HYACINTH
HYdrogen Acceptance IN Transition pHase

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PROJECT OVERVIEW

Project Information	
Call topic	SP1-JTI-FCH.2013.5.3 Social acceptance of FCH technologies throughout Europe
Grant agreement number	621228
Application area (FP7) or Pillar (Horizon 2020)	**Cross-cutting**
Start date	01/09/2014
End date	28/02/2017
Total budget (€)	999,383
FCH JU contribution (€)	661,584
Other contribution (€, source)	None
Stage of implementation	86% project months elapsed vs total project duration, at date of November 1, 2016
Partners	Fraunhofer-ISI; NORSTAT; Aberdeen City Council; University of Sunderland; University of Leeds; I+F; RCVT; CIEMAT; CIDAUT; CNH2.

Impressions after driving a FCEV

FCH JU Hyacinth Project: Impressions after driving a hydrogen fuelled car

PROJECT SUMMARY

- MAIN AIMS: to gain a **deeper understanding of the social acceptance of hydrogen technologies across Europe**.
- Identify and **understand awareness and acceptance** of hydrogen energy and FCH technology and perceive potential benefits in the general public and at selected stakeholders.
- **Identify the main drivers of social awareness and acceptance** of FCH technologies in order to provide recommendations.
- **Support stakeholders** by providing a social acceptance research **toolbox**.

PROJECT PROGRESS/ACTIONS – PUBLIC SURVEY

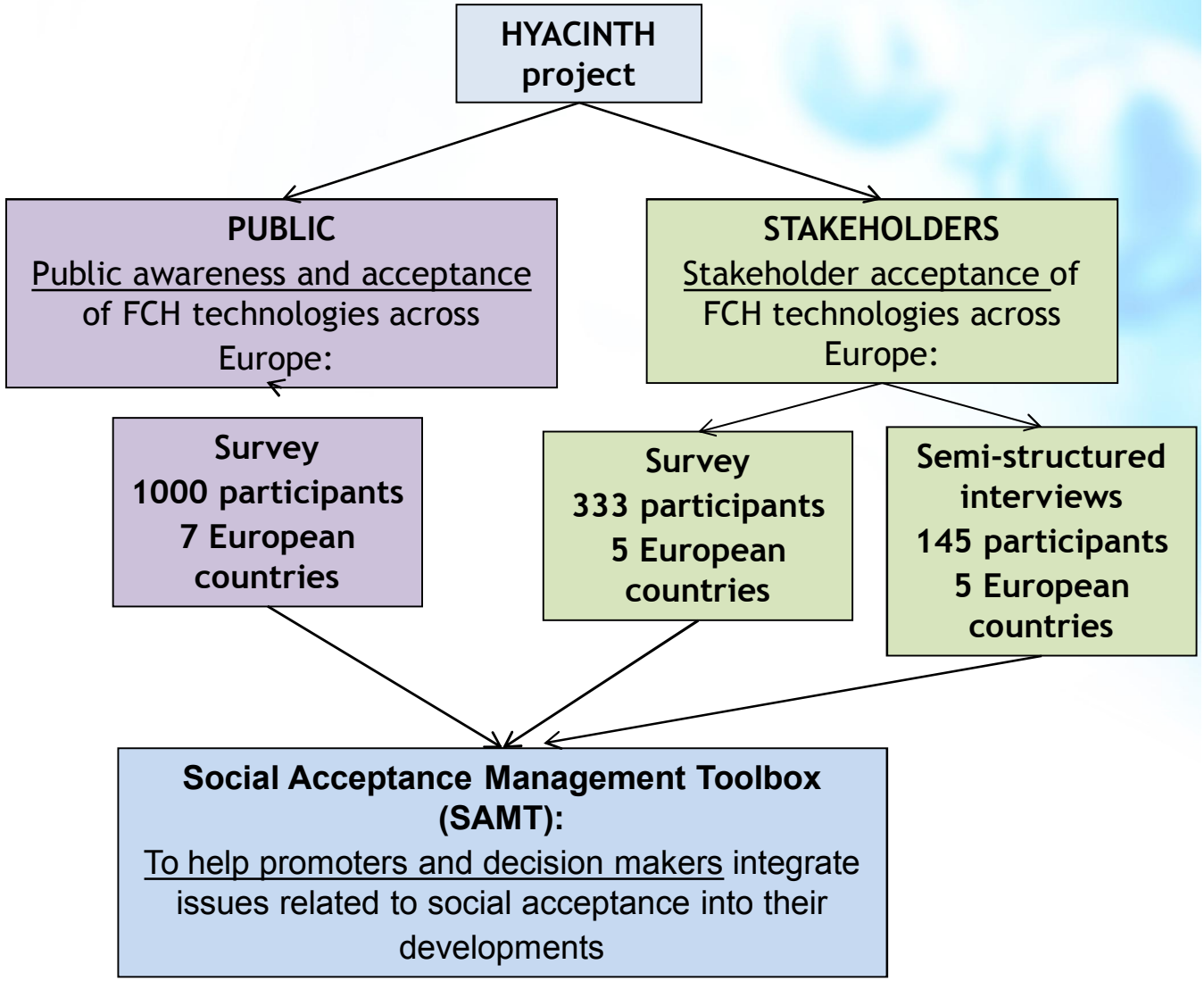
Studies:

1. Public awareness and acceptance of FCH technologies across Europe.
2. Stakeholder acceptance of FCH technologies across Europe

Studied applications:

1. Hydrogen fuel cell stationary residential applications

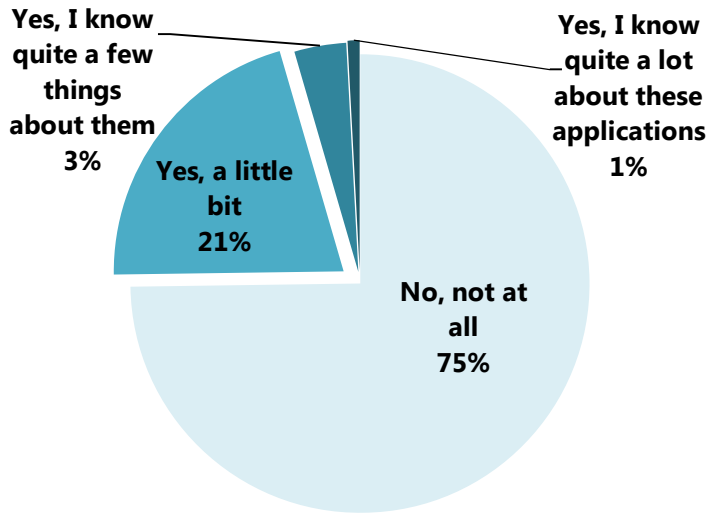
2. Hydrogen fuel cell transport applications and related infrastructures

