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COMMISSION OF THE EUROPEAN COMMUNITIES

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SEC (2008) XXX

COMMISSION STAFF WORKING DOCUMENT

**RESULTS OF THE PUBLIC CONSULTATION ON INFORMATION
AND COMMUNICATION TECHNOLOGIES ENABLING ENERGY
EFFICIENCY**

Accompanying document to the Commission proposal on

**Mobilising Information and Communication Technologies to facilitate the
transition to an energy efficient, low carbon economy**

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1. EXECUTIVE SUMMARY

An on-line public consultation on Information and Communication Technologies enabling energy efficiency was launched on the 20th May 2008 using the European Commission's Interactive Policy-making tool at [HTTP://EC.EUROPA.EU/YOURVOICE/](http://ec.europa.eu/yourvoice/) . It closed on the 21st July 2008. Wide visibility was given to the consultation through the i2010 High-level group, the six thematic consultation groups and the Ad-hoc Advisory Group set up by the Commission services, as well as at a workshop hosted by the Committee of the Regions on 26th May 2008.

The purpose of the consultation was to gather information and opinions from the stakeholders on which sectors offer the most promising prospects for improved energy efficiency through the use of Information and Communication Technologies (ICT) and what actions should be taken at EU level in order to accelerate progress.

The questionnaire was divided into a General Questions section, followed by six domain specific sections entitled:

- ICT as an enabler for energy efficiency in the electricity sector,
- ICT as an enabler for energy efficiency in the building and construction sector,
- ICT as an enabler for energy efficiency in the transport and logistics sector,
- ICT as an enabler for energy efficiency in manufacturing,
- ICT as an enabler for structural change,
- developing and deploying energy-efficient ICT.

Respondents were requested to answer only on the domains relevant to their knowledge and expertise.

In each section the questions were set in three blocks: one referring to the perceived benefits of applying ICT in the domain; the second on policy options, ie, how the EC could contribute to the process and the third was an open question to allow free text contributions in case any important points were missing in the two previous blocks.

The total number of responses is 436. Approximately half of the answers were made on behalf of an organisation and respondents were nearly all professionals in the domain. The majority of them come from the industry and about one quarter are researchers. Italy and the United Kingdom are the countries with highest participation.

All respondents claimed **the initiatives they are involved in are replicable** elsewhere and welcomed discussions with the Commission and/or other interested parties to facilitate the replication. However the following were identified as **obstacles to wide deployment of ICT**:

- Lack of **cooperation between the electricity and ICT sectors** due to the cultural gap between the two communities.
- Lack of international **standards** for measuring and reporting energy efficiency.
- Lack of **guidelines or toolboxes** for SMEs and local authorities.
- Lack of technical **interoperability** between technologies and systems,
- Lack of trans-European **very large-scale pilots**.

- Resistance to **cultural change** in organisations including the difficulty in getting senior management buy-in.
- Inertia and **lack of awareness**; user's reluctance to take up new technologies.
- Lack of agreed **consistent policy** objectives among governments resulting in country specific practices.
- The fact that the benefits of investment in technological solutions do not always accrue to those who make the investment.
- **Immaturity** of products/solutions available on the market.

Respondents identified: **transport, residential/commercial buildings and the Electricity Grid** as the top three sectors where the European Commission should promote energy efficiency.

Although the actions to be taken at EU level in order to accelerate the process were answered sector by sector the results had a lot in common. Of the actions proposed in the questionnaire the most highly supported are:

- Reinforce **multidisciplinary RTD and large scale pilot projects** on ICT for energy efficiency including researchers from the ICT, the energy and the user sectors.
- Support awareness raising and **exchange of best practices**.

In addition to these, respondents supported the need to:

- Foster the creation and promotion of **standards** both for measuring and reporting the energy used by products/services and for ensuring technical interoperability;
- Support the creation and promotion of cross-disciplinary **educational programmes**.
- Promote **international cooperation** paying special attention to developing countries.
- Promote government take-up and **green procurement**.

2. INTRODUCTION

In May 2008, the Commission adopted a first Communication on ICT for energy efficiency¹ and drew attention to the potential for additional energy-efficiency improvements in ICT use, and through ICT-enabled innovations. This Communication initiated a consultation process with a view to identifying opportunities for EU measures, quantifying their potential benefits, and stimulating partnership initiatives which could be developed at EU-level.

The on-line public consultation reported here is one element of this broad consultation process. It complements a number of expert studies, notably a study by BioIntelligence² commissioned by DG-Information Society and Media, and the Smart2020 report³, commissioned by the Global eSustainability Initiative (GeSI) of companies in the ICT sector and The Climate Group. It also complements the work done by six thematic Consultation groups set up by DG-Information Society and Media addressing specific opportunity areas: Buildings, Lighting and Photonics, Manufacturing, Smart Grids, Road transport and Structural change.

The on-line public consultation was launched on the 20th May 2008 using the Commission's Interactive Policy-making tool (IPM). It closed on the 21st July 2008. The results were presented at the Advisory group meeting on 25 September in order to feed into the broad consultation process.

3. QUESTIONNAIRE

The questionnaire was divided into a General Questions section followed by six domain specific sections entitled: ICT as an enabler for energy efficiency in the electricity sector; ICT as an enabler for energy efficiency in the building and construction sector; ICT as an enabler for energy efficiency in the transport and logistics sector; ICT as an enabler for energy efficiency in manufacturing; ICT as an enabler for structural change and Developing and deploying energy-efficient ICT.

In each section the questions were set in three blocks: one referring to the perceived benefits of applying ICT in the domain; the second on policy options, i.e., how the EC could contribute to the process and the third was an open question to allow free text contributions in case important points were missing in the two previous blocks.

Only the general questions were mandatory and the domain specific sections were optional. Respondents were requested to answer the domains relevant to their knowledge and expertise only.

Several questions allowed multiple answers; therefore, the percentages do not always add up to 100%. Percentages are based on the response rates to the respective question. The analysis is based on the total number of respondents to each question.

The questionnaire was made available only in English language.

¹ COM (2008) 241 of 13th May 2008: Addressing the challenge of energy efficiency through Information and Communication Technologies

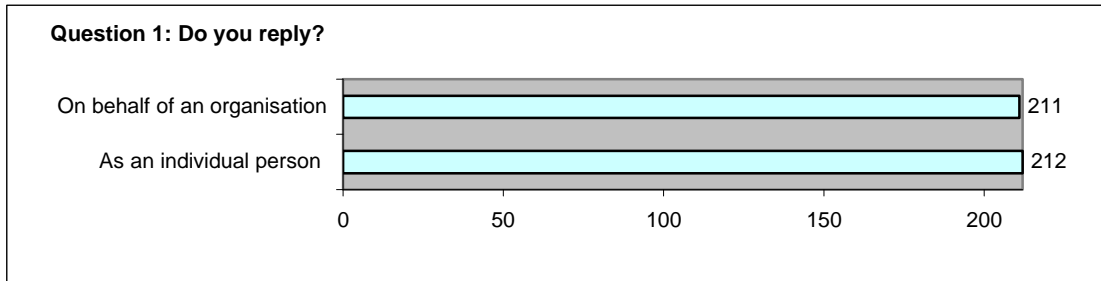
² Impacts of information and communication technologies on energy efficiency: BioIntelligence service, in collaboration with the European Council for sustainable energy and the Fraunhofer Institute, July 2008 : http://intra.infosec.ec.eu.int/H4/docs/studies/ict4ee-final_report_en.pdf

³ SMART2020: Enabling the low-carbon economy in the information age: McKinsey &co, for The Climate group and the Global eSustainability Initiative: www.smart2020.org

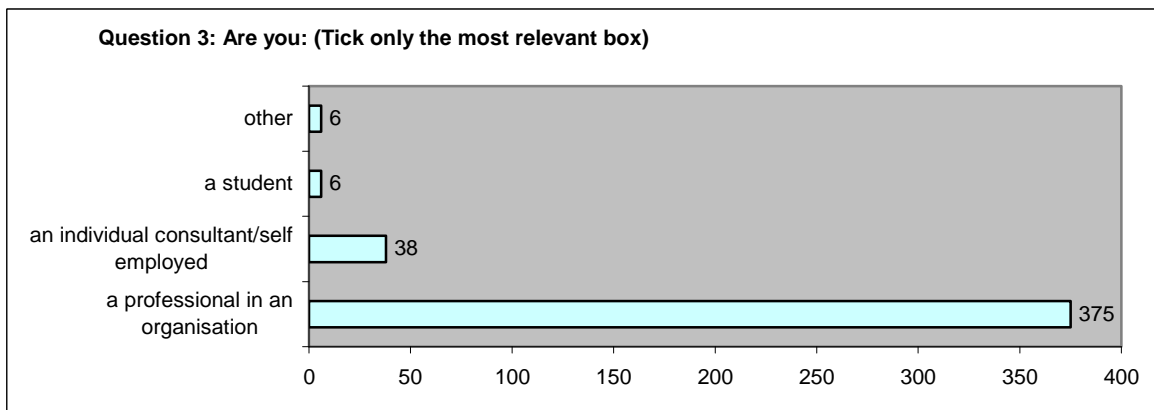
4. RESPONDENTS

Of the **436 respondents**, only 423 have been accepted. 13 responses have been discarded because they are duplicates (the same person answering more than once) or because the identification provided is not credible.

