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Final report of the Advisory Group on the Energy Roadmap 2050

Summary record of the PRIMES Peer review Meeting

Results of the public consultation on the Energy Roadmap 2050

Accompanying the document
COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS
Energy Roadmap 2050

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Results of the public consultation on the "Energy Roadmap 2050"

Executive Summary

The Commission is preparing an Energy Roadmap to 2050 to be adopted by the end of 2011. This Energy Roadmap will follow the Low Carbon Economy Roadmap 2050 adopted by the Commission on 8 March 2011[1] and focus on decarbonisation in the energy sector. The background to the need to develop a decarbonisation strategy is the EU commitment to an 80-95% reduction in greenhouse gas emissions below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group. The Energy Roadmap will present policy challenges for the decarbonisation of the energy sector while preserving the competitiveness of industry and strengthening energy security.

On 20 December 2010, the Directorate General for Energy launched a public consultation on the Energy Roadmap. The public consultation[2] was based on an online questionnaire with seven questions, some requiring comments and others in the form of multiple choice.[3] The public consultation was open between 20 December 2010 and 7 March 2011. Nearly 400 contributions were received.

This report summarises the replies. Statistical information is provided in annex 1.

Question 1 *How to ensure credibility:* A large number of contributors said that the assumptions and data used for modelling should be as transparent as possible and a variety of modelling methodologies should be used. Many private sector organisations emphasised the need for a stable, clear and predictable legislative framework, to encourage the necessary investments in the energy sector which generally have a very long lead time.

Question 2 *The EU's position in a global policy context:* More than half of all respondents chose "global energy efficiency and demand developments" and "global development of renewable energy" as the most important issues.

Question 3 *Societal challenges and opportunities:* Overall responses were fairly evenly distributed among the different choices. Public acceptance of new infrastructures was seen as important by many.

Question 4 *Policy developments at EU level:* Roughly half of the respondents believe that energy efficiency is among the three most important issues needing more development at the EU level.

Question 5 *Milestones in the transition:* Across all industries and NGOs, intermediate targets, checkpoints and regular updates towards 2050 were recommended. However, the decarbonisation roadmap should be flexible enough to allow the route to be changed along the way.

Question 6 *Key drivers for the future energy mix:* About half of all respondents believe that global fossil fuel prices in relation to costs of domestic energy resources and long term security of supply will be the most likely key drivers of the future European energy mix.

Question 7 *Additional thoughts and contributions:* There was a considerable divergence in opinions on the best way to decarbonise the energy sector in terms of market intervention as well in the selection of a preferred technology option to be pursued.

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[1] http://ec.europa.eu/clima/policies/roadmap/index_en.htm

[2] http://ec.europa.eu/energy/strategies/consultations/20110307_roadmap_2050_en.htm

[3] Questions 1, 5 and 7 were open questions and 2, 3, 4 and 6 were in form of multiple choice.

1 Introduction

The European Commission is currently preparing an Energy Roadmap to 2050 to be adopted towards the end of 2011. This Energy Roadmap will follow the Low Carbon Economy Roadmap 2050 adopted by the Commission on 8 March 2011[4] and will specifically focus on decarbonisation in the energy sector.
The need for our decarbonisation strategy is the EU commitment to an 80-95% reduction in greenhouse gas emissions below 1990 levels by 2050, in the context of necessary reductions by developed countries as a group[5].

The Energy Roadmap will present a number of policy challenges to achieve our long term strategy of progressive decarbonisation of our energy sector while preserving the competitiveness of industry and strengthening our security of energy supply.

On 20 December 2010, as part of the process of preparation of the Energy Roadmap to 2050, the Directorate General for Energy launched a public consultation. The public consultation was based on an online questionnaire of seven questions of which some were multiple choice and others open questions.

1. How to ensure credibility of the work (open question),
2. The EU's position in a global policy context (multiple choice),
3. Societal challenges and opportunities (multiple choice),
4. Policy developments at EU level (multiple choice),
5. Milestones in the transition (open question),
6. Key drivers for the future energy mix (multiple choice),
7. Additional thoughts and contributions (open question)

The public consultation was open between 20 December 2010 and 7 March 2011. Nearly 400 contributions were received, approximately half from organisations and half from individual citizens. Approximately half dozen Member States sent a formal reply to the public consultation. This report summarises all contributions received. Additional statistical information on the replies is provided in the annex. The individual contributions have been published on the public consultation's webpage.[6]

Given the participation from a broad spectrum of organisations as well as citizens, this public consultation offers insights into a large range of stakeholder opinions.

