



EUROPEAN COMMISSION

DIRECTORATE-GENERAL FOR ENERGY AND TRANSPORT

DIRECTORATE D - New and Renewable Energy Sources, Energy Efficiency & Innovation
Innovation and technological development in energy

Brussels, 01.09.2007

PUBLIC CONSULTATION REPORT

Report of the Public Consultation on the European Strategic Energy Technology Plan (SET-Plan)

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Executive Summary

The European Commission intends to put forward a first European Strategic Energy Technology Plan (SET-Plan) at the end of 2007, aimed at accelerating the market introduction and take up of low-carbon and efficient energy technologies. As part of the preparation of a credible and widely supported SET-Plan a widespread consultation with all relevant stakeholders has been ongoing, aimed at agreeing a shared European vision on the role that technology could play in a sustainable energy future. This consultation includes hearings and workshops with established advisory and stakeholder groups, as well as a public on-line consultation offering the opportunity to all interested stakeholders to express their views.

▪ **EU energy policy and technology**

Collectively, the 604 individuals and organisations who contributed to the consultation have massively acknowledged the importance of technology to help achieve policy goals of a more sustainable future, including lower CO₂ emissions, increased reliance on renewable energy sources and improved energy efficiency. Among respondents¹ from all sectors,

- 96% think that there is added value in European level action to promote energy technologies;
- 49% believe that the European Union could reach the targets proposed in the Energy Policy for Europe with energy technologies currently available in the market; 10% do not know and the remaining
- 41% of believe that the current energy technologies available in the market are not enough to reach the targets proposed by the European Union. Among them:
 - 91% recognise that new (not yet fully deployed) technologies could contribute to reach the European Union targets and;
 - 95% consider that taking the right actions to develop and introduce in the market new energy technologies now could lead to sustainable energy in the future.

▪ **The role of technology and the need for action**

A vast majority of respondents also expressed agreement with statements in the communication "Towards a European Strategic Energy Technology Plan" regarding the role of technology and the need for action.

- Technology has a vital role to play (98% agree; among them 79% strongly agree).
- "Business as usual" is not an option (95% agree; among them 71% strongly agree).
- Development of a broad portfolio of many different technologies must be pursued (93% agree; among them 72% strongly agree).
- There is a need to create stable and predictable conditions (93% agree; among them 68% agree).
- Strategic action is required to transform the energy system (89% agree; among them 57% strongly agree).

¹ The percentages are relative to the total number of respondents to each topic, e.g. "European Union Energy Policy and Technology", "The role of technology and the need for action"...

- **Energy technology prospects: policy goals, innovation instruments and level of action**

The significance of energy technologies to EU policy goals is also widely acknowledged by the respondents.

The potential of energy efficiency to contribute to the energy policy goals by 2020 is largely recognised, particularly for

- buildings (65% of respondents) and for
- transport (62% of respondents).

Significant acknowledgement is also made of the contributions of

- wind energy (by 58% of respondents for on-shore and 51% for off-shore),
- biomass (by 57% of respondents) and
- biofuels (by 48% of respondents for 1st generation and 26% for 2nd generation).

Technologies currently under development are recognised by respondents as having the greatest potential to contribute to the energy policy goals by 2050:

- energy storage was selected by 40% of respondents,
- second generation biofuels and hydrogen vehicles had hits from 39% of respondents;
- hydrogen as energy carrier was selected by 38% of respondents;
- energy efficiency in transport (with hits by 39% of respondents) and in buildings (35% of hits) as well as photovoltaics (36% of hits) are also among the highest-ranked technologies;
- these are followed by concentrated solar power (35% of hits), polygeneration (34% of hits) and nuclear fusion (34% of hits).

In terms of effort levels, more than 63% of respondents indicated that they consider insufficient the current level of innovation efforts for technologies that they collectively selected as having the greatest potential to contribute to the energy policy goals by 2050, and for which they jointly consider technology-push to be the most suitable instrument to accelerate the pathway to the market (e.g. energy storage, hydrogen, 2nd generation biofuels). For technologies collectively seen to have a potential in the relatively shorter time horizon of 2020 and to benefit from demand-pull instruments (e.g. small hydro, district heating and cooling, energy efficiency in buildings), between 45% and 59% of respondents regard current innovation efforts as insufficient.

The need for initiative at EU level is understood to somewhat vary for the different technologies. For example, nuclear waste management, energy storage, energy efficiency in transport, hydrogen as an energy carrier and hydrogen vehicles are recognised by ca. 50% of respondents as technologies requiring EU initiatives.

- **International cooperation**

The importance of international cooperation in technology is also acknowledged by most respondents. For energy technologies, the most important issues for international cooperation are considered to be

- applied research and demonstration (73% of respondents),
- know-how exchange (59% of respondents) and
- technology transfer (58% of respondents).

Basic research is seen as the next priority (54% of respondents), followed by market and regulatory issues (ca. 45% of respondents).

- **Opinion, ideas and initiatives**

Out of the 604 respondents who contributed to the public consultation, 431 provided answers to open questions and put effort into expressing their views beyond the specific questions asked. They widely acknowledge the need for a SET plan and the importance of a broad technology portfolio.

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1. Introduction

In order to put forward the first European Strategic Energy Technology Plan for endorsement by the 2008 Spring European council, the Commission engaged in a process of widespread consultation and active involvement of stakeholders, whereby the purpose is to agree on a shared European vision on the role that technology could play in a sustainable energy future.

From March to June 2007, the Commission conducted an Expert Consultation with established advisory and stakeholder groups, such as the FP7 Advisory Groups, relevant European Technology Platforms and other sectors. A series of hearings and workshops were convened to feed into the development of the SET-Plan.

In parallel, a public consultation offered the opportunity to all interested stakeholders to express their views by means of an on-line questionnaire, which was published on 7 March 2007 and was open for public response until 13 May 2007. This report focuses on the outcome of the public consultation, and is structured around the themes of the Commission communication "Towards a Strategic Energy Technology Plan":

- EU Energy Policy and Technology;
- The role of technology and the need for action;
- Energy technology prospects regarding energy policy goals, innovation instruments and level of action;
- International cooperation.

This report also contains a description of the respondent groups.

2. EU Energy Policy and Technology

A vast majority (96%) of public consultation respondents are supportive of European action to help meet these goals. Additionally, a significant share (41%) of respondents realise that these targets are not likely to be met with technologies currently available in the market. Among them, a vast majority acknowledges the importance of developing new energy technologies and bringing them to the market (Table 1).