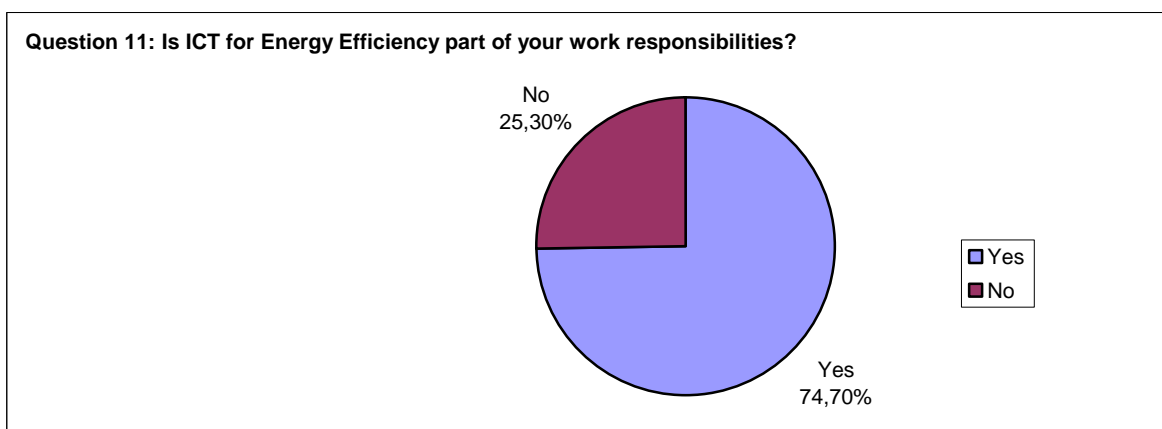
Half of the answers are made **on behalf of an organisation**.



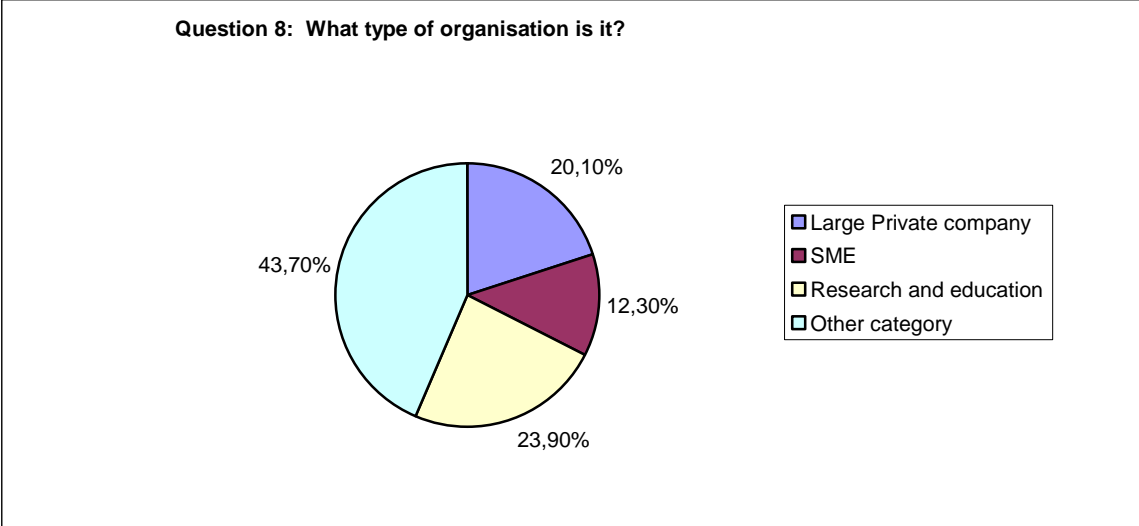
The respondents are nearly all **professionals**.



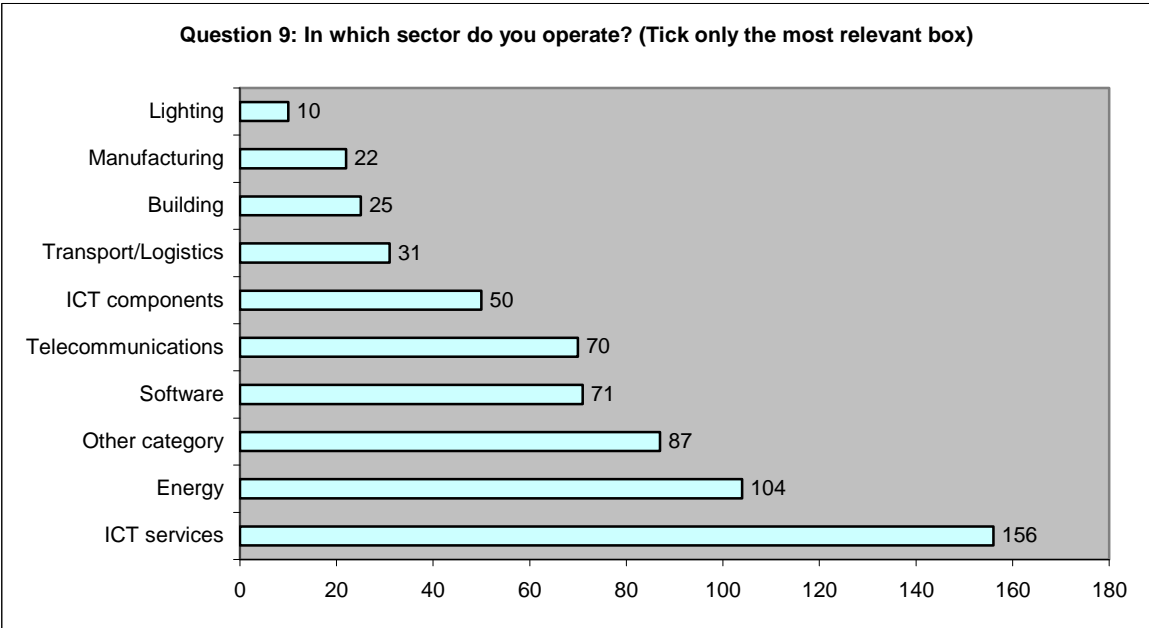
About 75% of the respondents have **energy efficiency as part of their work responsibilities**.



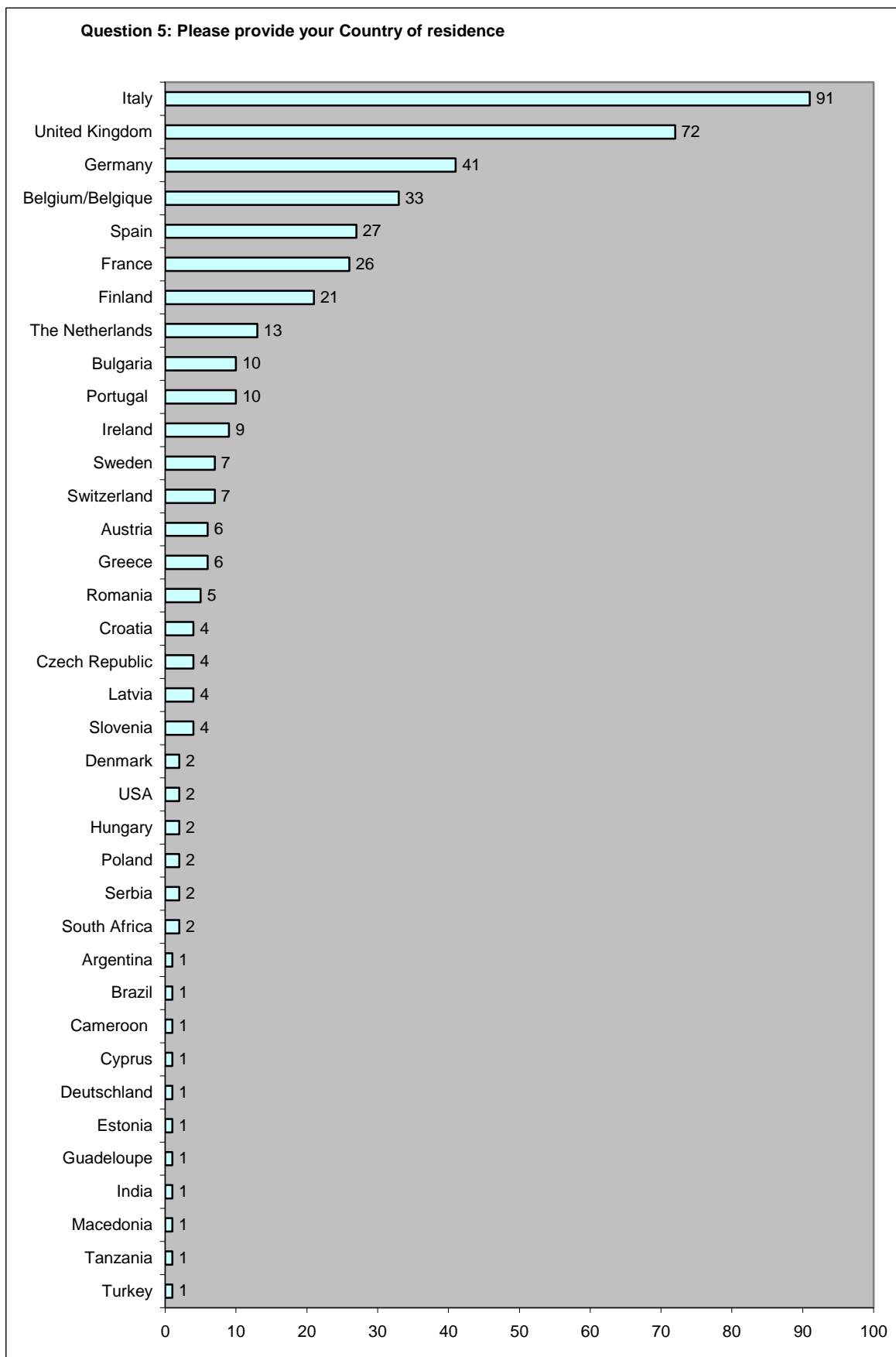
The majority of respondents are from **industry** (20,1% large private companies and 12,3% SMEs) followed by **researchers** 23,9%.



As expected, the majority of the respondents come **from the ICT and the energy sectors**.