[4] http://ec.europa.eu/clima/policies/roadmap/index_en.htm

[5] Conclusions of European Council, 4 February 2011.

[6] http://ec.europa.eu/energy/strategies/consultations/20110307_roadmap_2050_en.htm

2.1 How to ensure credibility of the work

Question 1: *How can the credibility of work on the transition to a low-carbon energy system in 2050 be ensured? (For example regular updating of projections using energy system models, focus on developments in technologies, level of expertise needed in each sector,…)*

A large number of contributors from different entities and sectors said that the assumptions and data used for modelling should be made as transparent as possible. They also recommended modelling a range of different scenarios using different modelling methodologies. Using diverse scenarios and considering results from different models would allow a better understanding of the risks and uncertainties in the modelling, e.g. regarding the pace of technological development, possible energy price developments, results from the implementation of policies, international developments influencing the energy sector, risk of technological lock-ins, etc. and could help identify configurations that could threaten the three core objectives of our energy policy, namely security of supply, competitiveness and sustainable development.
Scenarios used should be scientifically sound and updated on a regular basis to include latest developments and to check progress towards our objectives in the EU and Member States. The possibility to have peer reviews of the modelling exercise was also suggested.

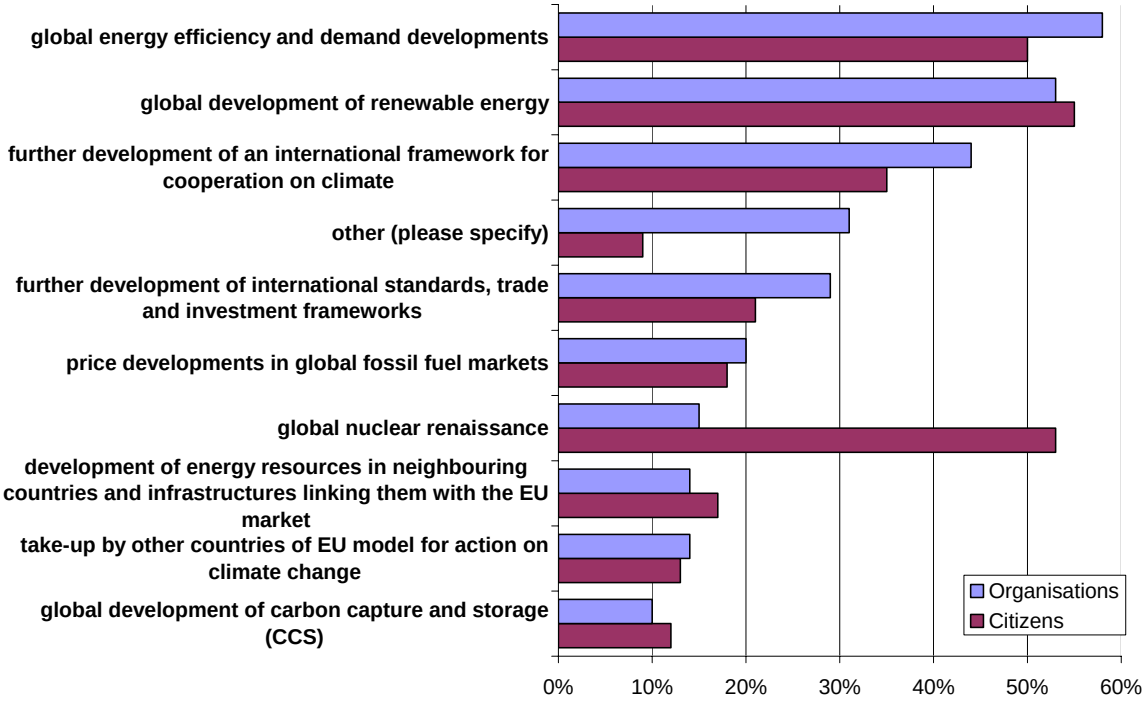
A few organisations from diverse sectors explicitly criticised the PRIMES model regarding its transparency.

