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Second consumer market study on the functioning of the retail electricity markets for consumers in the EU

Final Report Annexes

Ipsos-London Economics-Deloitte consortium
September 2016

Justice and Consumers

EUROPEAN COMMISSION

Produced by Consumers, Health, Agriculture and Food Executive Agency (Chafea) on behalf of the European Commission, Directorate-General for Justice and Consumers

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Annex 1 Methodology of the consumer survey

A1.1 Sampling approach and sample size

The survey was designed to target members of the general population (aged 18+) in each country, who are fully or jointly in charge of paying the electricity bill in the household. In total, 29,119 interviews were conducted across 30 countries.

A mixed-mode approach

A mixed-mode approach was used for data collection, involving face-to-face, online and telephone interviews. The data collection method in each country was decided by looking at the internet penetration rate. The purpose of this approach was to minimise non-coverage bias in countries with low internet penetration (by reaching non-internet households via telephone or face-to-face interviewing), all while ensuring a robust sampling approach.

The first market study (conducted in 2009) used a telephone methodology across all countries. Due to the change in methodology[1], comparisons between the current study and the first market study should be made with caution.

Survey modes used across countries

In countries where internet penetration is too low to guarantee representative samples, both online and telephone interviews were conducted; this resulted in a core sample that is broadly representative of the general population in these countries. In low internet penetration countries selected for the behavioural experiment (see Task 5), a proportion of the sample was interviewed via an in-home self-completion survey (rather than by phone).

In two of the smallest countries, an online approach was not viable. In Cyprus and, to a lesser extent, Malta, online penetration is limited. Furthermore, population sizes in these countries are too small to support an online panel without serious bias. Therefore, in these countries, we only conducted telephone interviews.

The following table presents the target sample sizes and methodological approach implemented in each country.

[1] Differences in responses by survey mode – i.e. mode effects – are fairly common. The experience of being interviewed by another person differs from completing a survey online (e.g. an interviewer can provide clarification). The social interaction during a telephone or face-to-face interview may also exert subtle pressures on respondents to present themselves in a more positive light, leading to an overstatement of socially desirable behaviours. Finally, because surveys require cognitive processing of words and phrases to understand a question and choose a response option, the channel in which the question is communicated can also affect responses (e.g. a complicated question with many response options may be difficult to comprehend when someone hears it on the phone, but easier to process when read online).

Table 1: Data collection mode and number of interviews, by country					
Country	% households with internet access at home (broadband connection) Source: Eurostat	Targeted number of interviews			Survey modes used in the country
		Online	Phone	In-person	
EU28					
Netherlands	95 / (87)	1000	-	-	Web
Luxembourg	94 / (70)	500	-	-	Web
Denmark	93 / (87)	1000	-	-	Web
Sweden[2]	**93 / (87)**	**1000**	**-**	**-**	**Web**
Finland	89 / (88)	1000	-	-	Web
Germany	**88 / (85)**	**1200**	**-**	**-**	**Web**
UK	**88 / (87)**	**1200**	**-**	**-**	**Web**
Ireland	82 / (67)	1000	-	-	Web
France	**82 / (78)**	**1000**	**-**	**-**	**Web**
Austria	81 / (80)	1000	-	-	Web
Belgium	80 / (79)	1000	-	-	Web
Estonia	80 / (79)	1000	-	-	Web
Malta	79 / (79)	-	500	-	CATI (landline)
Slovakia	78 / (70)	1000	-	-	Web
Slovenia	**76 / (74)**	**1000**	**-**	**-**	**Web**
Czech Republic	**73 / (69)**	**800**	**-**	**200**	**Web + In-home self-completion**
Latvia	72 / (70)	800	200	-	Web + CATI (mobile/landline)
Poland	**72 / (69)**	**1000**	**-**	**200**	**Web + In-home self-completion**
Hungary	71 / (71)	800	200	-	Web + CATI (mobile/landline)
Spain	**70 / (69)**	**1000**	**-**	**200**	**Web + In-home self-completion**
Italy	**69 / (68)**	**1000**	**-**	**200**	**Web + In-home self-completion**
Croatia	65 / (64)	800	200	-	Web + CATI (mobile/landline)
Cyprus	65 / (64)	-	500	-	CATI (landline)
Lithuania	**65 / (64)**	**800**	**-**	**200**	**Web + In-home self-completion**
Portugal	62 / (62)	700	300	-	Web + CATI (mobile/landline)
Romania	58 / (56)	600	400	-	Web + CATI (mobile/landline)
Greece	56 / (55)	600	400	-	Web + CATI (landline)
Bulgaria	54 / (54)	600	400	-	Web + CATI (mobile/landline)
Additional countries					
Iceland	96 / (95)	500	-	-	Web
Norway	94 / (88)	1000	-	-	Web

Web surveys

In the case of the web surveys, online access panels were used as a sampling frame. Online respondents were recruited via Ipsos' network of online access panels. Panellists are pre-recruited individuals who have agreed to take part in research. Since they have already provided key details about the demographics of all individuals in a household, as well as a range of other information, the surveys can be accurately targeted; this ensures that the samples are representative of the targeted population in each country.

[2] Countries in bold were selected to be included in the behavioural experiment (see Task 5).

Telephone surveys

In the case of CATI surveys, the sampling method used was Random Digit Dialling (RDD). Typically, "Plus Digit" sampling is used, which involves drawing a sample from a telephone directory or other source of "seed" numbers and then replacing the last one or two digits of each sampled seed number with one or two random digits.

In-home self-completion surveys

The basic sample design for the in-home self-completion surveys was a multi-stage, random (probability) one. In each country, a number of sampling points was drawn with probability proportional to population size and to population density. In each of the selected sampling points, a starting address was drawn at random. Further addresses (every N^{th} address) were selected by standard "random route" procedures, from the initial address.

A1.2 Pilot study

Prior to launching the main stage survey, a pilot study was carried out in three countries (Germany, Slovenia and the UK). The aim was to collect preliminary information from the general public (aged 18+) that would serve as support for finalising the questionnaire and behavioural experiment for the main stage survey.

The following approach was implemented:

- In the UK, 100 online interviews were carried out, with the objective of testing the overall questionnaire ("typical" survey questions, as well as the behavioural experiment).
- In Germany and Slovenia, "laboratory pilots" were carried out, consisting of, respectively, 16 and 20 online interviews, followed by an in-depth focus group discussion, conducted in central locations. The main aim was to test the behavioural experiment.

The main objective of the pilot study was to thoroughly test the questionnaire and experiment; and collect information on aspects such as interview length and respondents' understanding of the different questions and test conditions, and to make recommendations for possible improvements of the survey materials.

Outcomes of the pilot study for the consumer questionnaire

Pilot results in the UK showed that it took on average 15 minutes 7 seconds to complete the survey questionnaire, and 12 minutes 43 seconds to complete the experiment section. The *total* average duration of an online interview in the UK was 27 minutes 39 seconds.

Based on the pilot results, and in consultation with the DG JUST, Ipsos implemented a limited number of changes to improve the consumer questionnaire for the main stage.

A1.3 The questionnaire

The questionnaire was designed in line with the survey objectives, aiming to collect information about consumers' awareness, attitudes and experiences regarding electricity services. Questions were structured around the following themes:

- General awareness and information;
- Quality and service;
- Unfair commercial practices/unfair contract terms;
- Complaint and redress;
- Affordability;
- Choice and comparability;
- Choice drivers;
- Trust in electricity companies;
- Switching electricity companies;
- Switching tariff while staying with the same electricity company; and
- Functioning of the retail electricity market and role of energy regulators.

Questionnaire translation

Once the materials (survey questionnaire and experiment) were finalised and validated, they were translated towards the local languages of each country.

The following actions were undertaken:

1. The approved English version was first reviewed by a member of the translation team to ensure that nuances of local culture would be appropriately taken into account in the translated version;

2. The local agency/translation team was then responsible for translating the questionnaire into the local language(s);

3. The translated questionnaires were sent to DG JUST for sign-off prior to the start of the main stage fieldwork;

4. A briefing document explaining the survey and the specific terms used in the survey was provided to each translator to ensure they understood the context and were able to translate specific terms appropriately.

The following table presents the list of languages used for each of the countries where the survey was implemented:

Table 2: Languages per country

Country	Language(s)
Austria	German (Austrian)
Belgium	French (Belgium) & Dutch (Belgium)
Bulgaria	Bulgarian
Croatia	Croatian
Cyprus	Greek (Cyprus)
Czech Republic	Czech
Denmark	Danish
Estonia	Estonian
Finland	Finnish
France	French (France)
Germany	German
Greece	Greek
Hungary	Hungarian
Ireland	English
Iceland	Icelandic
Italy	Italian
Latvia	Latvian
Lithuania	Lithuanian
Luxembourg	Luxembourgish & French (Luxembourg)
Malta	Maltese
Netherlands	Dutch (Netherlands)
Norway	Norwegian
Poland	Polish
Portugal	Portuguese
Romania	Romanian
Slovakia	Slovakian
Slovenia	Slovenian
Spain	Spanish
Sweden	Swedish
UK	English

A1.4 Main stage fieldwork

Fieldwork took place between 9 February and 9 April 2015 for the online interviews. The fieldwork for the telephone interviews and in-home completions of the questionnaire (and experiment) mainly took place throughout May and June.

Number of interviews completed

The target audience of the consumer survey was the general population, aged 18 and above, who are fully or jointly in charge of paying the electricity bill in their household. Quotas were set upon age, gender and region, to ensure that the sample in each country was representative of the target population. The table below presents the targeted sample size and the number of completed interviews per country.

Table 3: Number of interviews (target and completed), per country		
Country	**Number of online interviews/(target)**	**Number of offline interviews/(target)**
Austria	1001/(1000)	NA
Belgium	1000/(1000)	NA
Bulgaria	600/(600)	403/(400)
Croatia	822/(800)	200/(200)
Cyprus	NA	500/(500)
Czech Republic	801/(800)	200/(200)
Denmark	1000/(1000)	NA
Estonia	1000/(1000)	NA
Finland	1000/(1000)	NA
France	1001/(1000)	NA
Germany	1200/(1200)	NA
Greece	604/(600)	401/(400)
Hungary	801/(800)	201/(200)
Iceland	503/(500)	NA
Ireland	1000/(1000)	NA
Italy	1011/(1000)	204/(200)
Latvia	800/(800)	200/(200)
Lithuania	800/(800)	205/(200)
Luxembourg	501/(500)	NA
Malta	NA	494/(500)
Netherlands	1000	NA
Norway	1000/(1000)	NA
Poland	1004/(1004)	203/(200)
Portugal	700/(700)	306/(300)
Romania	601/(600)	443/(400)
Slovakia	1003/(1000)	NA
Slovenia	1000/(1000)	NA
Spain	1006/(1000)	200/(200)
Sweden	1000/(1000)	NA
UK	1200/(1200)	NA
Total (N = 29,119)	**24,959**	**4,160**

A1.5 Panel information

The "on the ground" execution of the online fieldwork was carried out by the Ipsos Interactive Service Bureau (IIS). All the work conducted by IIS was managed centrally, with one scripting, data collection and data delivery process.

The main stage fieldwork was conducted using Ipsos' online panels where possible. In some countries, partner panels were used, either due to Ipsos not currently having a panel in that country, or the Ipsos panel being too small to achieve the required number of interviews. All selected polling institutes are well known for the quality of their network and are involved in numerous multilingual and multinational surveys. All are ESOMAR members as well. To prevent scripting errors, the same script was used by all panel partners.

The table below shows where ISS and external panels were used:

Table 4: IIS and external panels

Country	External panel	IIS panel
Austria	Bilendi	
Belgium		X
Bulgaria	JTN	
Croatia	Ipsos Adria	
Czech Republic	Ipsos CZ	
Denmark	Userneeds	X
Estonia	Norstat	
Finland	Userneeds	X
France		X
Germany		X
Greece	JTN	
Hungary		X
Iceland	MMR	
Ireland	Userneeds	
Italy		X
Latvia	Norstat	
Lithuania	Norstat	
Luxembourg	TNS	
Norway	Userneeds	X
Poland		X
Portugal	CINT	
Romania		X
Slovakia	Narodni	
Slovenia	Ipsos Adria	
Spain		X
Sweden		X
Netherlands		X
UK		X

CAWI Quality processes

Ipsos has developed an internal four-stage data quality process called iPi4 (Ipsos Panel Integrity). The four components are detailed below.

iPi Pre-panel stage: Before becoming panel members, applicants are scrutinized by a complex validation system. No one can join the panel without successfully passing all of the checks. These include checking for duplicates, CAPTCHA security code, screening out individuals who work in market research, validating personal and geographical details.

The external panels have similar processes at panellists' registration. Duplicate detection is implemented on all panels, as are CAPTCHA security codes and deduplicating against a black list. A double opt in recruitment ensures that email and personal details are verified.

iPi Early-panel stage: Shortly after joining the panel, new members are tested again with a short survey. New panellists who are most likely to make intentional or unintentional errors on future surveys are deactivated at an early stage. This survey checks anomalies in answers and detects fraudulent behaviour. Respondents who obtain high anomaly scores or provide a large number of errors are removed from the panel.

The iPi Survey module: This module identifies low engagement behaviour during a survey. The quality of answers is ensured by measures such as duplicate detection using the RelevantID digital fingerprinting, geo-IP validation and speeding. These survey standards are implemented on all surveys IIS manages, no matter the sample source.

- RELEVANTID® removes duplicates from live surveys, based on digital fingerprinting criteria. The module is applied on all surveys conducted by IIS, including those where mixed/external panel sources are used. This ensures that each respondent will only be selected once for a survey, even if they are a member of more than one panel.
- COUNTRY GEO-IP validation ensures the panellist is in the country they are expected to be in.
- iPi SPEEDERS are monitored for every survey and respondent experience is measured.

iPi Ongoing panel stage: IIS monitors and tracks panellists' behaviour history across all surveys. IIS employs purging procedures based on behaviour history to remove bad and inactive panellists from our active panel. Reasons for removal include: hard bounce emails, inactivity, fraudulent and inconsistent data.

Our partners perform many similar checks and cleaning procedures on their panels; they purge respondents with hard bounce emails, and track and monitor inconsistencies which are flagged and removed as appropriate.

All surveys managed by IIS (no matter the sample source) are hosted in Rackspace, a managed hosting facility. The servers and network infrastructure and physically located in the UK. Rackspace guarantees' recovery of hardware failure within one hour, ensures zero downtime, its facility security is strictly managed and power back up is guaranteed.

A1.6 Weighting

For this survey, the data was weighted in two ways:

- Within each country, the data was weighted by demographic variables (gender, age and activity status) to correct for any biases in the achieved sample profile compared to known population statistics.
- Across countries, the data was weighted to ensure that each country is represented according to its population size in the EU-wide results.