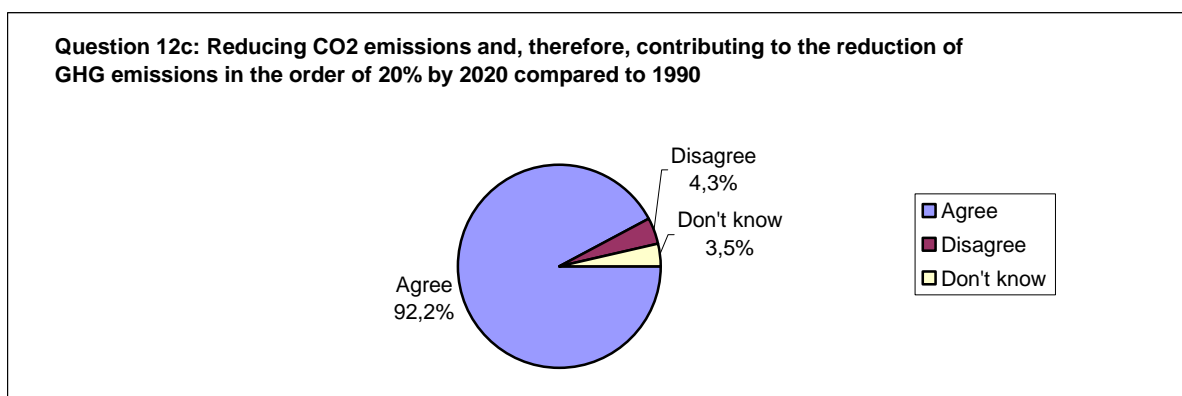
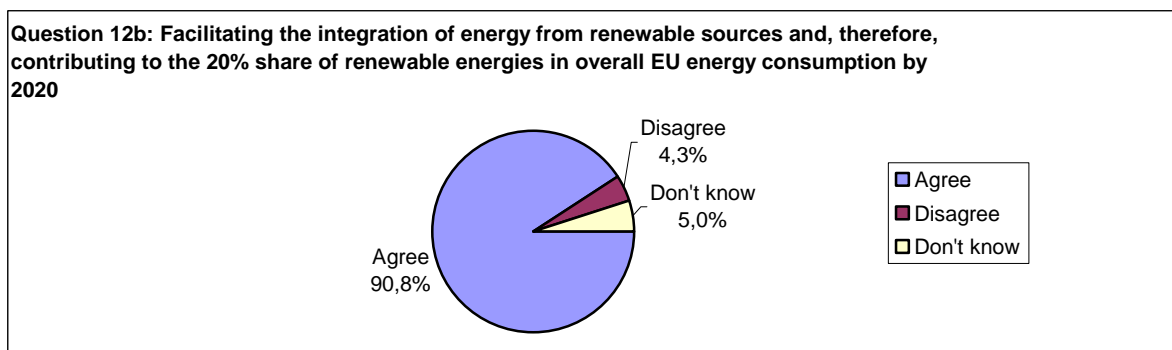
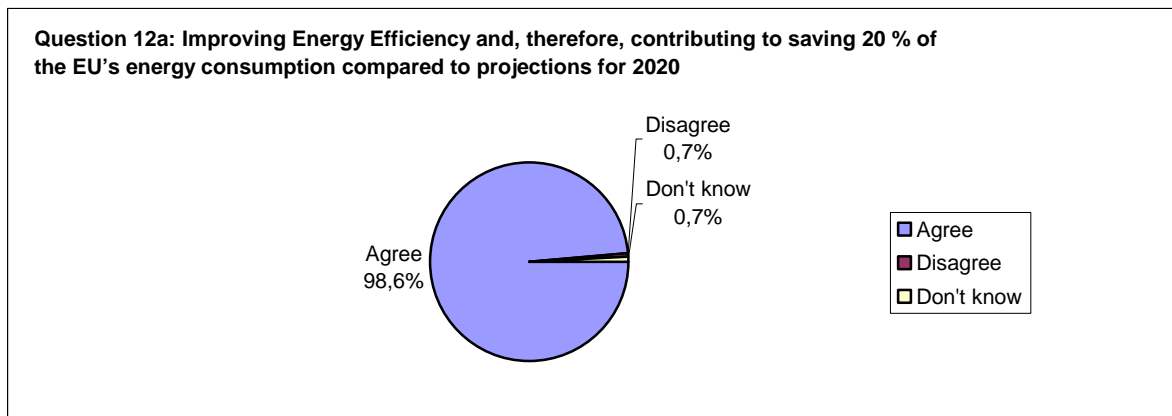
Italy and United Kingdom are the Member States with the highest participation.



5. GENERAL QUESTIONS

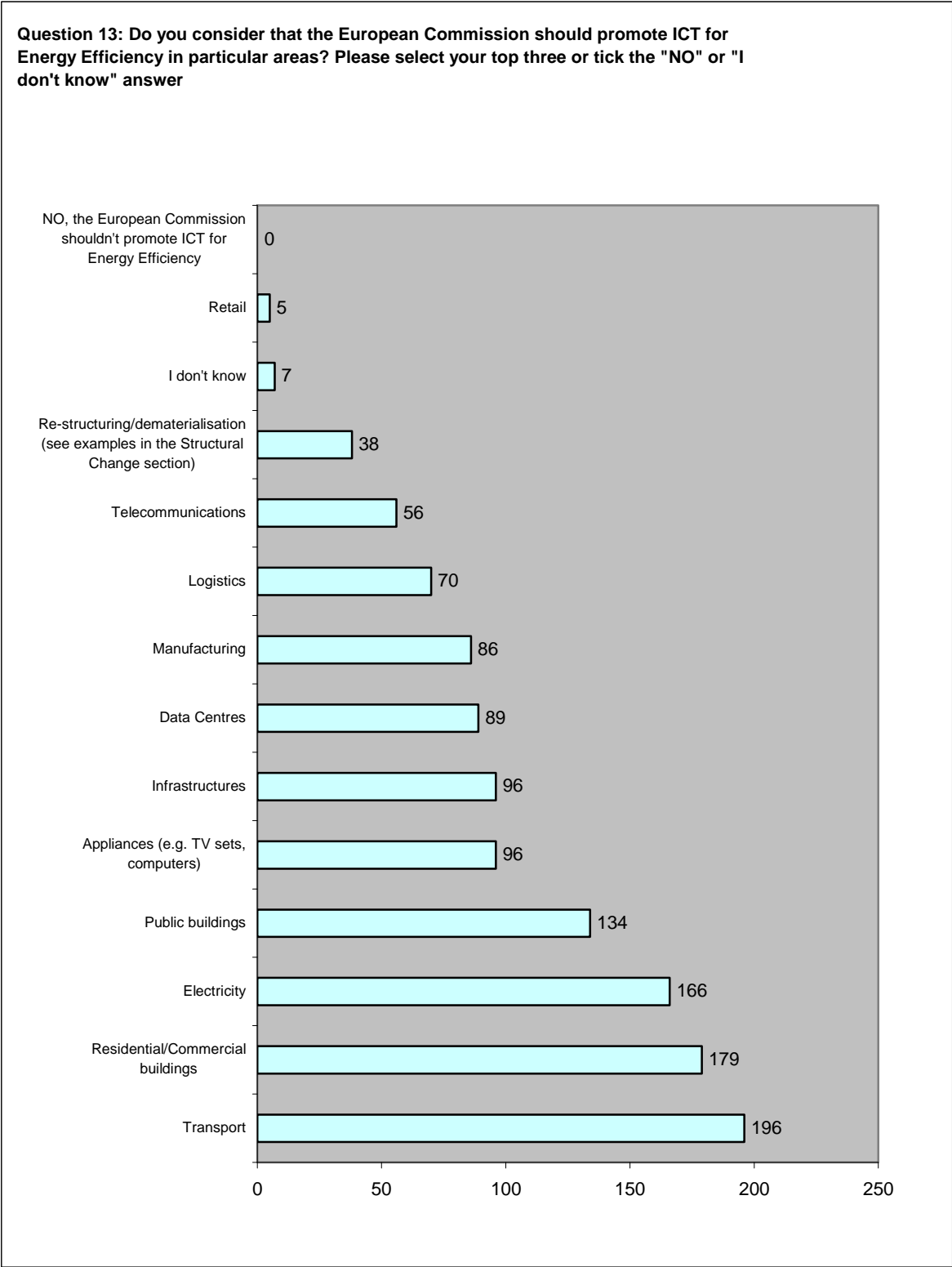
The first question was on the role of ICT in achieving the three 20% targets for 2020⁴, that is, the potential of ICT to contribute to: improving energy efficiency, increasing the share of renewable energy sources and reducing CO2 emissions.

98,6% of the respondents consider that ICT plays a key role in energy efficiency but it is important to note that **the contribution of ICT to achieving the other 2 targets** is nearly at the same level: 90,8% for the integration of renewable energy sources and 92,2% in reducing CO2 emissions.



⁴ Conclusions of the European Council, March 2007:
<http://register.consilium.europa.eu/pdf/en/07/st07/st07224-re01.en07.pdf>

The top three areas where the European Commission should promote energy efficiency are: Transport, Residential/Commercial buildings and Electricity.



Out of the 423 respondents, 86 considered important areas were missing in the list (under question 13) and filled in the open question. Most of the answers provide elaborations on areas already proposed in the list or suggest extending a proposed area. For instance, manufacturing should cover not only

production, but also supply chain management. Other answers refer to important issues (e.g. standards, modelling and simulation) which can not be considered an area. However 10 respondents point to the agriculture and food sector; 5 to the healthcare and 2 to each one of the following sectors: military, natural gas and waste disposal.