Many private sector organisations emphasised the need for a stable, clear and predictable legislative framework, to encourage the necessary investment in the energy sector which have generally very long lead time. In establishing the legislative framework preference should be given to market driven policies rather than top down political intervention.
Some industry respondents recommended that initiatives related to sustainable use of energy, and GHG (greenhouse gas) reductions should be bundled together in a holistic approach rather than a piecemeal method tackling specific sectorial issues at different times. The importance of striking a balance among decarbonisation of the energy sector while maintaining competitiveness and ensuring security of energy supply was underlined.

A few organisations expressed concerns about a loss of international competiveness because of high energy costs and argued that GHG abatement policies in the EU should only be implemented under equally strong commitments from other countries and regions in a robust international framework for cooperation on climate change.
The need for a legislation ensuring fair competition between different energy sources on a level playing field was also emphasised. However, different views were expressed on what constitutes a level playing field. Renewables organisations in particular argued that policies should take all external costs into account while other organisations argued for a "technology neutral" approach and phase out of subsidies for specific energy sectors (see also replies to question 5 in chapter 2.5).

2.2 The EU's position in a global policy context

Question 2: *Looking forward, EU energy policy may be increasingly influenced by developments in global energy supply and demand, international cooperation on climate and initiatives taken* ***outside the EU****. Which developments should be considered in the Energy Roadmap 2050? On which do you think a stronger EU line is necessary? (Pick three most important ones)*



The chart above represents the relative preferences expressed by organisations and citizens to question 2. A detailed percentage split of opinions of different organisations, with a breakdown among industries, NGOs and utilities is provided in annex 1.

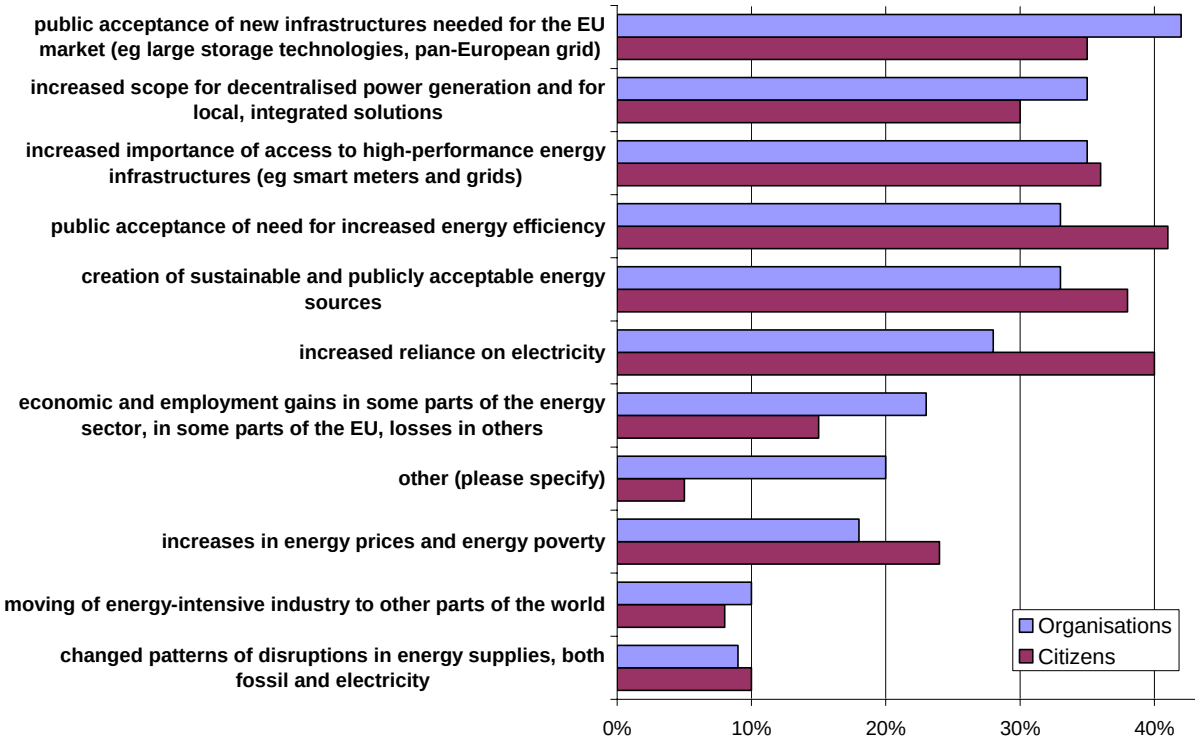
Overall, more than half of all respondents chose "global energy efficiency and demand developments" and "global development of renewable energy" as the topics most worthwhile of consideration in the roadmap or requiring a stronger EU line. Among NGOs, those two answers received the strongest majority.
The third most chosen response for organisations was the further development of an international framework for cooperation on climate, a response which the vast majority of energy utilities judged to be among the most significant factors.
"Further development of international standards, trade and investment frameworks" was supported by almost a third of the respondents from organisations.

