



HYACINTH

FCH JU → SPI-JTI-FCH.2013.5.3

Hydrogen Acceptance in the Transition Phase

Support & Coordinated Action



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- The transition phase of FCH technologies is expected to happen within the next decades.

Implementation process



- **Challenges:** higher cost and less comfortable infrastructure or lower reliability. **Benefits:** energy efficiency and environmental benefits (no local emissions)
- Advanced hydrogen support (Germany, UK), medium support (Spain) and low support.
- Fuel Cell technologies for private end users
 - Fuel cell heating appliances
 - FCEV (fuel cell electric vehicles) and hydrogen refueling station (HRS) network

- **PUBLIC AWARENESS**: Are attitudes, behaviours, opinions and activities that comprise the relations between the general public or lay society as a whole to scientific knowledge.

Technology ↔ **Society**

- How are these

{	attitudes	}	towards	{	new products?
{	behaviours				new applications?
{	opinions				new technology?
{	activities				

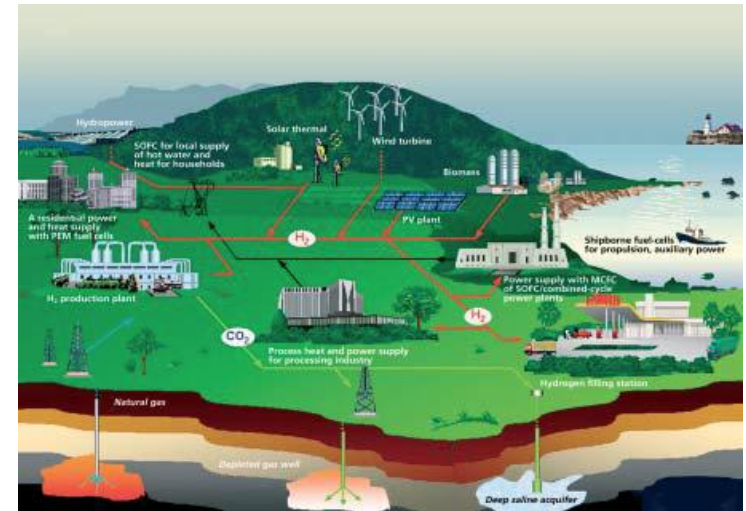
⇒ **Public acceptance?**

Public acceptance: objective

- Main aim => To link technology and society.
- How? => Social research, to know the state of public and stakeholder acceptance and the factors that influence them.

- The aim is to achieve a **better knowledge** that helps to optimize the **management** of a **technology Transition**.

⇒ **Hydrogen?**



Source: Hydrogen Energy and Fuel Cells
A vision of our future

Why measuring acceptance?

It is a key consideration to deploy a new technology

Because:

No broad experience

No feedback

Not many images...

⇒ **Hydrogen?**

⇒ **Fuel cells?**

So, there is a need for a development of a good understanding of the conditions of societal acceptance of FCH technologies as an essential element to support the establishment of these conditions in Europe.

Public acceptance: remarks

- Awareness and acceptance could vary along time.
- Awareness and acceptance could also influence and be influenced by factors and relevant actors
 - ⇒ So it is important to identify what level of acceptance is needed and when.

So far, research has shown that a **supportive acceptance** will be necessary in a **transition phase** of the technologies and the strategies to successfully establish a market.

Public acceptance of FCH: questions?

What has to be accepted?

⇒ HFC based applications

Who has to accept?

⇒ General public and stakeholders

When is acceptance needed? ⇒ Market approach (transition phase)

Implementation process



What level of acceptance is needed? ⇒ Support

⇒ **Hyacinth project**

HYACINTH: HYdrogen ACceptance IN the Transition PHase

- Funded by the **FCH-JU in call 2013** (SP1-JTI-FCH.2013.5.3 Social acceptance of FCH technologies throughout Europe). Total cost: 999,383 €; EU contribution: 661,584 €.
- Coordinator: Centro Nacional del Hidrógeno (CNH2), **11 main partners from 5 different European countries**.
- Started in September 2014 with a duration of **30 months**.
- Aims to gain a **deeper understanding of the social acceptance** of hydrogen technologies across Europe.