Table 1 Need for the EU to promote energy technologies and the feasibility of the targets proposed in the Energy Policy for Europe

Statements and % of responses	agree	don't know	disagree
1. There is added value of EU level action to promote energy technologies	96%	2%	2%
2. The EU could not reach these targets with technologies currently available in the market	41%	10%	49%
2.a Right actions to develop/market new energy technologies now could lead to sustainable energy in the future	96% *		
2.b Not yet fully deployed new technologies could contribute to reach the targets proposed in the Energy Policy for Europe	92% *		

* the figures 96% and 92% are relative to the 41% of respondents who agree that the EU could not reach the targets with technologies currently available in the market.

3. The role of technology and the need for action

In the public consultation, the need for EU action and the role of technology are widely acknowledged. The importance of developing a broad technology portfolio, stepping up current efforts beyond "business as usual", and providing a stable business climate are also recognized by most respondents. The significance of technology to reach the targets and of strategic action to transform the energy system is also widely recognised (Table 2).

Table 2 Agreement with key statements from the Communication "Towards a European Strategic Technology Plan",

Statements and % of responses	strongly agree	some-what agree	some-what disagree	strongly disagree	un-decided or no opinion
- EU must act jointly and urgently	83%	13%	1%	0%	3%
- Technology has a vital role to play	79%	19%	1%	0%	1%
- Development of different technologies must be pursued	72%	20%	3%	2%	3%
- "Business as usual" is not an option	71%	24%	1%	1%	3%
- Need of stable and predictable conditions	68%	25%	2%	1%	4%
- Technology is crucial to reach the targets	57%	33%	4%	2%	5%
- Strategic action is required to transform the energy system	57%	32%	3%	1%	8%

4. Energy technology prospects regarding energy policy goals, innovation instruments and level of action

Of all respondents, the majority recognise the potential of technology to contribute to the energy policy goals by 2020, and a significant number acknowledge the potential to contribute by 2050. The majority of respondents consider that current development and innovation efforts in the EU are insufficient to reach the targets proposed in the Energy Policy for Europe, and that technology push would be most suitable to accelerate the pathway to the market.

- **Energy policy goals**

The potential to contribute to the energy policy goals by 2050 was gauged for the same set of technologies as for 2020. In absolute terms, the response rate regarding 2050 was somewhat lower than for the nearer time horizon of 2020. In relative terms, energy efficiency in transport and in buildings is among the 10 technologies perceived to have the greatest potential to contribute to the energy policy goals by 2050.

Technologies by 2020

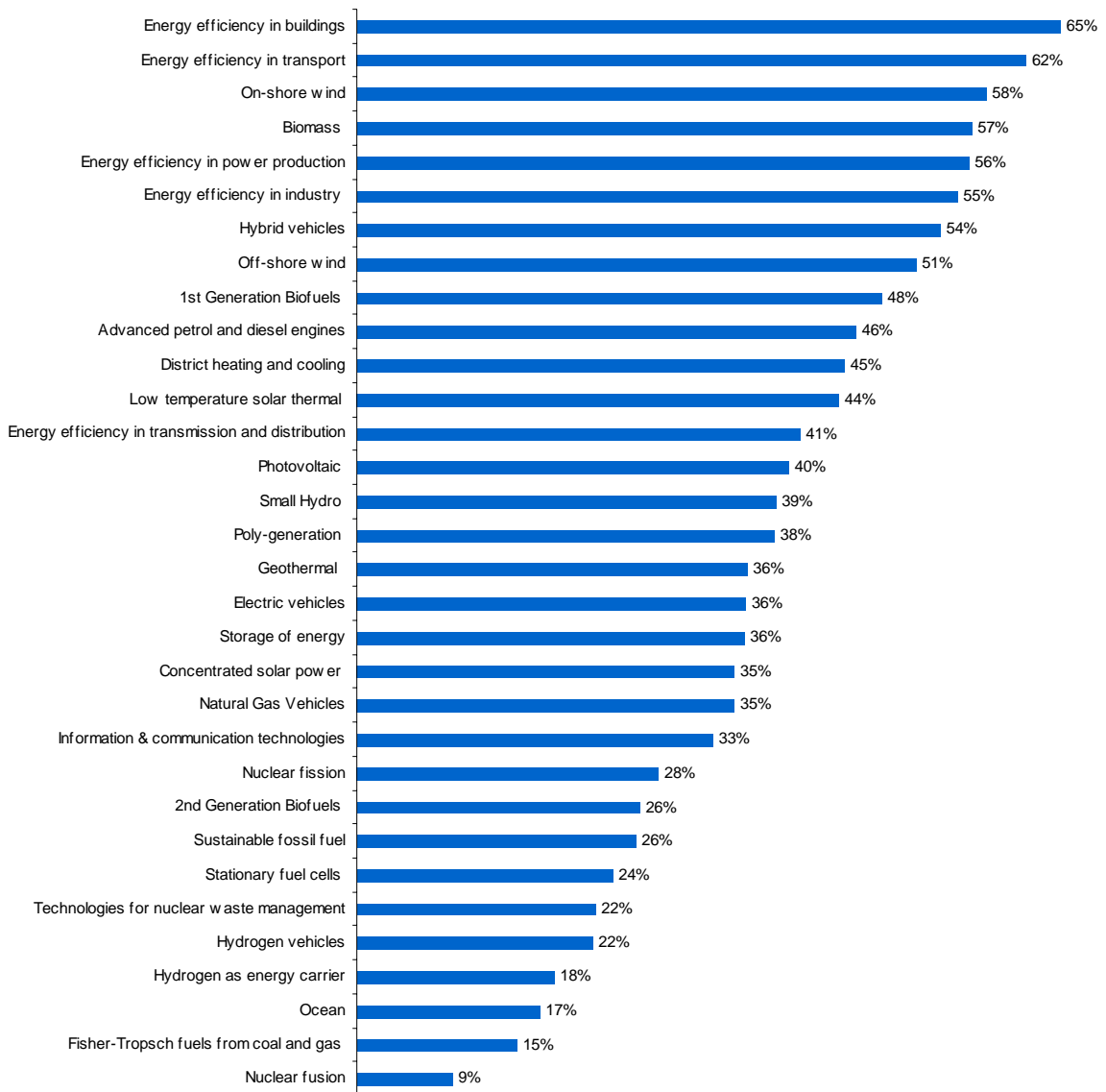


Figure 1 Potential of technologies to contribute to the energy policy goals by 2020 (number of hits per total number of respondents)

The highest-ranked technologies in terms of potential contribution to policy goals by 2050 are energy storage (40% of hits), 2nd generation biofuels (39% of hits) and hydrogen vehicles (39% of hits). These technologies are perceived to have more or less the same potential as energy efficiency in transport (39% of hits). A few percentage points lower are photovoltaics (36%), concentrated solar power (35%) and nuclear fusion (34%). These technologies are perceived to have more or less the same potential as energy efficiency in buildings (35% of hits), in terms of contribution to achieve policy goals by 2050.

