

# Development of Business Cases for FCH Applications for Regions and Cities

Results of the self-assessment  
survey of regions/cities



# The survey provides specific insights into the regions'/cities' current situation, ambitions and challenges for FCH deployment

## Key findings of the self-assessment survey



**Experience** – 66% of the cities and regions have concrete plans or have already deployed FCH applications; the average experience level is equally distributed across Working Groups



**Objectives** – Regarding this project, 64% of participants indicated a strong and concrete interest towards deploying FCH applications, with 58% indicating strong interest in financing options



**Challenges** – Funding & financing (57%) as well as viable business cases (42%) are major challenges for the successful deployment of FCH applications for regions and cities



**Drivers** – For more than 60%, the strongest drivers for pursuing FCH applications are industrial innov. & development and the creation of employment (slightly ahead of environmental reasons)



**Financing** – Almost half of the participants have no dedicated internal FCH-budget available, but the aggregated, averaged 5-year FCH-related project volume is expected to increase by ~170% to EUR 5.5 m between 2017 and 2022

# 1. Introduction



# The high participation in the self-assessment survey and the clear results underpin the pan-European interest in FCH deployment

## Key facts about the survey

**73** completed, **79** partially completed surveys<sup>1)</sup>...

...from **19** European countries...

comprising **>17%** of European population...

...covering ca. **14%** of European surface...

...with **>94%** of the participants indicating a moderate to strong interest in future deployment of FCH applications<sup>2)</sup>

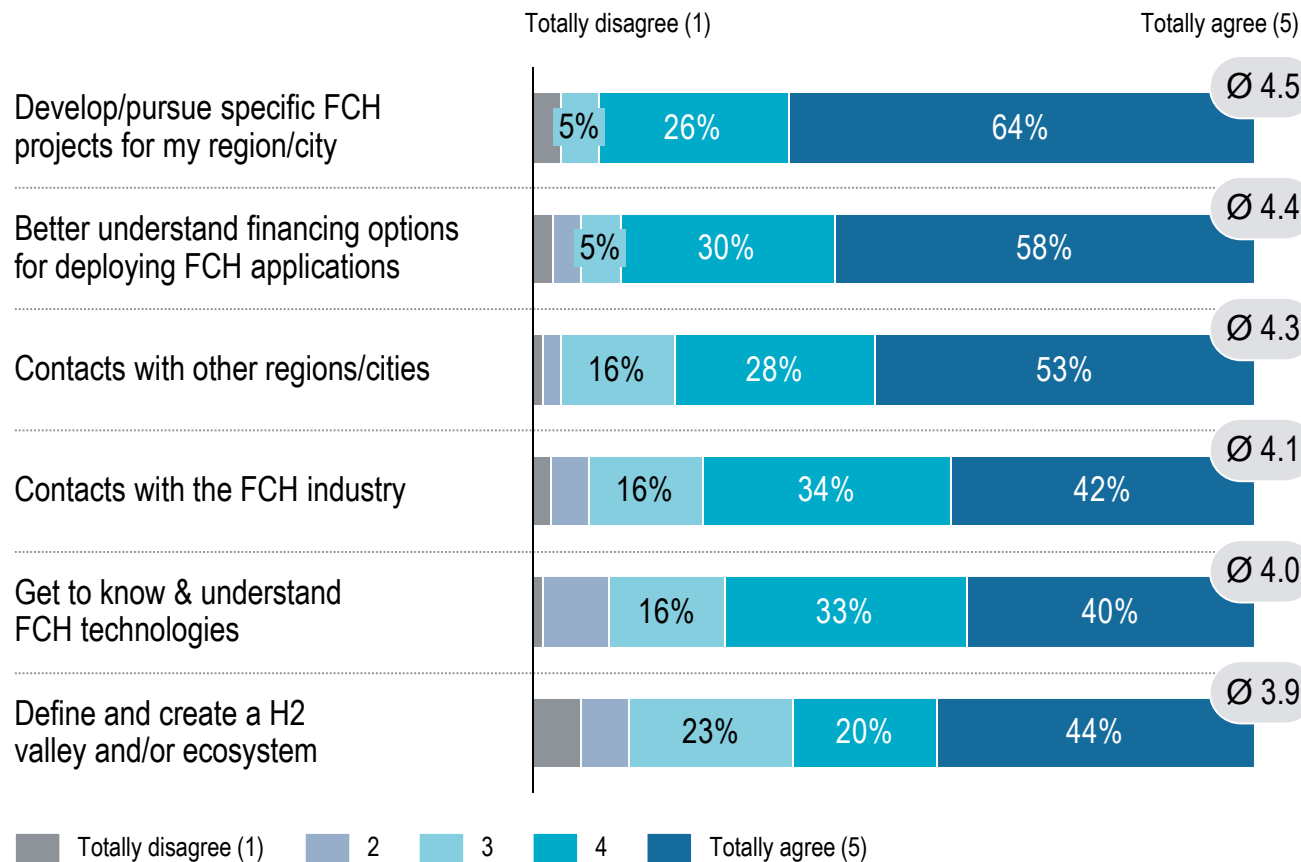


■ Countries with regions/cities that participated in the survey

1) All answered questions were included 2) Question: "How interested is your region/city in actively pursuing the future deployment of FCH applications?" (n=71), 94,37% of the participants set either 3, 4 or 5 points on a 5-point Likert Scale

# Survey participants state a strong interest in pursuing concrete FCH projects and exploring FCH financing options

## Reasons for participating in the project<sup>1)</sup>



### Other reasons (selection):



*"Communicate internally and increase buy-in across departments within municipality"*

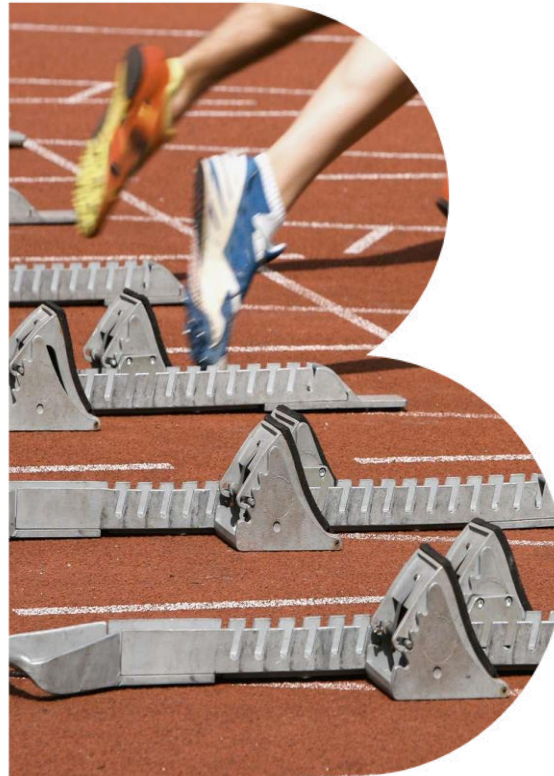
*"Develop approaches to public acceptability"*

*"Specify funding needs to be considered for future policies"*

*"Overview of Pro`s and Con`s of H<sub>2</sub> compared to other energy carriers"*

1) Question: "Please evaluate the following reasons for participating in this project" (n=74-76)

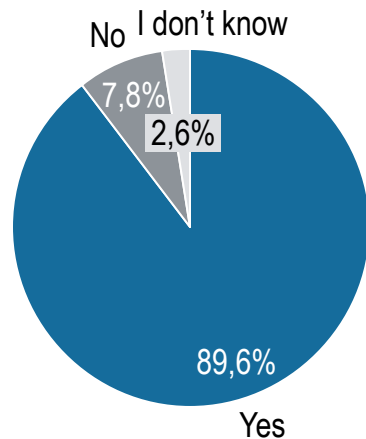
## 2. Current set-up and starting point of regions/cities



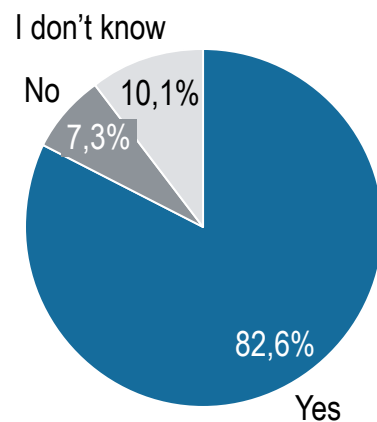
# More than 80% of the regions & cities report ambitious quantitative targets for reduction of local emissions

## Emission reduction within regions and cities

**Question:** "Does your political agenda include reduction of local emissions like GHG, pollutants and fine dust?" (n=77)



**Question:** "Is there a concrete quantitative target for reducing local emissions?" (n=69)



**Concrete targets (selection)<sup>1)</sup>**



"100% electricity generation from renewables by 2050, 50% zero emission public transport by 2030, 100% by 2050"

"40% reduction in CO<sub>2</sub> emissions by 2020 compared to 2005"