Annex 2 Methodology of the price collection exercise

The Third Energy Package[3] requires all Energy Regulatory Authorities to present yearly to the Council of European Energy Regulators (CEER): (1) an annual report on the electricity and gas markets; and (2) the electricity prices available in the country.[4] This means that many regulators have begun to compile tariff data for their respective markets. One of the aims of the Third Energy Package is to empower consumers. In support of this aim, the European Commission recommended the establishment of "trustworthy price comparison tools".[5] In response to this recommendation, many regulators have gone one step further and created price comparison tools as a way to stimulate competition.

The price collection used a multi-pronged approach which was a departure from the 2010 study. The 2010 study employed solely desk-based research. In this study, regulator databases were used as the first source of data where available. The second step was to combine this approach with desk-based research in cases where regulators did not have a database or their database did not reach the data threshold (80% of the national retail market). As more regulators begin to build centralised tariff databases, future studies can more and more rely on this source.

The preferred hierarchy of data sources for tariffs was as follows:

1. Regulator's own dataset;
2. Regulator's own comparison tool;
3. Private sector comparison tool certified by the regulator;
4. Combination of data from regulator (e.g. regulated tariffs) and private sector data (comparison tool certified by the regulator or desk research); and
5. Only private sector data (comparison tool certified by the regulator or desk research to exhaust the market).

Objectives

The objectives of the data collection exercise were to compile a comprehensive and representative sample of electricity prices offered to consumers. Additionally, the exercise aimed at gathering a comparable body of data across Member States and between the current and the previous study. The current methodology pursues these standards, by building upon the methodology used in the 2010 data collection exercise.

Representative set of prices. To achieve representative prices across Member States, the collection aimed at collecting 100% of the price data offered by the main electricity suppliers on selected tariffs.

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[3] https://ec.europa.eu/energy/en/topics/markets-and-consumers/market-legislation

[4] Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators. Article 11 on 'Monitoring and reporting on the electricity and natural gas sectors', states: (1.) The Agency, in close cooperation with the Commission, the Member States and the relevant national authorities including the national regulatory authorities and without prejudice to the competences of competition authorities, shall monitor the internal markets in electricity and natural gas, in particular the retail prices of electricity and natural gas, access to the network including access of electricity produced from renewable energy sources, and compliance with the consumer rights laid down in Directive 2009/72/EC and Directive 2009/73/EC. (2.) The Agency shall make public an annual report on the results of the monitoring provided for in paragraph 1. In that report, it shall identify any barriers to the completion of the internal markets in electricity and natural gas. (3.) When making public its annual report, the Agency may submit to the European Parliament and to the Commission an opinion on the measures that could be taken to remove the barriers referred to in paragraph 2.

[5] EC Press Release, Transforming Europe's Energy System – Commission energy summer package leads the way, 15 July 2015. Available at : http://europa.eu/rapid/press-release_IP-15-5358_en.htm

80% of retail market to be covered. The price collection exercise focused on recording tariffs offered by the companies that cumulatively supplied at least 80% of the national retail market. This followed the same approach as the 2010 study.

Tariff types

The tariff types recorded were for Green Energy tariffs (100% renewable energy rates) and Grey Energy tariffs (renewable and fossil fuel mix). In addition to recording data for these tariffs, the data collection template also recorded tariffs for variable and fixed rates contracts, as well as high, low and medium consumption levels. Where there are multiple rates associated with a tariff that apply according to the time the electricity is consumed (e.g. peak/off-peak, day/night), the higher and lower rates were collected.

A sample of the information sent to the relevant stakeholders is provided below. As it can be observed, the document details the characteristics of the selected tariff types.

Table 5: Information provided to stakeholders describing the selected body of tariff types

We are seeking information on **domestic electricity tariffs** offered by your organization. However, recognizing the wide variety of tariff types on offer across the EU, we have chosen to focus on **4 main tariff types**. These are:

- Fixed grey tariff
- Variable grey tariff
- Fixed green tariff
- Variable green tariff

→ A **green tariff** is defined as one for which 100% of electricity production is from green sources (e.g. hydro, renewables). A **grey tariff** is one which cannot be described as a green tariff.

→ A **fixed price tariff** is defined as a tariff under which unit rates stay at the same price for the duration of the contract. A **variable price tariff** is defined as a tariff under which unit rates may change during the contract period.

As we understand that your organization may not offer all of these tariff types, the survey allows you to skip sections which are not relevant.

For each of the tariff types that your organization does offer, we ask you to provide tariff information for different **consumption levels** (low, medium and high) and different **contract durations** (1 year, 2 years and unspecified).

Where there are **multiple rates** associated with a tariff which apply according to the **time the electricity is consumed** (e.g. peak/off-peak, day/night), we ask you to fill the higher and lower rates into the multiple rates table. If there are not multiple rates, please fill the single rate table.

Source: Price collection exercise

Data collection template

Data that was collected was formatted for entry into a data collection template. This data template allowed the accommodation of the specific information being collected: this refers to the **components** of the electricity prices and the **units** in which these components are presented.

Final electricity prices are derived from three different components:

- **Supply costs** include the commodity price (i.e. the cost paid by the supplier for electricity generation) plus the cost of interactions with consumers (such as billing) and administrative costs, plus supplier profits and other costs of running the business.
- **Transmission, distribution and network costs** are the costs of distributing electricity to customers, including maintaining the grid and load balancing.
- **Taxes and additional costs** include any components of the price related to taxes, levies, social subsidies or public service obligations as well as any costs not covered by the other categories.

The units[6] in which these data components can be presented are:

- **Fixed element** – fixed amount (i.e. it does not depend on kWh consumed); and
- **Variable element** – depending on the amount of kWh consumer for a certain period of time.

Units were measured per a period of one day.

All these elements can be observed on the data matrix presented on the next page. As can be observed, the matrix is designed in order to accommodate all the tariff types that were selected for the price collection exercise[7].

Deloitte and London Economics worked together to refine the tariff data into this universal format, querying specific items with regulators to ensure accuracy. Thereafter London Economics conducted the analysis against the benchmark data from the previous study.

Data collection

The data collection template used in this study is presented in the table on the following page.

[6] The units should not be confused with fixed and variable prices.

[7] Specifically, this snapshot presents the grid for green tariffs. For grey tariffs, the cells were presented immediately beside the green tariffs.

Table 6: Data collection template for the price collection exercise

				CONSUMPTION (KWh/year)		
				1000KWh	3500KWh	10000KWh
GREEN TARIFFS	1 year contract	Single rate	Name			
			Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
		Multiple tariff - Lower rate	Name			
			Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
		Multiple tariff - Higher rate	Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
	2 year contract	Single rate	Name			
			Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
		Multiple tariff - Lower rate	Name			
			Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
		Multiple tariff - Higher rate	Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
	Undefined contract	Single rate	Name			
			Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
		Multiple tariff - Lower rate	Name			
			Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			
		Multiple tariff - Higher rate	Supply costs - Fixed cost (per day)			
			Supply costs - Cost per kWh			
			Transmission, distribution & network costs - Fixed cost (per day)			
			Transmission, distribution & network costs - Cost per kWh			
			Taxes & additional costs - Fixed cost (per day)			
			Taxes & additional costs - Cost per kWh			
			Total annual cost			

Source: Price collection exercise

In the course of the study, all regulators were contacted by Deloitte. Most had centralised data which they shared with Deloitte. When they did not have such data, Deloitte requested that they assist them by directing them to valid data or reliable comparison tools[8]. Deloitte additionally used a price collection survey of major electricity companies.

Table 7: Data gathering method used to collect electricity prices

	Regulator		Private sector (retailers and CT)			
	Dataset	Website	Survey	Certified CT	Supplier website	General comments
Austria	x					Regulator gave own dataset and clarified queries
Belgium	x					Regulator gave own dataset and clarified queries
Bulgaria					x	Regulator could not assist on the compilation of data
Croatia		x				93% of consumers under 'universal service' (Dec. 2014) – regulated market
Cyprus		x				'Universal service' tariffs – regulated market
Czech Republic			x			Regulator acted as intermediary to request energy companies to provide data to us via our price collection tool (i.e. data matrix)
Denmark	x					Regulator gave own dataset and clarified queries
Estonia					x	Regulator could not assist on the compilation of data and referred us to specific CT
Finland	x					Regulator gave own dataset and clarified queries
France	x					Regulator gave own dataset and clarified queries
Germany					x	Regulator forwarded us to a CT (which also provided the data to CEER)
Greece		x				State controlled company with 98% of market share
Hungary	x					Regulator gave own dataset and clarified queries. Regulator comment: "90% of consumers under 'universal services'"
Ireland				x	x	Two sources of data used: Certified CT and websites to provide tariffs from suppliers to 80% of retail market
Italy	x					Regulator gave own dataset and clarified queries
Latvia		x			x	Price was available on the regulator website
Lithuania	x	x			x	Regulator gave own dataset and clarified queries
Luxembourg	x					Regulator gave own dataset and clarified queries
Malta					x	State Electricity Company, single provider
Netherlands				x		Regulator referred us to a certified CT and clarified queries
Poland	x					Regulator gave own dataset and clarified queries
Portugal	x	x				Regulator gave own dataset and clarified queries
Romania		x			x	Regulated tariffs from regulator, rest from websites
Slovakia					x	Regulator clarified queries, but data from supplier websites
Slovenia	x				x	Data from regulator's own CT + desk research
Spain	x					Regulator gave own dataset and clarified queries
Sweden	x					Regulator gave own dataset and clarified queries
UK				x	x	Certified CT + desk research on main suppliers
Iceland	x				x	Regulator gave own dataset and clarified queries
Norway		x			x	Regulator referred us to the prices which were available on the regulator website

Source: Price collection exercise

[8] All the comparison tools that were used were certified or belonged to the regulator.

Issues faced during price collection:

- Tariffs vary widely across the EU, Norway and Iceland. For instance, in electricity markets like Spain, Portugal or Italy, the final price to the consumer takes into account the maximum rate of current flow as well as the volume of electricity supplied. In other countries, such as in the UK or Ireland, other terms are used for the price components of the final price (i.e. "standing charges" – identified as the network costs). It should be noted that such conversion activity is unavoidable in any cross-comparison of European national electricity tariffs.
- In some countries, certain tariffs may have been missed because they were not provided by the companies who supplied 80% of the retail market.
- A number of Member States rely on different Amperes or KW (based on the electrical wiring of the residence). In these countries, the tariffs are split according to the Ampere/KW level, while in the methodology of this exercise (and the 2010 data collection exercise), only one tariff type could be used. In line with the 2010 data collection exercise, the value of 3 KW (or closest to this value) was used. This decision was in line with recommendations received from regulators.
- When gathering data from price comparison tools, very often it was necessary to use a post code. This was particularly relevant in larger markets where supply costs may differ between regions. For the sake of comparison (and in line with approaches from other research bodies[9]), Deloitte always applied a post code from the capital city.[10]
- While 2010 data collection exercise relied upon collection of tariffs directly from electricity providers, this study relied more on the regulator's own price data. However, for regulator datasets, no information was available on how the data was collected, the age of the data or whether it was also standardised prior to it being given to Deloitte (however, from dealings with the regulators it was understood that this data was quite up-to-date). Additionally, Deloitte was explicit regarding the necessity of having tariffs from companies which represented 80% of the retail market.
- Not all regulators collect data in the same way. For example, in at least one market, the data which the regulator provides to ACER/CEER comes directly from a private sector firm running a comparison tool. In other markets, the electricity companies provide the data directly to the regulator.

The Consortium's interaction with regulators varied country, with some regulators able to provide quite detailed responses to queries (in some cases even reviewing the price collection matrix for accuracy), and others being more concise. However, ultimately all technical queries put to the regulators in relation to the appropriate conversion of the received tariff data to the final formatted tariff data were answered.

[9]For example, see Household Energy Price Index published by E-Control, MEKHH and VaasaETT Ltd which references prices from EU capitals. Available at https://www.e-control.at/documents/20903/-/-/4c0e230b-3ef4-4eeb-b696-3b6a4467eac8

[10] This approach is different to the 2010 study where regional suppliers were included in the desk-based research.

Annex 3 Methodology of the empirical analysis of determinants of prices

This annex presents additional tables and analysis related to:

- The variables used in the empirical analysis;
- Correlations between variables used in the empirical analysis;
- Summary statistics of the variables used in the empirical analysis; and
- Grouping of variables in empirical analysis.

A3.1 Variables used in the empirical analysis

Table 8: Variables used in the empirical analysis

Variable	Description	Source	Coverage
P1	Average electricity price excluding taxes and network costs for households consuming less than 1,000kWh/year	Eurostat - Electricity prices components for domestic consumers - annual data (from 2007 onwards) [nrg_pc_204_c]	2007s2-2014s2
P2	Average electricity price excluding taxes and network costs for households consuming 1,000-2,500kWh/year	Eurostat - Electricity prices components for domestic consumers - annual data (from 2007 onwards) [nrg_pc_204_c]	2007s2-2014s2
P3	Average electricity price excluding taxes and network costs for households consuming 2,500-5,000kWh/year	Eurostat - Electricity prices components for domestic consumers - annual data (from 2007 onwards) [nrg_pc_204_c]	2007s2-2014s2
P4	Average electricity price excluding taxes and network costs for households consuming 5,000-15,000kWh/year	Eurostat - Electricity prices components for domestic consumers - annual data (from 2007 onwards) [nrg_pc_204_c]	2007s2-2014s2
P5	Average electricity price excluding taxes and network costs for households consuming more than 15,000kWh/year	Eurostat - Electricity prices components for domestic consumers - annual data (from 2007 onwards) [nrg_pc_204_c]	2007s2-2014s2
V1	Share of total net electricity generation using combustible fuels as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V2	Share of total net electricity generation using nuclear power as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V3	Share of total net electricity generation using hydro power as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V4	Share of total net electricity generation using wind power as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V5	Share of total net electricity generation using solar power as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V6	Share of total net electricity generation using pumped hydro power as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V7	Share of total net electricity generation using geothermal power as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V8	Share of total net electricity generation using tides/waves/ocean as main input factor	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V9	Share of total net electricity generation using renewable energy as main input factor	Sum of shares of solar, tidal, wind and geothermal heat energy	2007-2013
V9	Total net electricity generation	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V10	Total net electricity generation per capita	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]; Population on 1 January by age and sex [demo_pjan]	2007-2013
V11	Final energy consumption of households	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]	2007-2013
V12	Final energy consumption of households per capita	Eurostat - Supply, transformation and consumption of electricity - annual data [nrg_105a]; Population on 1 January by age and sex [demo_pjan]	2007-2013

Table 8: Variables used in the empirical analysis			
Variable	**Description**	**Source**	**Coverage**
V13	Dummy variable for whether retail electricity prices are regulated or not	Consortium's desk research	2009, 2015
V14	Number of main generators (with share >5%)	Eurostat - Electricity market indicators (Data from January 2015)	2007-2013
V15	Average market share of main generators (with share >5%)	Eurostat - Electricity market indicators (Data from January 2015)	2013
V16	Cumulative Market share of main suppliers to industry and households (with share >5%)	Eurostat - Electricity market indicators (Data from January 2015)	2013
V17	Average market share of main suppliers to industry and households (with share >5%)	Eurostat - Electricity market indicators (Data from January 2015)	2013
V17	Herfindahl-Hirschman index of suppliers to households	Calculated using the general consumer survey	2015
V18	Switching rate for the 3 years to 2015 (% of consumers who switched)	Calculated using the general consumer survey	2015
V20	Years since liberalisation	Consortium's desk research	2015