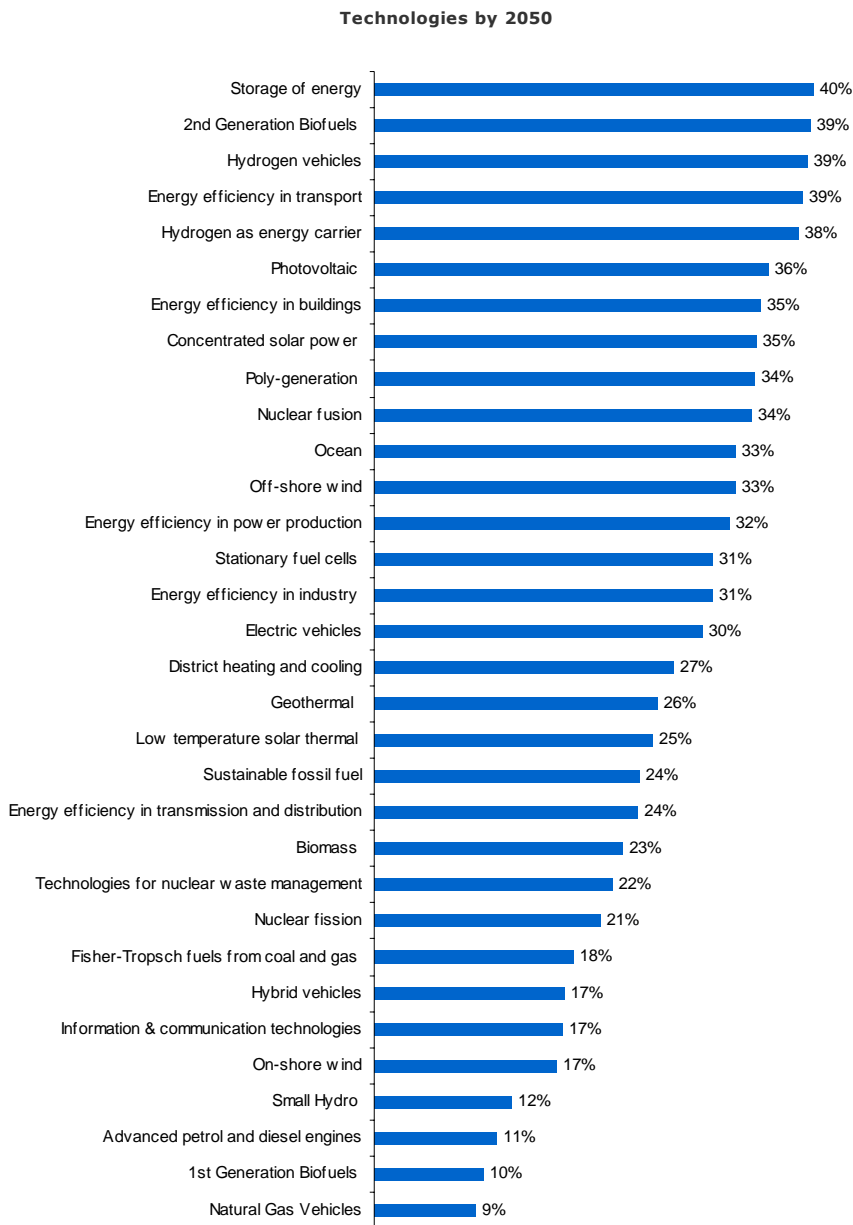


Figure 2 Perceived potential of technologies to contribute to energy policy goals by 2050 (number of hits per total number of respondents)

Some shifts regarding the potential of different technologies to contribute to the energy policy goals by 2020 and by 2050 are noteworthy. For example, nuclear fusion moved from the last or 32nd place in terms of potential by 2020 to the 10th place by 2050. 2nd generation biofuels, hydrogen vehicles and hydrogen storage moved from the 24th, 28th and 29th places by 2020 to the 2nd, 3rd and 5th respectively by 2050. Other renewable energy technologies (e.g. concentrated solar power, poly-generation, ocean, offshore wind...) also moved upwards, albeit to a lesser extent.

The potential of energy efficiency in buildings, on the other hand, is perceived by the respondents to somewhat decrease from the 1st place in terms of potential by 2020 to the 7th place by 2050. Energy efficiency in transport is ranked at the 4th place in terms of potential contribution to the energy policy goals by 2050, only two ranks down from the 2nd place by 2020.