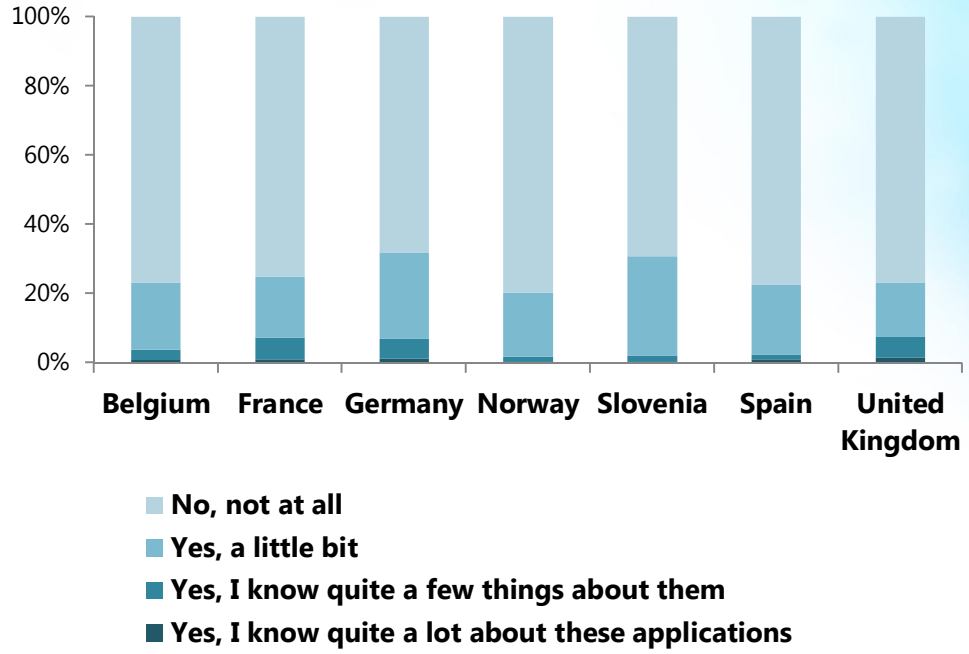


PROJECT PROGRESS/ACTIONS - PUBLIC SURVEY

Awareness of residential hydrogen fuel cells

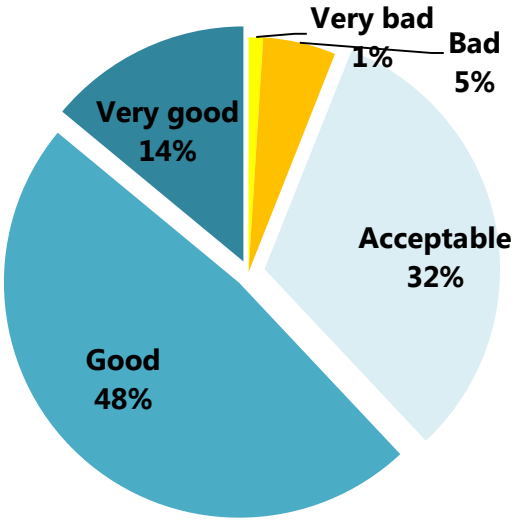
The level of public awareness about home HFCs is very low in the seven studied populations. **Only around 25% of respondents report having heard about residential fuel cell micro-CHP** (this is 15 percentage points lower than the level of awareness of HFCs in general). And less than 5% consider themselves knowledgeable about this application.





PROJECT PROGRESS/ACTIONS - PUBLIC SURVEY

Informed evaluation/global attitude of home HFCs

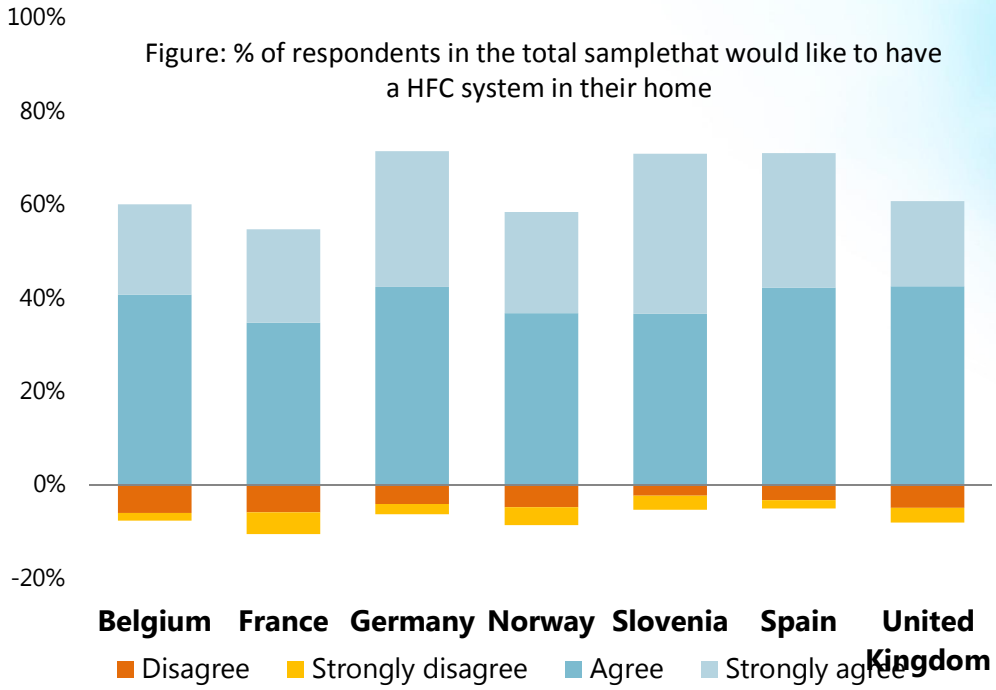


In all the countries surveyed we find that **the majority of the population rates the technology as a good option** (percentages range from 40% and 53%), followed by those who rate it as acceptable (from 27% to 36%)