Approximately one third of organisations indicated specific developments not included in the multiple choice option such as: taxes and carbon markets, impacts on developing countries, competitiveness, land use change from biomass, caps on energy use and increased efficiency, renewables, as well as secure availability of fossil fuels.

Remarkably among citizens, "global nuclear renaissance" was the most popular answer after "global development of renewable energy", indicated by more than half of the respondents.

2.3 Societal challenges and opportunities

Question 3: *What **societal challenges and opportunities** do you think are likely in Europe over the next decades as a result of changes in the EU and global energy system? On which ones do you think a stronger EU line is needed? (Pick three most important ones)*



The chart above represents the relative preferences expressed by organisations and citizens to question 3. A detailed percentage split of opinion different organisations, with a breakdown among industries, NGOs and utilities is provided in annex 1.

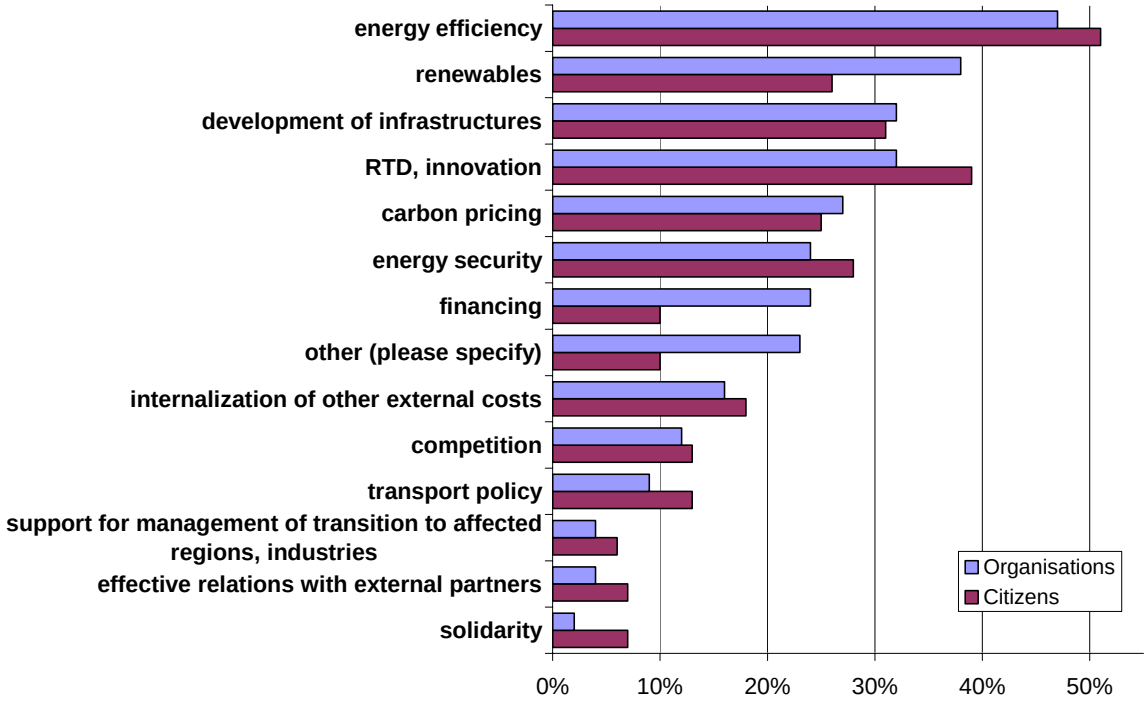
Overall, responses were fairly evenly distributed among the top six choices. Public acceptance on new infrastructures received the highest share of votes from organisations. More than half of utilities viewed public acceptance and increased reliance on electricity as major social challenges or in need of a stronger EU line. Among NGOs "increased scope for decentralised power generation and for local, integrated solutions" and "creation of sustainable and publicly acceptable energy sources" received most support.