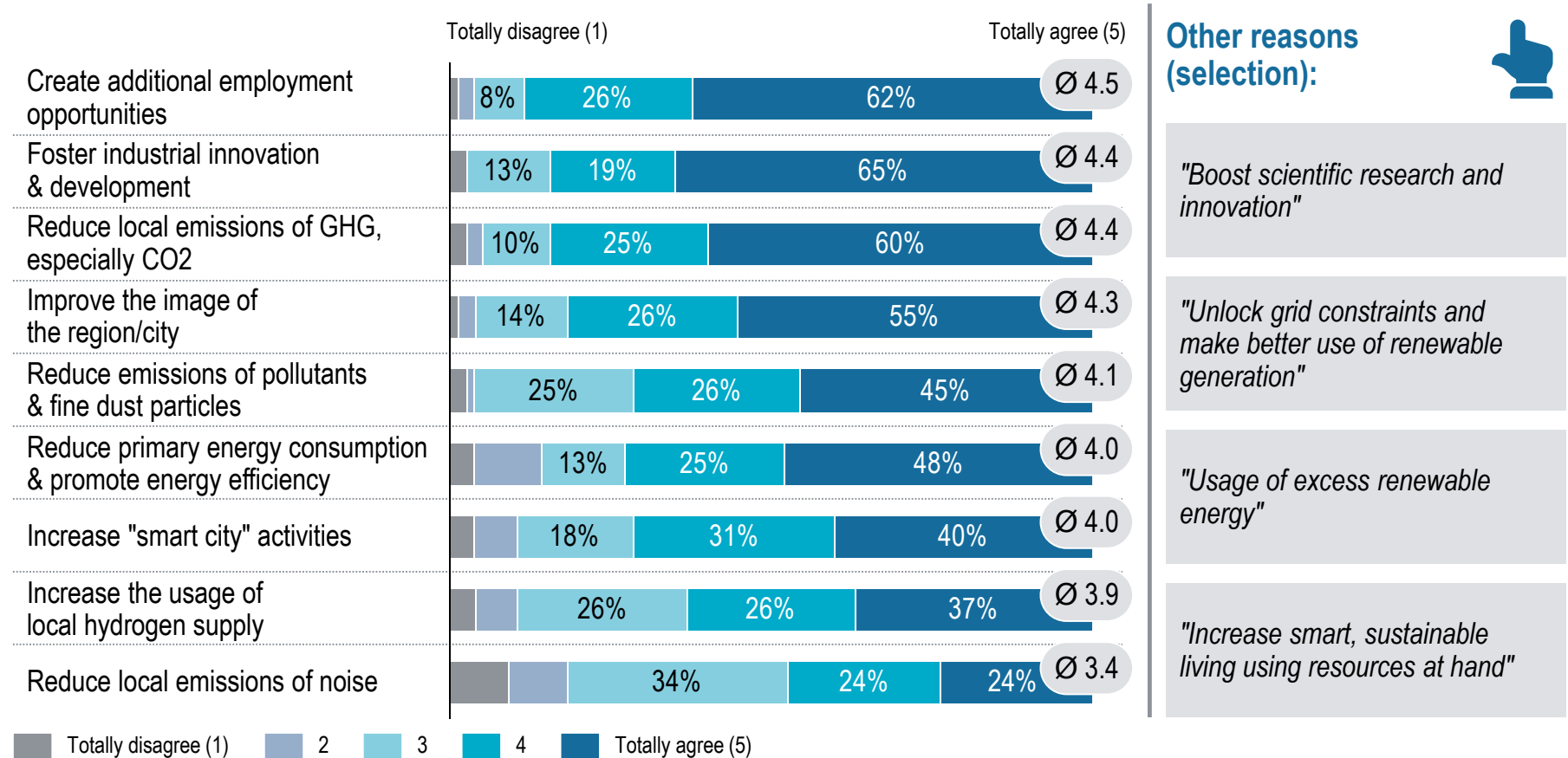
"Replace petrol share in energy mix for mobility to 40% by 2050"

"Reduce CO<sub>2</sub> emissions to 4t p.p. by 2020, less than 1.5t by 2050"

1) Question: "Please specify one or more concrete targets."

# The strongest drivers for pursuing FCH applications are industrial innovation & development as well as additional employment

## Reasons for pursuing FCH applications<sup>1)</sup>

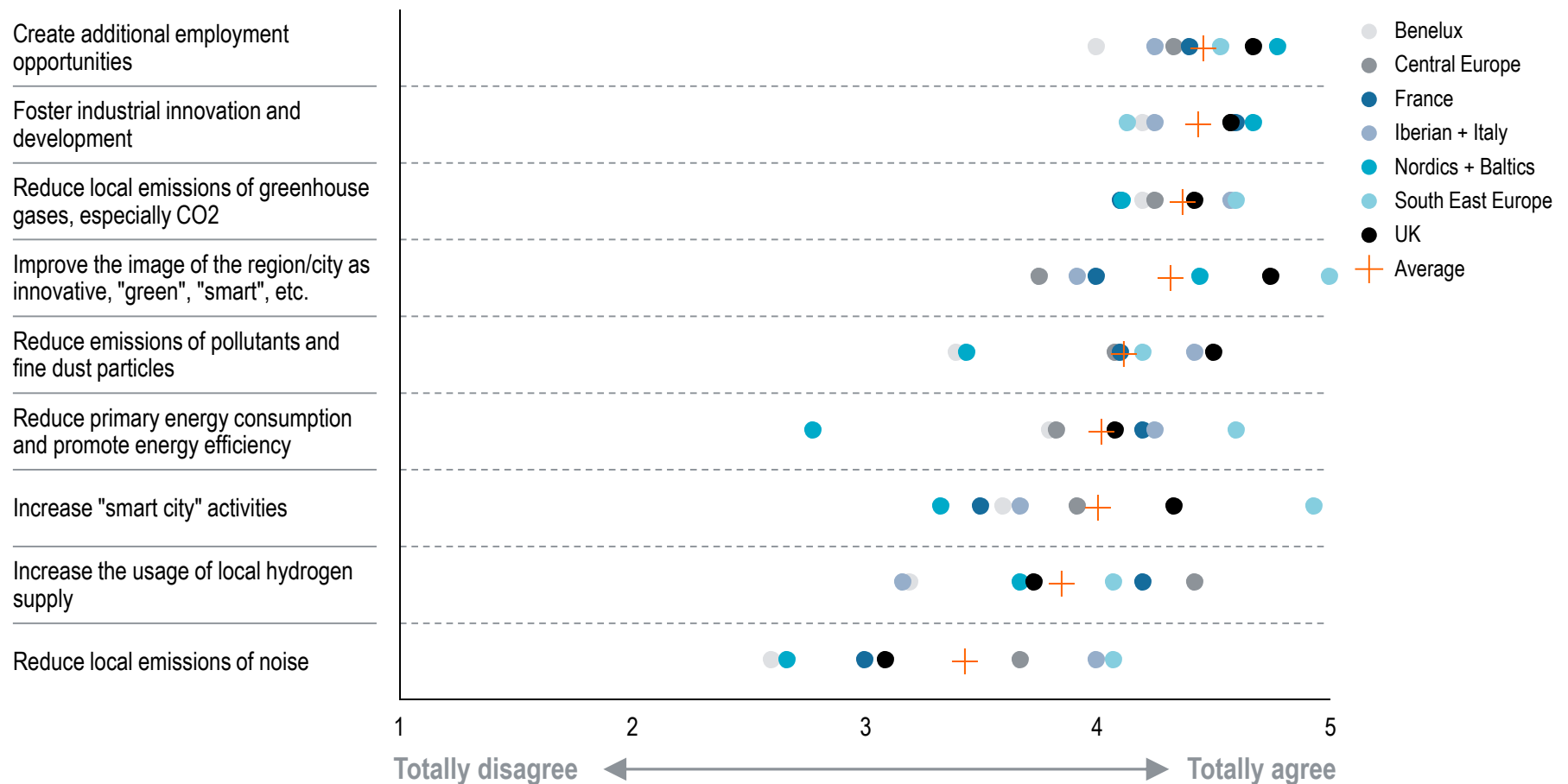


1) Question: "What are your region's/city's main reasons for pursuing FCH applications? How relevant and important are typical drivers for FCH technologies to you, also compared to one another?" (n=76-77)



# When weighting different reasons for pursuing FCH applications, a strong variance across geographic clusters can be seen