Acceptance of home HFCs

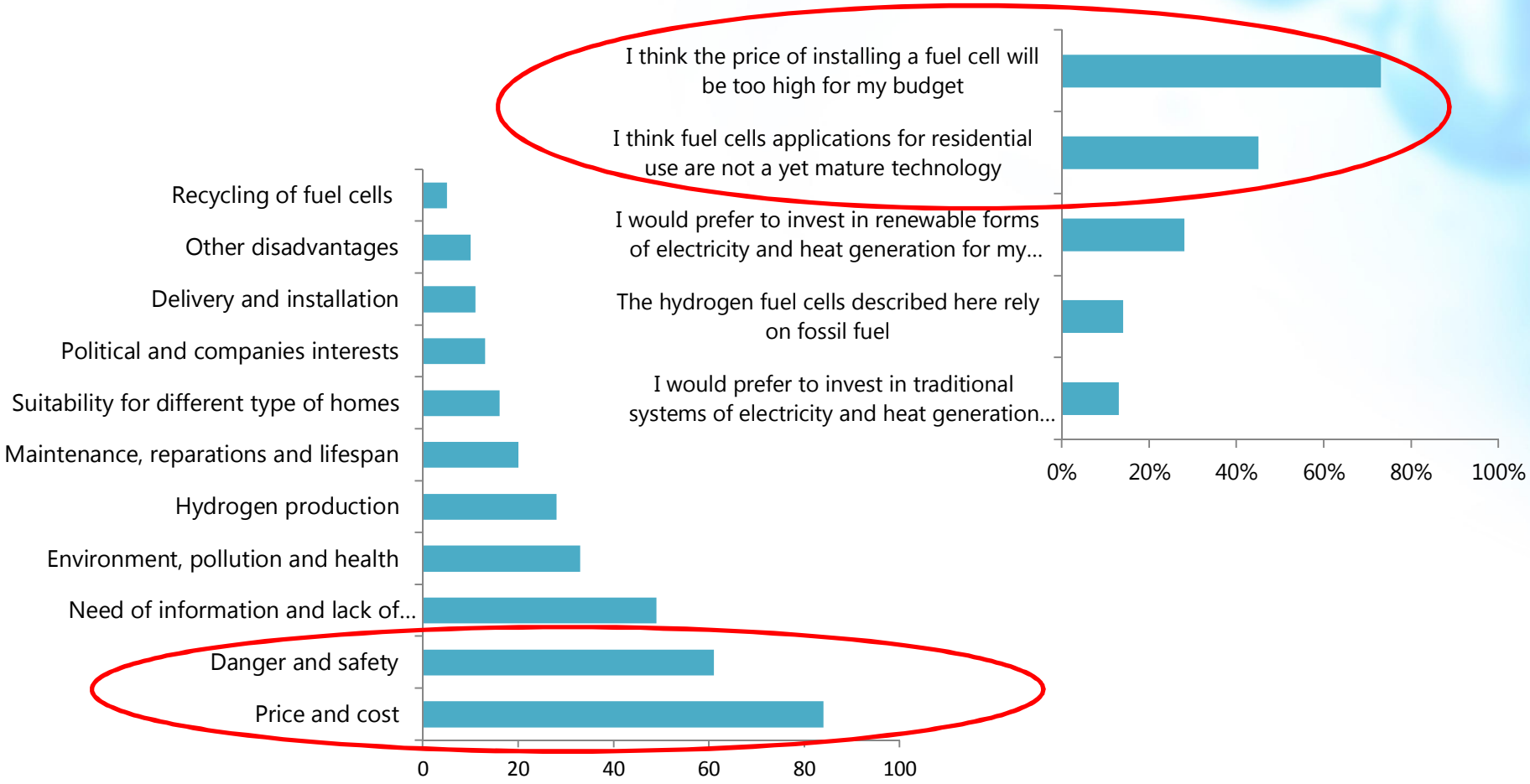
The study shows: "I would be happy to have an hydrogen fuel cell unit in my home in future". **Around 6 out of 10 would be happy to have a residential HFC unit at home** (2 out of 10 would be very happy), 3 out of 10 are undecided about this and less than 1 out of 10 would not be happy about it at all.

Figure: % of respondents in the total samplethat would like to have a HFC system in their home



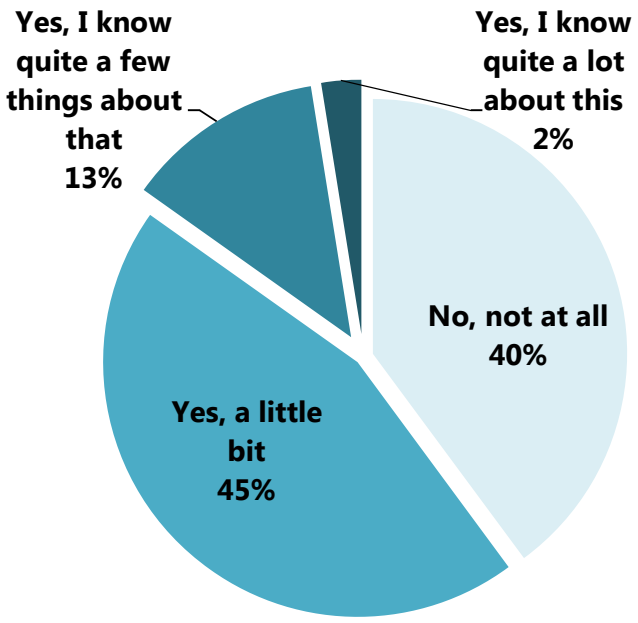
PROJECT PROGRESS/ACTIONS - PUBLIC SURVEY

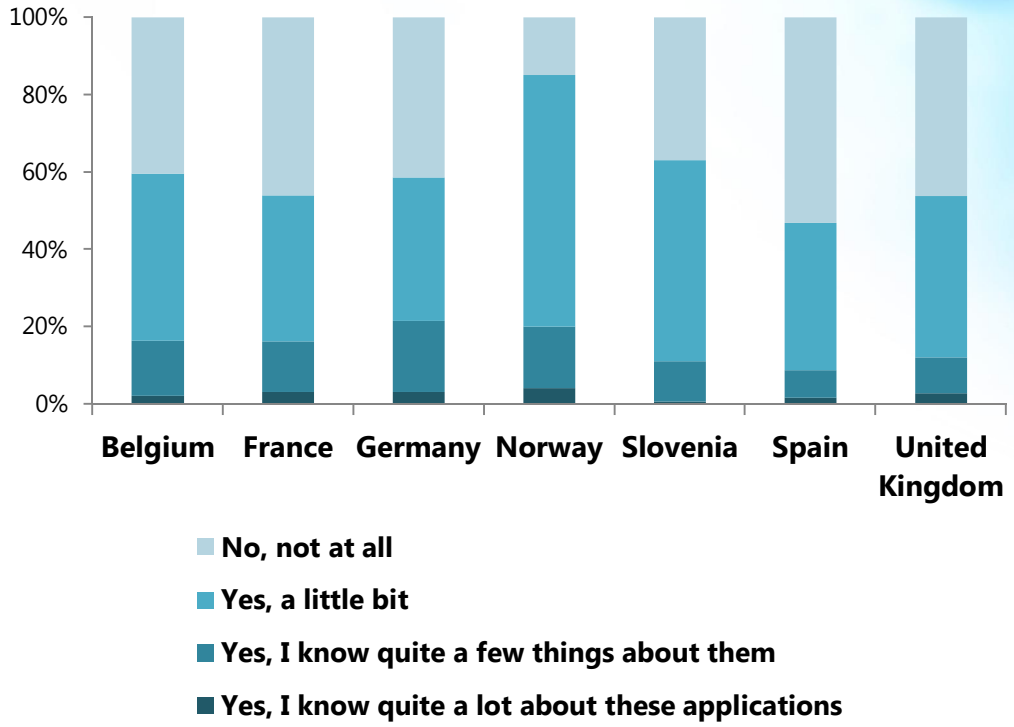
Respondents' reasons for not willing to buy a home HFC