A3.2 Correlations between variables used in the empirical analysis

Table 9: Correlations between variables used in the empirical analysis

	p1	p2	p3	p4	p5	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	v17	v18	v19	v20	v21
p1	1.00																									
p2	0.90	1.00																								
p3	0.81	0.98	1.00																							
p4	0.74	0.95	0.99	1.00																						
p5	0.64	0.87	0.94	0.98	1.00																					
v1	0.42	0.43	0.40	0.37	0.32	1.00																				
v2	-0.13	-0.23	-0.30	-0.35	-0.37	-0.26	1.00																			
v3	-0.27	-0.29	-0.25	-0.23	-0.23	-0.54	-0.17	1.00																		
v4	0.58	0.51	0.49	0.46	0.42	0.25	-0.32	-0.05	1.00																	
v5	0.31	0.37	0.39	0.44	0.46	0.26	-0.14	-0.17	0.12	1.00																
v6	-0.22	-0.22	-0.20	-0.23	-0.27	-0.32	-0.23	0.32	-0.05	-0.17	1.00															
v7	0.04	0.09	0.12	0.14	0.15	0.06	-0.21	0.02	0.05	0.54	-0.08	1.00														
v8	-0.05	-0.18	-0.22	-0.25	-0.26	-0.20	0.62	-0.07	-0.15	-0.11	-0.07	-0.06	1.00													
v9	0.62	0.58	0.57	0.56	0.54	0.32	-0.33	-0.09	0.93	0.48	-0.11	0.28	-0.17	1.00												
v10	0.22	0.15	0.06	0.02	0.02	0.08	0.40	-0.29	0.03	0.34	-0.23	0.17	0.54	0.15	1.00											
v11	-0.25	-0.43	-0.49	-0.53	-0.57	0.01	0.51	0.04	-0.21	-0.13	-0.17	-0.13	0.18	-0.23	0.22	1.00										
v12	0.12	0.16	0.20	0.20	0.20	-0.15	-0.20	0.34	0.26	-0.05	0.28	-0.10	0.07	0.21	-0.10	-0.41	1.00									
v13	-0.25	-0.25	-0.22	-0.24	-0.27	-0.21	-0.28	0.32	-0.11	-0.24	0.95	-0.13	-0.11	-0.19	-0.36	-0.14	0.30	1.00								
v14	0.20	0.27	0.32	0.35	0.40	-0.29	0.06	0.11	0.11	0.14	-0.24	0.31	0.26	0.16	0.13	-0.36	-0.09	-0.27	1.00							
v15	0.52	0.69	0.69	0.68	0.63	0.25	-0.30	-0.14	0.60	0.28	0.01	0.04	-0.22	0.63	0.14	-0.38	0.39	-0.12	-0.03	1.00						
v16	-0.29	-0.36	-0.35	-0.34	-0.32	-0.05	0.15	-0.01	-0.47	-0.38	-0.02	-0.21	0.16	-0.55	-0.29	0.09	-0.25	0.15	0.06	-0.82	1.00					
v17	0.18	0.23	0.29	0.28	0.26	-0.03	-0.11	0.05	0.09	-0.36	0.24	-0.41	0.09	-0.06	-0.48	-0.47	0.35	0.31	0.01	0.03	0.32	1.00				
v18	-0.01	-0.01	0.06	0.10	0.14	0.43	-0.19	-0.09	-0.06	0.25	-0.04	-0.06	0.17	0.03	-0.16	-0.05	0.11	0.12	-0.07	-0.21	0.35	0.33	1.00			
v19	0.01	0.02	0.10	0.14	0.18	0.23	-0.02	-0.05	0.06	0.18	0.02	-0.10	0.36	0.11	-0.12	-0.11	0.21	0.13	0.08	-0.14	0.29	0.49	0.92	1.00		
V20	0.23	0.10	0.01	-0.07	-0.15	0.35	0.00	-0.19	0.15	-0.16	-0.28	0.04	-0.21	0.08	0.24	0.32	-0.15	-0.29	-0.48	0.13	-0.19	-0.22	-0.38	-0.49	1.00	
v21	-0.02	-0.07	-0.14	-0.18	-0.20	-0.05	0.10	0.08	0.05	-0.03	-0.11	-0.10	-0.10	0.05	0.40	0.43	0.01	-0.24	-0.38	0.31	-0.54	-0.50	-0.49	-0.54	0.65	1.00

Source: Price collection exercise

A3.3 Summary statistics of the variables used in the empirical analysis

Table 10: Summary statistics of the variables used in the empirical analysis (2013)

	Obs.	Mean	Std. Dev.	Min	Max
Price1	28	0.1244	0.0815	0.0199	0.4007
Price2	28	0.0906	0.0390	0.0248	0.1776
Price3	28	0.0846	0.0352	0.0335	0.1789
Price4	28	0.0827	0.0356	0.0315	0.1789
Price5	28	0.0886	0.0690	0.0315	0.4013
Combustible Fuels	28	0.2943	0.2965	0.0000	0.9822
Nuclear	27	0.1459	0.1986	0.0000	0.7357
Hydro	28	0.1761	0.1922	0.0000	0.6616
Wind	28	0.0707	0.0785	0.0000	0.3356
Solar	28	0.0126	0.0221	0.0000	0.0761
Pumped Hydro	28	0.0256	0.0699	0.0000	0.3606
Geothermal	27	0.0008	0.0037	0.0000	0.0191
Tide/Waves/Ocean	27	0.0000	0.0001	0.0000	0.0007
Renewable energy	27	.086346	.0845867	0	.3355861
Total Net Generation	28	111	158	2	597
Per Capital Net Generation	28	0.0000	0.0000	0.0000	0.0000
Consumption	28	0.2862	0.0889	0.1577	0.5821
Per Capita Consumption	28	0.1010	0.1696	0.0028	0.6743
Price Regulation	28	.5	.5091751	0	1
Herfindahl-Hirschman Index	28	3425	2816	539	10000
Switching	25	0.1191	0.0969	0.0019	0.2800
Main Generators	28	3.3214	1.7858	1.0000	7.0000
Average Share Main Generators	26	0.3693	0.2953	0.0925	1.0000
Cumulative Share Main Suppliers	26	0.8077	0.1822	0.3610	1.0000
Average Share Main Suppliers	26	0.3221	0.2882	0.0903	1.0000
Years Since Liberalisation	28	9	5	0	19

Source: Price collection exercise

A3.4 Grouping of variables in empirical analysis: factor analysis

In the study, explanatory variables are grouped according to variable definition. However, these variables may be correlated with each other, leading to concerns of multicollinearity. Principal Component Analysis (or the generalised form, Factor Analysis, which permits the error term to have an arbitrary diagonal covariance matrix) is a transformation technique used to convert groups of potentially correlated variables into a set of linearly uncorrelated variables.

Factor analysis is used to explore groupings of explanatory variables and compare them with groupings based on the literature and variable definitions. Factor analysis is a commonly-used technique in social sciences to reduce the dimensionality of a problem (Kim and Mueller, 1978[11]). Briefly, factor analysis is a method for expressing a number of variables in terms of a smaller number of 'factors'. Factors are unobserved latent variables created to capture the underlying shared component (i.e. the shared essence and ultimate cause) of the observed variables.

[11] Kim, Jae-On and Mueller C.W. (1978b). Factor Analysis: Statistical methods and practical issues. Thousand Oaks, CA: Sage Publications, Quantitative Applications in the Social Sciences Series, No. 14.

The specific factor analysis method we have used is a principal factor analysis with rotation.[12]

Number of factors

When performing factor analysis, there is a choice to be made regarding how many factors to analyse, given that each additional factor adds less value (incrementally) to the analysis. One common approach in the literature is to restrict the analysis to those factors with an eigenvalue above 1 (since factors with eigenvalue<1 account for less variability than a single variable (Girden, 2001[13])). This approach yields **6 factors**.

Results of the factor analysis

Factor analysis produces two types of results:

- Factor loadings, which measure how much a factor explains an indicator, show the association of each indicator with each factor. Low factor loadings note an indicator is not closely associated with a factor. Conversely, high factor loadings mean an indicator is associated with a factor. A number of high factor loadings from the same factor group indicators that define and express the same factor.

- Uniqueness scores, which measure how much of the indicator is explained by none of the factors, show indicators that are not associated strongly by any factor. These indicators cannot be grouped with other indicators.

It is common practice to look at factor loadings of above 0.3 or below -0.3 in order to determine which variables are linked to the same factor.[14] Conversely, variables with a uniqueness score above 0.9 will not have any factor that explains 10% or more of the variable variance and will not be explained substantially by any shared factor.

The figure below presents factor loadings and uniqueness scores for each of the variables described in Table 8. As a reminder, variables have also been presented with the groupings based on the variable definitions. Variables with a loading factor of magnitude more than 0.3 (i.e. <0.3 or <-0.3) are highlighted, as well as variables with a uniqueness score >0.9.

Values within a factor are colour-coded, so that groupings under different factor headings can be distinguished. As a rule of thumb, if no one colour is dominant across any factor, or several variables have a uniqueness score >0.9, then that suggests low validity of the construction of the groups. If, on the other hand, there is one colour that appears more than any other in any one factor, and uniqueness scores are low, then that suggests moderate to high validity of the construction of the variable groups.

As seen below, the groups "Variables related to price regulation" and "Variables related to competition" are dominated by one colour block. The groups "Variables related to the fuel mix of electricity generation" and "Variables related to the quantity of electricity

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[12] In a principal factor analysis, the first factor is a linear combination of the correlation matrix (with communalities as the diagonal) of indicators that captures the maximum variance of the matrix; the second factor is a linear combination that captures the maximum variance of the matrix and is uncorrelated to the first factor, etc. A principal factor analysis is the preferred method in exploratory factor analysis, since it makes no assumptions about the number of patterns among the indicators or the underlying factors of the indicators (Fabrigar and Wegener, 2011). While principal factor analysis does not allow the statistical tests of other approaches, important advantages of the approach are that it finds a unique factor solution, has a simple structure, and provides comparable results to other factor analysis techniques. For these reasons, the principal factor method is commonly used in the exploratory part of factor analysis. Rotation (i.e. redefining factors such that loadings on various factors tend to be very high or very low) permits linking individual groups in order to generate factors from underlying variables. However, the results shown are very similar when rotation is not performed.

[13] Girden, E. R. (2001). Evaluating research articles from start to finish. Thousand Oaks, Calif., Sage Publications.

[14] Factor loadings of above 0.3 or below -0.3 imply that 10% or more of the variation in a variable is explained by the factor.

supplied/demanded" are weakly dominated by two colours blocks under two factor headings. However, this is to be expected, since these variables are highly correlated by definition. Therefore, the approach taken is to run regressions with alternative specifications: one where explanatory variables pertain to the fuel mix of electricity generation, and one where explanatory variables pertain to the quantity of electricity supplied/demanded.)

In addition, no variable has a uniqueness score of greater than 0.66. This, in conjunction with the relatively low levels of overlap across factors, suggests that the groupings of variables suggested by the literature, and variable definitions, is in line with groupings suggested by factor analysis.

Figure 1: Results of factor analysis on the determinants of electricity prices

Variable definition	Variable definition	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Uniqueness
Variables related to the fuel mix of electricity generation	Net electricity generation – Combustible fuels (%)	0.2293	0.5288	0.4235	-0.4865	-0.2994	0.0724	0.1569
	Net electricity generation – Nuclear fuels (%)	-0.3154	-0.1156	0.0075	-0.1958	0.7391	-0.1393	0.283
	Net electricity generation – Hydro (%)	-0.0537	-0.2113	-0.1466	0.5235	-0.0358	-0.0317	0.6546
	Net electricity generation – Wind (%)	0.8507	0.0424	-0.0566	-0.1275	-0.1183	-0.0766	0.2353
	Net electricity generation – Solar (%)	0.2751	0.2591	-0.0322	-0.1412	0.0255	0.8248	0.1553
	Net electricity generation – Pumped (%)	0.0062	0.0509	0.0308	0.9187	-0.1224	-0.0493	0.135
	Net electricity generation – Geothermal (%)	0.0446	-0.0659	-0.0513	-0.0328	-0.1214	0.8261	0.2928
	Net electricity generation – Tide (%)	-0.1032	0.2161	-0.1701	0.0004	0.8363	-0.0973	0.2049
	Net electricity generation - renewables (%)	0.8478	0.1219	-0.0643	-0.1624	-0.101	0.2588	0.1587
Variables related to quantity of electricity supplied/demanded	Net electricity generation – Total	0.2042	-0.09	0.2325	-0.2177	0.7075	0.3127	0.2503
	Net electricity generation – Per capita	-0.3583	-0.0872	0.5708	-0.1069	0.3872	0.0084	0.3768
	Electricity consumption – Total	0.4642	0.1071	-0.2057	0.4321	0.0381	-0.1979	0.5033
	Electricity consumption – Per capita	-0.1085	0.1896	0.036	0.8834	-0.2249	-0.1217	0.1052
Variables related to price regulation	Price regulation dummy	0.1712	-0.1341	-0.8759	-0.06	0.1766	-0.1669	0.1229
Variables related to competition (market concentration or consumer information)	Number of main electricity generators	0.8779	-0.1097	0.0268	-0.0192	-0.1044	0.0435	0.2034
	Average share of main electricity generators (%)	-0.7391	0.2908	-0.1868	-0.0815	-0.086	-0.292	0.2351
	Cumulative share of main suppliers (%)	0.075	0.4102	-0.3641	0.1745	-0.2032	-0.6331	0.221
	Average share of main suppliers	-0.1037	0.951	-0.0438	-0.0059	-0.033	0.0359	0.0805
	HHI	0.0149	0.9115	-0.2412	0.0544	0.1592	-0.0693	0.0776
	Switching rate (%)	0.1553	-0.31	0.759	-0.3156	-0.0944	-0.1536	0.1717
Variables related to liberalisation of retail electricity markets	Years since liberalisation	0.2475	-0.4556	0.6867	0.0357	0.2296	-0.0347	0.2045

Source: Price collection exercise

Annex 4 Additional information on convergence of prices

Change in price dispersion over time

Before 2007, electricity prices were collected by Eurostat using an alternative methodology[15], and are thereby not included in this analysis. The charts below use data referring to households in the middle consumption band: households with consumption of between 2,500 and 5,000kWh/year.