HYACINTH: objectives

- **Identify and understand awareness and acceptance** of hydrogen energy and FCH technology and perceived 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.

HYACINTH: 11 Partners

- [Centro Nacional del Hidrógeno](#) (CNH2) – SP
- [I PLUSF France](#) – France [I PLUSF España](#) – SP
- [Fraunhofer-Institut für System- und Innovationsforschung ISI](#) – GE
- [Aberdeen City Council](#) – UK
- [University of Sunderland](#) – UK
- [Centre for Energy, Environment and Technology](#) (CIEMAT) – SP
- [Sustainability Research Institute](#) (SRI), University of Leeds - UK
- [CIDAUT Foundation](#) – SP
- [Razvojni Center za Vodikove Tehnologije](#) (RCVT) – SL
- [NORSTAT Services GmbH](#) (NORSTAT) – GE

HYACINTH: Studies

- **Two studies:**
 - Public awareness and acceptance of FCH technologies across Europe.
 - Stakeholder acceptance of FCH technologies across Europe
- **Objectives of the public study:**
 - To examine public **awareness**, familiarity, perception of benefits and costs, global attitude, **acceptance** of FCH technologies.
 - To identify key individual and social **determinants** of public awareness and acceptance of FCH technologies;
 - To report on **cross-country comparisons** in public awareness, attitudes and acceptance towards FCH technologies.

Results of the literature review

- **Public awareness about hydrogen is high in Europe**, but also that it varies significantly across European countries.
 - The Eurobarometer on energy technologies (European Commission, 2007) found that five out of ten EU citizens reported having heard about hydrogen energy and cars and four out of ten reported having heard about fuel cells.
 - Awareness was significantly higher in countries such as Denmark or the Netherlands and lower in Eastern European countries. (European Commission, 2007).
 - But: Very few cross-country studies systematically comparing public attitudes to HFC applications. Majority of studies focused on specific countries or regions.
- Levels of awareness do not correspond, necessarily, with high levels of **public knowledge** about hydrogen technologies (**low levels of knowledge** of - and interest in - hydrogen among the public coexist with relatively **high levels of acceptance** (public tends to report positive attitudes towards hydrogen in general).
- Majority of studies focused on transport applications. Very few studies have focused on the public reactions to **HFC stationary residential applications**. No systematic comparisons have been found regarding the acceptance of specific applications, but it is acknowledged that **public attitudes towards HFC** technologies might vary depending on the **type of application** considered.