## Geographic distribution of reasons for deployment of FCH applications<sup>1)</sup>

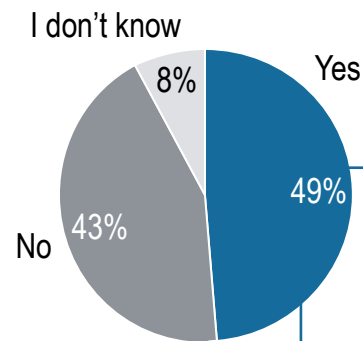


1) Please see slide 16 for an overview of countries covered in each cluster

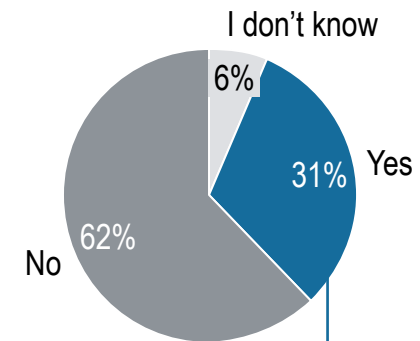
~50% of participants say FCH applications are part of their political agenda, with 32% having a dedicated FCH strategy in place

### FCH applications as part of the political agenda

**Question:** "Does your political agenda explicitly include the promotion of FCH applications?" (n=76)



**Question:** "Does your region/city have a dedicated strategy in place to promote FCH applications?" (n=77)



#### Exemplary elements of promoting FCH applications:

"Deploy at least 300 FCEV in the region by end of 2018"

"Develop a pilot project for hydrogen production in 2017"

"Establish FCH demo infrastructure"

"Attract further partners of hydrogen technology to region"

"Test hydrogen storage solutions associated to renewable energy sources"

#### Exemplary strategies:

"Swindon Hydrogen Roadmap"

"Hydrogen Strategy for Oslo and Akershus (2014-2025)"

"Hydrogen Masterplan in Aragon (2016-2020)"

"Vendée Hydrogène"

"Roadmap for the Realisation of a Wind Hydrogen Economy in the Lower Elbe Region"

# Internally, less than half of participants have an designated FCH unit or manager; externally, most partnerships are with industry

## Internal capacities and external partnerships

### Internal capacities

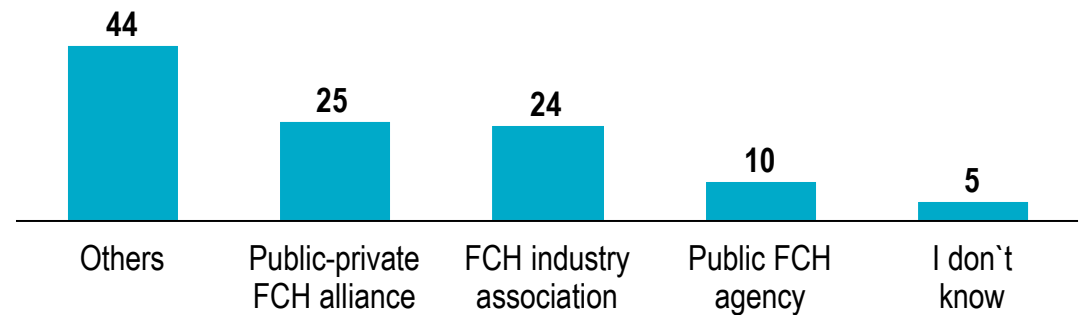
**Question:** "How many staff in your team are working on FCH-related activities" (n=70)



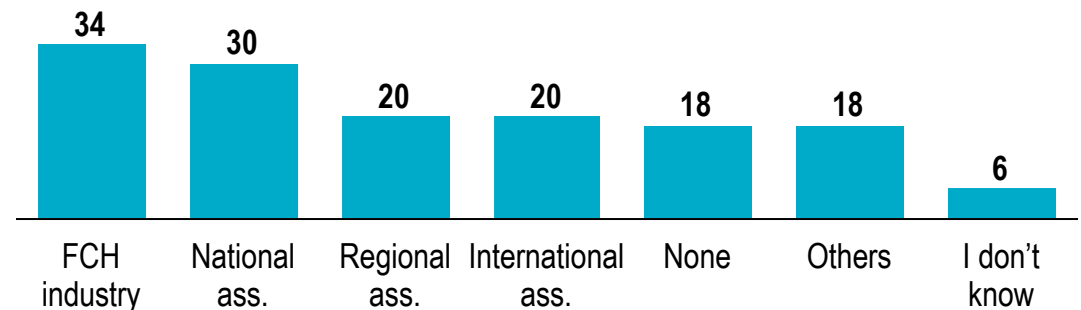
...**40%** of the regions/cities have a designated FCH activities unit or manager<sup>1)</sup>

### External partnerships and cooperation's

**Question:** "Which institutions are active within my region/city?"



**Question:** "My region/city has already partnered up with..."



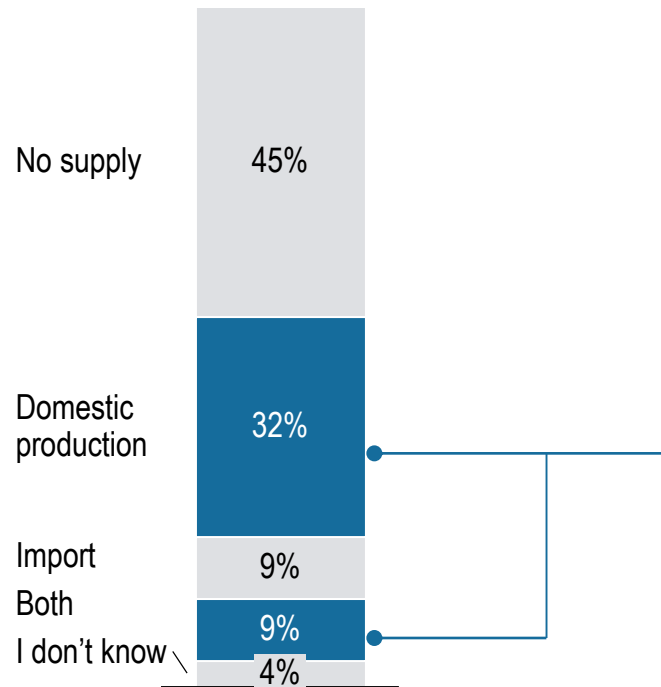
1) Question: "Is there a designated FCH activities unit or manager within your regional or municipal authority?" (n=75)

~50% of participants have access to H<sub>2</sub>, with renewable electricity being the most relevant source – "Grey" H<sub>2</sub> still important

