dispenser readiness
- **Update frequencies:** every 60 seconds or on signal change

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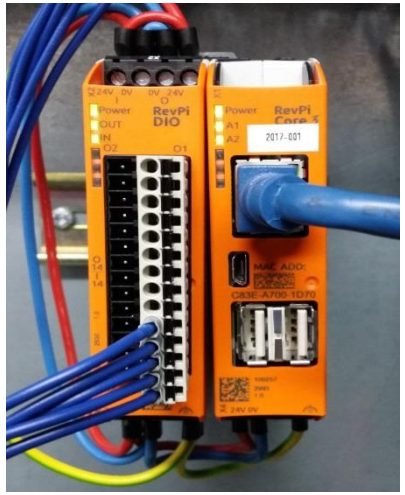
RESULTS: TECHNICAL SOLUTION

Define a common standard → **Find a technical solution** → Test the concept → Implement the system

Type A signal transmisssion

Revolution Pi



Manual Switch

Type B signal transmission

Standardized API

POST /maintenance/{hrs_uuid}

DESCRIPTION

Schedule downtime for a specific HRS

REQUEST PARAMETERS

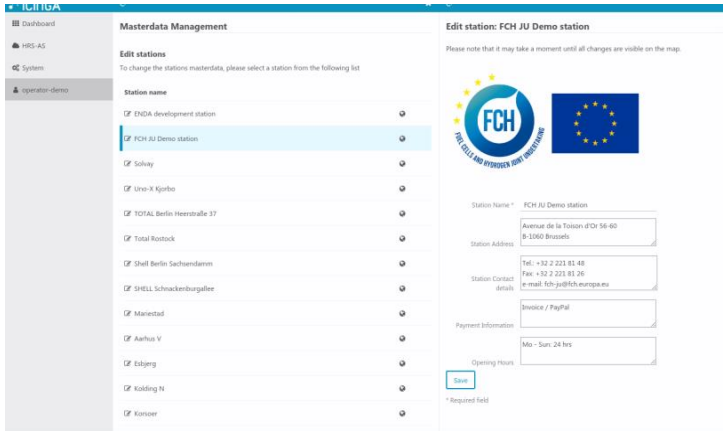
hrs_uuid	ID of HRS	required
type	string *(uuid)*	
in	path	
begin	Begin of maintena	required
type	string *(dateTime)*	
in	query	
end	End of maintenan	required

Individual API


```
{
  "h2m": {
    "columns": [
      "ID",
      "SerialNumber",
      "Availability",
      "Service",
      "EventCommentExternal",
      "StationCommentExternal",
      "LastChanged",
      "LastRecieved",
      "LastUpdated"
    ],
    "records": [
      [
        "1",
        "20",
        "1",
        "0",
        "-",
        "-",
        "2017-11-16 07:03:54",
        "0000-00-00 00:00:00",
        "2017-11-16 07:03:54"
      ],
      [
        "2",
        "22",
```


Data access and storage platform

OpenAPI Specification (OAS) format



RESULTS: TECHNICAL SOLUTION

Define a common standard → **Find a technical solution** → Test the concept → Implement the system

Criteria	Type A HRS	Type B HRS
Origin of signal	• HRS via relais and transmitter • LAN, WiFi or mobile data (modem, SMS)	• HRS suppliers /operators plant monitoring system via API[1]
Signal update	• Every 60 seconds	• On signal change only plus life-signal every 60-240 min.
Manual override from „available“ to „not / limited available“	• On site via maintenance switch • Online via operator‘s access platform	• Online via operators‘ access platform
Manual override from „not available“ to „available“	• Not possible	• Online via plant monitoring (API)
Data access and storage platform	• Common database for all information (static & dynamic) from type A / B HRS with operator‘s individual interface, basic reporting function, open source based and json /xml-export function to third party applications (apps, maps, car navigation system…)	

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PRELIMINARY RESULTS: PROOF-OF-CONCEPT

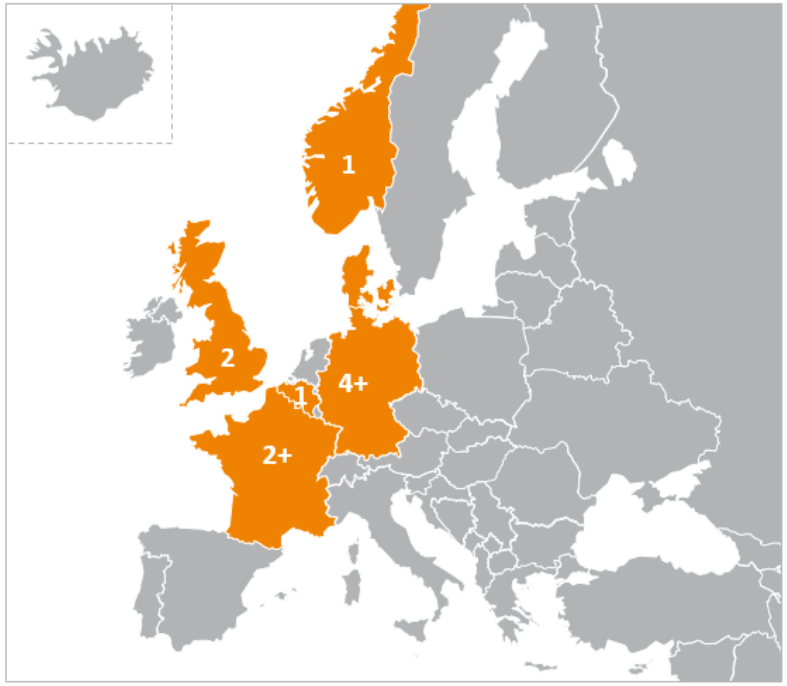
(30.10.2017 – 31.12.2017)