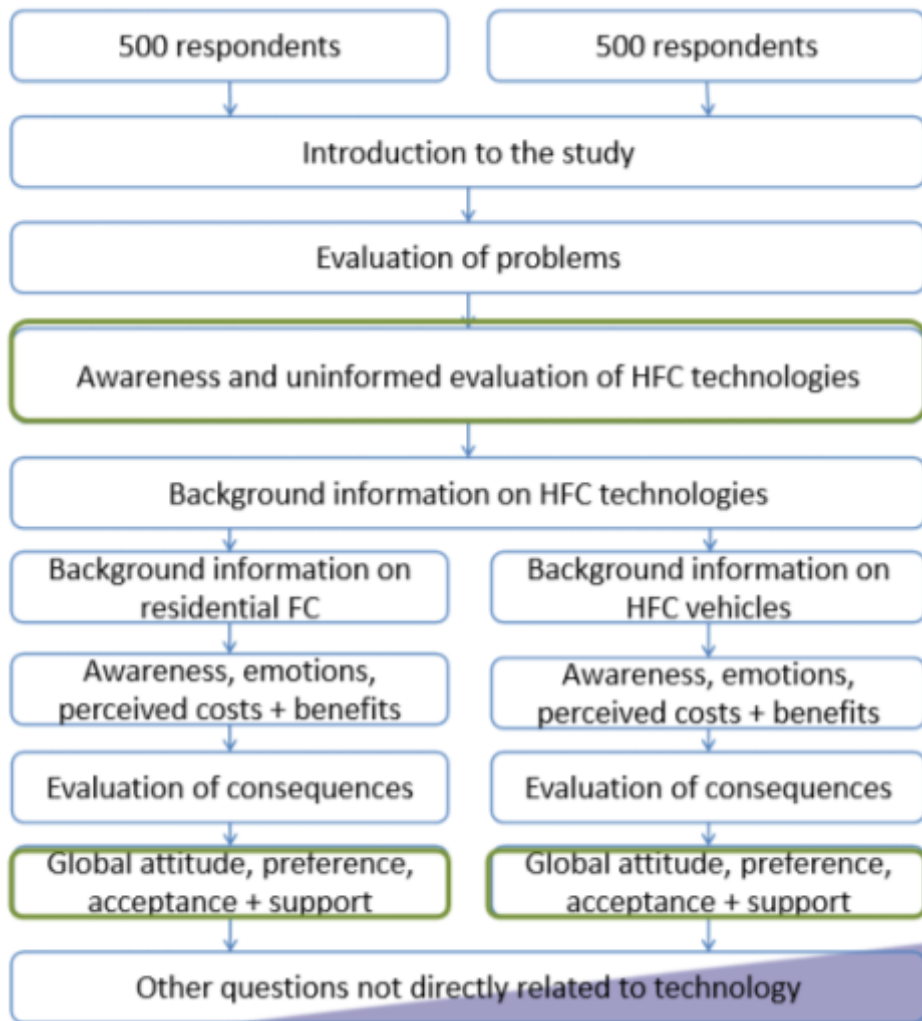
Data and methods public study

- **Survey Method**: Survey data collected in 7 European countries (Belgium, France, Germany, Norway, Slovenia, Spain and United Kingdom).
- **Participants**: around 1000 members of the general population aged 16 and over. Nationally-representative samples.
- **Data collection**: April and May 2016.



- **Studied applications**:
 - 1. Hydrogen fuel cell stationary residential applications
 - 2. Hydrogen fuel cell transport applications and related infrastructures