Prices in Euros

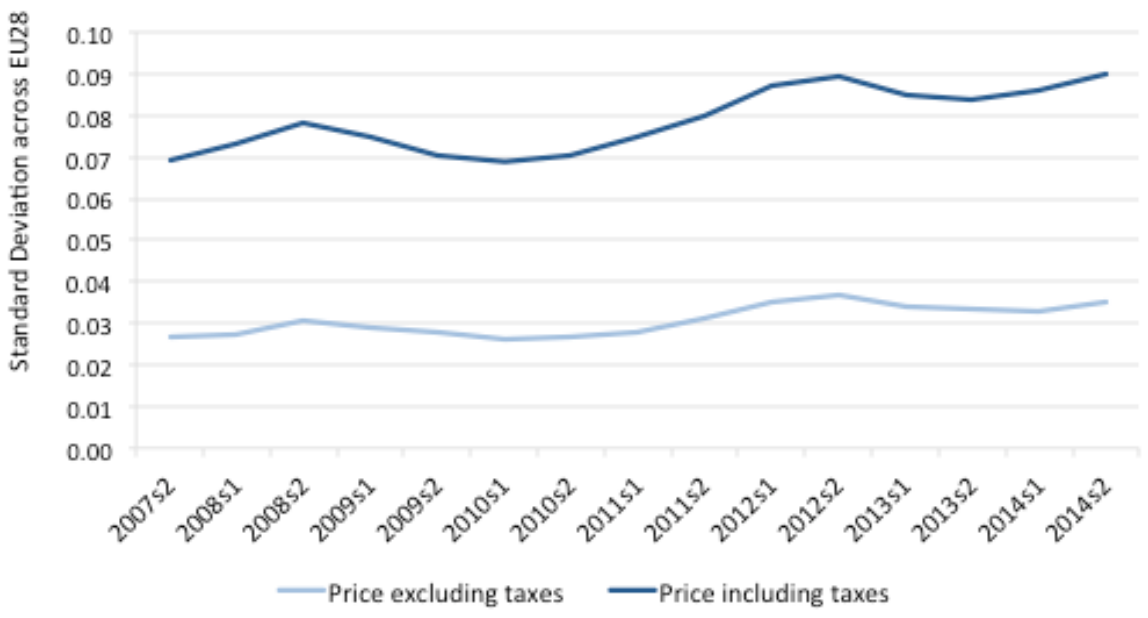
Figure 2: Standard deviation of prices in Euro across the EU15, 2007/SEMESTER 2 to 2014/SEMESTER 2

Note: The 15 Member States are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the UK. Prices refer to consumers with consumption between 2,500kWh and 5,000kWh per year. Series for prices excluding taxes do not include Italy before 2010/SEMESTER 2 due to missing data.

Source: Eurostat - Electricity prices for domestic consumers (nrg_pc_204)

[15] The main difference being the standard consumption bands to which prices refer.

Figure 3: Standard deviation of prices in Euro across EU28, 2007/SEMESTER 2 to 2014/SEMESTER 2



Note: Prices refer to consumers with consumption between 2,500kWh and 5,000kWh per year. Series for prices excluding taxes do not include Italy before 2010/SEMESTER 2 due to missing data.
Source: Eurostat - Electricity prices for domestic consumers (nrg_pc_204)

Prices in PPS

Figure 4: Standard deviation of prices in PPS across the EU15, 2007/SEMESTER 1 to 2014/SEMESTER 1

Note: The 15 Member States are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the UK. Prices refer to consumers with consumption between 2,500kWh and 5,000kWh per year. Series for prices excluding taxes do not include Italy before 2010/SEMESTER 2 due to missing data.
Source: Eurostat - Electricity prices for domestic consumers (nrg_pc_204)

Figure 5: Standard deviation of prices in PPS across the EU28, 2007/SEMESTER 1 to 2014/SEMESTER 1

Note: Prices refer to consumers with consumption between 2,500kWh and 5,000kWh per year. Series for prices excluding taxes do not include Italy before 2010/SEMESTER 2 due to missing data.
Source: Eurostat - Electricity prices for domestic consumers (nrg_pc_204)

Convergence models

Standard beta and sigma convergence models are presented and estimated below using data from Eurostat. In addition, the price gap for every pair of Member States in the EU28 is regressed against a time trend.

The data and periods used to estimate the convergence models are presented first; the beta convergence model and results are then presented; thirdly, the sigma convergence model and results are presented; the time trends of Member State-pair price gaps are presented last.

Data and periods

Eurostat provides half-yearly price data. Due to a change in 2007 in the methodology used to collect electricity price data, the period under consideration is 2007/semester 2 to 2014/semester 2. Data correspond to standard households with consumption of 2,500-5,000kWh/year.

For all Member States except Italy, the earliest data available refer to 2007/semester 2. For Italy, data on prices including taxes are available from 2008/semester 1, but data on prices excluding taxes are available only from 2010/semester 2.

Beta convergence

Beta convergence models examine the relationship between the initial price difference and the change in the price difference in subsequent periods. A negative relationship demonstrates beta convergence.

Model: the equation to be estimated is:

$$\Delta p_{ij,t} = \alpha - \beta p_{ij,t-j} + u_{ij,t} \qquad (1),$$

where $p_{ij,t}$ is the absolute difference between log-prices in Member States i and j in period t, and $u_{ij,t}$ is the error term. A one period lag (j=1) is usually employed (Dobado

and Marrero, 2005[16], Wolszczak-Derlacz, 2006[17], and Belke *et al* 2007[18]), in which case equation 1 is equivalent to:

$$p_{ij,t} = \alpha + (1-\beta)p_{ij,t-1} + u_{ij,t} \qquad (2),$$

The absolute difference in log-prices, $p_{ij,t}$, is calculated for all possible pairs of Member States (378 pairs in total) using prices in PPS. The speed of convergence is calculated as $\lambda = -\ln(1-\beta)$, and the half-life as $t^* = -\ln 0.5/\lambda$.

Estimation method: Since the explanatory variable in our model is the lagged value of the dependent variable, the standard panel data estimators (OLS level, fixed effects) cannot be used. Instead, Equation 2 is estimated using the Arellano-Bond method.

Results

Table 11: Beta convergence – results from estimation of Equation 2

	Price excluding taxes		Price excluding taxes	
	EU28	EU15	EU28	EU15
Coefficient	0.847	.9032	0.817	.8630
p-value	0.000	0.000	0.000	0.000
Speed of convergence	17%	10%	15%	15%
Half-life	4.2	6.8	4.7	4.7

Note: Prices in PPS.

Source: Authors' calculations using Eurostat data

Sigma convergence

Sigma convergence of prices means decreasing price dispersion over time, and sigma convergence models estimate the time trend of measures of price dispersion. The models are estimated using the same data and periods as described above.

Model: Two measures of price dispersion are calculated; the standard deviation of prices and the coefficient of variation of prices (equal to the ratio of the standard deviation to the mean). These price dispersion measures are regressed on a linear time trend in Equations 3 and 4:

$$S_t = \alpha + \beta.t + u_t \qquad (3), \text{ and}$$

$$CV_t = \alpha + \beta.t + u_t \qquad (4),$$

where t is time, S_t is the standard deviation of prices at time t, CV_t is the coefficient of variation of prices at time t, α is a constant and u_t is the error term.

Equations 3 and 4 are estimated for the EU28 and for the EU15.

[16] Dobado, R. and Marrero, G.A. (2005). Corn market integration in Porfirian Mexico. The Journal of Economic History, Cambridge University Press, 65(1), pp.103-128, March.

[17] Wolszczak-Derlacz, J. (2006). One Europe, one product, two prices-the price disparity in the EU, Working Papers Department of Economics ces0614, KU Leuven, Faculty of Economics and Business, Department of Economics.

[18] Belke, A., Dreger, C. and de Haan, F. (2007). Energy consumption and economic growth: new insights into the cointegration relationship, Ruhr Economic Papers #190

Results

Table 12: Sigma convergence – results from estimation of Equations 3 and 4				
	Standard deviation:		Coefficient of variation:	
	Coefficient	p-value	Coefficient	p-value
Prices excluding taxes:				
EU28	0.0006*	(0.0104)	-0.0208	(0.1925)
EU15	0.0009***	(0.0000)	-0.0923**	(0.0021)
Prices including taxes:				
EU28	0.0008***	(0.0001)	-0.0045	(0.6916)
EU15	0.0015***	(0.0000)	-0.0761***	(0.0001)

Note: Prices in PPS.

Source: Authors' calculations using Eurostat data

Member State-pair price gaps

The price gap for every pair of Member States in the EU-27 is regressed against a linear time trend. The price gap (PG) is calculated as the absolute value of the difference in log prices (prices in PPS). The regression equation is:

$$PG_t = \alpha + \beta.t + u_t \qquad (5)$$

where t is time, α is a constant and u_t is the error term.

Equation 5 is estimated for every pair of Member States over the period for which data are available for both Member States (351 pairs of Member States in total).

Results

Table 13: Signs of significant coefficients (p-value < 0.1) on time trends of Member State-pair price gaps - results from estimation of Equation 5 (prices excluding taxes)

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
AT																												
BE	–																											
BG																												
CY	–	–	–																									
CZ	–			+																								
DE	–			+																								
DK	–			+																								
EE	–	–	–		–	–	–																					
EL	–	–	–		–	–	–																					
ES	–	–	–		–	–	–		–																			
FI	–			+				+	+	+																		
FR	–		–	+		–		+		+																		
HR	–	–	–	+	–	–	–	+		+	–																	
HU		+		+	+	+	+	+	+	+	+	+	+															
IE	–	–	–		–	–	–			+	–	–	–	–														
IT	–				–	–	–	+	+		–		+	–	+													
LT	–			+						+				–		+												
LU	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+											
LV	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+											
MT										+				–		+		–	–									
NL		+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	–										
PL	–		–	+		–		+		+	–			–	+	+		–	–		–							
PT				+				+	+	+			+		+	–		–	–		–							
RO		+		+				+	+	+		+	+		+			–	–			+						
SE	–	+		+				+	+	+	+	+	+	–	+	+		–	–		–	+						
SI	–	–	–		–	–	–			+	–			–				–	–		–		–	–	–			
SK		+		+	+			+	+	+	+	+	+	–	+	+	+	–	–		–	+				+		
UK	–		–			–	–	+		+	–			–	+	–		–	–		–		–	–	–		–	

Note: Prices in PPS.

Source: Authors' calculations using Eurostat data

Table 14: Signs of significant coefficients (p-value < 0.1) on time trends of Member State-pair price gaps - results from estimation of Equation 5 (prices including taxes)

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
AT																												
BE																												
BG																												
CY	–	–	–																									
CZ				+																								
DE	–	–	–		–																							
DK	–		–	+		+																						
EE	–	–	–		–	–	–																					
EL	–	–	–		–	–	–	–																				
ES	–	–	–		–	–	–																					
FI	–	–	–	+	–	+	–	+	+	+																		
FR	–	–	–		–		–	+	+	+																		
HR	–	–	–	+	–		–	+	+	+																		
HU	+	+		+	+	+	+	+	+	+	+	+	+															
IE	–	–	–		–		–		+	+	–		–	–														
IT				+		+		+	+	+		+	+	–	+													
LT	–	–	–		–	–	–				–	–	–	–		–												
LU	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+											
LV				+				+	+	+		+		–	+		+											
MT				+				+	+	+				–			+											
NL	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+											
PL	–		–	+		+		+	+	+				–	+		+	–			–							
PT	–	–	–		–	–	–		+	+	–	–	–	–		–		–	–		–	–							
RO	–		–	+		+		+	+	+				–	+	–	+	–			–		+					
SE		+		+	+	+	+	+	+	+	+	+	+		+		+	–				+	+	+				
SI	–	–	–		–		–	+	+	+	–			–		–	+	–	–		–	–		–	–			
SK				+	+	+	+	+	+	+	+	+	+	–	+		+	–			–	+	+	+		+		
UK	–	–	–	+		+		+	+	+			+	–	+		+	–			–		+		–	+	–	

Note: Prices in PPS.

Source: Authors' calculations using Eurostat data

Annex 5 Methodology of the mystery shopping

A5.1 Scenarios tested and mode of evaluation

In order to replicate real consumers' experiences, four scenarios were developed:

Scenario 1 "billing": mystery shoppers were instructed to: (1) check the information provided on their electricity bill and (2) contact their provider by phone to ask for clarifications about their electricity bill;

Scenario 2 "cheaper tariff": mystery shoppers were instructed to: (1) try to find a cheaper tariff from their own provider (via phone or via the provider's website); (2) try to find cheaper offers from various other providers (via phone, via the provider's website or using comparison tools) and (3) answer a set of questions about the cheapest tariff they found;

Scenario 3 "switching and complaint handling": mystery shoppers were instructed to: (1) visit the website of a provider and look for information about switching and complaint handling and (2) call this provider to ask for information about switching and complaint handling;

Scenario 4 "green tariffs and energy efficiency": mystery shoppers were instructed to (1) visit the website of a provider and look for information on "green" tariffs, efficient energy use and recent innovations/initiatives and (2) call this provider to ask for similar information.

In order to cover the most commonly used channels of interaction between electricity users and their current or potential providers, scenarios 3 and 4 were carried out both via online evaluations of providers' websites and through phone calls to providers. For scenario 1, mystery shoppers tried to obtain assistance related to understanding the electricity bill by contacting their electricity provider by phone. For scenario 2, mystery shoppers were free to choose a method and mode of contact; some mystery shoppers searched online for cheaper tariffs/offers (on providers' websites and/or by using comparison tools), others contacted electricity providers by phone, while a final group of shoppers used both methods.

A5.2 Number of evaluations completed and number of providers evaluated

Number of evaluations

Table 15 indicates the number of evaluations completed for each scenario, by country. The number of evaluations varied by country in order to take into account differences in terms of market size across countries. For scenario 1 "billing", in addition to the evaluations completed by mystery shoppers, a small number of bills were evaluated by country experts (the numbers of such evaluations is indicated in brackets in the table on the next page). Note: the number of evaluations by country experts depends on the number of providers evaluated in the "billing" scenario[19].

[19] This expert evaluation was performed by Helion as an additional step in their quality control process; the experts were selected among the local panel managers who have an in-depth knowledge of the local situation. The experts were briefed by Helion and Ipsos before completing the evaluations. For each provider in the sample (at the time of the evaluation), one of the bills of the mystery shoppers was selected at random; this sub-set of bills was analysed by the expert in each of the countries. The total number of expert evaluations in some countries is smaller than the total number of providers in the final sample; this is due to the fact that the evaluation was performed before the end of the fieldwork period. In summary, bills of a large majority of providers included in the final sample have been analysed (33% of providers in Germany and 96% of providers in other countries). Looking at the total sample, 19% of all bills has been analysed by a country expert (57 out of 300).