Among citizens, the most popular answers were on increased energy efficiency and increased reliance on electricity. Throughout the questionnaire, citizens often tended to highlight a social dimension, e.g. through advocating a role for education and media in driving behavioural change (energy saving) and increasing public understanding or acceptance of certain technologies. Some also viewed vocational training to create the necessary skills for a low-carbon economy as essential.
Some organisations underlined that due to the profound structural changes in the energy industry required for a transition to a low-carbon energy system, the roadmap should explicitly consider social and employment effects.

Under "other (please specify)", a variety of other challenges and opportunities were highlighted by respondents, mostly relating to particular technologies.

2.4 Policy developments at EU level

Question 4: *The EU's approach to energy policy is founded on regulation and an internal energy market providing competition, innovation, energy efficiency and development of resources including renewables, environmental sustainability, energy security and solidarity, and effective relations with external partners. Which are the main areas which you think might need further* ***policy development at EU level****, in a 2050 perspective? Please specify what you think is needed, references to supporting analyses welcome. (Boxes, pick three; also text box)*



The chart above represents the relative preferences expressed by organisations and citizens to question 4. A detailed percentage split of opinion different organisations, with a breakdown among industries, NGOs and utilities is provided in annex 1.

Roughly half of respondents consider that energy efficiency is among the three most important aspects needing more development at the EU level. This figure is goes up to 70% for NGOs and but is considered a priority by only about a quarter of the preference for utilities, after infrastructure, financing and energy security. A similar difference in emphasis between NGOs and utilities can be found for renewables.

Development of infrastructure was seen as a priority by approximately a third of respondents. Within organisations a significant majority of utilities views the development of infrastructure as a main area for further policy development.

Asked to give their own views, a variety of other possible areas for policy development were specified by respondents, mostly related to particular technologies. A few respondents also mentioned policy harmonisation in general and a level playing field.
Other aspects of EU low-carbon policy development, such as solidarity, effective relations with external partners and support for industrial and regional transition management were not viewed as high priorities by respondents.

2.5 Milestones in the transition

Question 5: *Which milestones would you see as most useful to specify at this stage for the transition to a low-carbon energy system in Europe? References to supporting analyses welcome.*

Across all industries and NGOs, intermediate targets, regular checkpoints and updates towards 2050 were recommended. The regular monitoring of the proper implementation of existing legislation e.g. targets for Member States was also considered important.
However, with respect to future milestones and targets to be adopted, it was indicated that a straight line to our decarbonisation target will not reflect the way in which changes will happen in our society. A decarbonisation roadmap should be flexible enough to change route along the way through periodic reviews, taking into account the latest developments in technology, international framework etc. The usefulness of specific roadmaps for different sectors was acknowledged e.g. industry, transport, agriculture etc.

A 'level playing field' is also seen as important by a broad spectrum of organisations including renewables, nuclear, gas and CCS associations as well as commerce chambers and utilities. However, 'level playing field' appears to be interpreted in a variety of ways by different stakeholders, some arguing for a free market approach and others for some form of intervention to internalise externalities or introduce support schemes for making certain technologies commercially viable (renewables, CCS, energy storage, etc.) Utilities tend to view liberalised and integrated EU energy markets and a binding global post-Kyoto agreement as essential. A few organisations indicated that EU decarbonisation efforts should be conditional on equally far-reaching measures in other economies.