### Origins and sources of hydrogen supply for regions and cities

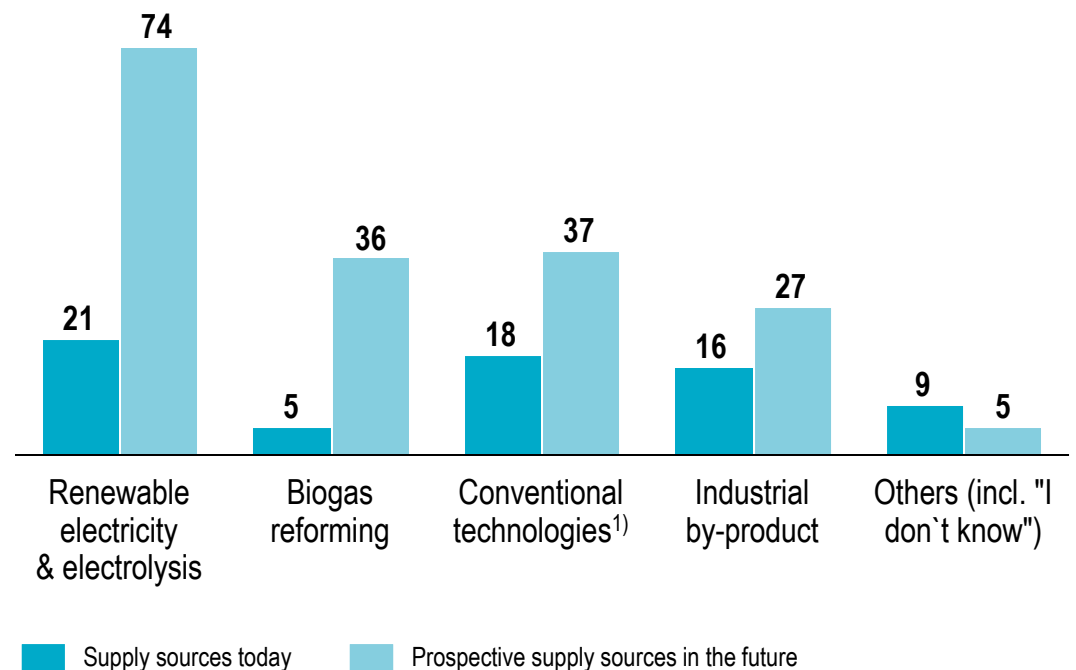
#### Origins of hydrogen supply

**Question:** "Is hydrogen already supplied in your region/city today?" (n=77)



#### Sources of hydrogen supply if produced within region/city

**Question:** "What is your source for hydrogen supply today and where do you see it in the future?" (n=77)



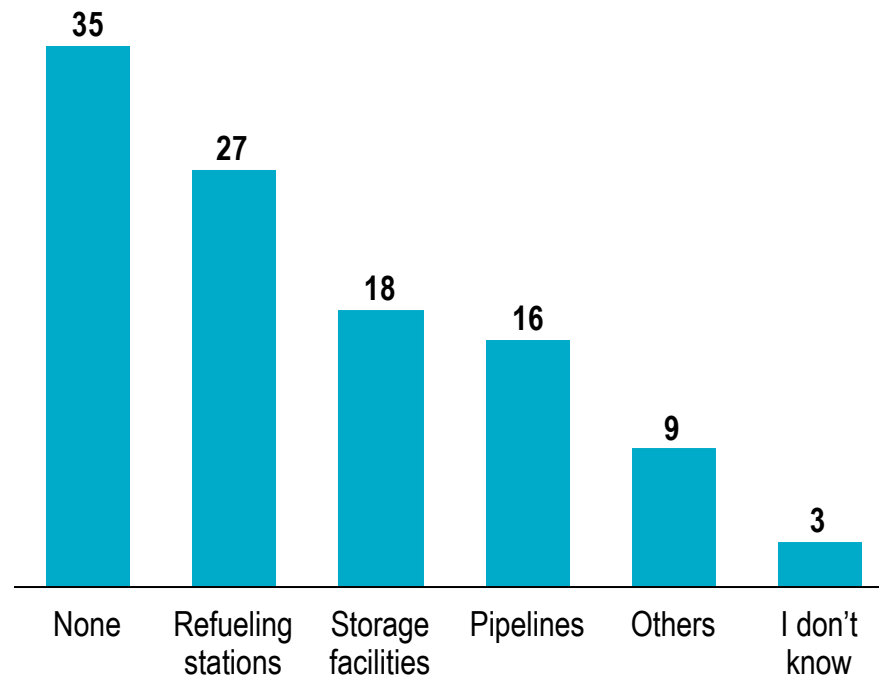
1) Steam-methane reforming (SMR), chloralkaline electrolysis

Most of the participants have no H<sub>2</sub> infrastructure in place yet, but the majority states plans to further develop infrastructure and supply

## Hydrogen infrastructure today and tomorrow

### Infrastructure in place

**Question:** "What hydrogen infrastructure does your region/city have in place?" (n=77)



### Future infrastructure

... **69%** of the regions/cities have plans to further develop hydrogen supply or hydrogen infrastructure within their region until 2022<sup>1)</sup>.

### Exemplary initiatives:

*"BIG HIT – Hydrogen Refuelling Station by 2017 for fleet of vans"*

*"DIMES – Distributed Integrated Multi Use Energy System for urban developments"*

*"ENRgHy Project, Vhyctor – co-produced hydrogen transported under high pressure and refuelling stations"*

1) Question: "Does your region/city currently have any plans to develop further hydrogen supply or hydrogen infrastructure until 2022?" (n=75)

### 3. Experience with FCH applications within regions/cities

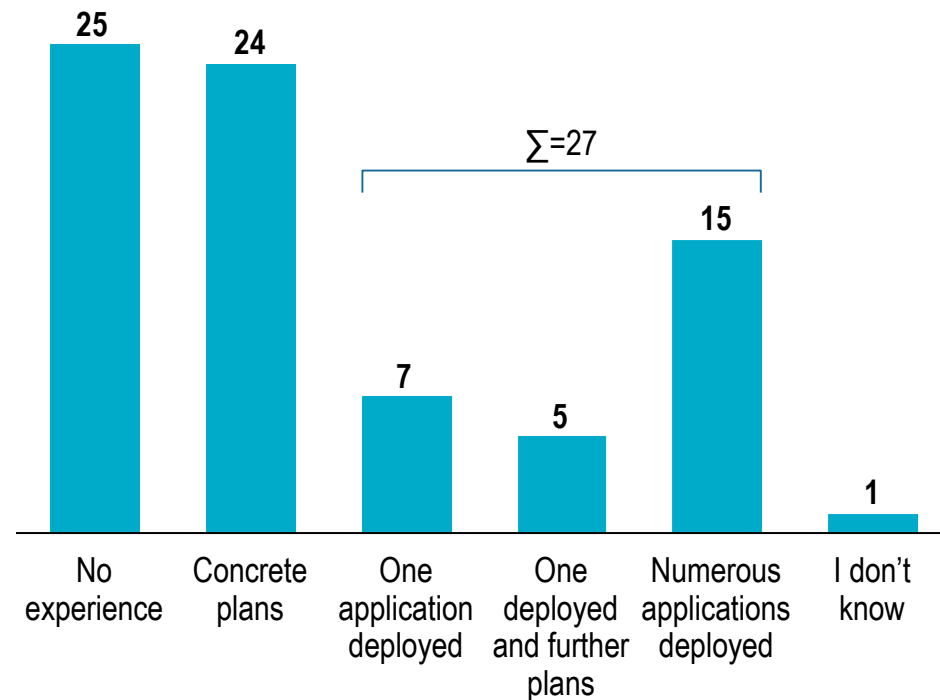


~60% of participants have not deployed FCH applications yet –  
The average experience level is equally distributed across WGs