Table 15: Number of evaluations for each scenario, by country												
		CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	*Total*
"Billing"	Information on bills	25 (6)	40 (9)	30 (3)	30 (3)	30 (6)	30 (5)	25 (1)	40 (7)	25 (12)	25 (5)	*300 (57)*
	Assistance by phone	25	40	30	30	30	30	25	40	25	25	*300*
"Cheaper tariff"	Own provider	25	40	30	30	30	30	25	40	25	25	*300*
	Other providers	25	40	30	30	30	30	25	40	25	25	*300*
"Switching"	Online enquiries	50	100	75	75	75	75	50	100	50	50	*700*
	Information by phone	50	100	75	75	75	75	50	100	50	50	*700*
"Green electricity"	Online enquiries	50	100	75	75	75	75	50	100	50	50	*700*
	Information provided by phone	50	100	75	75	75	75	50	100	50	50	*700*

Sample of providers

For scenario 1 "billing" and scenario 2 "cheaper tariff", mystery shoppers interacted with their own electricity provider using personal data (e.g. using their own electricity bills etc.). Mystery shoppers were selected to participate in these scenarios based on their current electricity provider (all mystery shoppers in Helion's panel provided information on their current provider). When selecting mystery shoppers for scenarios 1 and 2, the shoppers formed a representative sample of all electricity consumers in the country; in other words, for these two scenarios, the number of providers evaluated depended on the number of providers in the country and their market shares20. Note: in Lithuania, all mystery shoppers (and also most consumers in the country) were clients of Lesto; as such, only one provider was evaluated in scenarios 1 and 2.

For scenarios 3 "switching" and scenario 4 "green electricity", the evaluation did not depend on contacts with one's own provider; as such, the sample of providers was selected to generate mystery contacts with a larger number of providers. Table 16 indicates the number of providers evaluated in each scenario, by country.

[20] The number of providers evaluated in scenario 1 "billing" and scenario 2 "cheaper tariff" is not necessarily the same. For each scenario, a different group of mystery shoppers was selected. Given that mystery shoppers interacted with their own electricity provider for these scenarios, small differences are observed in the providers included in the sample.

Table 16: Number of providers evaluated, by country											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	*Total*
"Billing" Information on bills	6	26	3	2	6	5	1	8	12	6	*75*
"Cheaper tariff" (own provider)	7	26	3	2	6	5	1	8	12	6	*76*
"Cheaper tariff" (from other providers)	37	38	18	14	23	15	7	33	35	9	*229*
"Cheaper tariff" (comparison tools)	8	16	7	7	15	9	0	7	9	3	*81*
"Switching"	36	100	29	12	25	35	5	25	50	8	*325*
"Green electricity"	36	100	29	12	25	35	5	25	50	8	*325*

A5.3 Fieldwork dates

The fieldwork for the mystery shopping task across all countries was completed by Helion, a leading expert in mystery shopping. Table 17 present the fieldwork dates per country, for each scenario.

Table 17: Fieldwork dates, by country				
	"Billing"	"Cheaper tariff"	"Green electricity"	"Switching"
CZ	16/12/14 – 17/02/15	15/12/14 – 17/02/15	15/12/14 – 02/02/15	15/12/14 – 15/01/15
DE	11/12/14 – 21/05/15	11/12/14 – 18/05/15	06/01/15 – 09/03/15	12/12/14 – 17/02/15
ES	15/12/14 – 20/02/15	15/12/14 – 23/02/15	07/01/15 – 21/01/15	17/12/14 – 29/01/15
FR	15/12/14 – 09/02/15	18/12/14 – 18/02/15	13/12/14 – 20/01/15	13/12/14 – 15/01/15
UK	19/12/14 – 11/03/15	19/12/14 – 16/03/15	15/12/14 – 09/03/15	11/12/14 – 02/02/15
IT	07/01/15 – 05/03/15	08/01/15 – 12/03/15	15/12/14 – 06/02/15	15/12/14 – 27/01/15
LT	07/01/15 – 18/05/15	07/01/15 – 18/05/15	16/12/14 – 12/03/15	16/12/14 – 18/03/15
PL	11/12/15 – 12/05/15	15/12/14 – 11/05/15	16/12/14 – 29/01/15	16/12/14 – 29/01/15
SE	12/12/15 – 20/02/15	12/12/14 – 03/02/15	12/12/14 – 02/02/14	15/12/14 – 27/01/15
SI	15/12/14 – 21/03/15	12/12/14 – 21/03/15	19/12/14 – 20/01/15	21/12/14 – 27/01/15

A5.4 Quality control procedures

The success of mystery shopping highly depends on the observations made by the shoppers. Shoppers at Helion are trained before becoming active in Helion's mystery shopper panel and their performance is evaluated continuously. For complex mystery shopping tasks, such as the mystery shopping for this study, only the most experienced shoppers are eligible to participate.

Recruitment and training of mystery shoppers

The recruitment and training process at Helion is a combined and cohesive process; it is undertaken via a series of different stages:

Step 1. Shoppers register via Helion's online recruitment website and complete an initial profiling exercise.

Step 2. Shoppers receive training information to learn more about mystery shopping as a technique and the core competencies associated with mystery shopping (such as the need for objectivity).

Step 3. Shoppers are required to undertake a competency test to evaluate their understanding of the learning they have undertaken.

Step 4. Shoppers are also required to undertake an introductory telephone call with a panel manager, to verify their understanding of the methodology and to evaluate their ability to interact with others (e.g. in mystery phone enquiries).

Shoppers' test scores (recorded in Step 3 and Step 4) are recorded on the shopper's profile page, which is visible to the panel managers. These test scores form the initial basis of an ongoing performance grading, and are updated each time a shopping exercise is undertaken. Performance grades are affected by shopper's accuracy, ability to stick to required timings, completeness of evaluation sheets, etc. The better the shoppers complete their work and the greater volume of work they complete accurately and to specification, the higher their performance grades.

Selection of shoppers for the current study

Only experienced shoppers (with high performance grades) were selected to participate in the fieldwork of the current study. A larger pool of shoppers than the required sample number was selected and trained in order to ensure maximum flexibility (e.g. if a shopper would need to be removed from the panel due to a low performance grade).

Briefing and specific training for the current study

As explained above, when shoppers register on Helion's recruitment website, they need to participate in a basic training course to learn more about mystery shopping as a technique, its uses and purposes, and the core competencies associated with mystery shopping. In addition to this basic training, Ipsos and Helion organised specific training for all mystery shoppers involved in data collection for this study.

A standard briefing document was prepared by Ipsos and Helion; this detailed and comprehensive project briefing document, with detailed examples for each of the scenarios, provided important guidance about the process and the evaluation.

Next, a specific training session for the study was conducted with the selected shoppers. During the training, the mystery shoppers were briefed and trained in detail about their role in the project. The training of the mystery shoppers had several purposes:

- Providing basic knowledge about the electricity market (e.g. switching rules);
- Explaining the contact procedures (phone evaluations);
- Making sure the mystery shopper understands each item of the evaluation sheet;
- Preventing delays or misunderstandings by discussing all practical procedures;
- Giving rules on how to deal with unclear or debatable cases;
- Reminding shoppers about the importance of providing objective and complete answers;
- What should shoppers answer if they are asked a more personal question;
- What should shoppers do if their real identity is uncovered;
- Ensuring the procedures for reporting data via the central web platform are followed.

A5.5 Additional tables for scenario "billing" (content of bills)

A5.5.1 Results of the analysis by country experts

Table 18: Items on bill: audit vs. found by mystery shopper		
	Discrepancies Audit/mystery shopper	Error rate[21]
CONTACT DETAILS		
Provider's name	57/57	0%
Postal address of provider	54/54	7%
Email address of provider	39/43	21%
Telephone number of customer service/helpline	55/55	0%
Emergency number (e.g. to call in the event of an electrical emergency or power outage)	28/31	16%
CONTACT DETAILS OF ORGANISATIONS		
National energy regulator	5/21	32%
National contact information point (or single point of contact where you can obtain information about your energy rights)	12/16	21%
An energy mediator or third-party assistance	13/12	16%
Consumer organisations	6/11	16%
Grid operator (e.g. to call in the event of an electrical emergency or power outage)	16/20	32%
INFORMATION ABOUT CONTRACT		
Duration of the contract (e.g. 24 months)	7/15	18%
Expiration date of contract (e.g. 15 September 2015)	19/19	11%
Switching code/meter identification (EAN or MPAN code; a unique code for your electricity meter)	29/41	41%
The period of notice to terminate your electricity contract (e.g. 30 days before the intended termination date)	6/6	14%
Information about a possible exit fee (if you decide to switch before expiration date of your contract)	5/6	5%
PAYMENT DETAILS		
Billing period (e.g. 15 November – 14 December 2014)	52/54	7%
Amount to be paid	57/57	0%
Payment method (e.g. direct deposit, cheque, bank transfer)	45/48	20%
Potential fee for late payments	13/13	18%
INFORMATION ABOUT TARIFF		
Tariff name/plan (e.g. Day&Night; Fix)	41/46	16%

[21] The error rate is calculated as the percentage of discrepancies between the experts' evaluations and mystery shoppers' evaluations.

Table 18: Items on bill: audit vs. found by mystery shopper		
	Discrepancies Audit/mystery shopper	Error rate[21]
Base price per kWh of your tariff	45/44	13%
A detailed price breakdown for your tariff (e.g. division of total price in base price, network charge, etc.)	39/44	13%
CALCULATION OF BILLING AMOUNT		
Billing is based on actual consumption based on meter reading	42/39	23%
• Value of meter reading at the beginning of the billing period	38/31	13%
• Value of meter reading at the end of the billing period	38/31	10%
• Date of last meter reading	31/29	30%
• Details about consumption during billing period (in kWh)	43/36	3%
Billing is based on an estimate of your consumption	6/15	50%
It is not clear how the billing amount was calculated	9/3	67%
EXTRA INFORMATION		
Fuel mix/energy sources (e.g. wind power, biomass)	15/19	29%
Tips on saving energy (e.g. link to a website)	17/15	21%
Historical energy consumption (e.g. current energy consumption, compared to consumption for the same period in the previous year)	18/21	20%
A prediction of your energy costs over the next 12 months	14/13	20%
Information on how to obtain your bill in alternative format (e.g. paper/online, large print)	10/15	14%
An alternative/cheaper tariff	9/7	7%
A link to a tariff simulator	0/4	5%
Information on how to file a complaint	25/27	23%
Any other information?	21/21	40%

Box 1: Examples of "other information" included in electricity bills

- A graphic to show the price breakdown in more detail
- A notice that in the case of power outage, the customer can be compensated
- A phone number to contact for home improvements
- A phone number to transmit meter readings
- A prediction of the amount that will be due for the next billing period
- A reference to the respective electricity billing law
- An explanation of how the direct debit amount is calculated
- Average daily consumption during the last invoicing period
- Bonus or loyalty points saved
- Comparison of various tariffs offered
- Date for the next bill
- Date when the next meter reading can be submitted (to obtain an invoice based on real consumption)
- Debt advice
- Examples of how much electricity is used by domestic appliances, such as a kettle
- Green energy certificate
- Information about an increase in taxes as of 01/01/2015
- Information about carbon footprint (amount of carbon dioxide in kilogram saved during the last year)
- Information about charities supported by the electricity company
- Information about 'Knowing your rights' and how to get independent advice
- Information about new tariffs offered by the electricity company and new service points
- Information about the consumer rights
- Information about the impact of energy production on the environment
- Information about the possibility to use the supplier also as a mobile provider
- Information about where and how to pay the bill
- Information on how to change the frequency of billing
- Information on how to check prices and bills on a mobile phone (IPhone or Android).
- Information on profit of the electricity company and how this profit is used
- Information on the quality of the telephone service
- Information on what a customer can do in case of payment difficulties
- Information on what to do when moving
- Information relating to the possibility to receive one bill for various properties (e.g. holiday home)
- Link to help customers localise the nearest office
- Procedure to ask for a verification of the bill
- QR code for payments via mobile phone
- Working hours during the holiday period

A5.5.2 Mystery shoppers' evaluations

Table 19: Q4. Type of electricity bill – Overview											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Paper bill	64%	58%	63%	70%	17%	77%	24%	78%	36%	88%	58%
Electronic bill/e-bill	32%	38%	27%	17%	80%	23%	64%	15%	56%	2%	35%
Paper bill with additional information via my personal online account	4%	5%	10%	13%	3%	0%	12%	8%	8%	4%	7%

Table 20: Q5. Periodicity of the electricity bill – Overview											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Monthly	8%	30%	27%	7%	17%	27%	88%	18%	52%	100%	35%
Bimonthly	0%	3%	70%	87%	7%	67%	0%	35%	28%	0%	30%
Quarterly	0%	10%	0%	0%	67%	7%	8%	8%	20%	0%	12%
4 months	0%	0%	0%	0%	3%	0%	0%	3%	0%	0%	1%
6 months	4%	0%	0%	3%	7%	0%	0%	38%	0%	0%	6%
8 months	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Annual	88%	50%	0%	3%	0%	0%	0%	0%	0%	0%	14%
Other	0%	3%	3%	0%	0%	0%	4%	0%	0%	0%	1%

Table 21: Q6. Combined energy bill or not – Overview											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Electricity only	100%	90%	97%	97%	40%	93%	96%	100%	100%	100%	91%
Electricity and gas	0%	10%	3%	3%	60%	7%	4%	0%	0%	0%	9%

Table 22: Q7. Which of the following contact details are found on your electricity bill? (% Yes)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Provider's name	96%	100%	100%	100%	100%	100%	88%	100%	100%	100%	99%
Telephone number of customer service/helpline	92%	100%	100%	100%	97%	100%	80%	93%	100%	100%	96%
Postal address of provider	92%	100%	97%	100%	83%	100%	60%	100%	96%	100%	94%
Email address of provider	92%	95%	80%	27%	60%	37%	40%	75%	84%	96%	69%
Emergency number	68%	8%	97%	87%	87%	93%	28%	35%	64%	40%	59%
None of the above	4%	0%	0%	0%	0%	0%	12%	0%	0%	0%	1%

Table 23: Q8. Are the contact details of any of the following organisations provided on your electricity bill? (% Yes)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Grid operator	28%	15%	57%	80%	70%	57%	20%	30%	24%	32%	41%
National contact information point	44%	43%	33%	43%	53%	30%	4%	3%	16%	12%	28%
National energy regulator	56%	38%	27%	30%	50%	43%	4%	0%	0%	16%	26%
An energy mediator or third party assistance	36%	45%	23%	57%	50%	0%	0%	3%	12%	0%	23%
Consumer organisations	8%	35%	20%	23%	47%	3%	4%	0%	4%	0%	15%
None of the above	40%	30%	20%	10%	20%	27%	72%	68%	56%	60%	40%

Table 24: Q9. Which of the following information about your contract is found on your electricity bill? (% Yes)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Switching code/meter identification	96%	58%	87%	87%	67%	67%	44%	78%	76%	72%	73%
Expiration date of contract	0%	38%	87%	7%	83%	0%	0%	5%	44%	0%	27%
Duration of the contract	8%	50%	27%	17%	50%	10%	0%	5%	40%	4%	22%
The period of notice to terminate electricity contract	4%	50%	0%	57%	27%	0%	12%	0%	28%	0%	19%
Information about a possible exit fee	0%	8%	0%	7%	87%	3%	0%	0%	0%	0%	11%
None of the above	4%	35%	7%	3%	7%	30%	52%	23%	16%	28%	21%

Table 25: Q10. Which of the following payment details are found on your electricity bill? (% Yes)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Amount to be paid	100%	100%	97%	97%	97%	100%	72%	100%	100%	100%	97%
Billing period	96%	90%	100%	97%	97%	100%	80%	93%	100%	100%	95%
Payment method	88%	100%	87%	87%	100%	87%	64%	65%	92%	64%	84%
Potential fee for late payments	0%	10%	3%	50%	10%	60%	12%	33%	48%	4%	23%
None of the above	0%	0%	0%	0%	0%	0%	12%	0%	0%	0%	1%

Table 26: Q11. Which of the following information about your tariff is found on your electricity bill? (% Yes)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Base price per kWh of your tariff	68%	65%	87%	93%	93%	83%	68%	83%	92%	88%	82%
Tariff name/plan	84%	65%	57%	87%	100%	93%	60%	93%	80%	76%	80%
A detailed price breakdown for your tariff	92%	65%	100%	83%	73%	93%	8%	88%	92%	96%	79%
None of the above	4%	25%	0%	0%	0%	0%	16%	5%	4%	0%	6%

Table 27: Q12. How is the billing amount calculated?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Billing is based on actual consumption based on meter reading	80%	68%	77%	47%	67%	83%	60%	53%	92%	44%	66%
Billing is based on an estimate of your consumption	16%	15%	20%	53%	30%	17%	32%	45%	4%	52%	29%
It is not clear how the billing amount was calculated	4%	18%	3%	0%	3%	0%	8%	3%	4%	4%	5%

Table 28: Q12a. If billing amount is based on meter reading: Which of the following elements are found on your electricity bill? (multiple answers allowed)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	20	27	23	14	20	25	15	21	23	11	199
Details about consumption during billing period (in kWh)	75%	13%	74%	47%	72%	81%	60%	44%	77%	38%	62%
Value of the meter reading at the end of the billing period	71%	38%	74%	40%	72%	70%	40%	47%	77%	31%	60%
Value of the meter reading at the beginning of the billing period	75%	38%	74%	40%	68%	70%	40%	41%	73%	31%	58%
Date of last meter reading	63%	25%	74%	27%	72%	78%	0%	41%	59%	31%	53%
None of the above	0%	7%	0%	0%	0%	0%	7%	0%	0%	0%	2%

Base: those who indicated that billing is based on actual consumption based on meter reading.