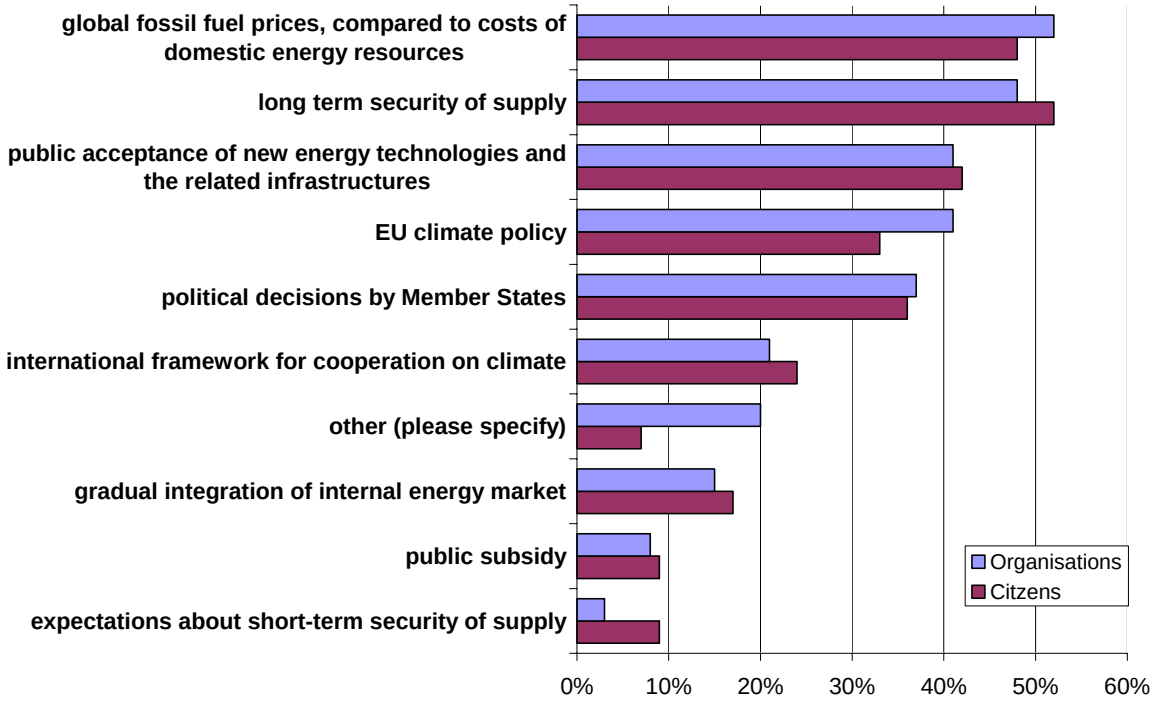
Renewables and energy efficiency industries, NGOs and environmental interest groups tend to view binding targets for energy efficiency by 2020 and binding targets for renewables or GHG emissions by 2030 as essential to support a predictable investment framework for low-carbon technologies. In some sectors, such as power generation, due to the long lifetime of fossil fuel and nuclear power plants, 2050 is only one investment cycle away. Clarity on the future legislative framework is needed to avoid a lock-in into high carbon investments and the stranded cost in the associated assets.

Some recommended that milestones should not be restricted to decarbonisation objectives but should also identify to "technological proof points" for large scale deployment of innovative low carbon technologies. This could concern technologies such as CCS, smart grids, super grids, new electricity storage technologies and e-mobility. However, different choices were emphasised by different stakeholders.

Broad support was expressed for increased electrification of our energy system and in particular of the transport sector. As the power sector will be a major contributor to the decarbonisation of our economy, the roadmap should provide milestones in the decarbonisation of power generation. Some respondents advocate a full decarbonisation of power generation as a prerequisite for achieving the overall 80-95% decarbonisation of our economy including an abandonment of unabated coal power generation.

2.6 Key drivers for the future energy mix

Question 6: *What are the most likely key drivers for the **future energy mix** in the EU? (Pick 3)*



The chart above represents the relative preferences expressed by organisations and citizens to question 6. A percentage split of opinions of different organisations, with a breakdown among industries, NGOs and utilities is provided in annex 1.