### Experience with deployment of FCH applications

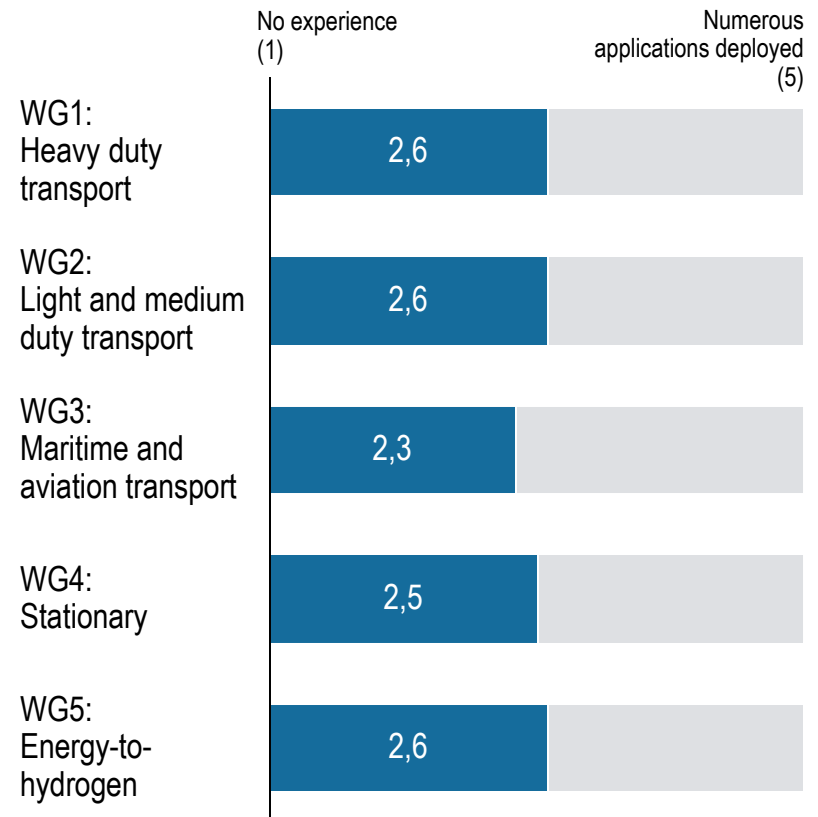
#### General Experience

**Question:** "What is the experience of your region/city regarding the deployment of FCH applications?" (n=77)



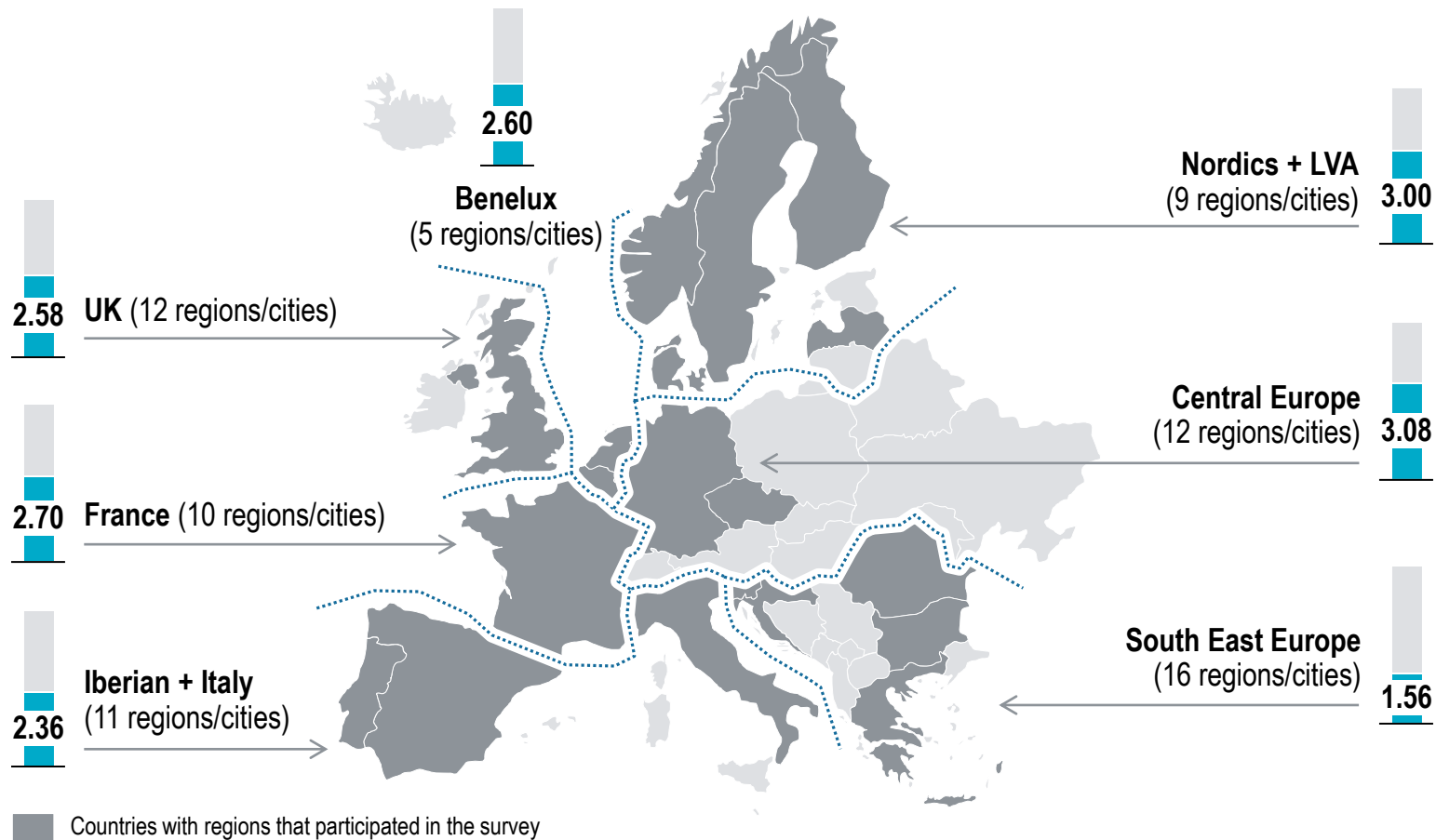
1) Averaged value on a 5-point Likert scale (n=73)

#### Averaged experience level per Working Group<sup>1)</sup>



# Heterogeneous experience levels across different regional clusters – Nordics + LVA and Central Europe with highest experience levels

Geographic distribution of averaged FCH deployment experience<sup>1)</sup>



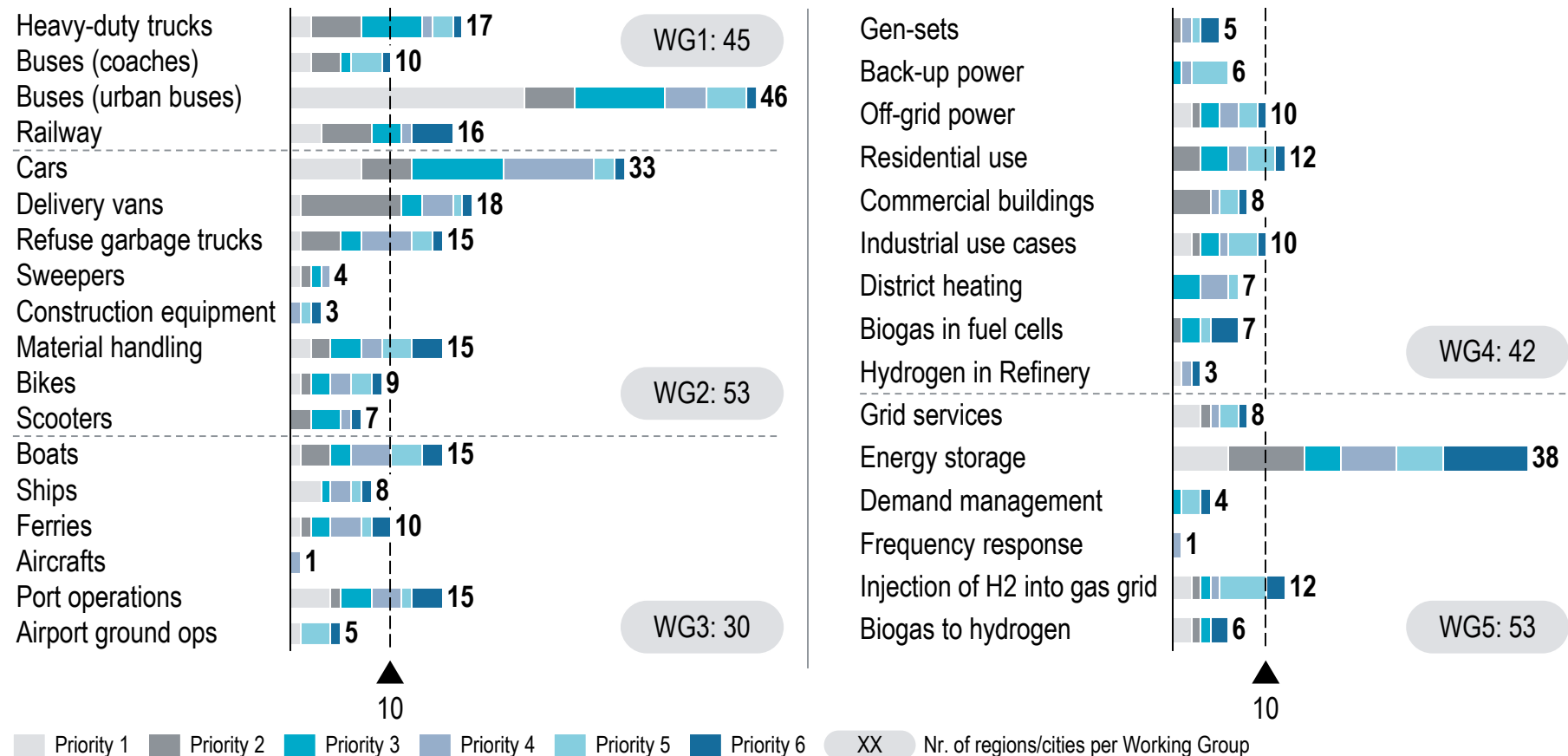
1) Experience level scale: (1) No experience – (5) Numerous applications deployed

(# of regions/cities refers to those with answers to this question)



# Buses, cars and energy storage accumulated the highest interest while a number of applications were hardly mentioned

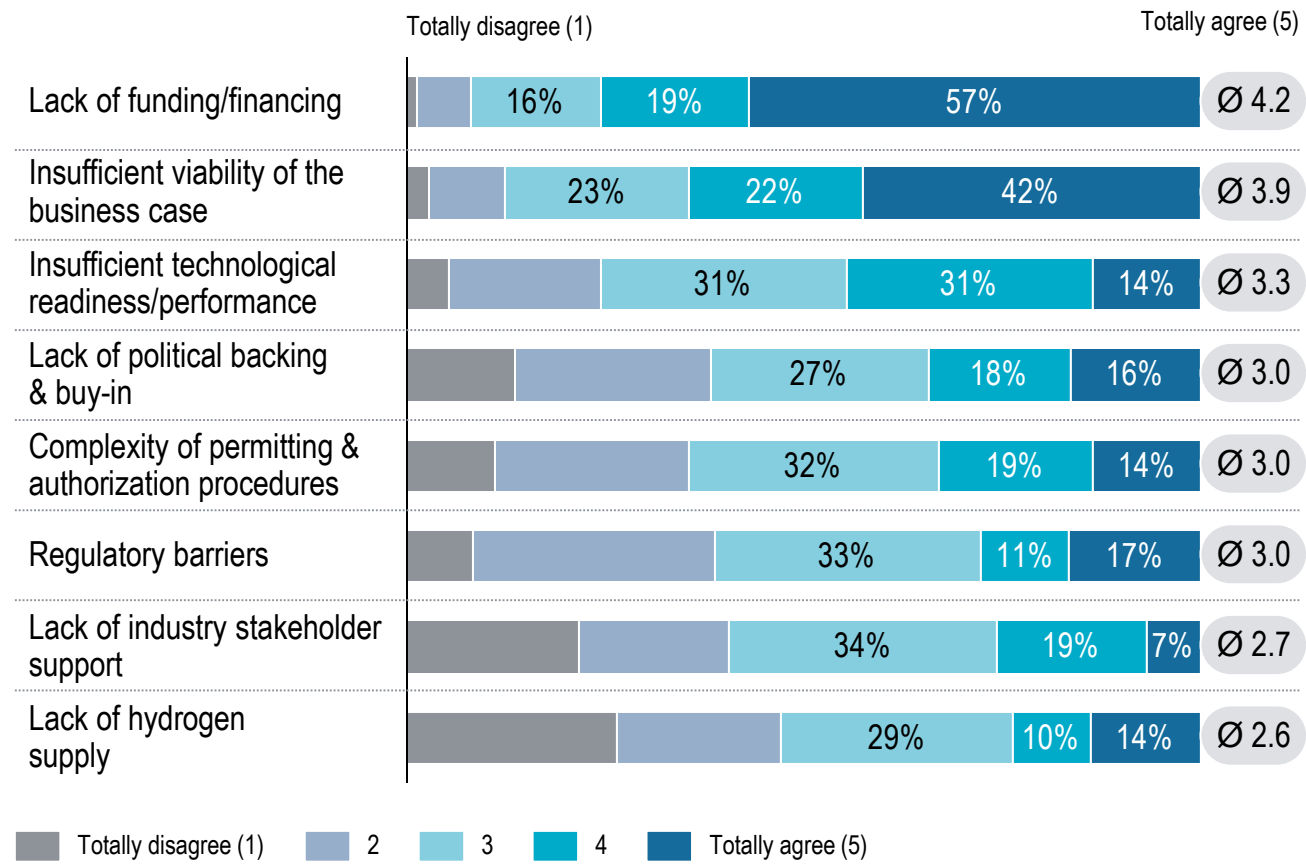
Number of participants ranking the FCH applications among their top-6 applications<sup>1)</sup>