Table 29: Q12b. Was this information provided on your paper bill or via your online account?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	1	2	3	4	1	0	2	3	2	1	19
Paper bill	100%	0%	0%	25%	0%	--	0%	33%	100%	100%	32%
Online account	0%	50%	67%	0%	0%	--	0%	0%	0%	0%	16%
Both paper and online account	0%	50%	33%	75%	100%	--	100%	67%	0%	0%	53%

Table 30: Q13. Is any of the following extra information provided on your electricity bill? (% Yes)											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Information on how to file a complaint	44%	45%	67%	60%	63%	87%	8%	5%	60%	64%	49%
Historical energy consumption	44%	48%	87%	83%	53%	67%	8%	13%	20%	16%	44%
Fuel mix/energy sources (e.g. wind power, biomass)	48%	45%	20%	47%	13%	43%	0%	18%	52%	40%	32%
Tips on saving energy (e.g. link to a website)	8%	48%	17%	23%	57%	20%	36%	8%	24%	20%	26%
Information on how to obtain your bill in alternative format (e.g. paper/online, large print)	16%	8%	23%	27%	50%	53%	28%	5%	20%	16%	24%
A prediction of your energy costs over the next 12 months	28%	15%	0%	0%	73%	3%	12%	15%	20%	4%	17%
An alternative/ cheaper tariff	0%	0%	7%	7%	63%	7%	12%	0%	0%	16%	11%
A link to a tariff simulator	4%	3%	13%	10%	33%	0%	12%	5%	4%	8%	9%
None of the above	20%	23%	0%	7%	0%	0%	40%	53%	12%	16%	18%

A5.6 Additional tables for scenario "billing" (obtaining information by phone)

Table 31: Q17. How clearly did the customer service explain the various modes of payment (bank transfer, direct deposit…)?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	0%	3%	3%	3%	0%	3%	0%	0%	0%	4%	2%
Provided incomplete/ incorrect information	4%	0%	10%	3%	10%	10%	0%	0%	0%	12%	5%
Provided complete/correct information	96%	98%	87%	93%	90%	87%	100%	100%	100%	84%	94%

Table 32: Q18. How clearly did the customer service explain the characteristics of your tariff (fixed or variable price, use of green energy or not, etc.)?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	4%	5%	3%	3%	0%	7%	0%	0%	0%	8%	3%
Provided incomplete/ incorrect information	8%	3%	23%	3%	13%	7%	36%	10%	8%	12%	12%
Provided complete/correct information	88%	93%	73%	93%	87%	87%	64%	90%	92%	80%	85%

Table 33: Q19. How clearly did the customer service explain how the base price for one energy unit (kwh) is calculated?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	0%	10%	7%	3%	10%	7%	8%	3%	4%	16%	7%
Provided incomplete/ incorrect information	24%	15%	33%	27%	10%	17%	16%	8%	8%	28%	18%
Provided complete/correct information	76%	75%	60%	70%	80%	77%	76%	90%	88%	56%	75%

Table 34: Q20. How clearly did the customer service explain the price breakdown for the tariff (basic price/green energy costs + all other charges; special offers if any)?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	0%	3%	3%	3%	3%	7%	8%	3%	0%	4%	3%
Provided incomplete/ incorrect information	0%	3%	3%	3%	3%	7%	8%	3%	0%	4%	22%
Provided complete/correct information	64%	78%	60%	73%	80%	77%	76%	83%	76%	76%	75%

Table 35: Q21. How clearly did the customer service explain the conditions under which the price of electricity can increase / decrease?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	4%	13%	30%	20%	10%	17%	8%	5%	4%	24%	13%
Provided incomplete/ incorrect information	28%	10%	17%	17%	13%	17%	20%	13%	20%	28%	17%
Provided complete/correct information	68%	78%	53%	63%	77%	67%	72%	83%	76%	48%	69%

Table 36: Q22. How clearly did the customer service explain how to obtain your bill in another format (e.g. large print or online/paper version)?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	0%	5%	3%	3%	3%	0%	0%	0%	0%	8%	2%
Provided incomplete/ incorrect information	16%	0%	10%	7%	7%	7%	4%	5%	0%	4%	6%
Provided complete/correct information	84%	95%	87%	90%	90%	93%	96%	95%	100%	88%	92%

Table 37: Q23. How clearly did the customer service explain where to look for information on complaint handling process?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	4%	8%	3%	3%	3%	0%	0%	0%	4%	8%	3%
Provided incomplete/ incorrect information	20%	8%	20%	13%	7%	7%	16%	5%	16%	8%	11%
Provided complete/correct information	76%	85%	77%	83%	90%	93%	84%	95%	80%	84%	85%

A5.7 Additional table for scenario "switching and complaint handling" (evaluations by phone)

Table 38: Q14. How clearly did the customer service explain where to look for information on complaint handling process?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	25	40	30	30	30	30	25	40	25	25	300
Could not provide any information	4%	8%	3%	3%	3%	0%	0%	0%	4%	8%	3%
Provided incomplete/ incorrect information	20%	8%	20%	13%	7%	7%	16%	5%	16%	8%	11%
Provided complete/correct information	76%	85%	77%	83%	90%	93%	84%	95%	80%	84%	85%

A5.8 Additional tables for scenario "Green tariffs and energy efficiency"

A5.8.1 Information found on providers' websites

Table 39: Q4. Do you find information about the percentage of energy in "green" tariffs that comes from renewable energy?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	5	84	22	62	41	34	10	26	46	33	361
Yes	40%	87%	77%	77%	58%	59%	60%	35%	70%	48%	68%
No	60%	13%	23%	23%	43%	41%	40%	65%	30%	52%	32%

Base: those who indicated that the provider offers "green" tariffs or a mix of "green" and other tariffs.

Table 40: Q4a. If yes, what is the percentage of energy in green tariffs that comes from renewable energy?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	2	73	17	48	24	20	6	9	32	16	247
Mean	100	92.9	95.2	94.9	72.8	79.6	70.0	27.7	90.8	78.1	86.3
Median	100	100	100	100	100	100	78	6	100	100	100
Minimum	100	25	18	11	8	28	8	3	10	10	3
Maximum	100	100	100	100	100	100	100	100	100	100	100

Base: those who indicated that the provider offers "green" tariffs or a mix of "green" and other tariffs and who found information about the percentage of energy in "green" tariffs that comes from renewable energy

Table 41: Q5. Do you find information about the sources of renewable energy (i.e. how the renewable energy is generated)?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	5	84	22	62	41	34	10	26	46	33	363
Yes	40%	75%	41%	84%	71%	56%	90%	69%	80%	76%	72%
No	60%	25%	59%	16%	29%	44%	10%	31%	20%	24%	28%

Base: those who indicated that the provider offers "green" tariffs or a mix of "green" and other tariffs.

Table 42: Q5a. If yes, which sources are mentioned?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	2	63	9	52	29	19	9	18	37	25	263
Hydro or marine power	100%	87%	33%	79%	69%	68%	100%	39%	84%	92%	78%
Wind power	100%	24%	78%	62%	93%	68%	33%	67%	73%	44%	57%
Solar power	100%	17%	89%	52%	83%	79%	0%	11%	46%	52%	45%
Biomass	100%	6%	44%	42%	45%	32%	33%	50%	35%	12%	30%
Geothermal energy	0%	3%	22%	10%	21%	32%	11%	6%	5%	12%	11%
Other[22]	0%	6%	11%	2%	14%	16%	22%	0%	3%	8%	7%

Base: those who indicated that the provider offers "green" tariffs or a mix of "green" and other tariffs and found information on the sources of this renewable energy.

A5.8.2 Evaluations by phone

Table 43: Q15. Ask the operator for advice about rational energy use/energy saving; how do you rate the information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	24%	23%	55%	29%	21%	37%	70%	27%	10%	12%	31%
Provided incomplete/ incorrect information	30%	8%	11%	19%	27%	29%	20%	40%	36%	30%	24%
Provided complete/correct information	46%	69%	35%	52%	52%	33%	10%	33%	54%	58%	45%

[22] Other sources mentioned mostly referred to anaerobic digestion to produce biogas, which in fact could be classified as biomass.

Table 44: Q16. Ask the operator for advice about self-generation of electricity; how do you rate the information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	26%	33%	63%	41%	28%	52%	60%	40%	16%	22%	39%
Provided incomplete/ incorrect information	36%	13%	19%	25%	25%	25%	32%	42%	32%	44%	28%
Provided complete/correct information	38%	54%	19%	33%	47%	23%	8%	18%	52%	34%	33%

Table 45: Q17. Ask the operator for advice about improving your home's energy performance; how do you rate the information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	24%	29%	55%	36%	25%	48%	74%	42%	14%	20%	37%
Provided incomplete/ incorrect information	34%	12%	13%	21%	21%	24%	18%	34%	28%	30%	23%
Provided complete/correct information	42%	59%	32%	43%	53%	28%	8%	24%	58%	50%	40%

Table 46: Q18. Ask the operator for advice on grants and allowances to improve your home's energy performance; how do you rate the information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	26%	41%	60%	45%	28%	51%	80%	51%	46%	50%	47%
Provided incomplete/ incorrect information	38%	20%	19%	23%	19%	28%	10%	30%	14%	28%	23%
Provided complete/correct information	36%	39%	21%	32%	53%	21%	10%	19%	40%	22%	30%

Table 47: Q19. Ask the operator for advice on smart energy tools; how do you rate the information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	38%	48%	61%	40%	48%	60%	82%	49%	36%	52%	51%
Provided incomplete/ incorrect information	26%	13%	17%	20%	17%	24%	12%	32%	16%	26%	21%
Provided complete/correct information	36%	39%	21%	40%	35%	16%	6%	19%	48%	22%	28%

Table 48: Q20. Ask the operator for information on smart meters; how do you rate the quality of information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	42%	48%	49%	41%	32%	63%	78%	44%	28%	46%	47%
Provided incomplete/ incorrect information	22%	8%	19%	25%	12%	28%	14%	30%	22%	22%	20%
Provided complete/correct information	36%	44%	32%	33%	56%	9%	8%	26%	50%	32%	33%

Table 49: Q21. Ask the operator for information on energy service contract; how do you rate the information/advice received?											
	CZ	DE	ES	FR	UK	IT	LT	PL	SE	SI	Total
	50	100	75	75	75	75	50	100	50	50	700
Could not provide any information	36%	55%	52%	40%	48%	39%	60%	17%	56%	54%	44%
Provided incomplete/ incorrect information	30%	9%	16%	21%	16%	28%	18%	32%	8%	24%	20%
Provided complete/correct information	34%	36%	32%	39%	36%	33%	22%	51%	36%	22%	36%

Annex 6 Methodology of the behavioural experiment

The online experiment was conducted in conjunction with the consumer survey in 10 countries: the Czech Republic, France, Germany, Italy, Lithuania, Poland, Slovenia, Spain, Sweden and the UK.

A6.1 Profiles

In two experiments (*stay or switch* and *marketing material comprehension*), respondents were told to assume that they use a certain amount of electricity per year. It was necessary to give this information in order to allow respondents to complete the experiment tasks and answer the test questions. So that the consumption levels given to respondents seemed reasonably realistic to them, the following profiling questions were asked before the experiments:

How big is your home?

1. *1 bedroom*
2. *2 bedrooms*
3. *3 bedrooms*
4. *4 bedrooms*
5. *5 bedrooms*
6. *More than 5 bedrooms*

How many people, including yourself, currently live in your household?

_____ *number of household members*

And how many people in your household are under age 16?

_____ *number of household members under age 16*

Which of the following best describes how often you use electricity at home?

1. *Evenings and weekends (e.g. a working couple)*
2. *All day (e.g. a family home)*

Do you use electricity for the following?

1. *Heating your home*
2. *Heating water (e.g. for showering)*
3. *Cooking*

These questions are used by regulators and suppliers in various countries to estimate consumers' consumption levels. In the experiments, these questions were used to allocate respondents to one of seven "consumption profiles" for each country. The profiles were calibrated for each country. This calibration process used the median household consumption in each county taken from Eurostat. This information was then complimented with targeted web-based research to set a maximum and minimum consumption for each country. A level for each profile was then set and agreed with the DG JUST. It should be noted that while these profiles aim to capture actual consumption by different household types, it is not possible to accurately estimate consumption based on data available.

Table 50: Proportion of "consumption profiles"	
Profile	**Proportion of consumers in each profile**
1	6.97%
2	23.91%
3	30.85%
4	24.21%
5	11.51%
6	2.32%
7	0.23%

Note: The experiment is conducted with 10,056 respondents. Country-level results are weighted by the share of socio-demographic groups in the population of each country. Overall results are weighted by the share of the population of each country in the total.
Source: Behavioural experiment

A6.2 Experiment 1: Stay or switch[23]

In the "stay or switch" experiment, respondents were shown an electricity bill and told to suppose that this bill represents their "current" electricity deal. The bill shown to each respondent was either the "best practice" bill or the "standard" bill (see the section on treatments below).