Insufficient Current Effort

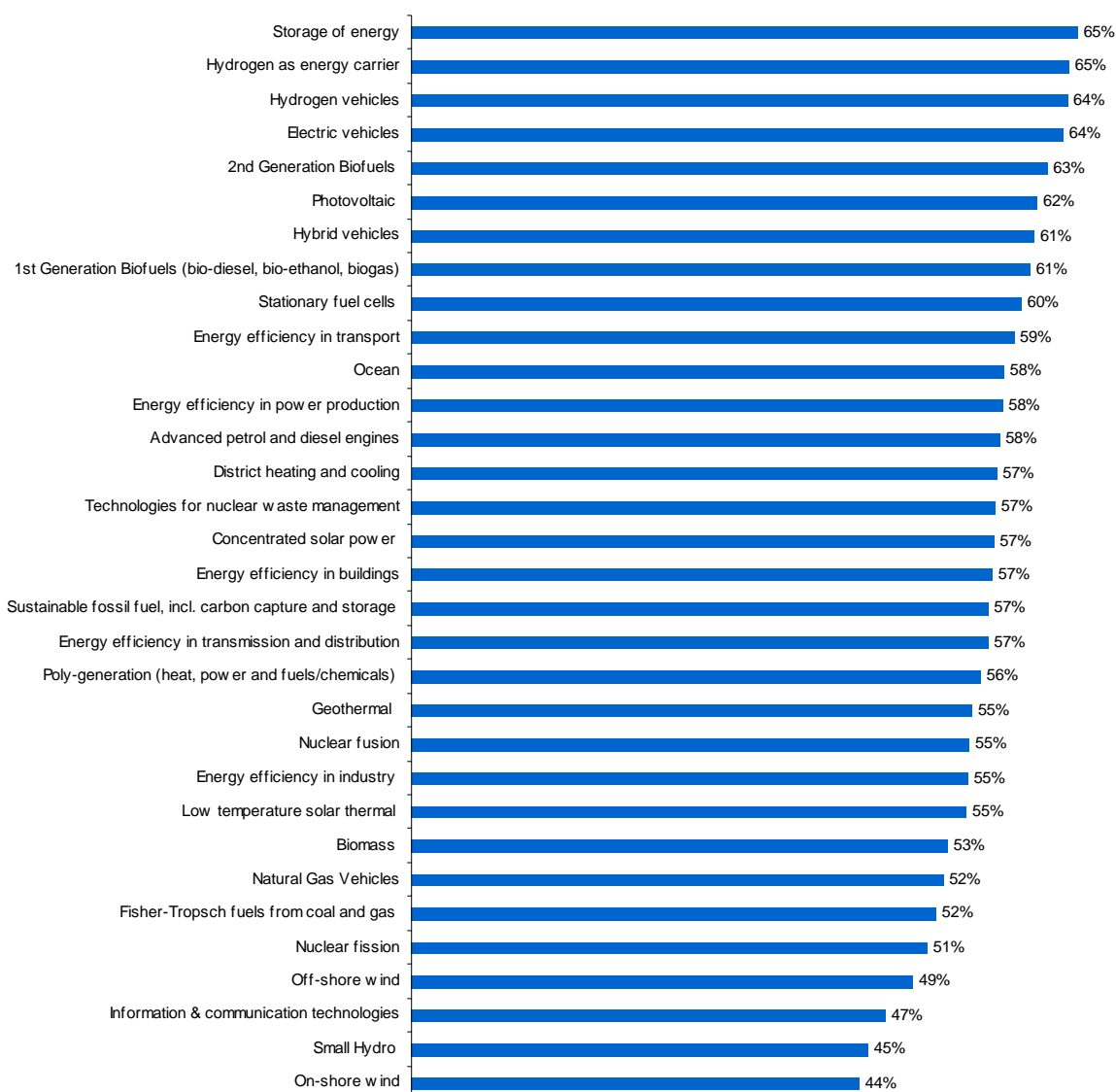


Figure 3 Technologies for which current innovation efforts are perceived to be insufficient

While the potential of technology to contribute to EU energy policy goals is widely recognised by respondents, there is also a widespread perception that current innovation efforts are insufficient. Roughly speaking, it may be said that for all technologies, about half of the respondents expressed this view. For example, 64% to 65% of respondents indicated that they regard as insufficient the current innovation efforts on energy storage, hydrogen (as an energy carrier and for vehicles) and electric vehicles. For 2nd generation biofuels and photovoltaics the percentages are 63% and 62% respectively. By and large, these technologies were also selected by most respondents as having the greatest potential to contribute to energy policy goals by 2050 (Figure 2), and as being on top of the list of technologies for which current development and innovation efforts are insufficient (Figure 3).

- **Innovation instruments**

Public policy can provide the framework conditions and incentives for the development and take-up of energy technologies. Instruments available at European and national level to help accelerate technology development and market introduction include technology push and market-oriented demand pull.

For the majority of technological options addressed in this public consultation, respondents expressed a preference for technology push as an appropriate instrument to accelerate the pathway to the market.

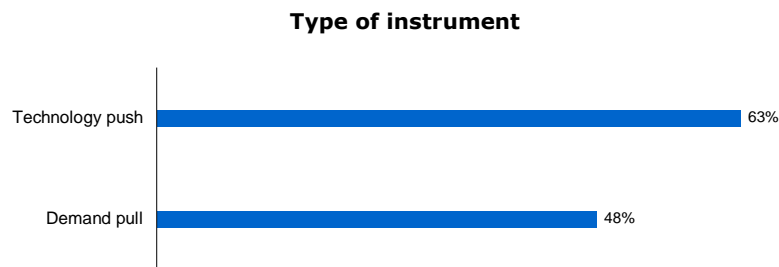


Figure 4 Overview of respondents' preferences for technology push or demand pull as instruments suitable to accelerate the pathway to the market.

Generally speaking, technology push had higher number of hits for technologies that are in the R&D stage (such as nuclear fusion, hydrogen as energy carrier and energy storage, Figure 5), and demand pull was preferred for technologies that are already closer to the market (energy efficiency in buildings, small hydro, district heating and cooling, Figure 6).