About half of all organisations and citizens believe that global fossil fuel prices, compared to costs of domestic energy resources and long term security of supply will be the mostly likely key drivers of the future European energy mix.
Overall less than 20% of respondents selected "gradual integration of the internal market" as their choice. Hardly any NGOs selected "gradual integration of the internal market" as their choice. However, some 40% of the utilities did so.
Among NGOs, over 60% believed that EU climate policy is decisive. However, only 33% of overall respondents believe that climate policy is a likely key driver for our future energy mix.

Throughout all types of organisations and among citizens, public subsidies were not viewed as one of the most likely key drivers for the future energy mix, receiving less than 10% of the choices.

As to other likely key drivers, several organisations emphasised specific low-carbon technologies, including nuclear power. Financing instruments for achieving the required investments into low-carbon technologies were also mentioned as another key driver.

2.7 Additional thoughts and contributions

Question 7: *Do you have additional suggestions or more specific thoughts on the Energy Roadmap 2050 ?*

There was a considerable divergence in opinions on the best way to decarbonise the energy sector.
Some replies indicated that decarbonisation should be obtained with minimal intervention and driven by market-based instruments. Policy and instruments should concentrate on goals and not on prescription on what industry should do or on a selection of technology options. Utilisation of offsets in other regions of the world through the *Clean Development Mechanism* and *Joint Implementation* to complement emission trading was advocated. Overlap of different legislative initiatives aiming setting a carbon price, e.g. a CO_2 tax, in addition to the emission trading system should be avoided.
Other replies supported mechanisms such as sectoral emission targets, specific technologies, additional targets for renewables and binding targets for energy efficiency, while explicitly opposing instruments for offsets in other regions. Some argued that more emphasis should be given to storage technologies, including utilisation of large hydro reservoirs in Northern Europe and particularly in Norway.
Energy efficiency should be pursued all along the full supply chain including power generation, cogeneration, district heating and actions on the demand side. The importance of energy efficiency in buildings which represent 40% of EU energy use was underlined. Energy efficiency measures in the building sector should avoid "shallow renovation" with only limited increase in efficiency as such "shallow renovation" seems attractive in the short term but prejudge future measures locking in suboptimal renovations. .

There was a broad consensus on supporting technology and innovation and on extension of the Strategic Energy Technology Plan beyond 2020.
Opinions on the potential contributions of nuclear, renewable energy sources and fossil fuels to our decarbonisation objectives are divergent. A few respondents advocated that for furthering a sustainable energy system without technical lock-ins a long-term perspective, beyond 2050 up to 2100 should be considered.

NGOs, environmental groups and renewable industries, tend to see a 100% renewable electricity supply as both feasible and desirable.
Others see nuclear power as the best form of decarbonised energy together with limited amount of renewables. Nuclear industries cite cost advantages and availability of nuclear as base load capacity as main advantages over intermittent and expensive renewables.

Fossil fuel industries emphasise CCS as a sustainable and cost effective way to reduce GHG emissions. For gas industries, gas is a cheap means of emission reductions and could play a key role in the decarbonisation of the power sector via fuel switch from coal, providing a cost efficient, sustainable, and flexible power generation to complement the increase renewable capacity in the next decades. Beside its role in power generation gas has still a major role in the residential sector and a huge potential exists for an increased penetration of natural gas vehicles in the transport sector. The need to strike a balance between reducing fossil fuel use and fostering substantial investments in new major gas infrastructures from third countries was underlined. The coal industry underlined the need to avoid lock-in into a dash for unabated gas generation.

Some viewed the development of a new "pan European" energy infrastructure as necessary for our transition to a low carbon system. A trade off among investments in new infrastructures, super grid, smargrid and new power generation capacity is needed.

Annex 1

Question 2. Looking forward, EU energy policy may be increasingly influenced by developments in global energy supply and demand, international cooperation on climate and initiatives taken outside the EU. Which developments should be considered in the Energy Roadmap 2050? On which do you think a stronger EU line is necessary? (Pick three most important ones)