Define a common standard → Find a technical solution → **Test the concept** → Implement the system

Type A HRS	State
H2M / Shell, Berlin	●
H2M / TOTAL, Berlin	◔
T&R / Linde, Fürholzen	◔
BOC /Hydrogenics, Aberdeen	◔

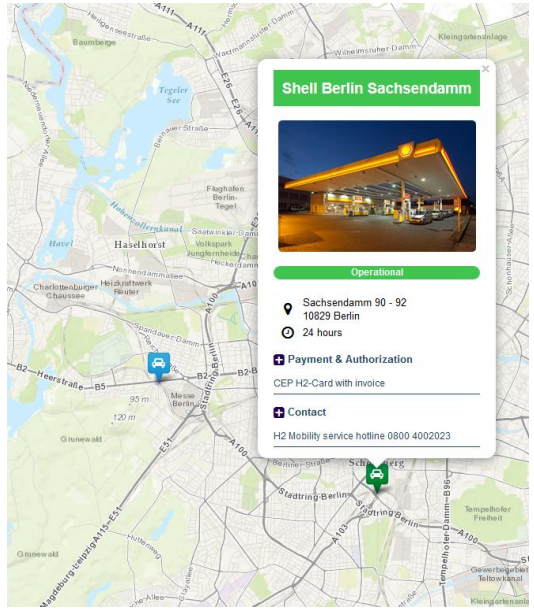
Legend
- ● Fully integrated and running
- ○ Integration not yet started

(all information as of Nov. 17th, 2017)



Type B HRS	State
H2M / ALAT, Offenbach	◔
Air Liquide, Paris	◔
McPhy, *tbd*	○
Air Liquide, Brussels	◔
NEL, all HRS	●
HyOP, Høvik	◔
Shell / ITM, London	◔

HRS availability map



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PRELIMINARY RESULTS: PROOF-OF-CONCEPT
(30.10.2017 – 31.12.2017)

Define a common standard | Find a technical solution | **Test the concept** | Implement the system

Live-Demonstration: https://portal.hrs-monitoring.enda.eu/ *(type B HRS from NEL live via API)*[1]

Shell Berlin Sachsendamm

Type A HRS

ENDA development station

Type A HRS

(1) all pictures are inserted as place holder for the proof-of-trial. Operators / suppliers may insert pictures in individual user interface menu.

Copyright of pictures are with the owners (CEP, CEP partner, H2M, NEL)

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RECOMMENDATIONS FOR A EUROPEAN ROLL-OUT
(TO BE DISCUSSED)

Define a common standard → Find a technical solution → **Test the concept** → Implement the system

Step 1:

Identify cost for roll-out and operation of the system

Step 2:

Discuss and define business models and / or funding options for roll-out and operation

Potential source of funding	Arguments
End users	FCEV users already pay a premium and are used to free access information on charging points. Unlikely to be willing to pay directly for HRS availability system.
Vehicle OEM	*Based on (limited) feedback to date:* The onus for showing HRS availability should be on HRS operators. Unlikely source of funding for HRS availability system (short term).
Advertising, sponsorship	High degree of uncertainty over level of funding available.
HRS operators	Some willingness to cover costs of HRS availability system. General view: Costs should be borne by others in the near term, paying on-going costs is expected to be more feasible from the mid-2020s.
HRS community	Some form of syndicated request for funding (on behalf of the sector) to a trade association / grouping of companies with a stake and who stand to benefit from commercialization of hydrogen transport.
Public funding	Possible option for the early phase, but not sustainable in the longer term.

Next steps

Recommendation to FCH 2 JU on how to roll-out and finance the system

(phase 2 of the project, beginning 2018)

SUMMARY OF THE SYSTEM FEATURES

1. **Common definition of availability**
   The following availability states will be communicated: available, not available, restricted available, outside opening hours, no information

2. **Agreement on signal to be used to indicate HRS availability**
   Dispenser availability, updated every 60 scond (type A HRS) or every signal change along with a life-signal every 60-240 minutes (type B HRS)

3. **Suitable hardware for transmitting signals @type A HRS identified and configured**
   Revolution Pi with security architecture

4. **Standardized API interface for integrating signals from type B HRS programmed**
   Integration of individual API interfaces possible (link to the standard API: https://api.hrs-monitoring.enda.eu/v1)

5. **Open Source software for operators' platform and availability map implemented**
   Link to the map: https://portal.hrs-monitoring.enda.eu/

6. **Export function to integrate live data of availability signals in own applications (apps, maps, navigation system…) included**
   Geojson interface with filter function to reduce data traffic: focus on updates of real-time availability information / of regional HRS

CONTACT

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