Technology Push

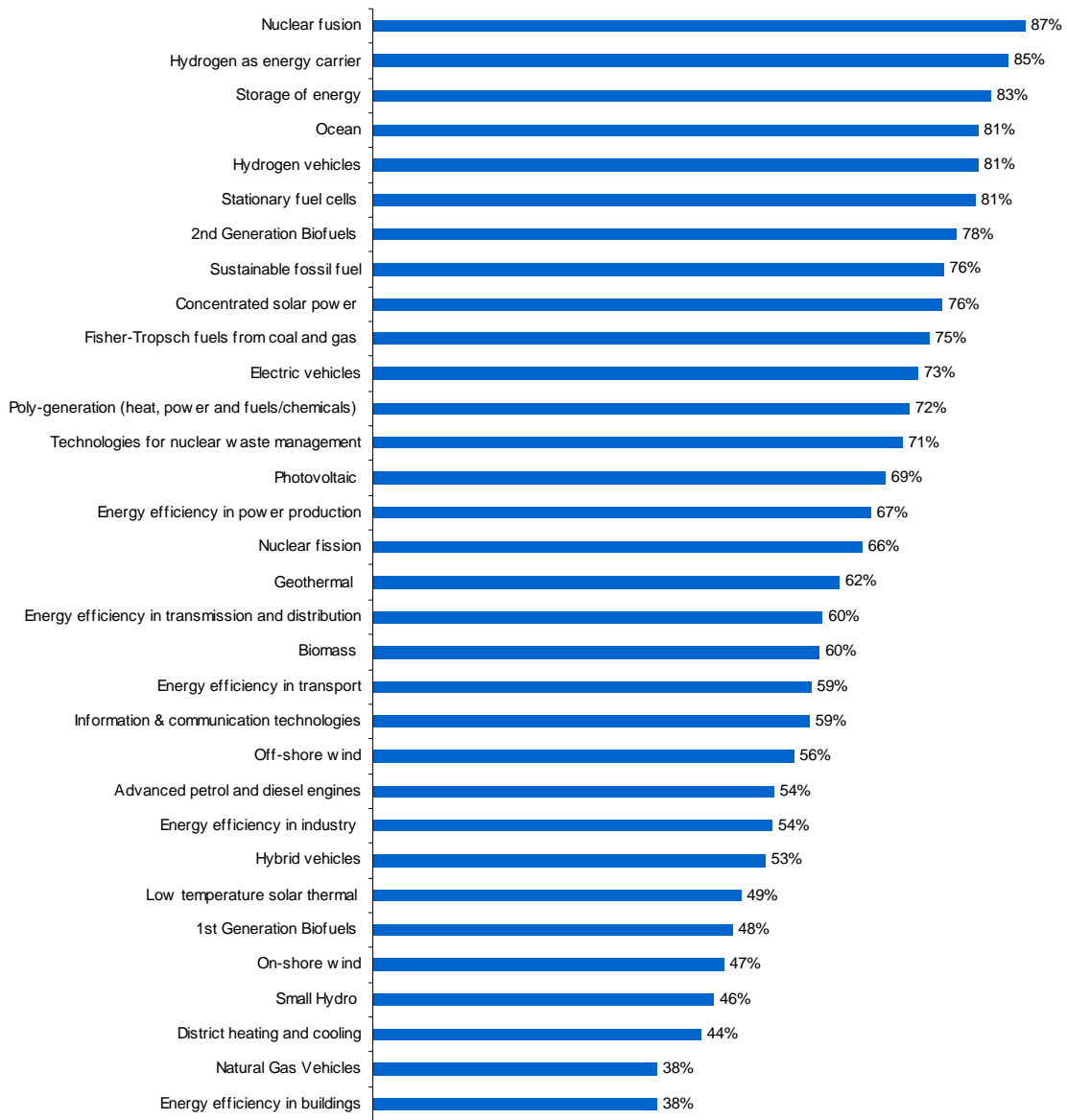


Figure 5 Technologies for which technology push is perceived to be a suitable instrument for accelerating the pathway to the market

Demand Pull

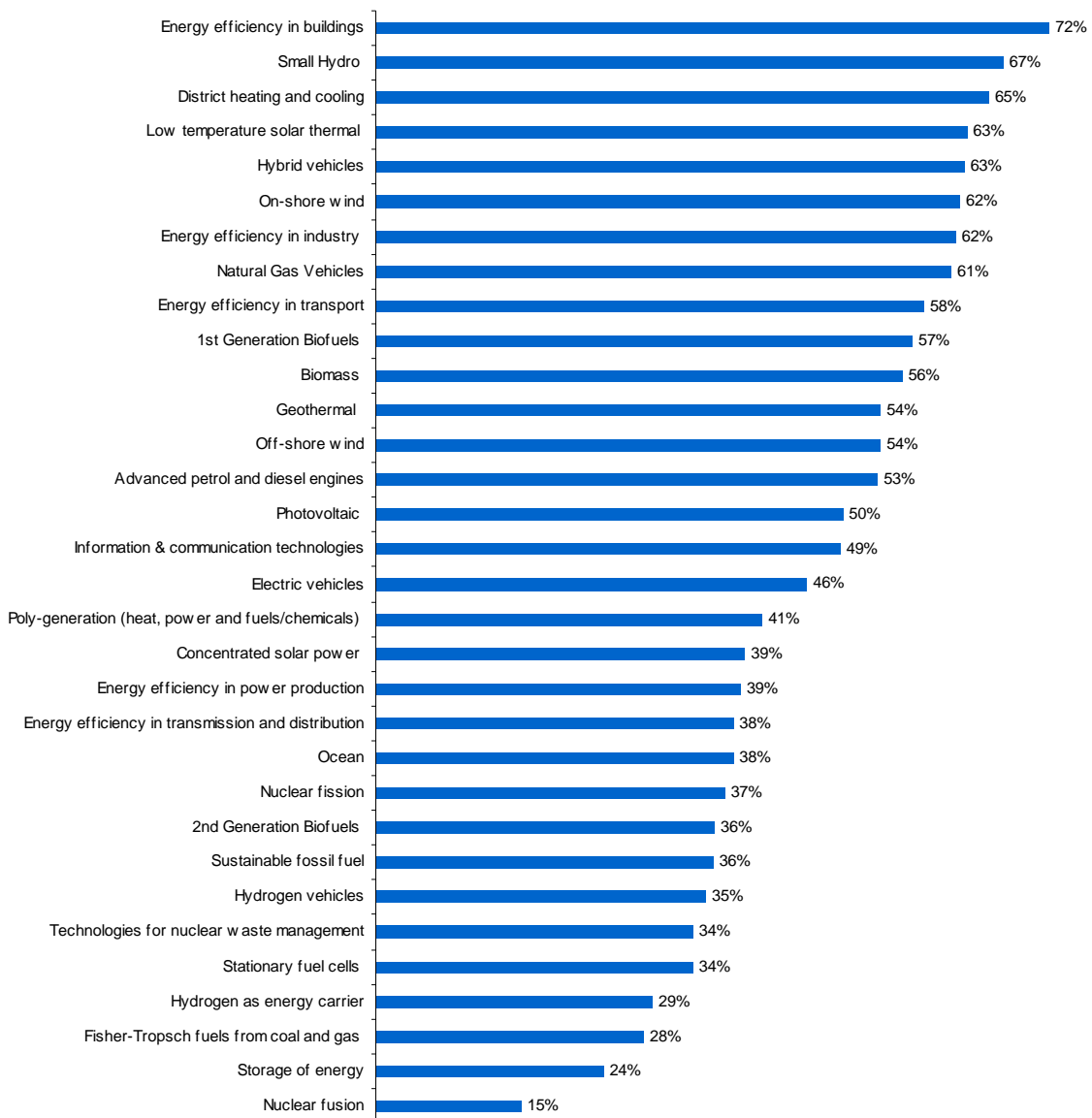


Figure 6 Technologies for which demand pull is perceived to be a suitable instrument for accelerating the pathway to the market.

- **Level of action**

The need for new European Union initiatives is perceived to somewhat vary among the different technologies. For example, nuclear waste management, energy storage, energy efficiency in transport, hydrogen as an energy carrier and hydrogen vehicles are perceived by 47% to 50% of respondents as requiring EU initiatives. Except for nuclear waste management, these technologies also scored relatively high in terms of potential to contribute to targets by 2050 (Figure 2), appropriateness of technology push (Figure 5) and insufficient current effort (Figure 3). Technologies with relatively high to medium scores for 2020 targets and for demand pull (e.g. energy efficiency in power production and buildings, district heating and cooling, low temperature solar thermal, geothermal... - Figure 1 and Figure 6) were perceived by as many as 30% to 40% of respondents as requiring initiative at EU level.