	Organisations				**Citizens**
	Total	Industry	NGO	Utility	
further development of an international framework for cooperation on climate	**44%**	**42%**	**42%**	**81%**	35%
take-up by other countries of EU model for action on climate change	14%	17%	20%	10%	13%
further development of international standards, trade and investment frameworks	29%	**39%**	12%	24%	21%
global energy efficiency and demand developments	**58%**	**51%**	**73%**	**33%**	**50%**
global nuclear renaissance	15%	9%	15%	**38%**	**53%**
global development of renewable energy	**53%**	38%	**71%**	29%	**55%**
global development of carbon capture and storage (CCS)	10%	17%	5%	15%	12%
price developments in global fossil fuel markets	20%	23%	20%	10%	18%
development of energy resources in neighbouring countries and infrastructures linking them with the EU market	14%	14%	15%	19%	17%
other (please specify)	31%	33%	22%	**33%**	9%

Question 3. What societal challenges and opportunities do you think are likely in Europe over the next decades as a result of changes in the EU and global energy system? On which ones do you think a stronger EU line is needed? (Pick three most important ones)

	Organisations				**Citizens**
	Total	Industry	NGO	Utility	
economic and employment gains in some parts of the energy sector, in some parts of the EU, losses in others	23%	20%	27%	15%	15%
increased importance of access to high-performance energy infrastructures (eg smart meters and grids)	**35%**	**32%**	**37%**	**38%**	36%
increased reliance on electricity	28%	25%	22%	**57%**	**40%**
creation of sustainable and publicly acceptable energy sources	33%	29%	**44%**	19%	**38%**
public acceptance of new infrastructures needed for the EU market (eg large storage technologies, pan-European grid)	**42%**	**49%**	27%	**57%**	35%
increased scope for decentralised power generation and for local, integrated solutions for meeting energy, waste management and other needs of communities	**35%**	**30%**	**46%**	29%	30%
public acceptance of need for increased energy efficiency	33%	25%	**37%**	29%	**41%**
changed patterns of disruptions in energy supplies, both fossil and electricity	9%	7%	15%	5%	10%
increases in energy prices and energy poverty	18%	23%	12%	10%	24%

moving of energy-intensive industry to other parts of the world	10%	13%	7%	24%	8%
other (please specify)	20%	29%	12%	14%	5%

Question 4. The EU's approach to energy policy is founded on regulation and an internal energy market providing competition, innovation, energy efficiency and development of resources including renewables, environmental sustainability, energy security and solidarity, and effective relations with external partners. Which are the main areas which you think might need further policy development at EU level, in a 2050 perspective? Please specify what you think is needed, references to supporting analyses welcome. (Pick three most important ones)

	Organisations				**Citizens**
	Total	Industry	NGO	Utility	
competition	12%	16%	5%	10%	13%
carbon pricing	27%	**32%**	**24%**	24%	25%
internalization of other external costs	16%	14%	22%	5%	18%
RTD, innovation	**32%**	**36%**	20%	**29%**	**39%**
energy efficiency	**47%**	**38%**	**71%**	24%	**51%**
transport policy	9%	6%	15%	5%	13%
renewables	**38%**	29%	**59%**	19%	26%
financing	24%	22%	20%	**43%**	10%
energy security	24%	29%	15%	**29%**	28%
solidarity	2%	1%	0%	10%	7%
development of infrastructures	**32%**	28%	20%	**71%**	**31%**
effective relations with external partners	4%	7%	0%	0%	7%
support for management of transition to affected regions, industries	4%	7%	5%	0%	6%
other (please specify)	23%	28%	22%	24%	10%

Question 6. What are the most likely key drivers for the future energy mix in the EU? (Pick three most important ones)

	Organisations				**Citizens**
	Total	Industry	NGO	Utility	
global fossil fuel prices, compared to costs of domestic energy resources	**52%**	**52%**	**51%**	33%	**48%**
long term security of supply	**48%**	**55%**	37%	**48%**	**52%**
public subsidy	8%	9%	10%	10%	9%
expectations about short-term security of supply	3%	6%	2%	0%	9%
political decisions by Member States	37%	**43%**	29%	38%	36%
gradual integration of internal energy market	15%	10%	7%	38%	17%
international framework for cooperation on climate	21%	14%	24%	24%	24%
EU climate policy	**41%**	29%	**63%**	**48%**	33%
public acceptance of new energy technologies and the related infrastructures	**41%**	39%	**42%**	**48%**	**42%**
other (please specify)	20%	26%	15%	14%	7%