Respondents were also told to assume that they use a certain amount of electricity per year according to the consumption profile they were allocated to (see previous section). The values in the bill shown to each respondent matched their consumption profile.

Respondents had the option to either stay with their current deal (as represented by the bill shown to them), or to switch to one of two alternative deals. The experiment tests whether the proportion of respondents that select the best deal available differs according to treatment. The best deal is the one that is the cheapest for the respondent's consumption profile. The treatments are discussed below.

In order to see details of the alternative deals, respondents had to complete a "real effort task", which was intended to simulate the effort required to search the market for a new deal.

After respondents had made a decision to either stay with their current deal or switch to an alternative, they were then given the option to switch to a "green" deal (see the section on "green deal offer" below).

Both the "stay or switch" decision and the "green offer" decision were incentivised with Ipsos points (which have real value to consumers): at the stay or switch decision respondents earned extra points if they chose the cheapest deal; at the green offer decision respondents were deducted points if they chose the green deal but were informed that in that case a contribution would be made to a fund to protect the environment.

[23] The following randomisation checks were carried out: (1) whether respondents are randomly and independently allocated to treatments, by country; and (2) whether respondents are roughly identically allocated across treatment, by country and socio-demographic group (age, education level and whether economically active or not). In all cases, the allocation worked as expected.

Treatments

In order to examine factors which may impact on consumers' ability to choose the best deal, two parameters were varied across the treatments in the "stay or switch" experiment: the **type of bill** seen by respondents; and the **price structure** of the alternative deals they were offered.

- **Bill type**: Each respondent saw either the "best practice" bill or the "standard" bill:
  - The design of the *best practice bill* draws on the Working Group Report on Billing[24], the Working Group Report on Billing and Personal Data Management[25] as well as the electricity bill model/ prototype developed following input received from working group members, which makes suggestions for both the content and format of an electricity bill and encourages the use of a "comparability box".
  - The *standard bill* was developed based on the bills collected through desk research on actual suppliers in Europe. It does not have a comparability box and although it provides consumers with the same information, the objective was to test whether this bill is more difficult to understand and less comprehensive than the best practice bill.

  The individual elements included in both bill types were based on our investigation of information that is included in electricity bills in Europe.
- **Price structure:** The alternative deals offered to respondents had one of three price structures:
  - *Non-complex pricing* had just two components, a unit price per kWh and a standing charge per day. This was the simplest price structure.
  - *Tiered pricing* had three components, one unit price for the first batch of energy (e.g. the first 800 kWh), another unit price for additional energy (e.g. above 800 kWh), and a standing charge per day.
  - *Tiered with discount pricing* had the same components as tiered pricing, and in addition a percentage discount was applied. This was the most complex price structure.

  The table below summarises the features that are included in each price structure.

Table 51: Features included in price structures

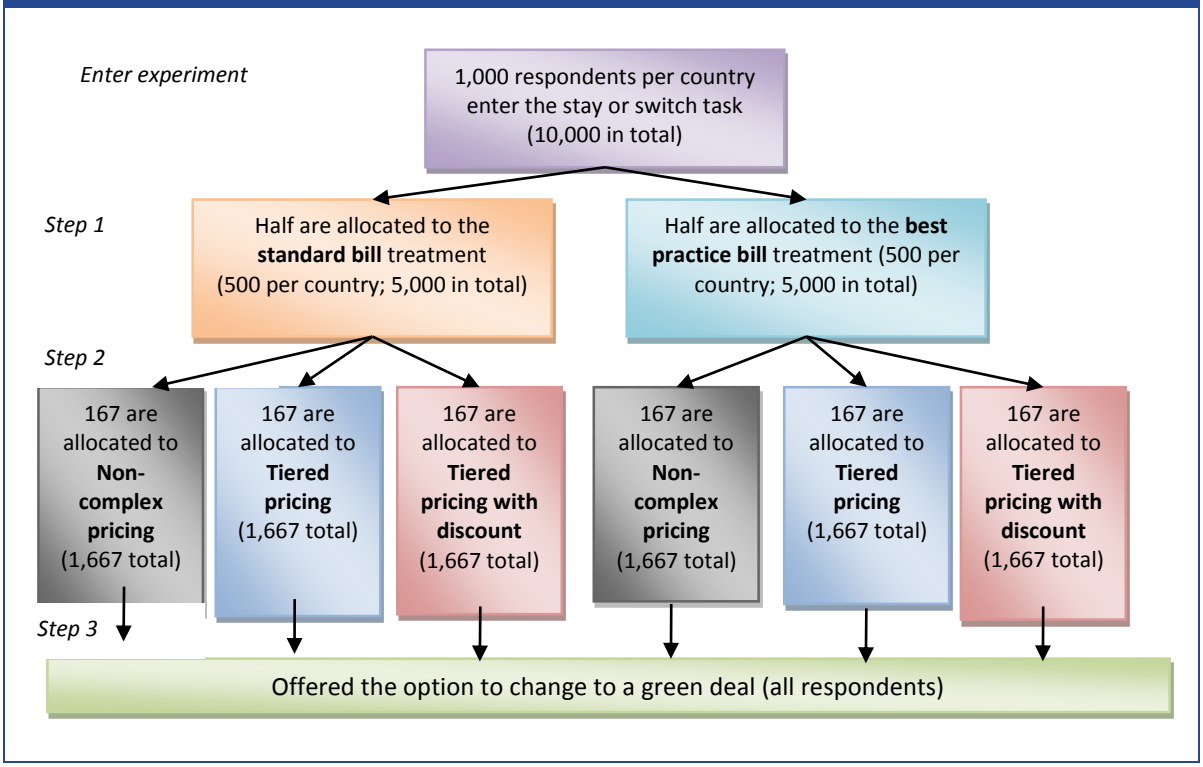
Feature	Non-complex	Tiered	Tiered with discount
Standing charge (€cent/day)	✓	✓	✓
Flat rate unit price for all kWh (€cent/kWh)	✓		
Tier 1 unit price for the first [X] kWh (€cent/kWh)		✓	✓
Tier 2 unit price for additional kWh (€cent/kWh)		✓	✓
Discount % on the above			✓

[24] European Commission (2009) Working Group Report on Billing

[25] European Commission (2013) Working Group Report on e-Billing and Personal Energy Management, Report prepared for the 6th Energy Forum.

The steps of the stay or switch experiment are summarised in the figure below.

Figure 6: Stay or switch experiment steps



Deal sets

In the "stay or switch" experiment respondents were randomly allocated to one of two alternative deal sets: deals "M" and "N"; or deals "N" and "P". If a respondent was shown N and P as the two alternative deals, then the cheapest deal was P (i.e. P was better than their current deal). However, if a respondent was shown M and N as the two alternative deals, the cheapest deal was their current deal.

These two deal sets were used because we know that people often have a tendency to stay with their status quo option (often called "status quo bias" or "inertia"), meaning it is important to compare behaviour in the scenario where staying with the status quo is the correct choice (i.e. the "should stay" scenario) to behaviour in the scenario where switching is optimal (i.e. the "should switch" scenario).

Real effort task

In the "stay or switch" experiment respondents had to complete a "real effort task" in order to view the alternative deals that they could switch to. This involved answering up to six questions by finding information from the bill shown.

Respondents were randomly allocated to one of two difficulty levels, "high" or "low", and the number of questions they had to answer depended on whether they did the real effort task once (in order to see just one alternative deal) or twice (in order to see both alternative deals), and on the difficulty setting they were allocated to. The table below sets out the pieces of information that respondents were required to provide in the real effort task.

Table 52: Information respondents were required to provide in the real effort task				
	High difficulty setting		Low difficulty setting	
Information	1st iteration	2nd iteration	1st iteration	2nd iteration
Date of issue of the bill	✓		✓	
Name of electricity company	✓		✓	
Payment method	✓			
Meter number	✓			
Reference number		✓		✓
Customer service number		✓		

"Green deal" offer

After respondents had decided whether to stay with their current deal or switch to an alternative, they were then given the option to switch to a "green" deal. Respondents were deducted Ipsos points if they chose the "green" deal, but were informed that in that case a contribution would be made to a fund to protect the environment. The premium attached to the green offer (i.e. the number of points that would be deducted if the respondent opted for the green deal) was varied across respondents between two levels, high and low.

A6.3 Experiment 2: Bill comprehension

In the bill comprehension experiment, respondents were shown one of six different bills. These included three variants of the best practice bill and three variants of the standard bill:

- Best practice;
- Best practice with enlarged comparability box;
- Best practice with additional (surplus) information;
- Standard;
- Standard with consumption history in a table; and
- Standard with additional (surplus) information.

Respondents were randomly allocated to one of these six bills.

Respondents were first required to answer eight questions about the information provided in the bill, each of which had a single correct answer (respondents could see the bill next to the questions they had to answer). Then respondents were asked several subjective questions about the bill including how easy it was to understand and find information, whether sufficient information was provided, whether the language was complicated, and whether they would prefer more charts and less text.

A6.4 Experiment 3: Marketing material comprehension

In the marketing material comprehension test, respondents were shown marketing material relating to two hypothetical electricity deals and were required to answer three test questions about these deals:

- Which offer is the cheapest over a period of 1 year?
- Which offer is the cheapest over a period of 2 years?
- Given the amount of electricity you use per year, would you expect to save 10% in Offer X?[26]

Each question had a single correct answer so that it is possible to examine whether the treatments (described below) impact on respondents' ability to understand the marketing material. In order to answer the third question, respondents were given their assumed level of electricity consumption per year, based on the consumption profile they were allocated to (see Section A6.1 above).

Treatments

In the marketing material comprehension test respondents were allocated randomly to one of four treatments:

- Standardised;
- Standardised with drip;
- Non-standardised; and
- Non-standardised with drip.

The treatments determined:

- Whether the marketing material that the respondent saw was "standardised"; i.e. whether all components of the different offers were shown side-by-side on the screen.
- Whether some important information relating to terms and conditions was "dripped"; i.e. whether the respondent had to click on a button in order to reveal the information.

Screen shots of the marketing material presented to respondents are shown in the figures on the following pages.

In all treatments, the information required to answer the first test question (Which offer is cheapest over one year?) was shown upfront (i.e. the respondent did not need to click on the button). The answers to the other test questions were shown upfront in the standardised and non-standardised treatments, but were "concealed" behind the "T&C" button in the "with drip" treatments.

[26] Respondents viewed two offers labelled X and Y. They were asked how much they would expect to save in Offer X.

Figure 7: Marketing material shown in the marketing material test – Standardised

OFFER X

sign up by February 28th 2015, and you get:
for **12 months***,
standing charge **26.2pence/per day**
unit price **10.5 pence/kWh**

SAVE 10%**

We'll let you know every 6 months if we have a better tariff for you.

*Offer lasts 12 months, after which you return to a standard unit price of 13.1 pence/kWh and the standing charge reverts to 32.7 pence per **day**.
****Savings** estimate is based on competitor prices for a household with annual consumption of 3200 kWh

OFFER Y

sign up by February 28th 2015, and you get:
for **12 months***,
standing charge **23.5pence/per day**
unit price **9.4 pence/kWh**

SAVE 11%**

We'll let you know every 6 months if we have a better tariff for you.

*Offer lasts 12 months, after which you return to a standard unit price of 14.4 pence/kWh and the standing charge reverts to 36.1 pence per day.
**Savings estimate is based on competitor prices for a household with annual consumption of 3200 kWh

Figure 8: Marketing material shown in the marketing material test – Standardised with drip

OFFER X

sign up by February 28th 2015, and you get:
for **12 months***,
standing charge **26.2 pence per day**
unit price **10.5 pence/kWh**

SAVE 10%**

We'll let you know every 6 months if we have a better tariff for you.

*, **terms and conditions apply

Click to See T&C

* Offer lasts 12 months, after which you return to a standard unit price of 13.1 pence/kWh and the standing charge reverts to **32.7 pence per day**.
**Savings estimate is based on competitor prices for a household with annual consumption of 3200 kWh

OFFER Y

sign up by February 28th 2015, and you get:
for **12 months***,
standing charge **23.5 pence per day**
unit price **9.4 pence/kWh**

SAVE 11%**

We'll let you know every 6 months if we have a better tariff for you.

*, **terms and conditions apply

Click to See T&C

Figure 9: Marketing material shown in the marketing material test – Non-standardised

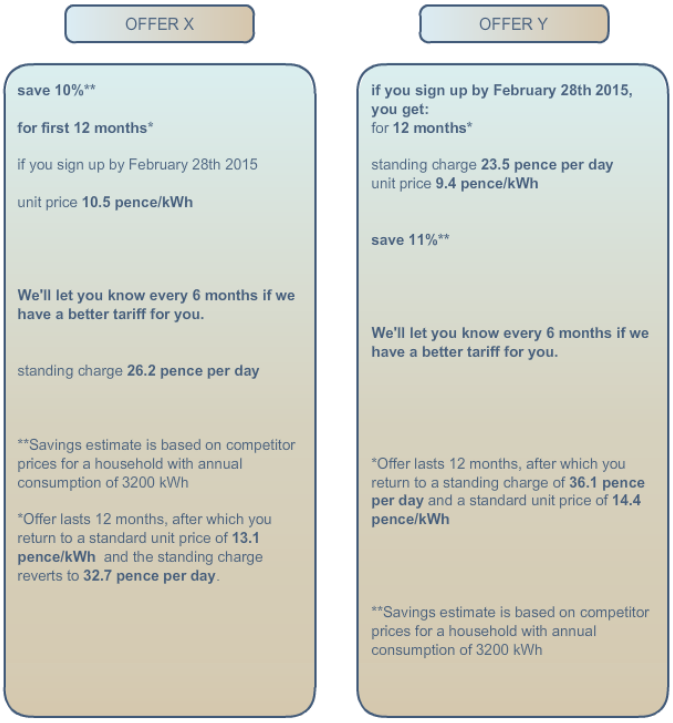
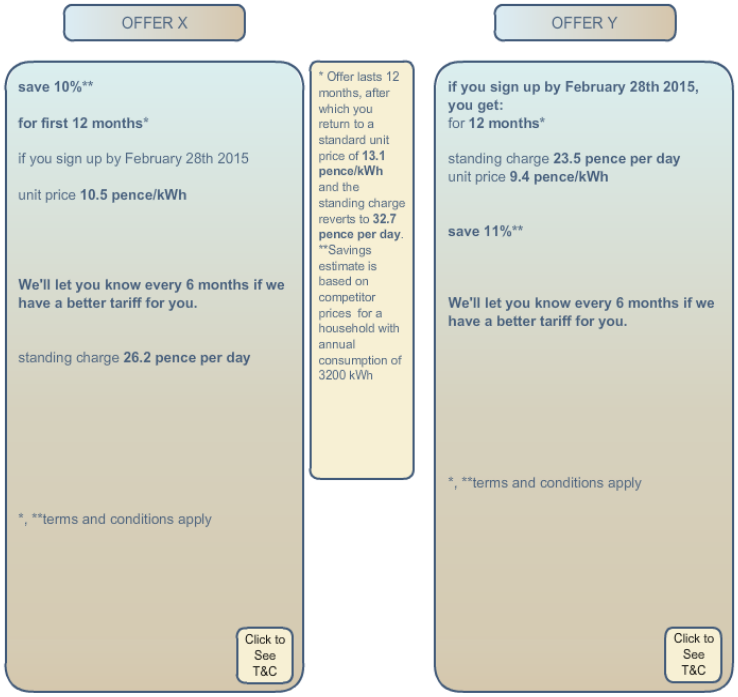


Figure 10: Marketing material shown in the marketing material test – Non-standardised with drip



A6.5 Questions on bundling

In addition to the experiments described above, the survey also included several questions on consumers' attitudes towards the practice of bundling gas and electricity into a single supply contract. These questions asked respondents whether they agree or disagree that bundling of gas and electricity:

- Reduces the complexity for consumers when choosing suppliers
- Reduces the effort for consumers when managing their energy supply contracts
- Allows consumers to get better customer service
- Allows energy suppliers to offer savings to consumers
- Allows energy suppliers to make higher profit
- Allows consumers to better monitor energy consumption
- Allows consumers to be more energy efficient

Annex 7 Transposition of the Third Energy Package into national legislation

The most recent round of EU energy market legislation, known as the Third Energy Package, was put into place to resolve structural problems in the internal energy market and to improve its functioning. It covers the following main areas:

- unbundling energy providers from operators of networks;
- strengthening the independence of regulators;
- establishing the Association for the Cooperation of Energy Regulators (ACER);
- cross-border cooperation between transmission system operators and the creation of European Networks for Transmission System Operators (ENTSO-E); and
- increased transparency in retail markets to benefit consumers.