Data and methods public study

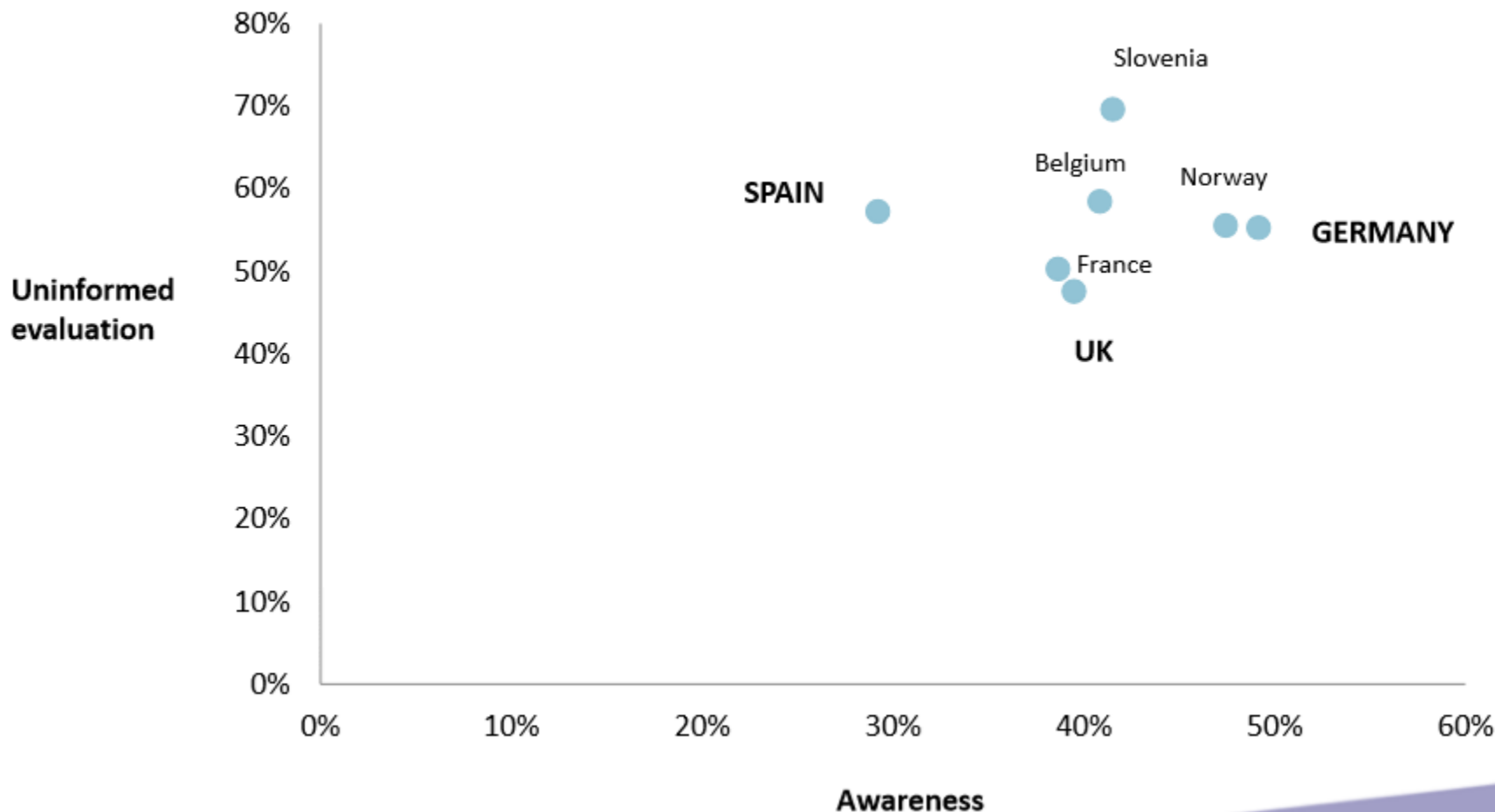


Awareness, familiarity, affects and beliefs: Participants received neutral information regarding:

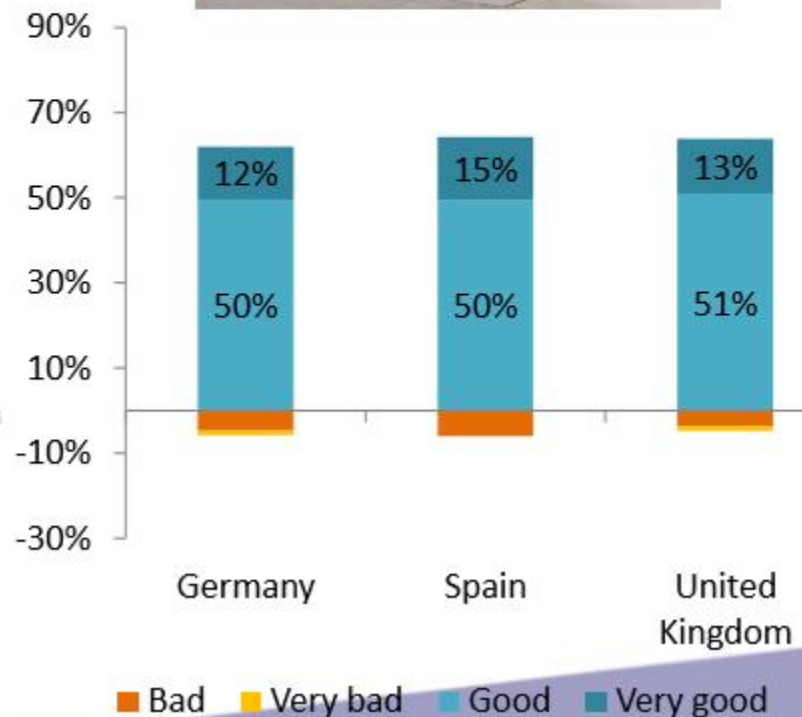
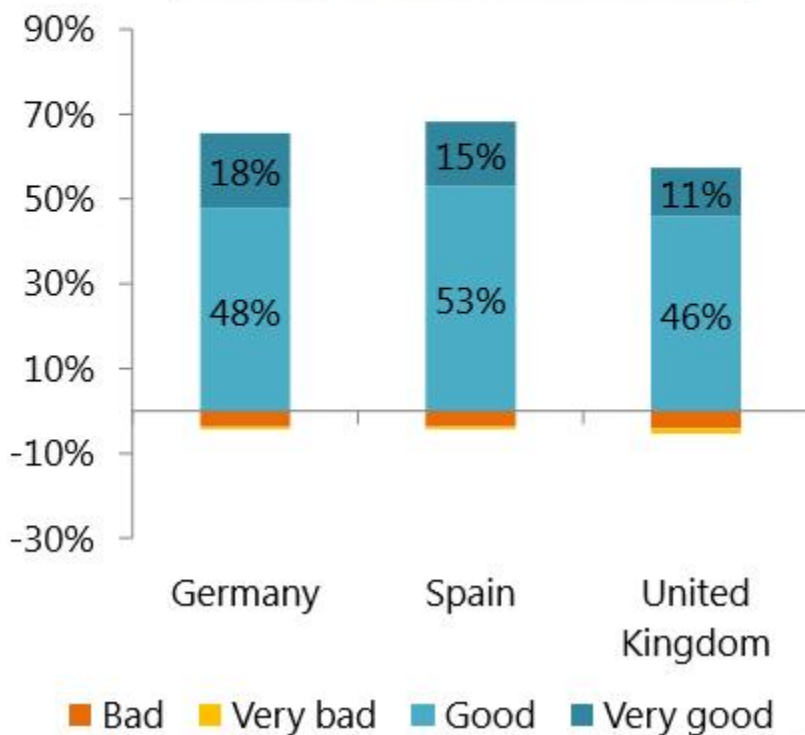
- a) hydrogen and fuel cells in general;
- b) fuel cells for residential use or hydrogen fuel cell vehicles.

Evaluation of consequences: Participants were then provided with information regarding some of the potential consequences (one potential benefit/cost) of the implementation of the specific HFC application.