1) Question: "Please rank up to six FCH applications according to their potential for future deployment in your region/city" (n=71)

# Funding/financing as well as business cases are the most acute challenges to the successful deployment of FCH applications

## Hurdles and challenges posing obstacles for FCH deployment<sup>1)</sup>



### Other reasons (selection):

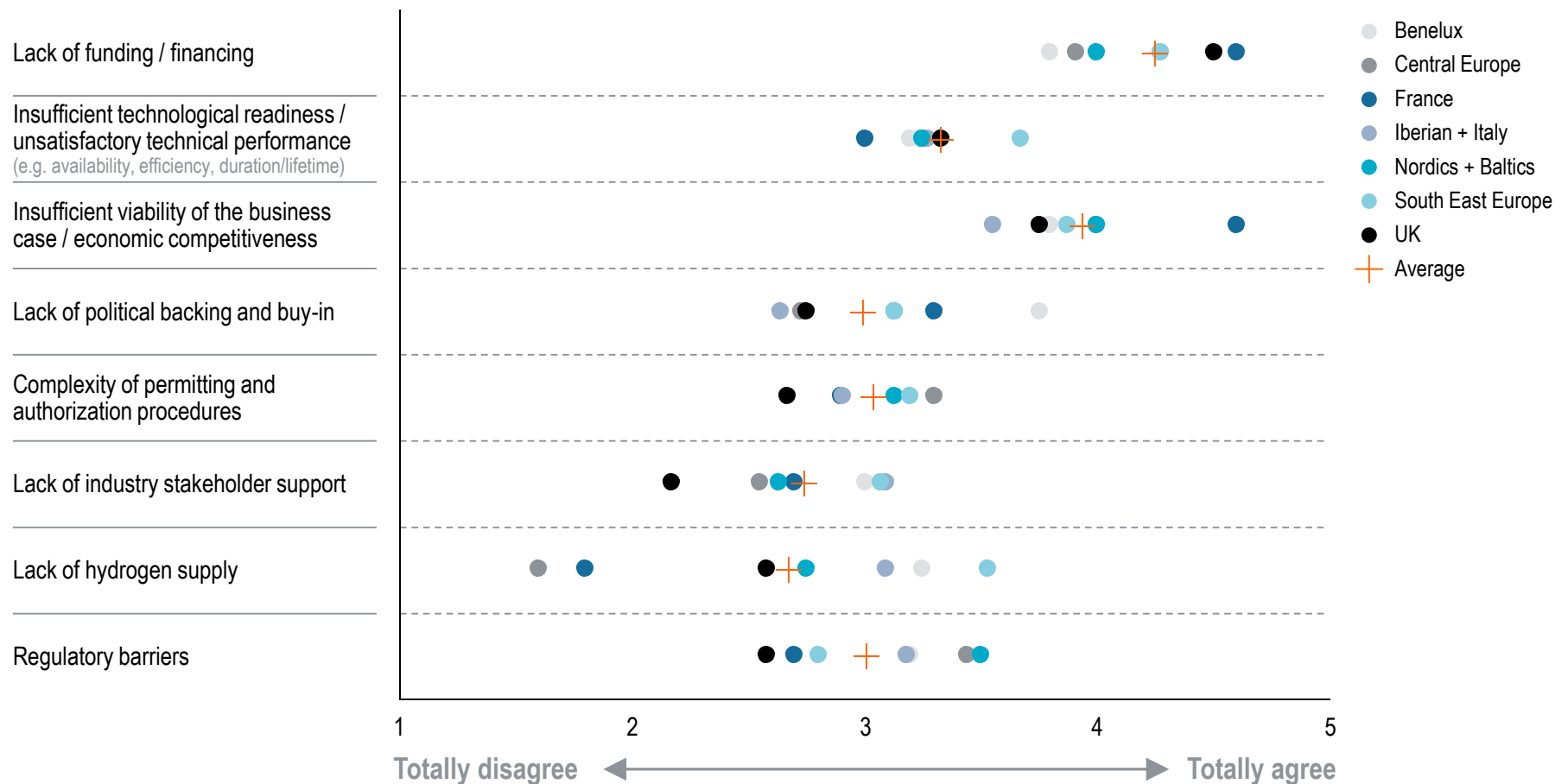


- "Lack of skilled local people"
- "Missing public awareness"
- "Lack of time"
- "Insufficient coordination between different initiatives"
- "Large area with small population density"

1) Question: "Within your region/city, which hurdles and challenges currently pose obstacles to the deployment of FCH applications?" (n=72-74)

# The relevance of different hurdles and challenges for deploying FCH applications differs across geographic clusters

## Geographic distribution of hurdles and challenges for deployment of FCH applications



1) Please see slide 16 for an overview of countries covered in each cluster

## 4. Regulatory framework in regions/cities



# Beside emission-regulation, there is other considerable regulation both favouring and hindering FCH application roll-out

## Regulation concerning emissions and deployment of FCH applications

### Regulation in place on emission reduction (selection)

**Question:** "In your region/city, what regulatory measures are in place to help reduce local emissions?"

"Low emission zones in cities"

"Periodic driving ban of diesel cars"

"Energy efficiency programme for council buildings"

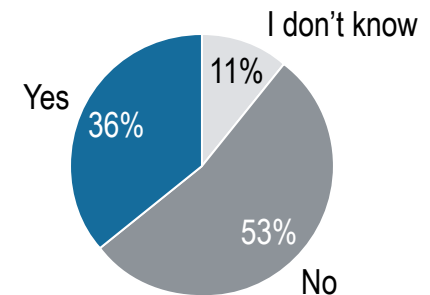
"Establishment of bus lines"

"Procurement of emission free buses only"

### Regulatory barriers favouring the deployment of FCH applications



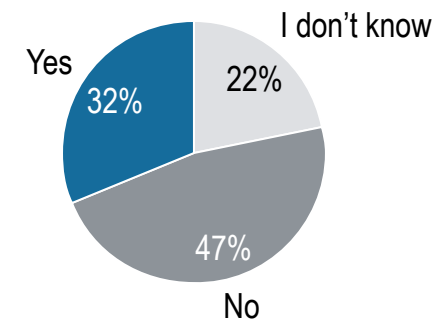
**Question:** "Are there any regulations in place favouring the deployment of FCH applications (directly or indirectly)?" (n=72)



### Regulatory barriers in place hindering deployment of FCH applications



**Question:** "Are there any regulatory barriers in place hindering the deployment of FCH applications in your region/city?" (n=73)



## 5. Financing of FCH related activities in regions/cities

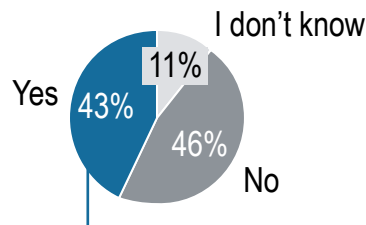


46% of participants have no internal FCH budget available yet, but the averaged 5-year project spent is projected to more than double

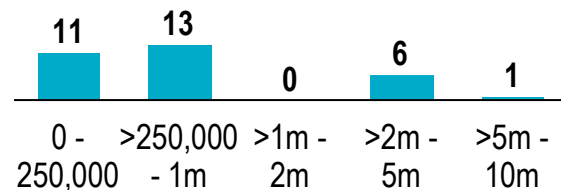
## Internal budgets for deploying FCH applications of regions and cities

### Current situation

**Question:** "Does your region/city have internal budgets available for implementing FCH application deployment projects?" (n=74)