The TEP entered into force in September 2009. However, Member States transposed the TEP into national legislation at different time periods. These time periods are summarised in Table 53.

Table 53: Transposition of the Third Energy Package (TEP) into national legislation			
Country	**Date of full transposition of TEP into national legislation**	**Comments**	**Source**
AT	2010	'The Directives of the Third Energy Package were transposed into national law in 2010 for electricity'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_austria.pdf
BE	2012	'The Third Energy Package was transposed into national law by a law issued on 8 January 2012.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_belgium.pdf
BG	Not fully transposed	'The European Commission is referring Bulgaria, Estonia and the United Kingdom to the Court of Justice of the European Union for failing to fully transpose the EU internal energy market rules. To date Bulgaria, Estonia and the UK have only partially transposed the Electricity and Gas Directives. The Directives had to be transposed by the Member States by 3 March 2011.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_bulgaria.pdf; http://europa.eu/rapid/press-release_IP-13-42_en.htm
HR	Not fully transposed	'The Energy Law adopted in 2012 aims at incorporating the Third Energy Package into Croatian national legislation. Implementation has not yet taken place.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_croatia.pdf
CY	2012	'An important regulatory development for 2012 was the implementing legislation of the Third Energy Package, which came into force in late 2012'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_cyprus.pdf
CZ	2012	'In 2012, the Energy Regulatory Office's activities continued to be based on the respective amendment to Act No 458/2000 on Conditions for Business and State Administration in the Energy Industries and on Changes to Certain Laws (the Energy Act), in which the Czech Republic had implemented the relevant provisions of the Third Energy Package.'	http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_CzechRep-EN_2.pdf
DK	2011	'The Third Energy Package was implemented in national law with the adoption of Act no. 466 on 18 May 2011'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_denmark.pdf
EE	Not fully transposed	'In 2014, additional amendments will be enforced both in the Electricity Market Act and in the Natural Gas Market Act, which harmonise other requirements arising from the transposition of the Third Package into the Estonian legislation'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_estonia.pdf
FI	2013	'Finally, in June 2013, the Finnish Parliament approved a legislation package which includes necessary amendments to electricity and natural gas market legislation in order to fulfil requirements of the Third Energy Package. The new legislation will come into force in September 2013.'	http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_Finland-EN.pdf
FR	2014	'France has notified full transposition of the Third Energy Package Directives.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_france.pdf
DE	2012	'The unbundling provisions of the Third Package have been fully transposed into German national	http://www.energy-regulators.eu/portal/page/portal/E

Table 53: Transposition of the Third Energy Package (TEP) into national legislation			
Country	**Date of full transposition of TEP into national legislation**	**Comments**	**Source**
		law, i.e. the German Energy Act (EnWG)'	ER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Cross-Sectoral/Tab/C12-UR-47-03_DSO-Unbundling_Status%20Review_Public.pdf; https://ec.europa.eu/energy/sites/ener/files/documents/Received%20notifications%20corr.xlsx
EL	2011	'The Third Energy Package was implemented in Greek legislation in August 2011.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_greece.pdf
HU	2011	'Following the transposition of the new unbundling rules in the Third Energy Package of the European Union implementation of the provisions was commenced.'	http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202012/NR_En/C12_NR_Hungary-EN.pdf
IE	Not fully transposed	'An infringement procedure for partial transposition of the Third Energy Package Electricity Directive is still on-going and has been referred to the Court of Justice of the EU in February 2014. Ireland had failed to adopt provisions related to unbundling of transmission system operators.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_ireland.pdf
IT	2011	'At the time of writing [2011], there is information that only the following seven EU Member States have transposed or are close to completion of the transposition of the Third Energy Package into national legislation: Austria, the Czech Republic, Denmark, France, Greece, Italy, and Portugal'	http://www.kslaw.com/library/newsletters/EnergyNewsletter/2011/August/article1.html
LV	Not fully transposed	'The liberalisation of the electricity retail market envisaged for 1 April 2014 was postponed until 1 January 2015'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_latvia.pdf
LT	2014	'Lithuania has by now fully transposed the provisions of the Third Energy Package.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_lithuania.pdf
LU	Not fully transposed	'An infringement procedure for incorrect transposition of the Third Energy Package Directives was launched in March 2014 and is on-going'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_luxembourg.pdf
MT	Not fully transposed	'The Third Energy Package has been transposed in 2011, it however provides for ample derogations.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreport_malta.pdf
NL	Not fully transposed	'Due to a court decision, part of the law on ownership unbundling of DSOs expired, which led the final two integrated companies to delay unbundling. The Ministry of Economic Affairs appealed to the Supreme Court of the Netherlands and a decision is pending.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_netherlands.pdf
PL	Not fully transposed	'The Third Package Directives were transposed only in 2013 and their compliance is currently under review.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_poland.pdf

Table 53: Transposition of the Third Energy Package (TEP) into national legislation			
Country	**Date of full transposition of TEP into national legislation**	**Comments**	**Source**
PT	2012	'During 2012, Portugal approved the new provisions for customers' protection in accordance with the Third Energy Package.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_portugal.pdf
RO	2014	'An infringement procedure on restrictions on the export of gas, initiated in 2012 under the TFEU and the Gas Directive, is on-going'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_romania.pdf
SK	Not fully transposed	'Some stakeholders have raised concerns with regard to the independence, transparency and accountability of the national regulatory authority.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_slovakia.pdf
SI	2014	'Slovenia's legislation transposing the Third Energy Package was approved by Parliament in February 2014'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_slovenia.pdf
ES	2012	'The unbundling provisions of the Third Energy Package have been fully transposed into Spanish law'	https://www.iea.org/Textbase/npsum/spain2015sum.pdf
SE	2011	'Sweden has undertaken reforms in the energy market in the process of transposing the Third Internal Energy Market Package, including important aspects of consumer protection, the powers and tasks of the regulatory authority and the definition of electricity and gas transmission activities.'	http://www.iea.org/textbase/nppdf/free/2013/sweden2013_excerpt.pdf
UK	Not fully transposed	'The European Commission is referring Bulgaria, Estonia and the United Kingdom to the Court of Justice of the European Union for failing to fully transpose the EU internal energy market rules. To date Bulgaria, Estonia and the UK have only partially transposed the Electricity and Gas Directives.'	https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_unitedkingdom.pdf; http://europa.eu/rapid/press-release_IP-13-42_en.htm

Annex 8 List of responding stakeholders (consultation)

Table 54: Stakeholders who participate in the stakeholder consultation

Category	Name of organisation	Country
Alternative Dispute Body	The Commission for Energy Regulation	Ireland
Alternative Dispute Body	Service de Médiation de l'Energie / Ombudsdienst voor Energie	Belgium
Alternative Dispute Body	Competition and Consumer Protection Commission	Ireland
Alternative Dispute Body	Lisbon Arbitration Centre for Consumer Complaints	Portugal
Alternative Dispute Body	Acquirente Unico SpA	Italy
Alternative Dispute Body	Síndic de Greuges de Catalunya (Catalan Ombudsman)	Spain
Alternative Dispute Body	Consumer Council Northern Ireland	Northern Ireland
Alternative Dispute Body	French Energy Ombudsman	France
Alternative Dispute Body	Ombudsman of the Republic of Bulgaria	Bulgaria
Alternative Dispute Body	Ombudsman Services	UK
Alternative Dispute Body	Coordination Gaz Electricité eau Bruxelles	Belgium
Alternative Dispute Body	Office of the Commissioner for Administration and Human Rights Protection (Cyprus Ombudsman)	Cyprus
Consumer Association	Citizens Advice	UK
Consumer Association	Portuguese Association for Consumer Protection (DECO)	Portugal
Consumer Association	Altroconsumo	Italy
Consumer Association	Energy Markets Inspectorate	Sweden
Consumer Association	Cyprus Consumer Association	Cyprus
Consumer Association	Danish Consumer Council	Denmark
Consumer Association	Fondazione Consumo sostenibile	Italy
Consumer Association	Consumentenbond	Netherlands
Consumer Association	KEPKA Consumer protection Centre	Greece
Consumer Association	Consumers' Association - Malta	Malta
Consumer Association	Estonian Competition Authority	Estonia
Consumer Association	Neytendasamtökin	Iceland
Consumer Association	Confederación de Consumidores y Usuarios (CECU)	Spain
Consumer Association	Sdružení pro ochranu spotřebitele, z.ú.	Czech republic
Consumer Association	The Swedish Consumer Energy Markets Bureau	Sweden
Consumer Association	House of Consumer Cooperation	Estonia
Consumer Association	Entidade reguladora dos serviços energéticos (ERSE)	Portugal
Consumer Association	Consumers' Organization of Macedonia	Macedonia
Consumer Association	Test-Achats	Belgium
Consumer Association	HISPACOOP - Confederación espanola de coopeativas de consumidores y usuarios)	Spain
Consumer Association	Verbraucherzentrale Bundesverband (VZBV)	Germany
Consumer Association	The European Consumer Organisation (BEUC)	Belgium
Consumer Association	Confederacion de Consumidores y Usuarios (CECU)	Spain
Consumer Association	Association for the Quality of Life (EKPIZO)	Greece
Consumer Association	National Federation of Associations for Consumer Protection in Hungary (NFACPH)	Hungary
Company Mediator	E.ON SE	Germany
Company Mediator	Nuon - Vattenfall	Netherlands
Company Mediator	Vattenfall Sähkönmyynti Oy	Finland
Company Mediator	Vattenfall Sales	Germany
Company Mediator	ENDESA	Spain

Table 54: Stakeholders who participate in the stakeholder consultation		
Category	Name of organisation	Country
Company Mediator	Vattenfall AB	Sweden
Electricity Association	Finnish Energy Industries	Finland
Electricity Association	Finnish Energy Industries	Finland
Electricity Association	BDEW German Assiciation of Energy and Water Industries	Germany
Electricity Association	Asociación Española de la Industria Eléctrica (UNESA)	Spain
Electricity Association	KS BEdrift	Norway
Electricity Association	Elinorr	Sweden
Electricity Association	Latvenergo	Latvia
Electricity Association	Energijos tiekimas UAB	Lithuania
Electricity Association	Eurelectric	Belgium
Consumer Protection Agency	Finnish Energy Industries	Finland
Consumer Protection Agency	Swedisk Consumer Agency (Konsumentverket)	Sweden
Consumer Protection Agency	Office of Competition and Consumer Protection	Poland
Consumer Protection Agency	Malta Competition and Consumer Affairs Authority	Malta
Consumer Protection Agency	Regulatory Authority for Energy (RAE) - Greece	Greece
Consumer Protection Agency	Romanian Energy Regulatory Authority - ANRE	Romania
Consumer Protection Agency	Federal Ministry of Labour, Social Affairs and Consumer Protection	Austria
Consumer Protection Agency	Ministry of Industry and Tradše	Czech Republic
Consumer Protection Agency	Service public federal Economy - Directorat general economic reglementation - Division consumers and enterprises	Belgium
Consumer Protection Agency	Autorità Garante della Concorrenza e del Mercato	Italy
Consumer Protection Agency	Ministry of Industry and Trade	Czech Republic
Consumer Protection Agency	Association for the Quality of Life (EKPIZO)	Greece
Consumer Protection Agency	State Consumer Rights Protection Authority of the Republic of Lithuania	Lithuania
Consumer Protection Agency	General Secretariat for Commerce and Consumer Protection	Greece
Consumer Protection Agency	National Authority for Consumer Protection	Romania
Regulator	The Office of Gas and Electricity Markets (Ofgem)	Uk
Regulator	Commission for Energy Regulation	Ireland
Regulator	Energy Markets Inspectorate	Sweden
Regulator	Croatian Energy Regulatory Agency (HERA)	Croatia
Regulator	Energy Agency	Slovenia
Regulator	Authority for Consumers and Markets	Netherlands
Regulator	Romanian Energy Regulatory Authority - ANRE	Romania
Regulator	Autorità per l'energia elettrica il gas e il sistema idrico (AEEGSI)	Italy
Regulator	Norwegian Water Resources and Energy Directorate	Norway
Regulator	National Commission for Energy Control and Prices	Lithuania
Regulator	Hungarian Energy and Public Utility Regulatory Authority	Hungary
Regulator	Energy Regulatory Office	Czech Republic
Regulator	Energy Regulatory Office	Poland
Regulator	Vlaamse Regulator voor de Energie- en Gasmarkt (VREG)	Belgium
Regulator	Commission wallonne pour l'Energie (CWaPE)	Belgium
Regulator	Comisión nacional de los mercados y la competencia (CNMC)	Spain
Regulator	Bundesnetzagentur	Germany

Table 54: Stakeholders who participate in the stakeholder consultation		
Category	Name of organisation	Country
Regulator	Energie-Control Austria	Austria
Regulator	Regulatory Office for Network Industries	Slovakia
Regulator	Commission de Régulation de l'Électricité et du Gaz (CREG)	Belgium
Regulator	Commission de regualtion d'énergie (CRE)	France
Regulator	Public Utilities Commission of Latvia	Latvia
Regulator	Regulatory Authority of Energy	Greece
Regulator	Institut Luxembourgeois de Régulation (ILR)	Luxembourg
Regulator	Danish Energy Regulatory Authority (DERA)	Denmark
State Enterprise Agency	Netherlands Enterprise Agency	Netherlands
Third Party Intermediary	iChoosr	UK

Annex 9 List of references

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