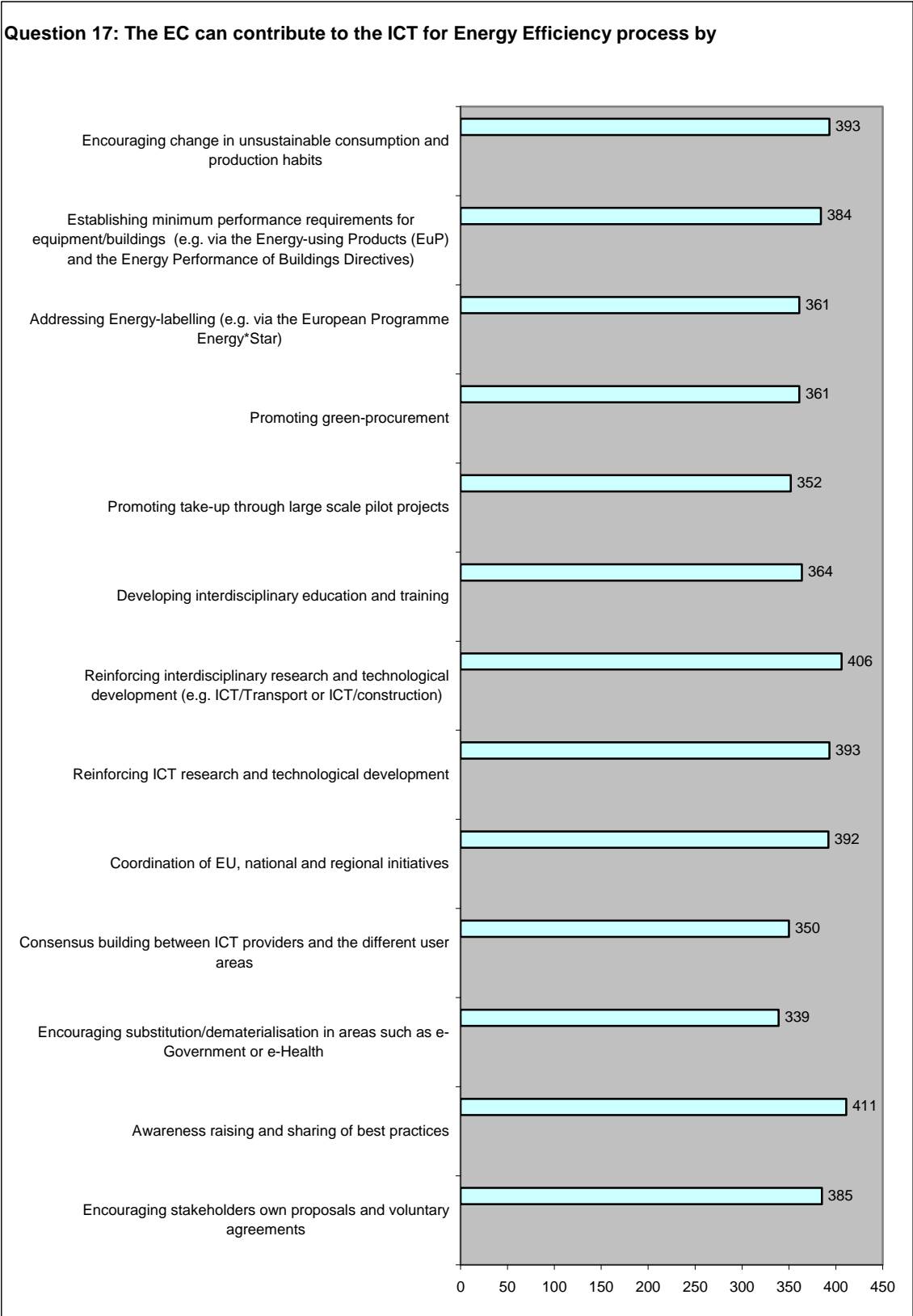
Despite not being mandatory 182 respondents explained their concrete initiatives on ICT for energy efficiency which they are involved in. These cover the broader spectrum: research and development projects, green procurement in private companies and public organisations, standards, smart metering, software development, educational programmes, global initiatives, national/regional/local programmes.

All respondents claimed **the initiatives they are involved in are replicable** elsewhere and welcomed discussions with the Commission and/or other interested parties to facilitate the replication. However the following were identified as **obstacles to wide deployment**:

- The resistance to **cultural change** in organisations including new working practices and business models.
- Inertia and **lack of awareness**; user's reluctance to take up new technologies.
- A big challenge is getting **senior-level management buy-in** - without genuine enthusiasm and drive at this level, progress is much more difficult and typically only achieved on a piecemeal basis.
- The fact that the benefits of investment in technological solutions do not always accrue to those who make the investment.
- Lack of implementation **knowledge**.
- Clear **guidelines or toolboxes** are needed for SMEs. A "10-easy-steps-guide" to energy efficiency.
- **Immaturity** of products/solutions available on the market.
- Lack of agreed **consistent policy** objectives among governments resulting in country-specific practices. A requirement for standard harmonised energy efficiency scales and measurements seems to be missing.
- Lack of international **standards** for measuring and reporting energy efficiency.
- Lack of technical **interoperability** between technologies and between solutions.
- Lack of demonstration in Europe of large-scale deployment.
- Lack of **cooperation between the electricity and ICT sectors** due to the cultural gap between the two communities.
- The difficulties in getting ICT and energy experts to work together. Many companies are organised into "silo-like" structures which reduces the possibility of multidisciplinary work.

In order to focus the European Commission contribution to ICT for energy efficiency, the questionnaire proposed 13 different possible interventions ranging from light measures to encouraging voluntary agreements to strong regulation. All proposed actions had an acceptance rate of over 80% . The most recommended interventions are "awareness raising and sharing of best practices"

followed by "reinforcing interdisciplinary research and technological development" with a 97,2% and a 96% of acceptance respectively.

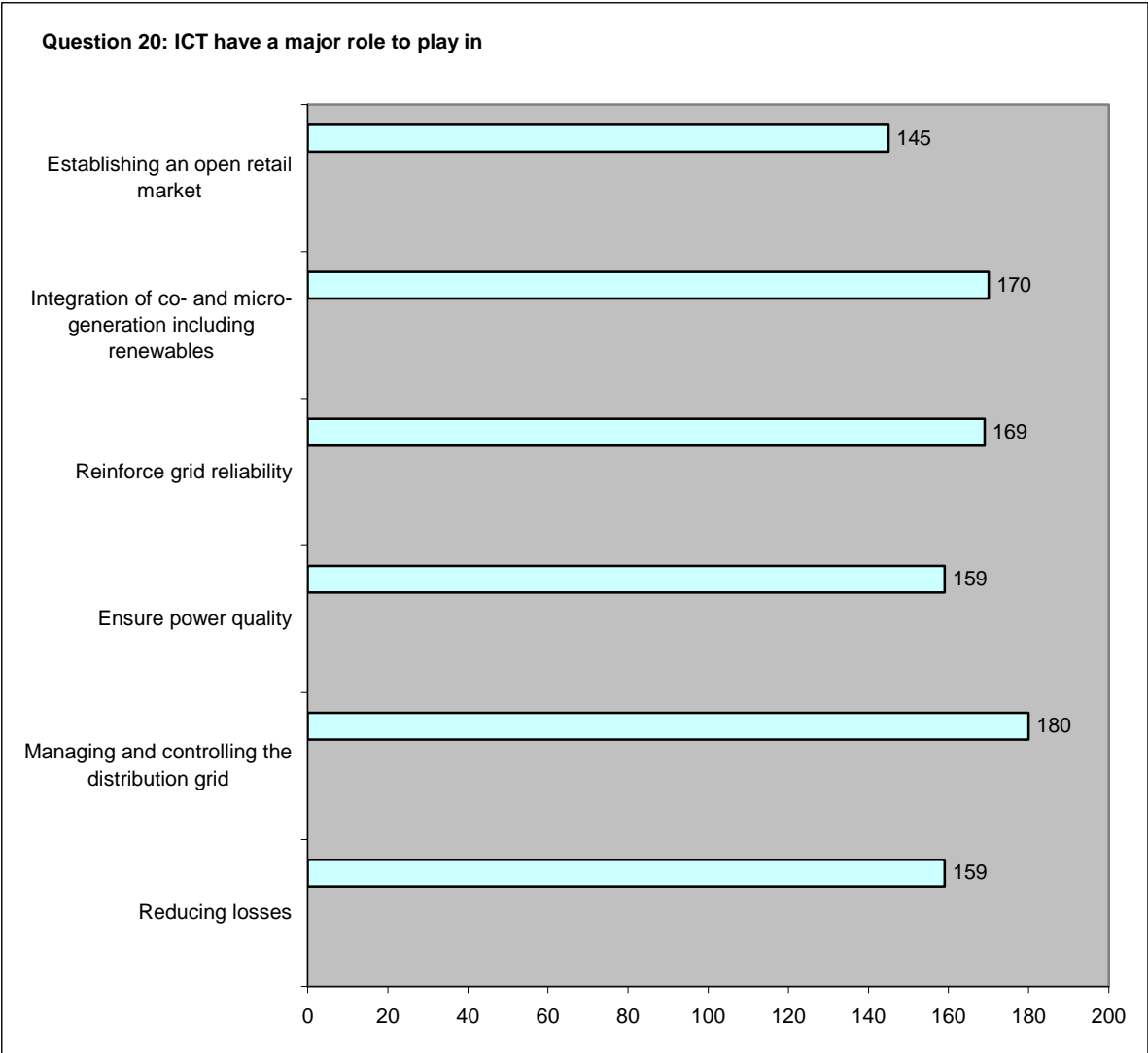


Out of the 423 respondents, 70 proposed additional European Commission interventions by filling in the corresponding open question. Most of the answers are part of an intervention already in the list or are just emphasising an already listed element. However, 8 respondents point to fostering the creation and promotion of **standards** both for metrics and for technical interoperability; 6 recommend to intervene in the creation and promotion of **cross disciplinary educational programmes**; 4 to reinforce the European directives adding binding targets for all key sectors and 3 propose to increase the EU financial support.

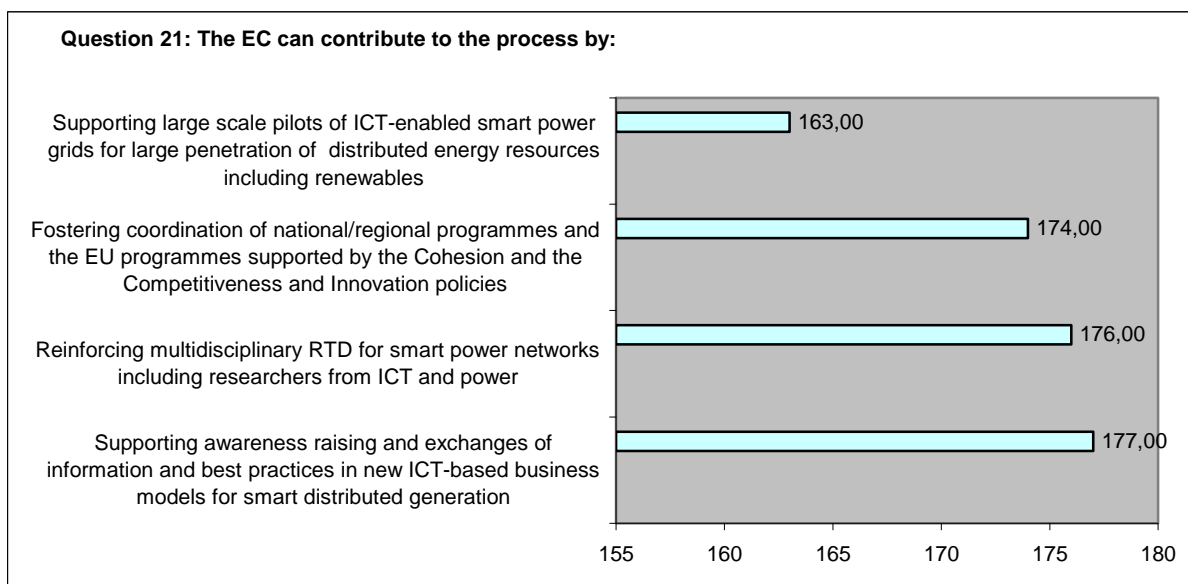
6. ICT AS AN ENABLER FOR ENERGY EFFICIENCY IN THE ELECTRICITY SECTOR

Out of the 423 respondents, 185 answered on this domain.