Awareness of FCEVs

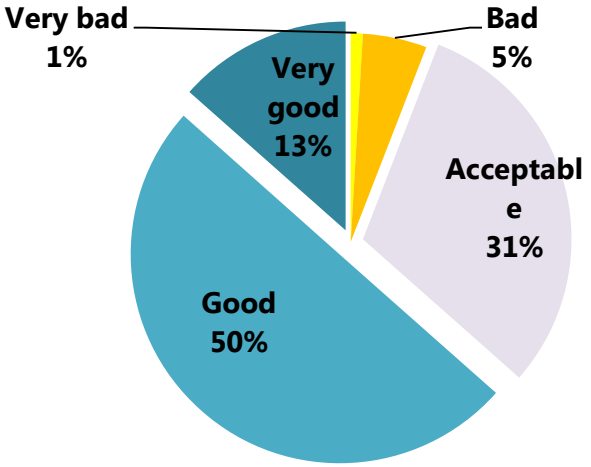
Awareness is significantly higher for FCEV relative to residential fuel cell micro-CHP. **Around 45% of respondents have heard a little bit about FCEV** and even a 15% reports knowing a few things about fuel cell cars.





PROJECT PROGRESS/ACTIONS - PUBLIC SURVEY

Informed evaluation/ global attitude of FCEV

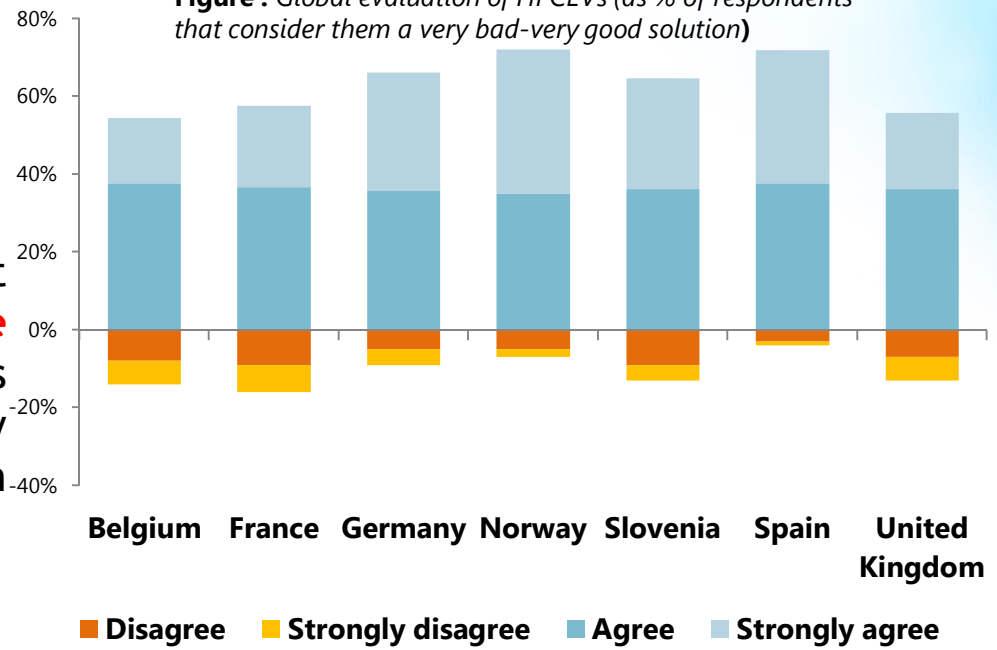


In all the countries surveyed we find that **the majority of the population rates the technology as a good option** (percentages vary between 44% and 56%), followed by those who rate it as acceptable (between 23% and 37%).