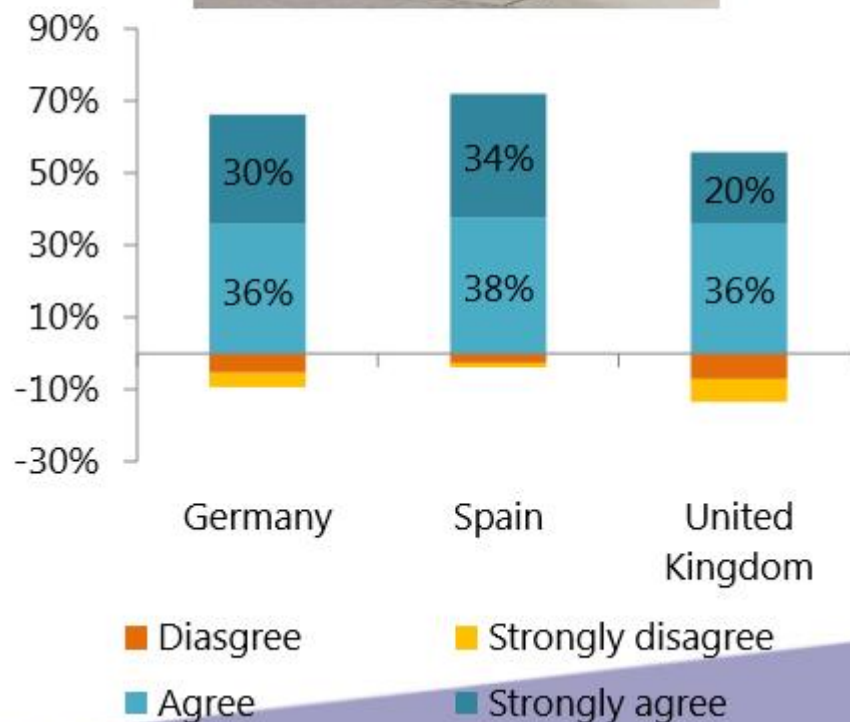
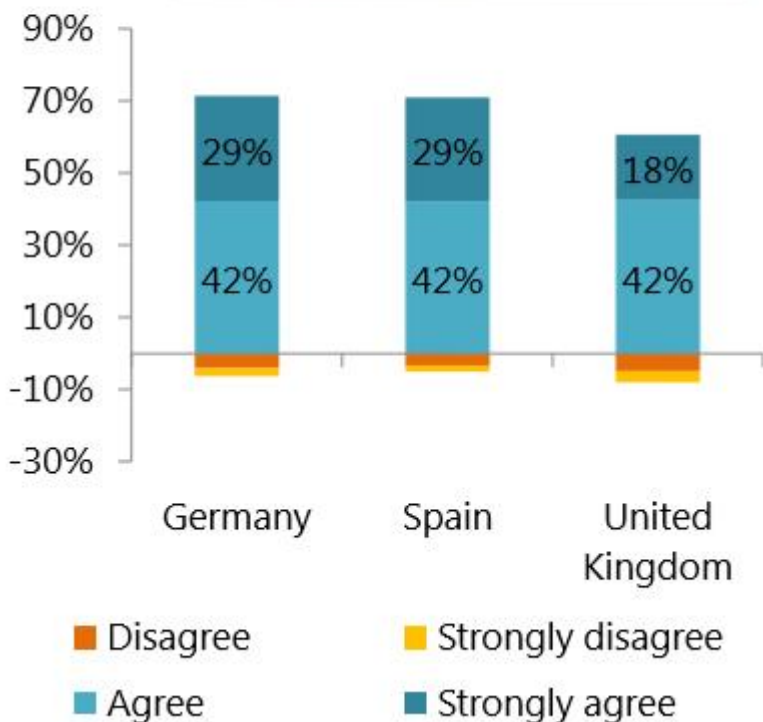
Public awareness and evaluation of HFC technologies



Informed evaluation of home fuel cells and HFCEVs



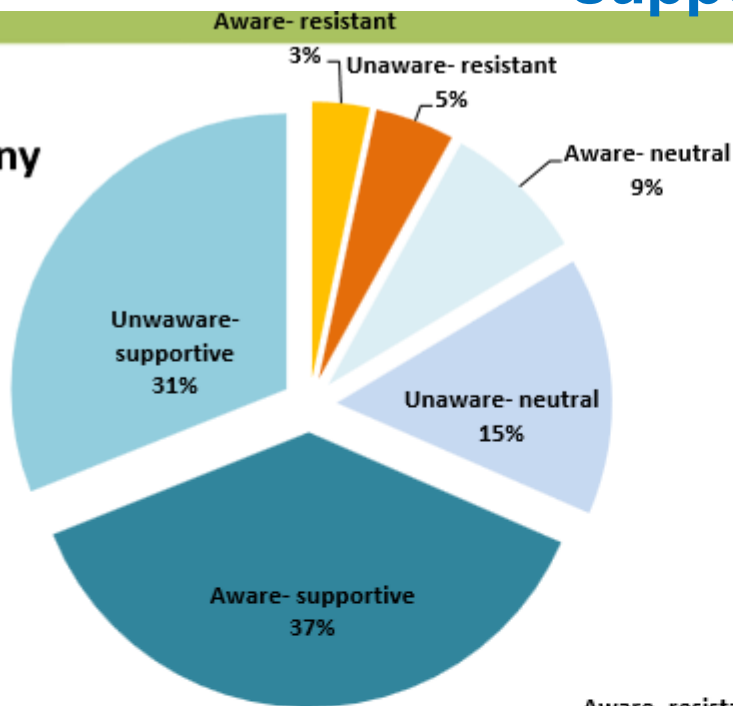
Acceptance (willingness to install/purchase) of home fuel cells and HFCEVs