The first question was on the role of ICT in addressing the main challenges the power grid is facing today. Respondents consider that ICT has an important role to play on all identified challenges, with the most supported domain being the management and control of the distribution grid.



The second question was on how the European Commission could contribute to the process. The most supported actions are "**awareness raising and exchange of best practices**" and "**reinforcing multidisciplinary RTD**" with 95.7% and 95.1% of support respectively.



The third question was open to allow free text contributions. It was optional. Out of the 185 respondents for this domain 28 used this option. Most of the answers are extensions or reformulation of already listed ideas. For instance, respondents stress the fact that multidisciplinary teams are needed not only for research, but also for design and many other business activities. Furthermore some respondents proposed ideas that are not obviously related to ICT for energy efficiency.

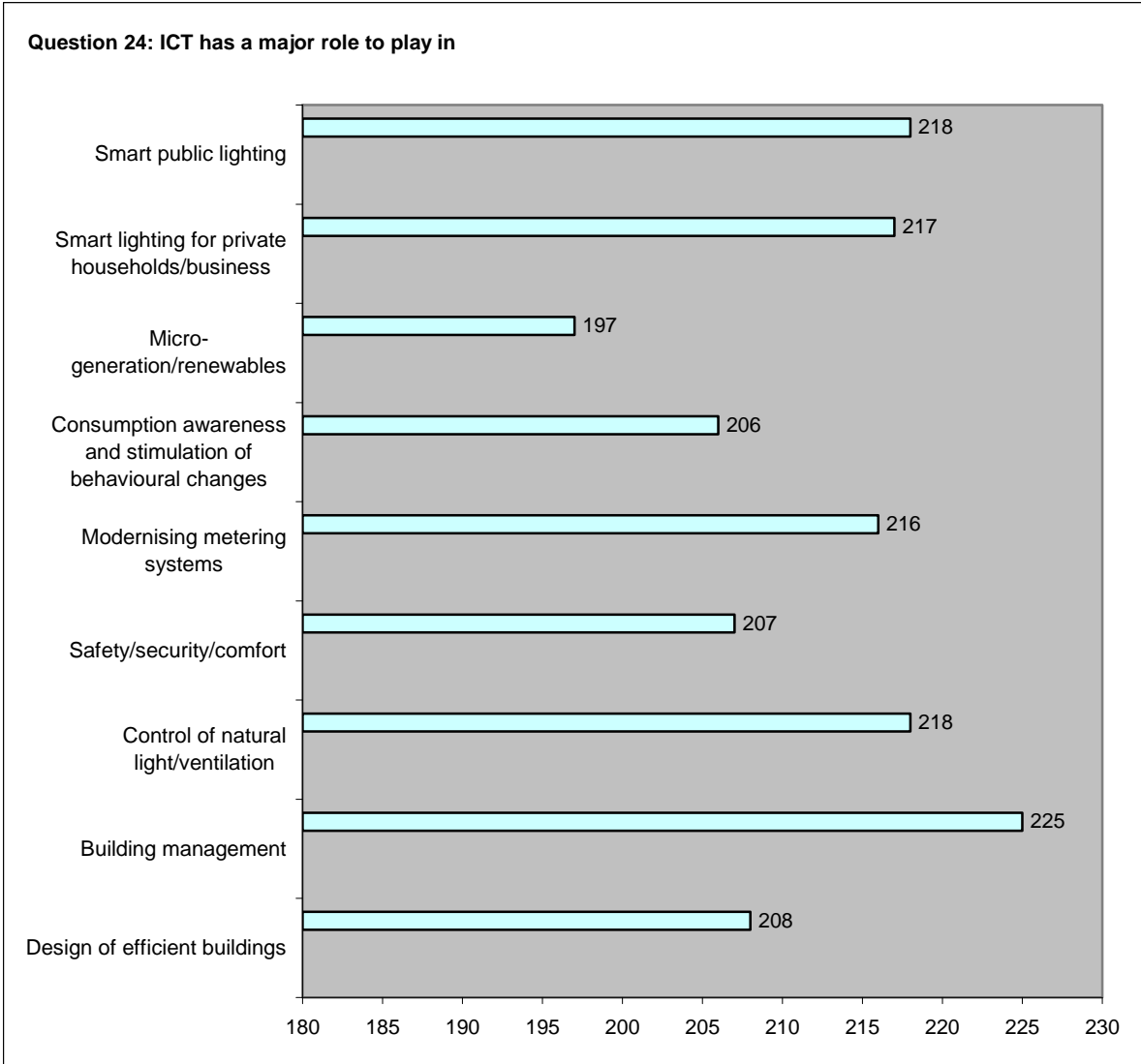
The main recommendations to be considered are:

- Support the creation and use of standards.
- Extend the proposed activities to the international arena, beyond the EU, with special attention to developing countries.
- Devise special actions to support innovative SME in this field.
- Support in-depth studies.
- Foster the development and deployment of electronic metering services to empower the consumer to monitor and manage energy consumption.

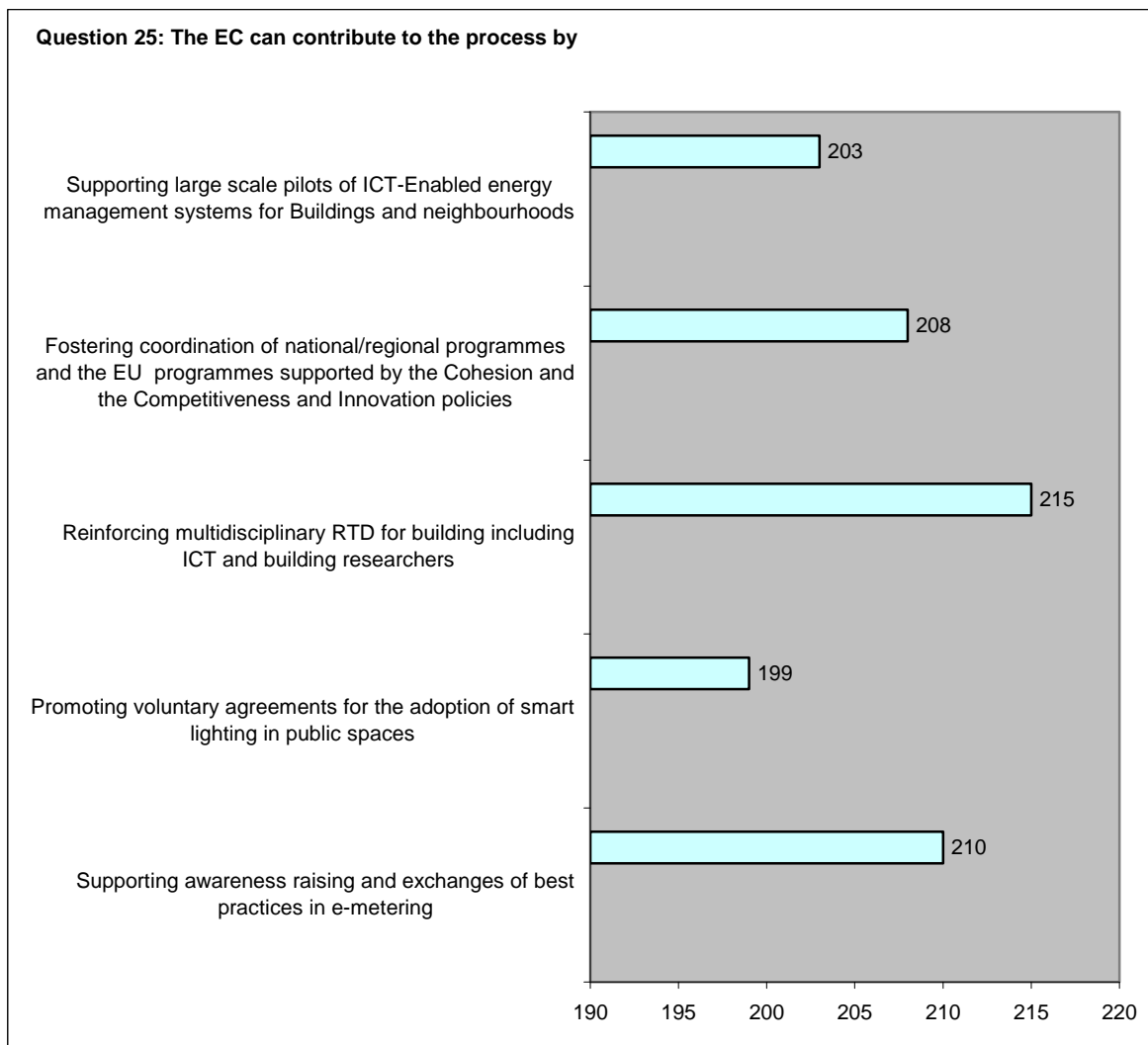
7. ICT AS AN ENABLER FOR ENERGY EFFICIENCY IN THE BUILDING AND CONSTRUCTION SECTOR

Out of the 423 respondents, 230 answered on this domain.