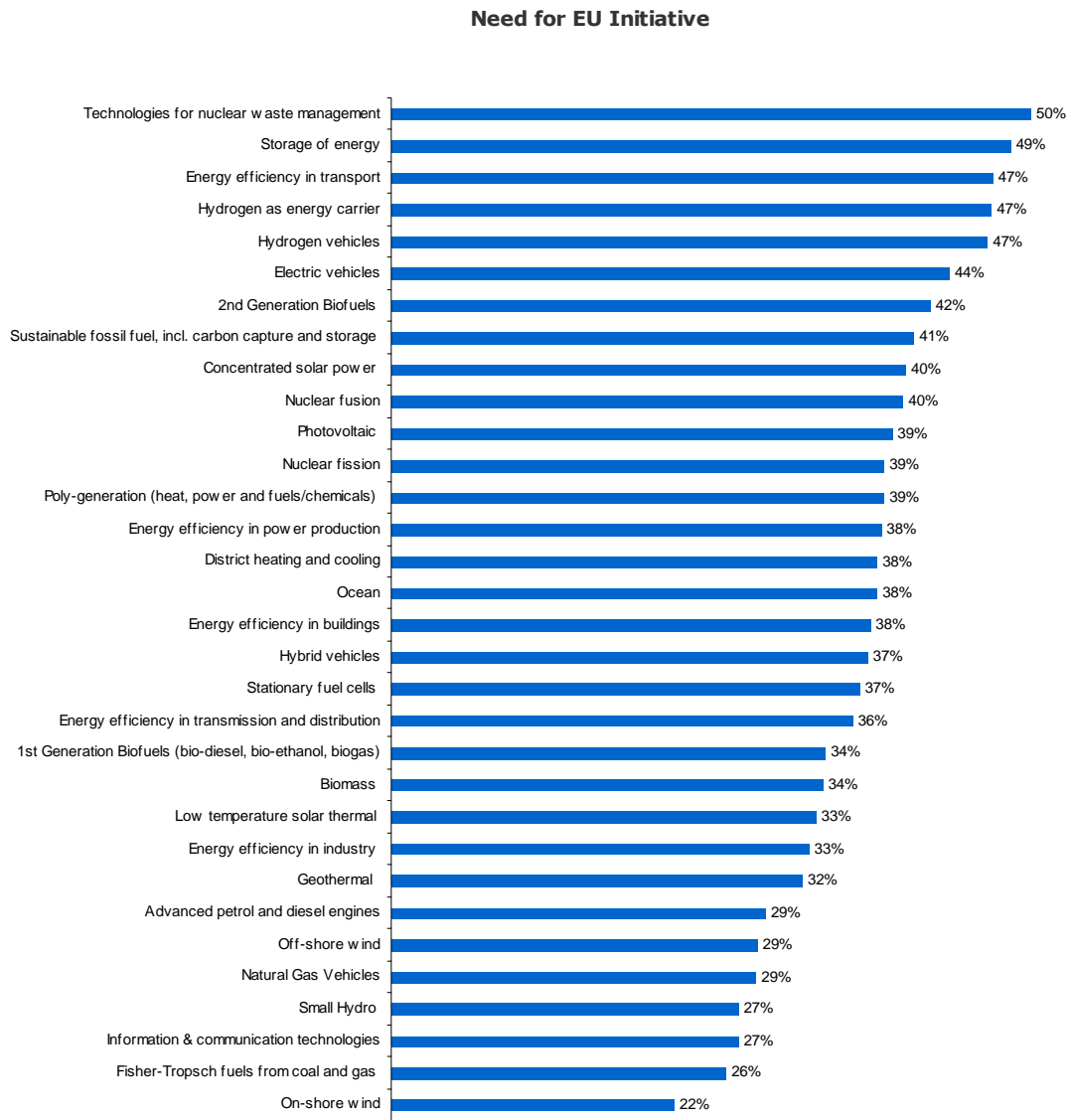


Figure 7 Technologies selected as those to require new European initiatives.

5. International Cooperation

Energy security and climate change are global issues with solutions that can be deployed globally, giving rise to huge markets but also to severe competition. Finding the right balance between cooperation and competition is vital. Synergies in the development of efficient and low carbon technologies should be further enhanced by closer and result-oriented cooperation with international partners.

Public consultation respondents widely support international cooperation in technology. The items regarded as most important are applied research and demonstration (72% of hits), as well as know-how exchange and technology transfer (58% to 59% of hits). Basic research is the next priority (54% of hits), followed by market and regulatory issues (44% to 45% of hits). Researcher mobility (32% of hits) and intellectual property rights (23% of hits) had the lowest scores.

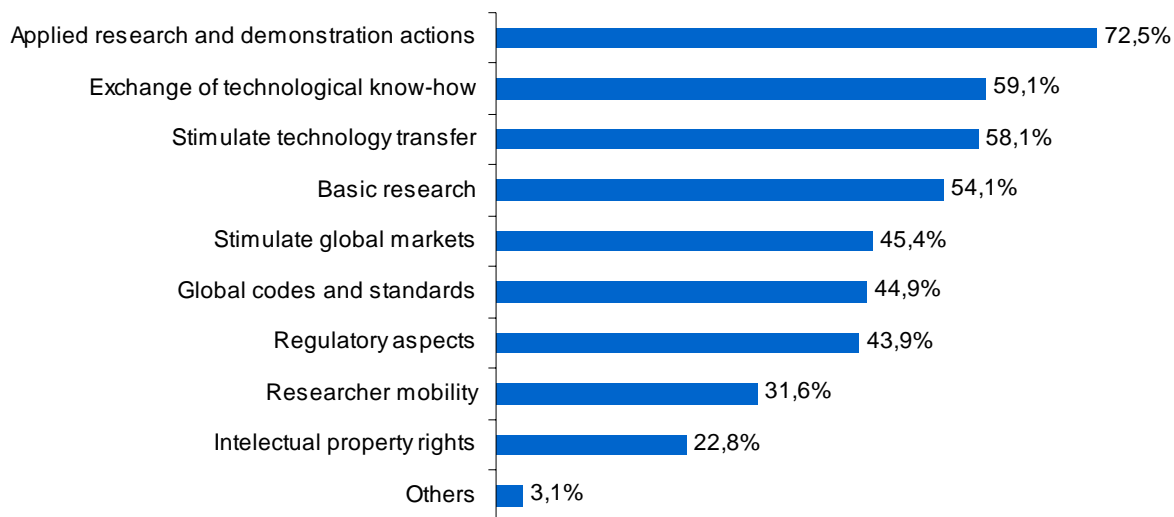


Figure 8 Most important issues selected for international cooperation.