Acceptance of FCEVs

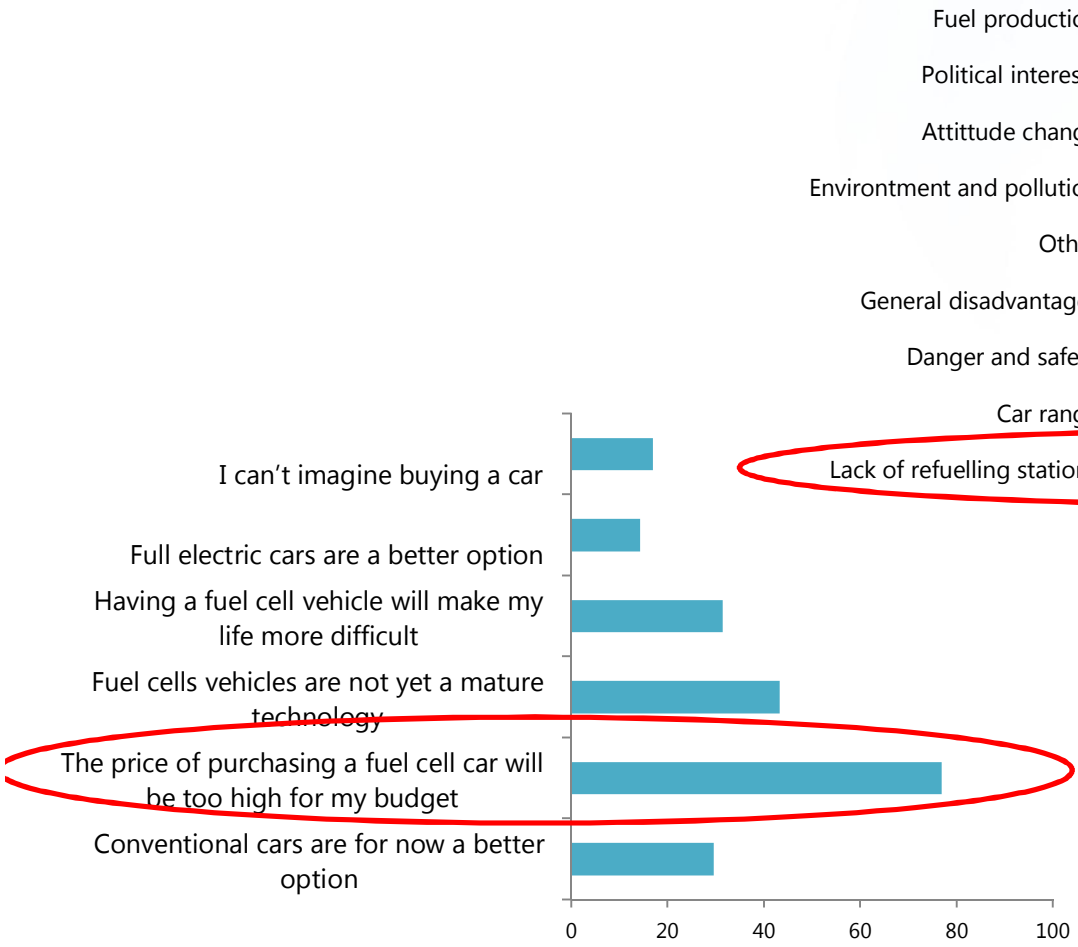
The majority of participants in the seven studied populations would be happy to have a hydrogen fuel cell car in the future (keeping all else equal). **More than 60% in the full sample would like to buy a HFC electric car in the future**. Around 30% of respondents are undecided about it; and around 10% are not willing to have a hydrogen fuel cell car in the future.

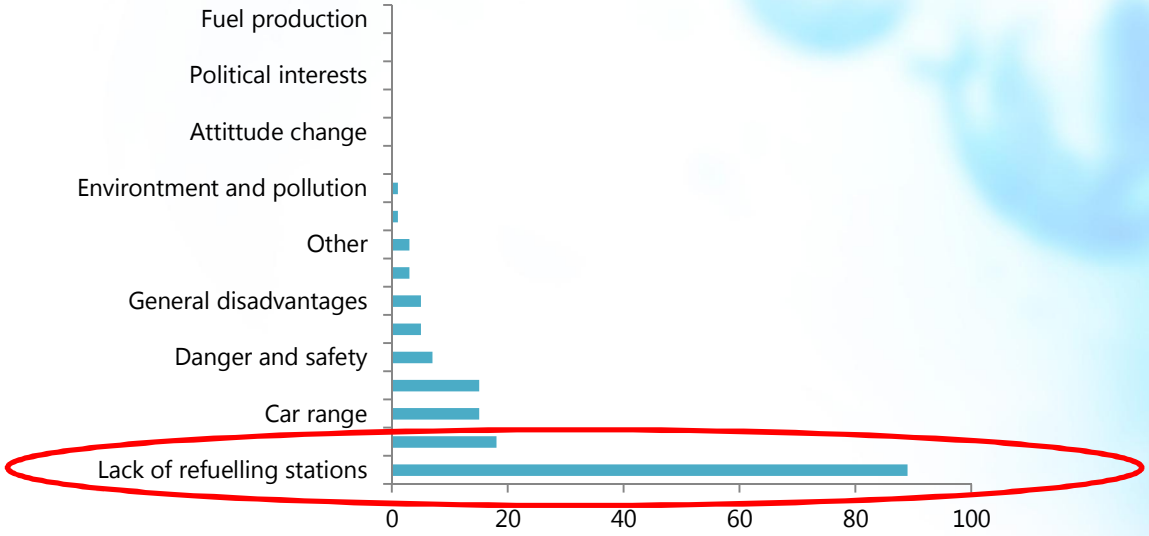
Figure . *Global evaluation of HFCEVs (as % of respondents that consider them a very bad-very good solution)*



PROJECT PROGRESS/ACTIONS - PUBLIC SURVEY

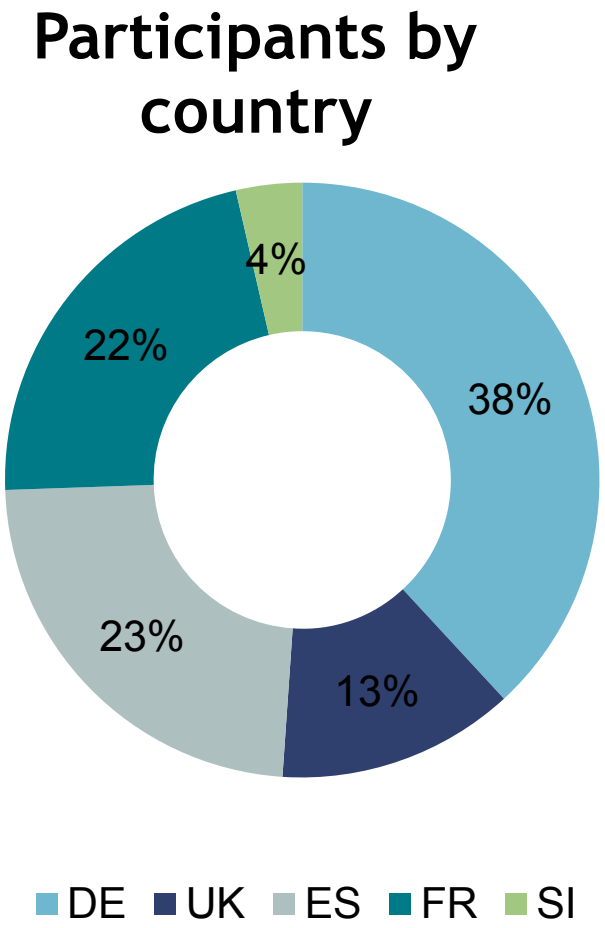
Respondents' reasons for not willing to buy a FCEV