The first question was on the role of ICT in addressing the main challenges the building and construction sector is facing today. Respondents consider that ICT has an important role to play on all identified challenges, "building management" being the area which received most support, 97,8%.



The second question was on how the European Commission could contribute to the process. There was broad support for all proposed actions. "Reinforcing multidisciplinary RTD for buildings including ICT and building researchers" was the most supported with 93,4% .



The third question was open to allow free text contributions. It was optional. Out of the 230 respondents for this domain 34 used this option. Most of the answers are extensions or reformulation of already listed ideas. For instance, respondents point to particular areas where research is much needed. These include: predictive control systems, sensor networks, monitoring systems based on satellite images and design tools for architects. Some respondents proposed ideas that are not obviously related to ICT for energy efficiency.

The main recommendations to be considered are:

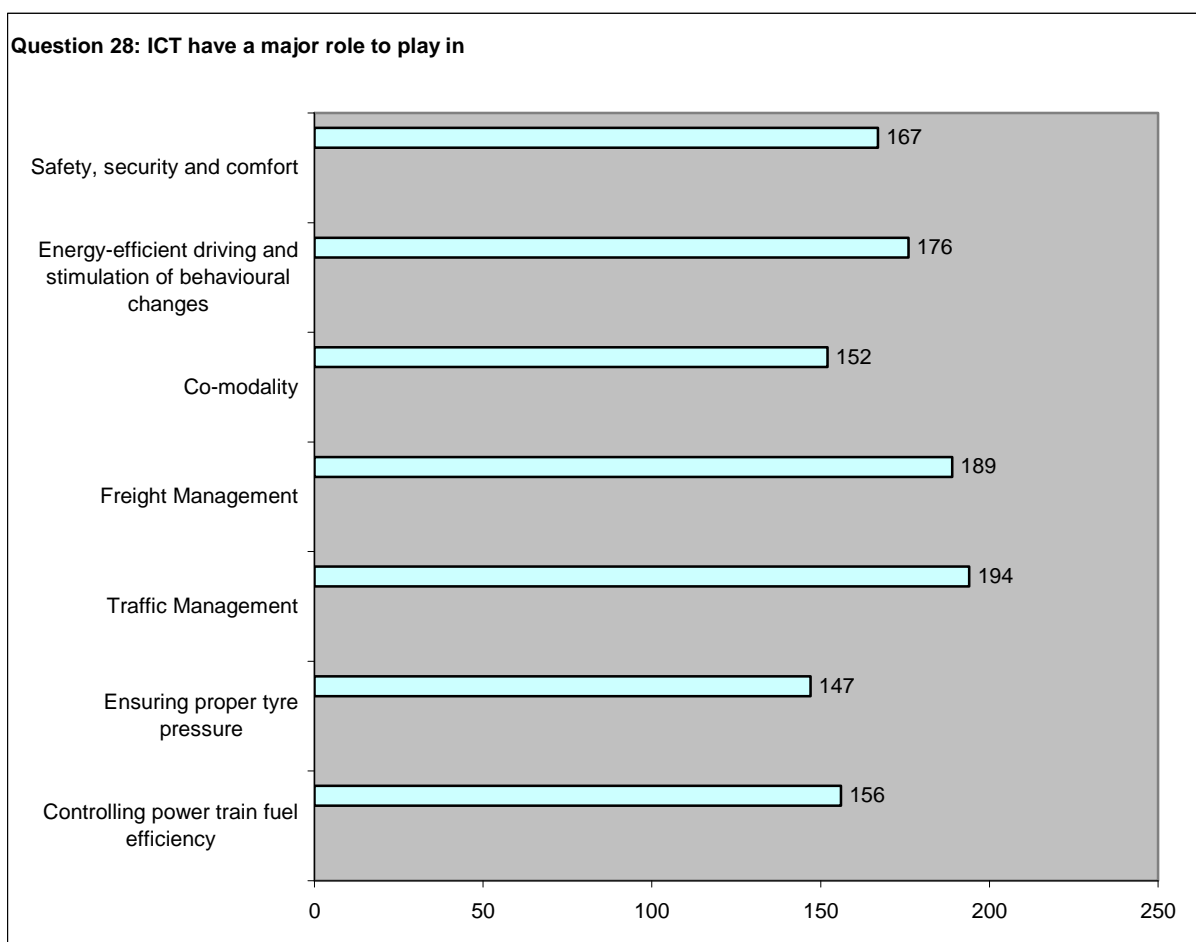
- Support the creation and use of standards.
- Extend the proposed activities to the international arena, beyond the EU, with special attention to developing countries.
- Foster the development of simulation tools to provide benchmarks, comparison of construction materials and design decisions along with the ROI to help justify higher construction costs.
- Consider low energy consumption in public tenders.

- Learn from the Zero Carbon Homes, an objective the UK (UK Sustainability Building Code) is targeting for 2016.
- Consider the social dimension. ICT services to monitor and control energy consumption are essential to drive individual behavioural change.

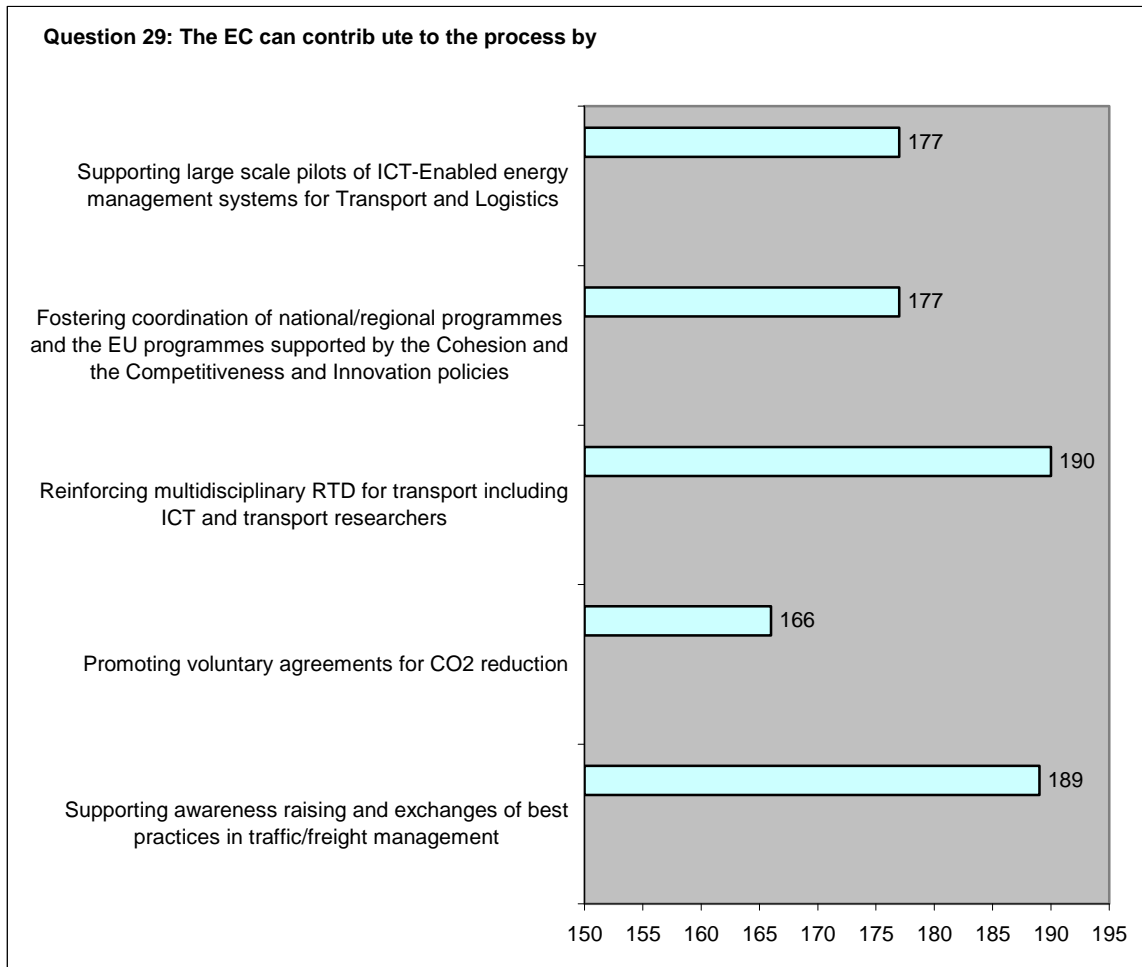
8. ICT AS AN ENABLER FOR ENERGY EFFICIENCY IN THE TRANSPORT AND LOGISTICS SECTOR

Out of the 423 respondents, 198 answered on this domain.

The first question was on the role of ICT in addressing the main challenges the Transport and logistics sector is facing today. Respondents consider that ICT has an important role to play in all identified challenges. "Traffic management" received the highest support, 97,9%.



The second question was on how the European Commission could contribute to the process. All proposed actions received more than 80% of support. "Reinforcing multidisciplinary RTD for transport including ICT and transport researchers" was the most supported, 96% .



The third question was open to allow free text contributions. It was optional. Out of the 198 respondents for this domain 37 used this option. As before, some answers are just extensions or reformulation of already listed ideas. For instance, some respondents stress the importance of local authorities in supporting large scale pilots. Furthermore, some respondents proposed ideas that are not obviously related to "ICT for energy efficiency".