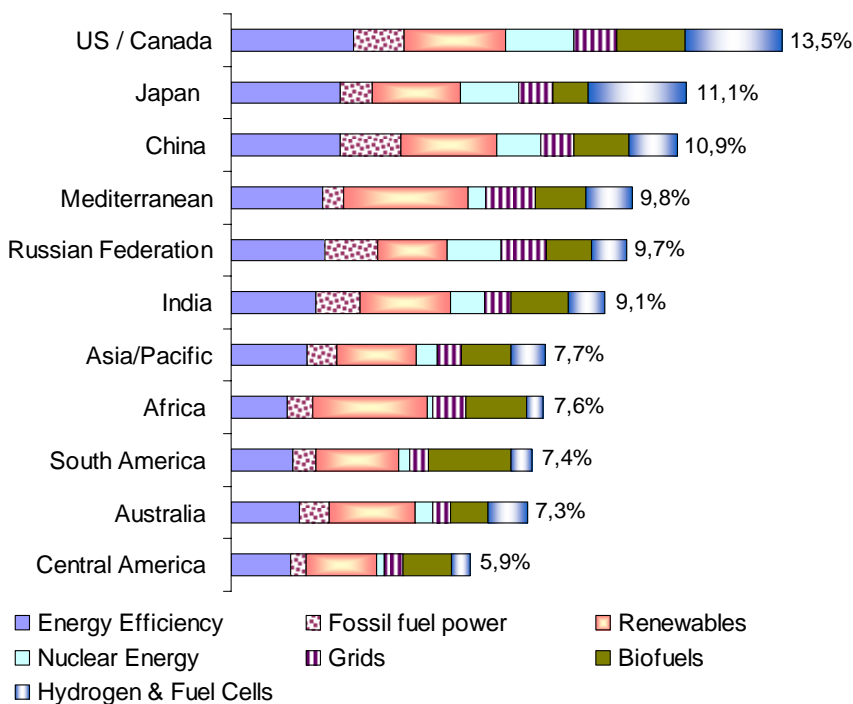


Figure 9 Regions and technologies selected for international cooperation.

Respondents were also asked which regions of the world should be targeted for cooperation on different technologies. The United States/Canada received the highest number of hits (13%), followed by Japan and China (11%). The Mediterranean and Russian Federation followed closely (10%) followed by India (9%), other emerging economies and Australia (around 7% to 8%).

The preferred technologies for international cooperation are renewables, energy efficiency and biofuels, followed by hydrogen/fuel cells and fossil fuel power generation. Preferences vary somewhat from region to region (Figure 9).

For example, renewables are notably preferred for the Mediterranean and Africa. For biofuels, the preference clearly leans towards South America. For hydrogen/fuel cells Japan and the United States/Canada are the preferred regions for cooperation. For fossil fuel power generation, the Russian Federation, China and the United States/Canada hold the highest number of hits. Cooperation on nuclear energy is seen as desirable mainly with US/Canada, Japan and Russian Federation, while cooperation on grids is envisaged with the Mediterranean, Russian Federation and US/Canada.

6. Opinion, ideas, and initiatives

Opinions regarding the Strategic Energy Technology plan were freely expressed by 431 out of 604 respondents, including the need for and essential success elements of a European SET plan, new actions and measures could accelerate the energy technology innovation process, and on-going or planned initiatives that the SET-Plan could build upon.

Regarding the need for a SET plan, a large number of respondents said that it is absolutely necessary, highly valuable and very important. Several respondents mentioned the importance of developing a vision, a roadmap and a coherent approach, and also of coordinating national and European interests. Some said that the SET plan is important for supporting regulatory decisions, while others pleaded for no increase in prescriptive legislation, EU intervention or needless bureaucracy.

Regarding success factors for the SET-plan and new actions that could accelerate the energy technology innovation process, a large number of respondents emphasised the importance of a broad technology portfolio (not picking winners). Economic sustainability, investors' security, stable and predictable conditions were further indicated by many respondents as success factors. Also mentioned were the importance of involving stakeholders early on, of promotion and education, as well as of market-drive, competitiveness and result-orientation. Furthermore, respondents acknowledged the importance of indicators for evaluating impact, integration of R&D with innovation and industry, and a scientific basis of research policy.

As for on-going or planned initiatives that the SET-Plan could build upon, many respondents mentioned other European initiatives, in particular the Intelligent Energy Europe programme, Technology Platforms and ongoing or concluded European projects. Joint Technology Initiatives and international cooperation (including the International Energy Agency and non-European countries) were also mentioned.

Annex 1 - Characterisation of the respondents

During the consultation period the Commission received 604 responses via the on-line questionnaire (321 from citizens and 283 from various organisations/stakeholders). 53% of respondents were citizens and 47% were organisations.