PROJECT PROGRESS/ACTIONS - STAKEHOLDER SURVEY

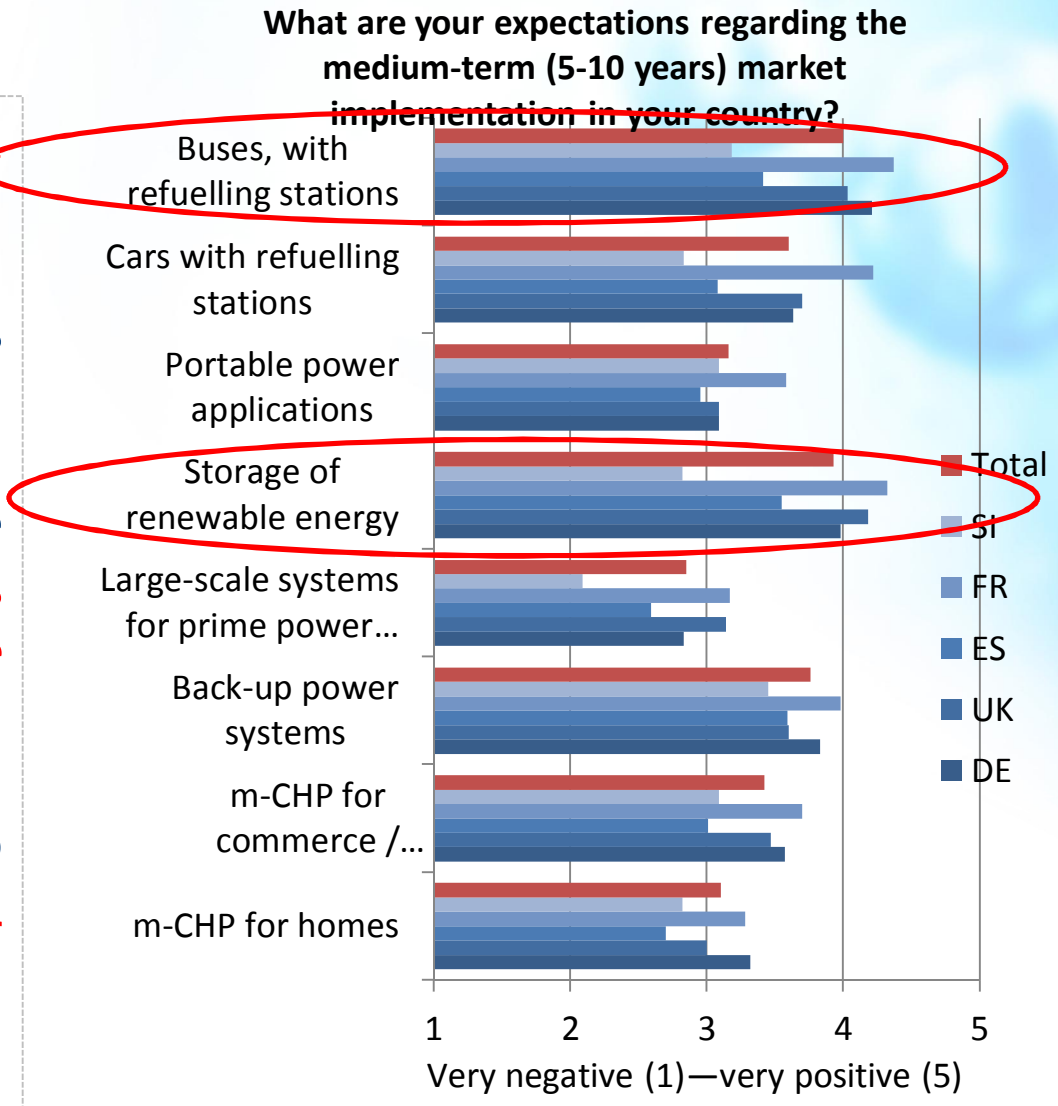
SAMPLE



- Heterogeneous affiliations:
  - Around **33% from private companies**
  - Around 15% from public and government organisations, education and other non-profit
- Plenty of experience:
  - **>25% have 11+ years of work experience**
  - >21% 5-10 years of experience
- Different fields of expertise:
  - **>50% work in research**
  - 30% on H2 production
  - 25% in systems integration

PROJECT PROGRESS/ACTIONS - STAKEHOLDER SURVEY

- 88 % think that HFC are a good or a very good solution for energy and environmental challenges (no country differences).
- Most positive future expectations about H2-buses and H2 as a means of storage for renewable energy.
- Respondents are in favour to further governmental support for FCH technologies.



PROJECT PROGRESS/ACTIONS - STAKEHOLDER SURVEY

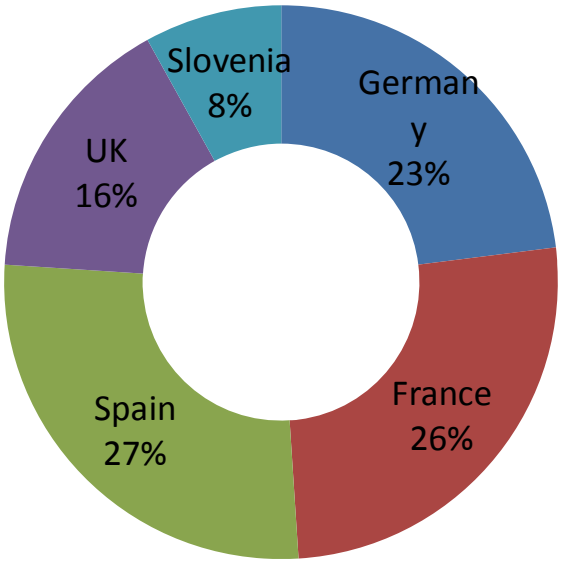
- **Factors influencing ratings of future market deployment**

- For **stationary applications**:
  - Competition of renewable electricity and heat technologies
  - Implementation of air quality regulations
  - Development of business models for H2 distribution infrastructure
- For **FCEVs**:
  - Competition from alternative technologies
  - Competition from full electric cars as well as CNG / LNG cars
  - Perceived attitudes of professionals from the same sector and from actors from the automotive sector