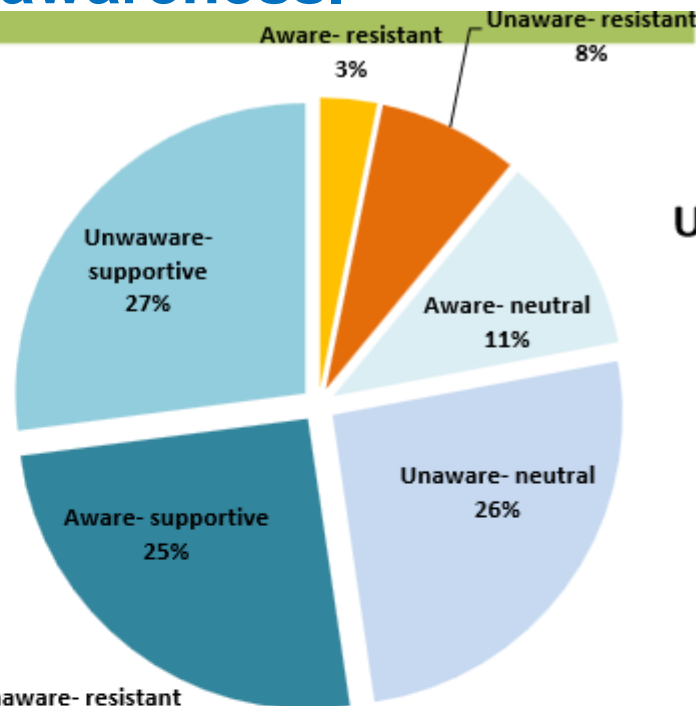
Distribution of the country samples in support-awareness.



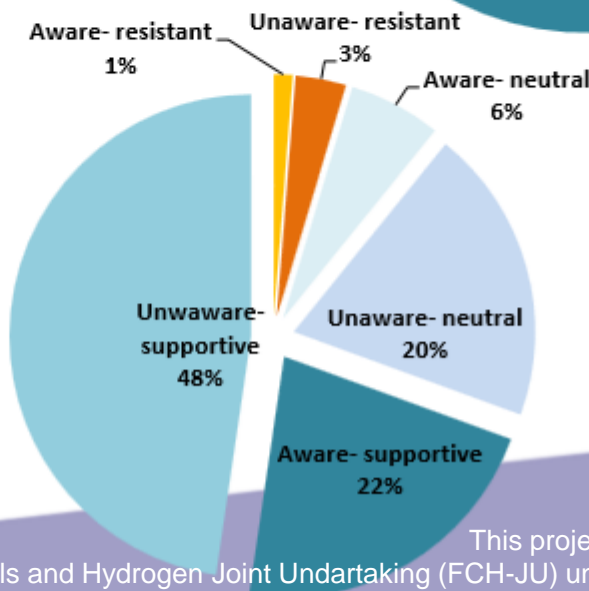
Germany



UK



Spain



Discussion and Outlook

- In countries with advanced hydrogen support (e.g. Germany, Norway) the awareness of the technology is higher in the public (except from the UK). Uninformed evaluation, however, is very similar in all countries
 - Home fuel cells are evaluated slightly better than hydrogen fuel cell vehicles and also receive a higher acceptance in all three countries. – Respondents from the UK are more critical towards the technologies than those from Germany or Spain.
 - Providing information can have a (small) positive effect on the evaluation of the technology.
- More information is needed in all countries.
- Outlook: Further analyses planned



HYACINTH: expected results

Analysis of the collected data ongoing ⇒ two studies will be published (autumn 2016):

- Report on results of the stakeholder survey
- Integrated report on general findings on public acceptance

Both will feed a Social Acceptance Management Toolbox, which is being developed and will be released early 2017.





HYACINTH: toolbox

- It is a software, based on the HYACINTH studies of general public and stakeholders and also in other external information: policy support mechanisms, lessons learned / best case studies, etc.
- Its main aim is to **support stakeholders**, by providing information and methodologies (factors) to **facilitate decisions on promotion activities, market preparation, and effective policy support mechanisms** particularized for a given European region and a certain technology.

Thank you for your attention!

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