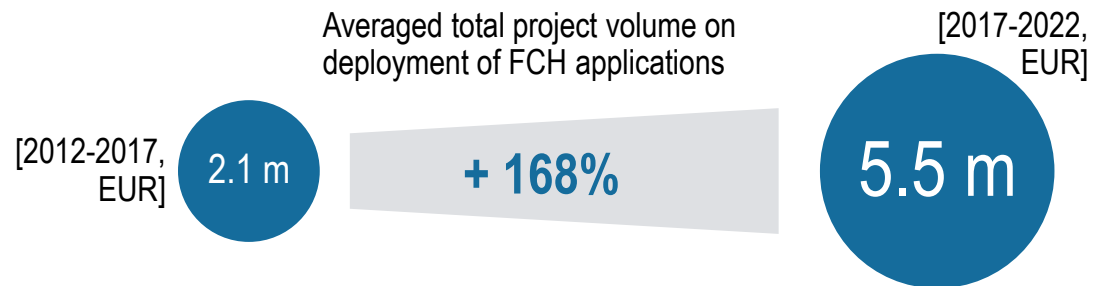
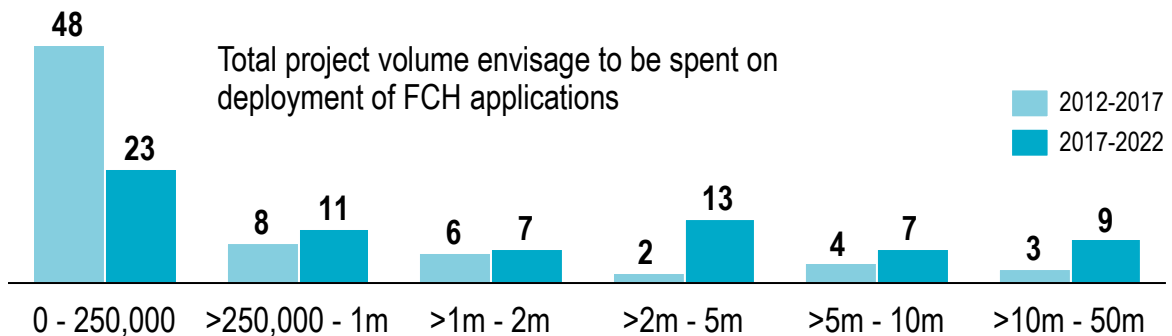


**Question:** "What is the aggregated volume of your internal, FCH-related budgets per year [EUR]?" (n=31)



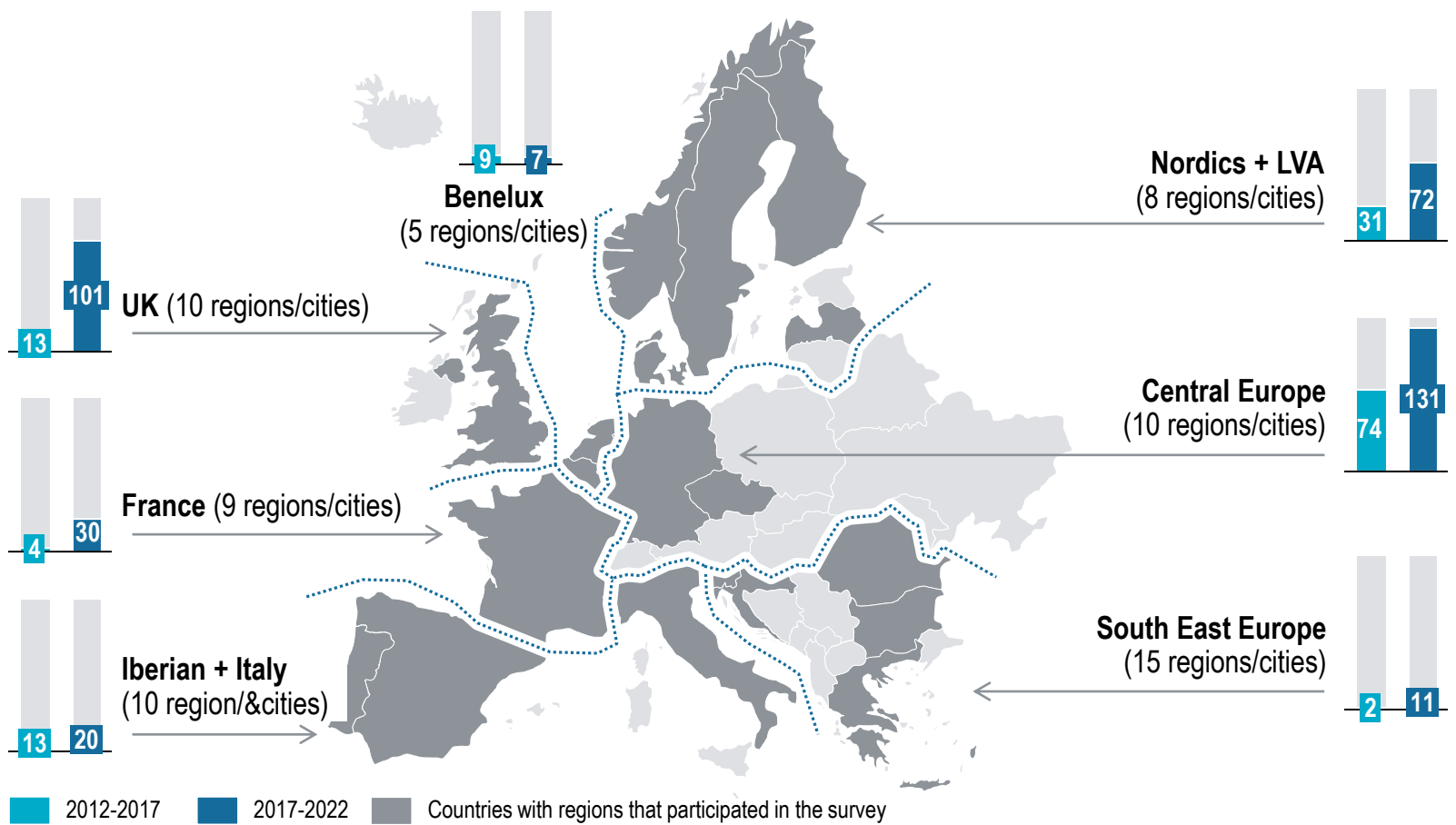
### Track-record and future ambitions

**Question:** "What total project volumes did your region/city spent on the deployment of FCH applications over the last five years (2012-2017, n=71), how much is envisaged over next five years (indicative, 2017-2022, n=70) [EUR]?"



# Considerable future FCH projects are planned all over Europe (2017-2022), especially in Central Europe, Nordics and UK

Total overall project volume<sup>1)</sup> across geogr. clusters [m EUR] – APPROXIMATION