The main recommendations to be considered are:

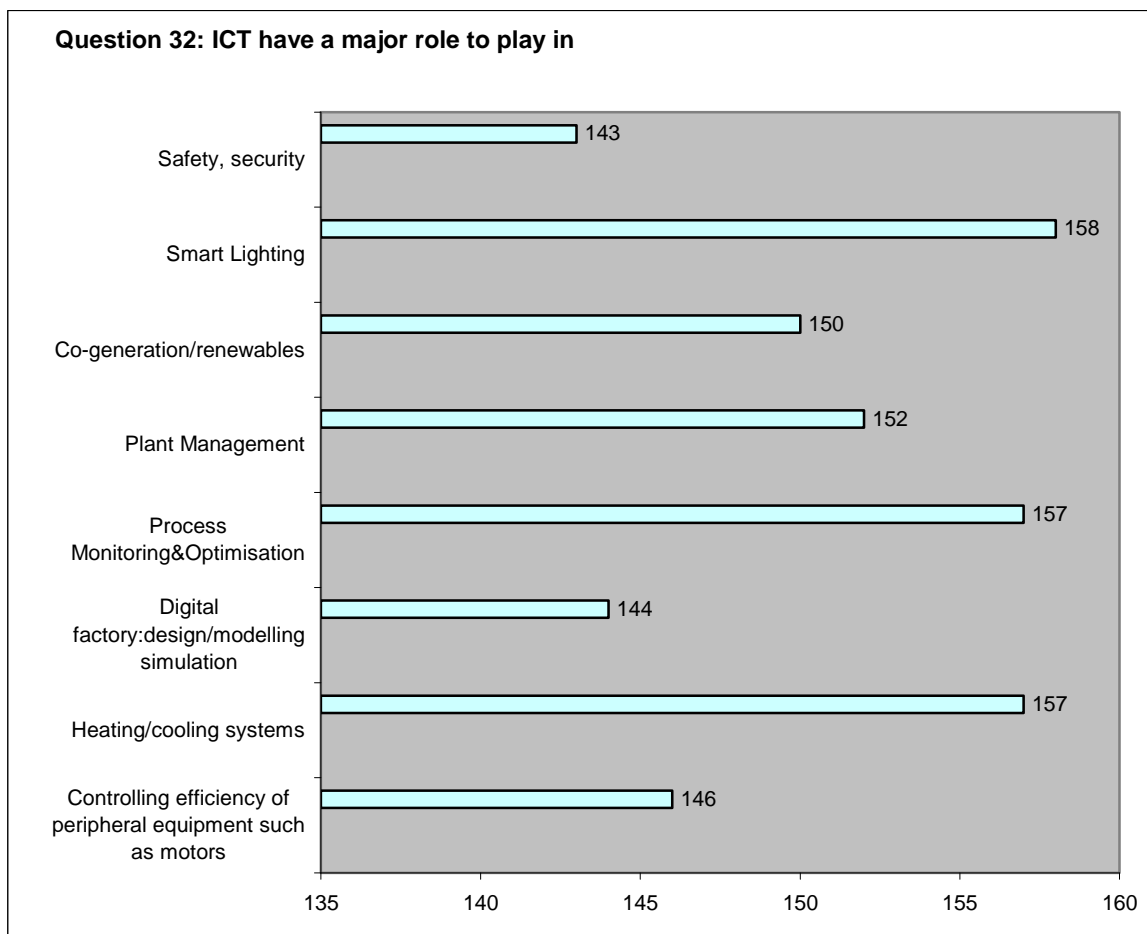
- Extend the concept of multidisciplinary RTD to include not only transport and ICT but also energy storage and energy management. Examples include the PHEC (Plug Hybrid Electric Vehicle) and the exploitation of braking energy.
- Support the development and deployment of ICT tools for holistic transport systems, that is, systems including road transport, air traffic, rail and ships. These Europe wide systems should cover intermodal management, alternative forms of transport such as car-pooling/ride-sharing route planning, load and first delivery attempt maximization.
- Support standardisation and interoperability.
- Foster green procurement.

- Extend the proposed activities, beyond the EU, to the international arena.

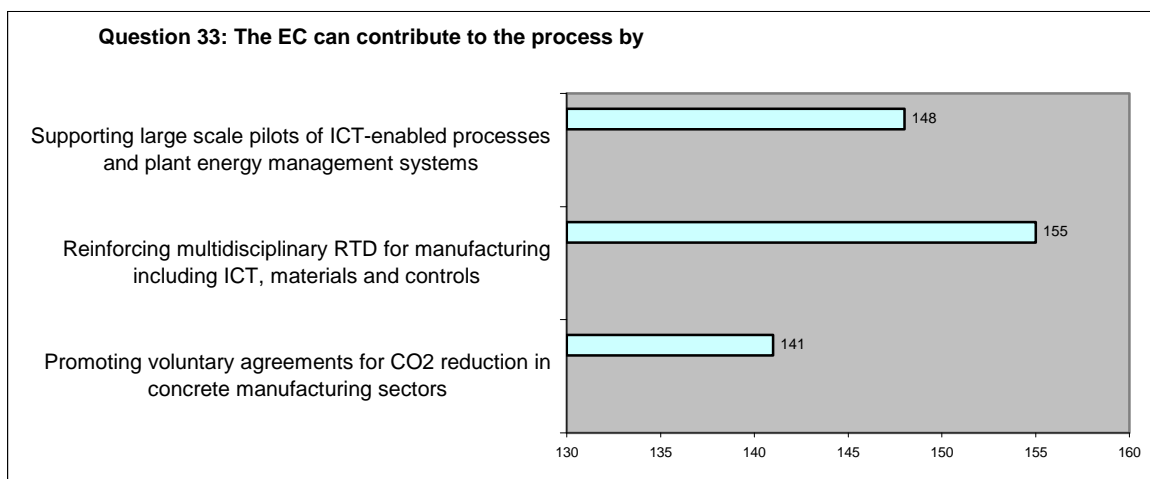
9. ICT AS AN ENABLER FOR ENERGY EFFICIENCY IN MANUFACTURING

Out of the 423 respondents, 163 answered on this domain.

The first question was on the role of ICT in addressing the main challenges the manufacturing sector is facing today. Respondents consider that ICT has an important role to play on all identified challenges. "Smart lighting", "heating/cooling systems" and "process monitoring and optimisation" received the highest level of support, about 97%.



The second question was on how the European Commission could contribute to the process. Respondents are supportive of all proposed actions. The highest level of support was for "reinforcing multidisciplinary RTD for manufacturing including ICT, materials and controls", 95,1% of the respondents.



The third question was open to allow free text contributions. It was optional. Out of the 163 respondents for this domain 20 used this option. As before, some answers are just extensions or reformulation of already listed ideas. For instance, some respondents point to particular areas where research is much needed. These include: simulations and virtual reality technologies; basic research on new manufacturing processes; and new optimising systems (e.g. constraint programming). Furthermore, some respondents proposed ideas that are not obviously related to ICT for energy efficiency.

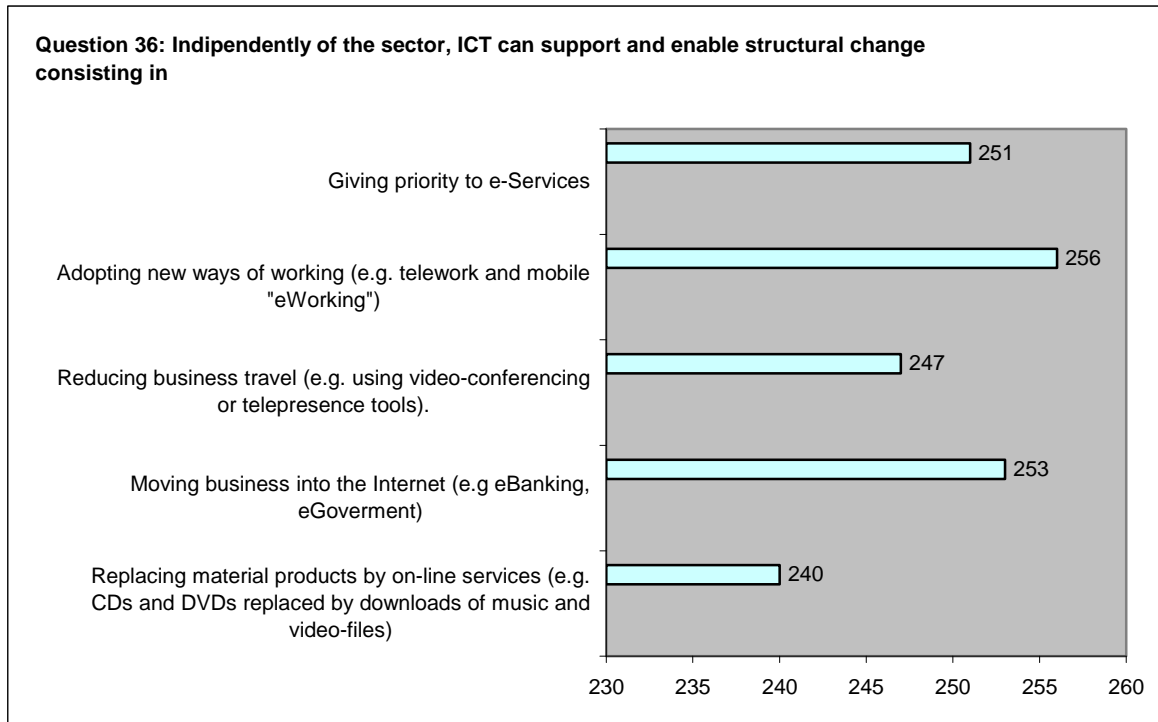
The main recommendations to be considered are:

- Measure the energy needed to put a product into the market considering the complete chain of subcontractors and also the transport of both components and final products. This will allow for a fair comparison between products manufactured in different world regions.
- Promote voluntary agreements to define the technical criteria for the energy saving of installations.
- Extend the proposed activities to the international arena in particular collaborate with Japan where energy efficiency via ICT has been a key objective for decades.
- Support standardisation and interoperability.
- Support research that will develop a better understanding of the role of ICT in energy efficiency for manufacturing ensuring that the right industries are involved and avoiding duplication.