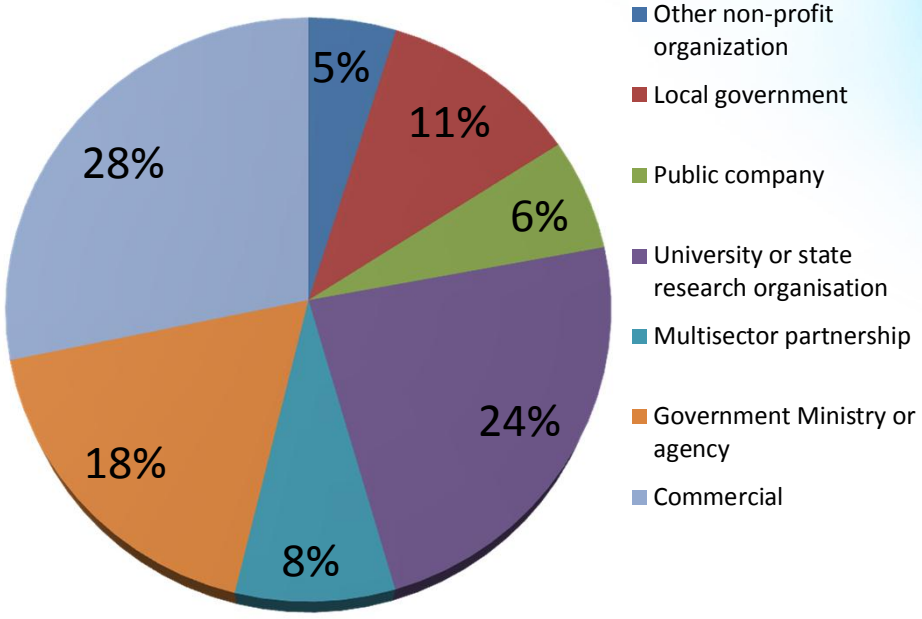
PROJECT PROGRESS/ACTIONS - STAKEHOLDER INTERVIEW

- **Semi-structured interviews** between November 2015 and June 2016
- Population: **selected stakeholders** in **5 countries**
- Implementation: **telephone** or **face-to-face interviews,** recorded and summary transcripts

Interviewee percentage by country



Interviewee percentage by affiliation

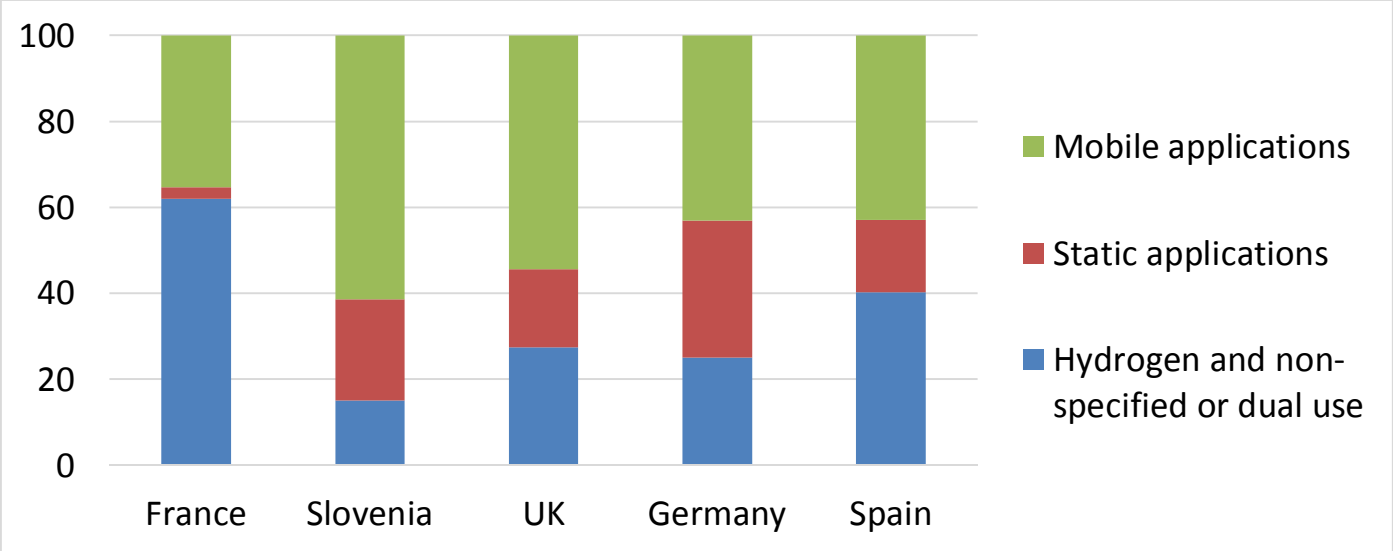


PROJECT PROGRESS/ACTIONS - STAKEHOLDER INTERVIEW

- Applications of HFCs discussed in the

Technology application	Percentage of comments, all interviewees
Static applications	16
Mobile applications	44
Hydrogen and non-specified or dual use	40

- Percentage of comments, by application, by country



PROJECT PROGRESS/ACTIONS - STAKEHOLDER INTERVIEW

- **Perceptions of hydrogen supply and use**

Strengths:

- **Environmental performance of hydrogen** (despite the scepticism of the inefficiency of combining multiple conversion processes)
- Versatility: **energy storage vector for renewable energy supply** (per se and in relation to electrical grid balancing)

Weaknesses:

- Cost
- Limited awareness among regulators and government
- Inadequate or excessive regulation
- Competition from alternative technologies
- Lack of commercial support and lack of markets
- Immaturity and durability
- General lack of infrastructure
- Perceived safety issues

Key expectations (mixed):

- Positive view: market development expected by many in the relatively near term (albeit with national differences and specificities).
- Uncertain future for hydrogen and a high degree of conditionality on government policy support.

Recommendations:

- More government and political support is required
- Need to inform and engage stakeholders
- Additional R&D to reduce costs

PROJECT PROGRESS/ACTIONS - STAKEHOLDER INTERVIEW

Perceptions of static applications

Strengths:

- H2FCs for portable power (could also be bracketed with the potential for uninterruptible power)
- **Integration with existing infrastructure** (UK respondents only)
- Efficiency of fuel cells (reducing the pressure on the electrical network)
- **The capacity to offer domestic and non-domestic CHP, power and heat, including high power.**

Weaknesses

- Cost & Investment costs
- Complexity of the system and its components
- Perceived and 'actual' safety
- Competition from alternative technologies
- The challenge of finding commercial partners

Key expectations (mixed):

- Expectations expressing a positive inevitability for the technology
- Uninterruptible supply systems as one such niche (German respondents only)
- Stationary uses being more likely than mobile uses (UK respondents only)
- Hydrogen being used as a storage medium as key to the take-up of static applications (UK respondents only)

Recommendations:

- Government support
- Regulatory support particularly relating to issues of safety

PROJECT PROGRESS/ACTIONS - STAKEHOLDER INTERVIEW

Perceptions of mobile applications

Strenghts:

- Operational performance: long range, **short refill times**, high torque, strong performance generally and relative to alternatives
- **Ease integration with existing infrastructure**
- **Suitability for specific fleets**

Expectations:

- **Specific vehicle fleets being the first to use H2FC technology**
- Niche uses first or only
- **Tighter emissions standards driving H2FC use**
- Battery electric vehicle (BEV) with H2FC being the most likely option
- **Transport corridors being first to support H2FCs**

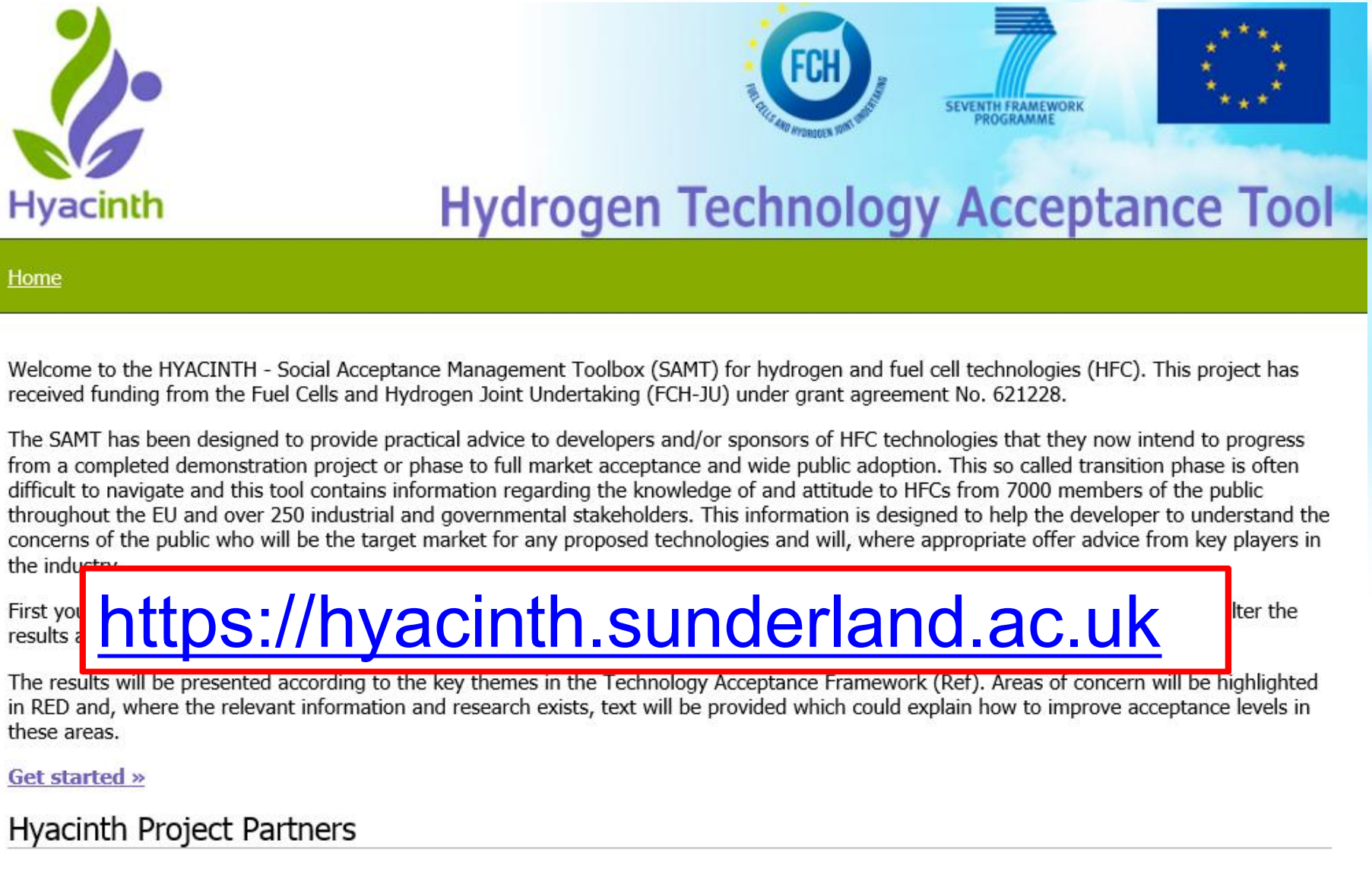
Weaknesses:

- **Financial cost**
- Perceived competition with other technologies
- Lack of infrastructure
- Limited awareness and support by regulators and government
- Inadequate or excessive regulations, codes or standards
- Safety

Recommendations:

- Governmental, political and regulatory support
- R&D to support cost reductions
- Commercial partner support
- More communication and engagement generally, including of publics
- Investment in refuelling infrastructure

PROJECT PROGRESS/ACTIONS - SOCIAL ACCEPTANCE MANAGEMENT TOOLBOX - SAMT



DISSEMINATION ACTIVITIES

Public deliverables

- 13 deliverables finished (10 public), 7 deliverables in progress:
- D. 5.1 Report on results of the stakeholder survey.
- D. 5.2 Integrated report on general findigns on public acceptance.

Conferences/Workshops

- 2 webinars and 8 workshops planned to be organised by the project.
- >20 conference and seminars in which the project is participating.
- 4 Drive&Ride events (WHEC2016 and Aberdeen).

Publications:

- Working in 3 academic papers.
- Press releases in 5 countries (UK, DE, SP, FR, SL).
- Newsletters in 4 countries (UK, DE, SP, FR).
- Digital mailing (300 stakeholders).

Social media:

Website:

http://hyacinthproject.eu

Close contact with **National and International Sector Associations.**

Identify more than 10 projects to establish project alliances.

CONCLUSIONS

- Less than half of the population in the seven countries is aware of the existence of hydrogen and fuel cell technologies in the context of energy production.
- Public awareness is significantly lower for residential applications and higher for hydrogen fuel cell vehicles.
- The majority of the population in the seven studied countries have a positive initial attitude towards HFC technologies. The label associated to hydrogen and fuel cells seems to invoke positive feelings and thoughts among respondents.

- Variation across countries: associated with differing levels of government investment in R&D programmes.
- R&D stakeholders have a strong positive appraisal of HFC technologies, but with limitations:
  - **cost and limited regulatory**, political and commercial support;
  - **competition from other technologies** and inter-related obstacles.
- Stakeholders view: medium to long term rather than near term.
- HFC technologies view: realistic niche potential in the shorter term
  - uninterruptible power, auxiliary power and high power demand such as fork lifts and heavy goods vehicles.

It is increasingly understood that the success of innovative energy technologies is dependent not only upon the technical characteristics of those technologies, but equally on supportive social, political and economic contexts (EC, 2014 and 2015; OECD, 2014).

Thank You!

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