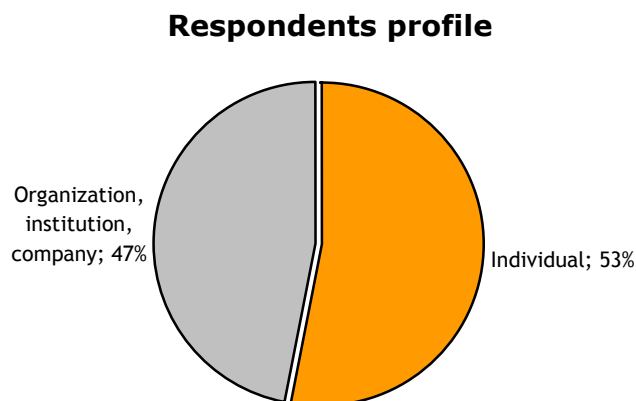


Figure 10 Respondents' profile

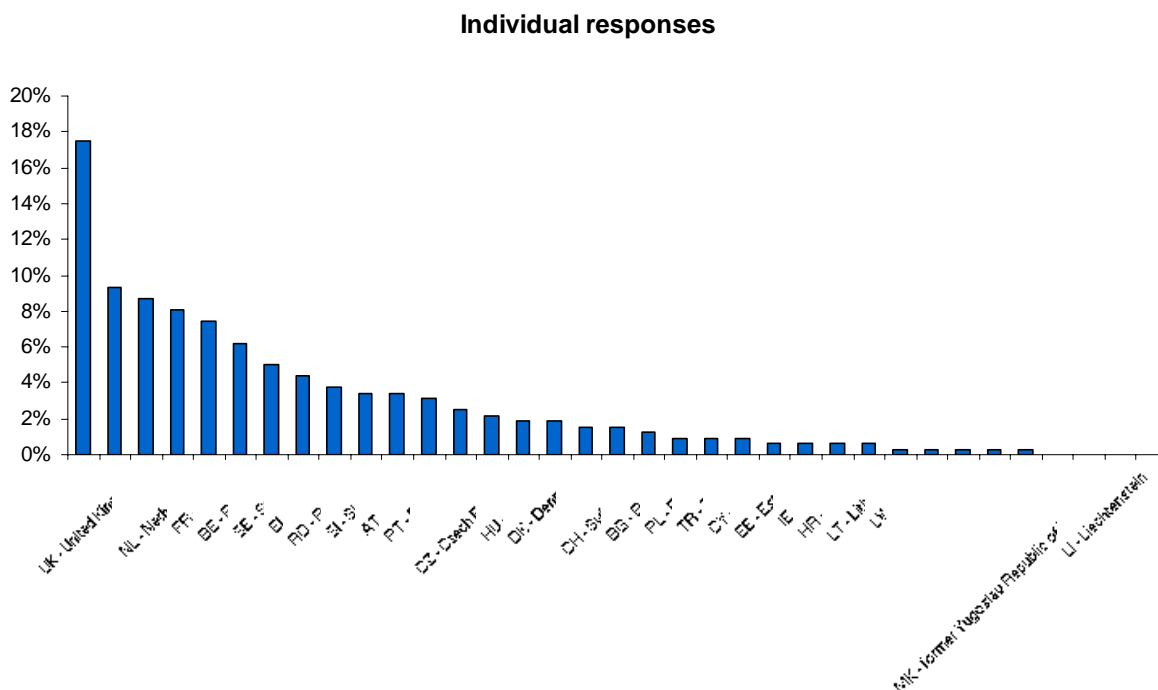


Figure 11 Individual responses

Most of the individual responses came from Italy (17.4%), Germany (9.3%), United Kingdom (8.7%), and Spain (8.1%). 47% of respondents were people between the ages of 25 and 44, followed by 42% between the ages 45 and 64.

Organizations responses

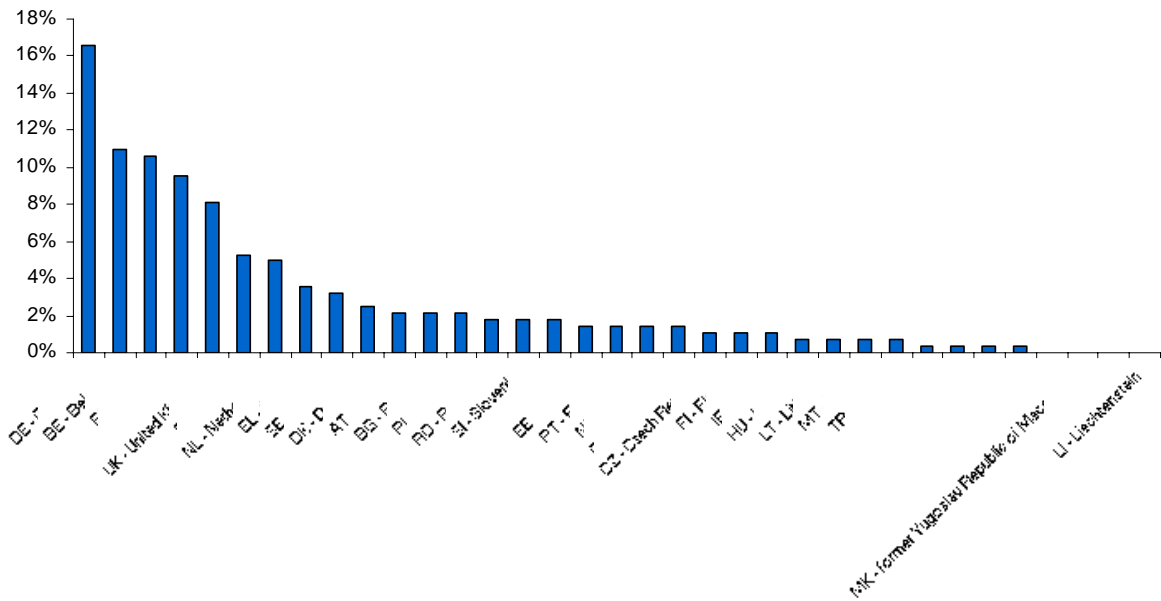


Figure 12 Organizations' responses

Most of the organizations' responses came from Germany (16.6%), Belgium (11%), Spain (10.6%), and Italy (9.5%).

Type of organization

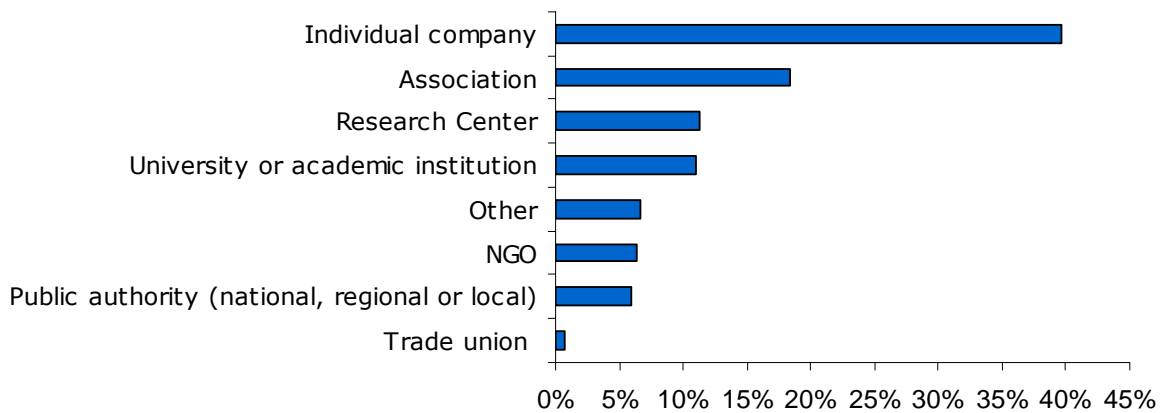


Figure 13 Types of organization

In terms of type of organization, most of the organizations responses came from individual companies (39.6%), associations (18.4%), research centers (11.3%), and universities or academic institutions (11%).