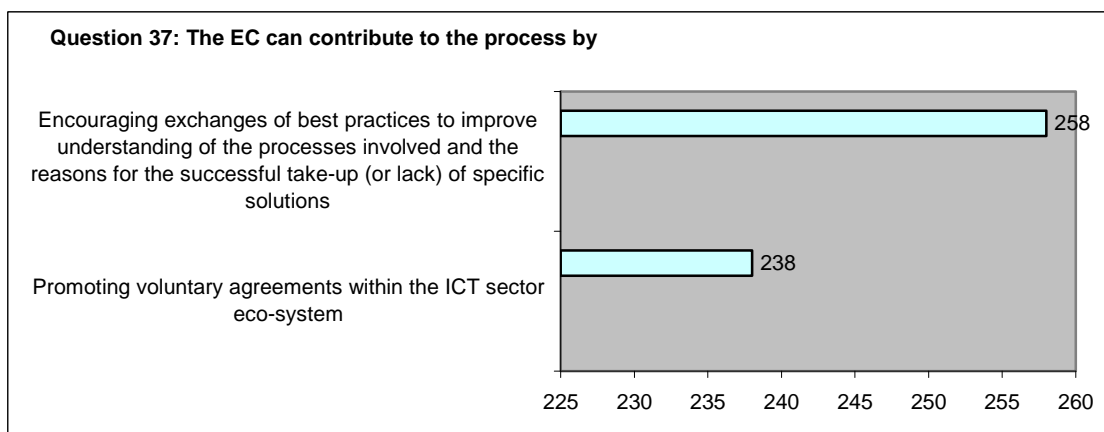
10. ICT AS AN ENABLER FOR STRUCTURAL CHANGE

Out of the 423 respondents, 271 answered on this domain.

The first question was on identifying the areas where ICT can better support and enable structural change. All proposed areas were supported by more than 90% of the respondents.



The second question was on how the European Commission could contribute to the process. Two options were proposed. Both received high levels of support.



The third question was open to allow free text contributions. It was optional. Out of the 271 respondents for this domain 44 used this option. Some responders proposed to add topics which are not within the scope of "ICT for energy efficiency".

The main recommendations to be considered are:

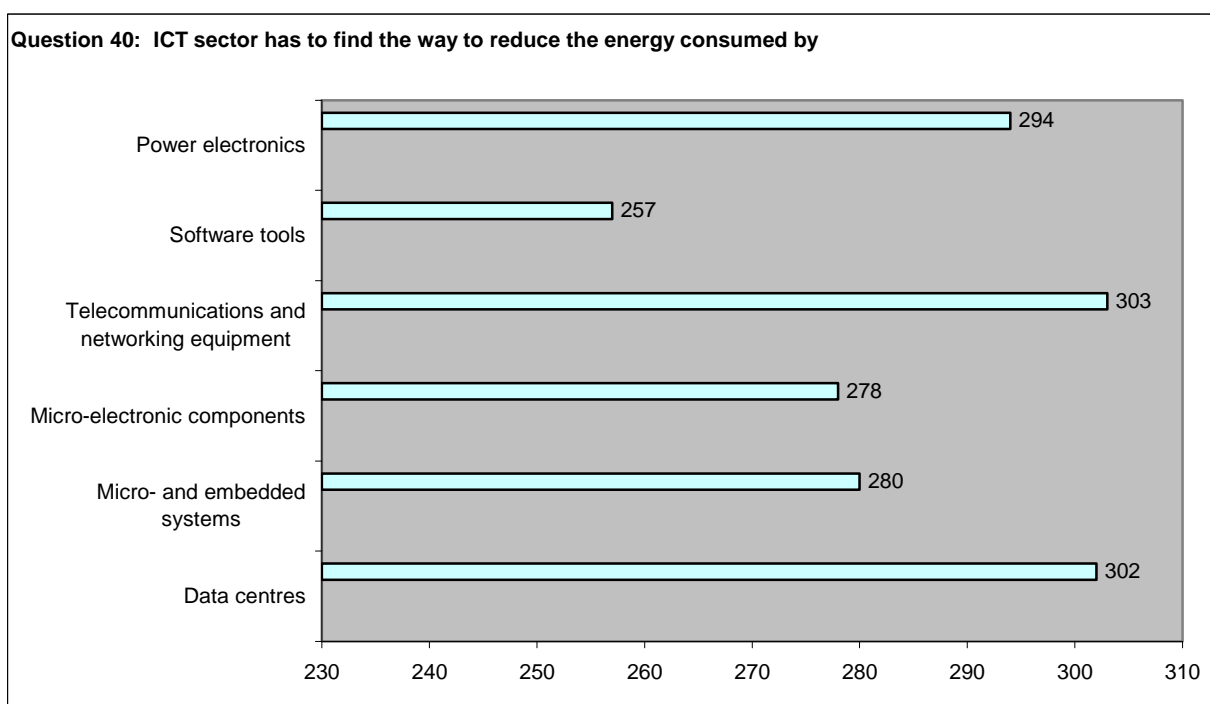
- Encourage training and awareness-raising as the basis for changing human behaviour.

- Support RTD projects on e-work/e-business going beyond technology to cover non-technical aspects e.g. how do people interact with ICT, how do they change their habits; what rebound effects exist and how to mitigate these.
- Support the development of the digital infrastructure and of large scale pilots across different European countries.
- Promote government take-up and green procurement.
- Reinforce coordination with other EU initiatives in particular the EU cohesion policy programmes. Coordinate also with local, regional and national initiatives.

11. DEVELOPING AND DEPLOYING ENERGY-EFFICIENT ICT

Out of the 423 respondents, 319 answered on this domain. This is the most answered domain. More than two thirds of the respondents answered here.

The first question was on identifying areas where the energy used by ICT has to be reduced. The most important areas are "telecommunication and networks equipment" and "data centres" which were supported by 95% and 94,7% of the respondents respectively.

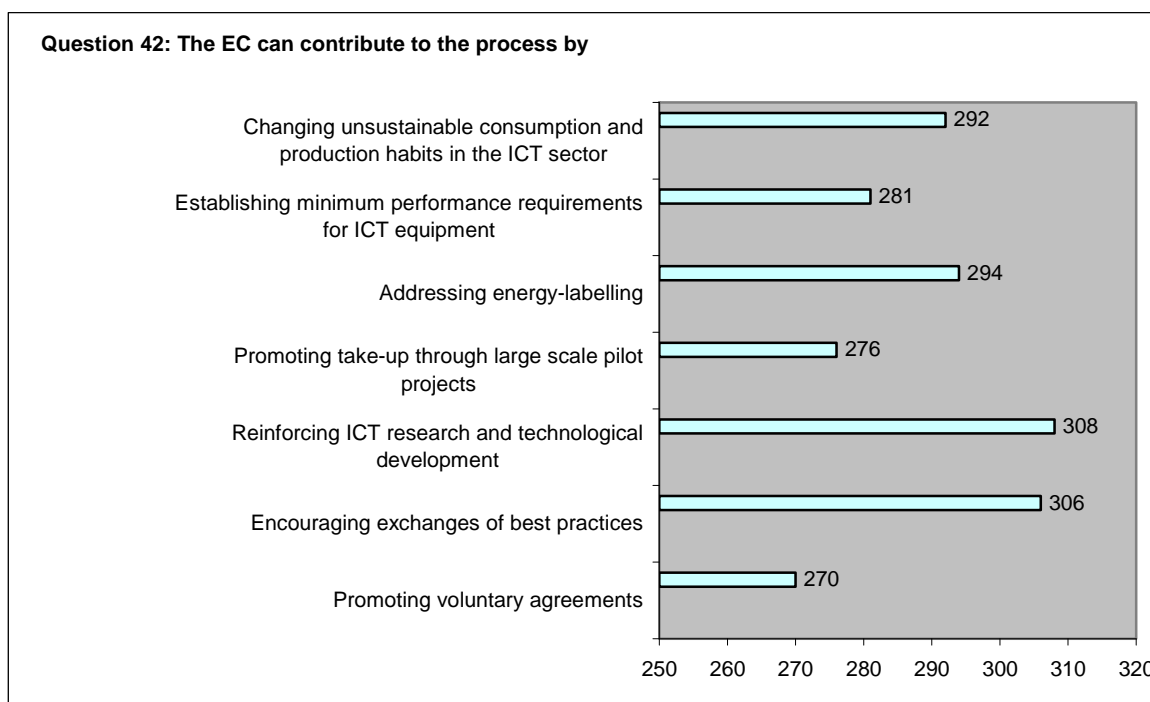


The second question was open allowing responders to identify areas not listed in the previous question. It was optional. Out of the 271 respondents for this domain 35 used this option. Some respondents referred to topics out of the scope of "ICT for energy efficiency".

21 respondents identified equipment types. More specifically, 3 respondents pointed to mobile devices, 8 to personal and desktop computers, 3 to printers, 6 to home electronics and 1 to RFID.

7 respondents referred to specific types of software tools (e.g. compilers, ERP).

The third question was on how the European Commission could contribute to the process. The most supported contributions are "Reinforcing RTD" with 96,6% and "promoting the take-up of large scale pilot projects" with 96,5%.



The fourth question was open to allow free text contributions. It was optional. Out of the 271 respondents for this domain 30 used this option. Some answers are just extensions or reformulation of already listed ideas. For example, some respondents pointed to the necessity for covering a particular RTD area e.g. virtualisation or micro-power sources. Others referred to topics not within the scope of "ICT for energy efficiency". Others referred to the need for behavioural change which is a topic not addressed here but is considered in the Restructuring area.

The main recommendations to be considered are:

- Promote the development, by global industry bodies, of measurement methodologies (what and how to measure) to demonstrate that an increase in CO2 emission by ICT yields bigger savings elsewhere.
- Promote measures to extend the life of equipment, that is, repairs or upgrade paths rather than replacement.
- Support standardisation and interoperability.
- Foster coordination of RTD efforts at the local, regional, national and international levels.

12. ADDITIONAL COMMENTS

In addition to answering the questionnaire, interested parties submitted position papers which provide valuable input to the Commission's further activities. The table below lists those contributions that can be made publicly available and are online at the European Commission's ICT for Energy Efficiency website (see address below).

Organisation	Website
AeA Europe	http://www.aeanet.org/europe
AMCHAM EU	http://www.eucommittee.be/
EICTA	http://www.eicta.org/
Google	http://www.google.com
Symantec	http://www.symantec.com

The European Commission services, and in particular the unit "ICT for Sustainable Growth" of the Directorate General Information Society and Media, would like to thank all respondents for their answers and encourage all interested parties to continue contributing to the definition of an ICT for energy efficiency policy for Europe. For this purpose, or simply for being kept up-dated, please refer to the European Commission's ICT for Energy efficiency website at:

http://ec.europa.eu/information_society/activities/sustainable_growth/energy_efficiency/index_en.htm