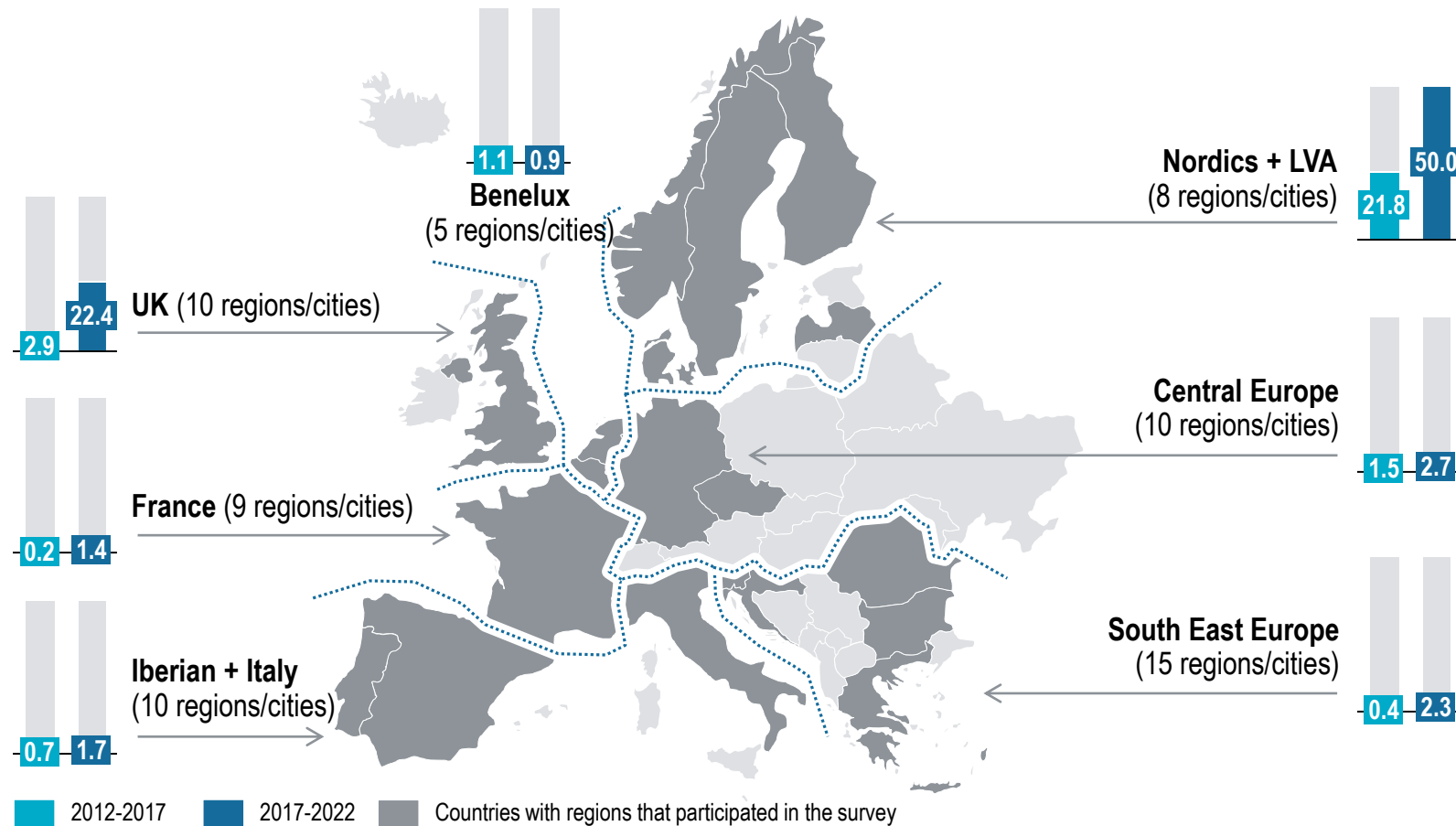


1) Overall project volume in each geographic cluster calculated as sum of all aggregated project volumes of regions/cities (average of ranges on slide 35 considered for summation); # of regions/cities refers to those with answers to this question



# Per capita investment is expected to increase significantly, particularly in the Northern European clusters

Average project volume per capita<sup>1)</sup> across geogr. clusters [EUR] – APPROXIMATION

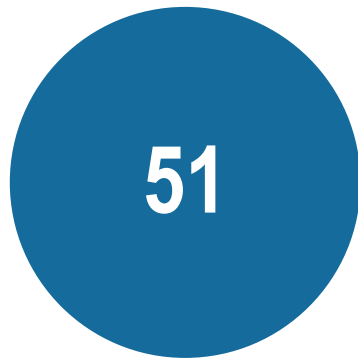


1) Overall project volume in each geographic cluster calculated as sum of all aggregated project volumes of regions/cities (average of ranges on slide 35 considered for summation); population for per capita calculation based on regions/cities who have participated in the survey; # of regions/cities refers to those with answers to this question

# There is a large variety of funding instruments that regions consider relevant, with most experience on country specific instruments

## External, non budgetary funding sources

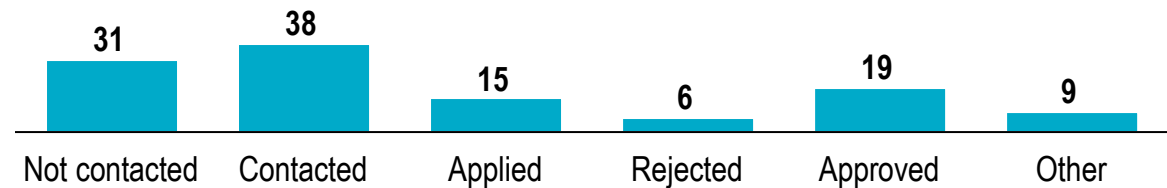
### Number of funding/financing sources named in the survey



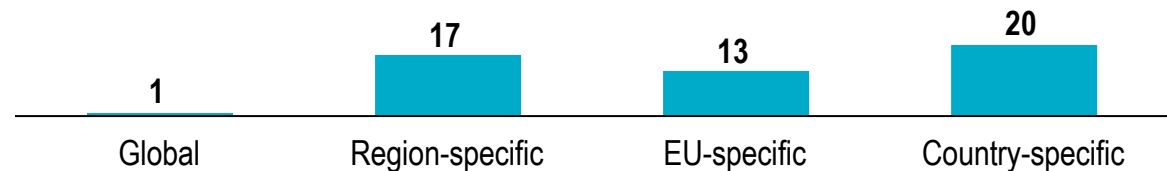
... 44%

of the regions/cities have a designated person, unit or agency in charge of identifying FCH-related funding sources<sup>1)</sup>.

#### Question: "What is your current status of tapping this source of financing?"



#### Question: "What is the geographic focus?"



#### Question: "What FCH applications are eligible?"

"Hydrogen vehicles & refuelling stations"

"Development and implementation of environmentally friendly technology"

"Hydrogen production and use, hydrogen transport, etc."

1) Question: "Do you have a designated person, unit or agency in charge of identifying FCH-related funding sources?" (n=73)

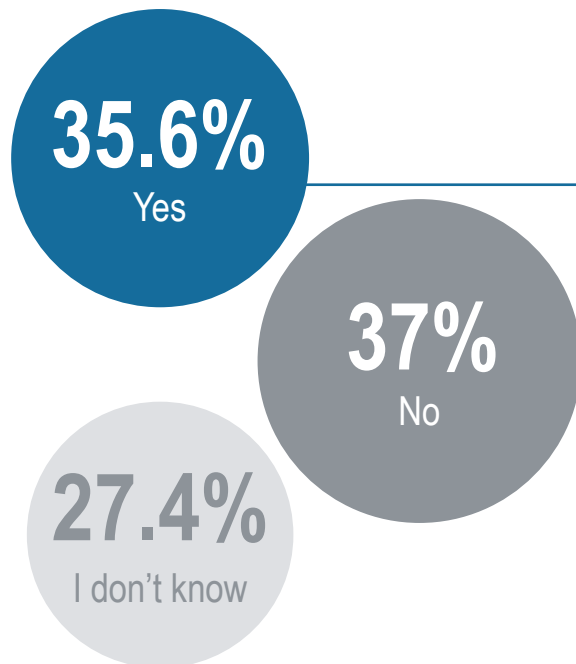
## 6. Smart specialisation



~35% of participants are registered on the S3 Platform, with some calling for a stronger interaction between FCH and S3 initiatives

## Smart Specialisation Strategy (S3)

Are you a registered member of the EU's S3 platform?<sup>1)</sup>



What activities has your region/city realised so far (exemplary)?

- > "Participation in the S3 Chem program, which promotes innovation in chemical related areas"
- > "Chymène project: generation of hydrogen compressors for refuelling stations which are intended for hydrogen mobility"
- > "LAVOISIER, a technological research program"
- > "Establishment of an on-line environmental platform for the submission of proposals, ideas and observations by citizens and bodies"

What role do you envisage for FCH applications in the context of S3 (exemplary)?

- > "A pivoting role for boosting the development of local economies based on scientific research, innovation and entrepreneurship"
- > "Funding for projects related to the hydrogen domain"
- > "Implementation of new activities targeted at the promotion of new technological solutions"
- > "Creation of an industrial network to implement innovative tech-projects"

1) Question: "Is your region/city currently a registered member of the Smart Specialisation Strategy (S3) platform?" (n=73)

## 7. Survey and project feedback



# Participants provided a large variety of comments on the survey and overall project – Food for further discussions on project steering

## Feedback of participants regarding the survey and the project

### Question: "How did you like the survey?"

"I believe it is **comprehensive** without feeling overwhelming"

"Would be nice to be able to jump between questions by clicking on the page number"

"I consider it **adequate** to this initial stage"

"Maybe we can **dig a bit deeper** about the technologies we intend to set?"

"Could you add the notion of duration and ready deadline"

"Some points do not fit very well to **our situation**"

"Really good application but missed things like **H<sub>2</sub> boilers**"

"It was good. Most difficulties regarding the **financial questions**"

1) Answers have been anonymized

### Question: "Any further comments about the project?" (selection)

"(...) politicians have agreed on the **hydrogen strategy and its ambitions**. We now see that questions are raised mainly of two reasons: 1) BEVs are getting a higher range resulting in a discussion whether FCE passenger vehicles are a suitable application. 2) The **lack of vehicles** is becoming an increasing problem. Some million XX<sup>1)</sup> have been invested in infrastructure, and still only some XX<sup>1)</sup> FCEVs are on the road. We need **more models and a higher volume** of vehicles available. Car manufacturers limiting their production and deploying vehicles only in selected countries are resulting in and **increasing impatience** which may hinder the development. I hope the project in some way can help on this situation"

"(...) **poor air quality** is gaining increasing importance, delivery vans is a very interesting segment. Several cities will introduce **zero emission zones**, and this is a perfect segment for hydrogen and fuel cells. The project should help identify the market and business models so that the manufacturers will provide such vehicles"

"From our point of view this self assessment is a good approach to analyse the regional funding activities and topics. The objective should be to **align the available funding sources** (EU, national and regional)"



Please do not hesitate to get in touch with us

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complexity