

Electricity Disclosure: Will It Transform Electricity Markets?

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ABSTRACT

In a regulated monopoly environment, the utility bill is often the only perceived characteristic of electricity service. With the liberalization of electricity markets, electricity becomes a product with multiple characteristics. The option of choosing between products and providers naturally creates the need for more information related to the electricity the consumer is buying. Therefore, electricity disclosure—providing the consumer with information related to the characteristics of purchased electricity—is becoming an integral component of liberalized markets.

Following the footsteps of several states in the US and some other pioneers worldwide, in June 2003 the European Union adopted Directive (2003/54/EC). The directive required, among other rules and principles for the completion of the internal electricity market, mandatory disclosure of information on the origin of the electricity from suppliers. A European-wide, six-institute research project titled “Carbon Consciousness and Consumer Choice in Electricity” has been providing guidance for the efficient design of the European scheme. The project has studied residential and commercial consumers’ preferences (through focus groups and a large EU-wide telephone survey) towards a disclosure regime, as well as making an attempt to understand the potential impacts of disclosure.

The present paper will present some of the results of the project, combined with evidence from the literature documenting the impacts of disclosure schemes worldwide, and answer the following questions. Does, or will, electricity disclosure transform electricity markets towards more environmentally sustainable ones? If we empower the consumer with information on their electricity product or supplier, will this influence their choice? Beyond the consumer effect, can disclosure transform the market through other pathways? How will disclosure interact with existing policies, such as existing voluntary markets for ‘green’ electricity? What other characteristics of disclosure make it an essential component of liberalised electricity markets?

Introduction

With the liberalization of electricity markets, electricity becomes a product with multiple characteristics, as opposed to a utility service with the bill to be paid as its key, and often only perceived, characteristic under a monopoly regime. The option of choosing between products and providers naturally creates the need for more information related to the electricity the consumer is buying. Therefore, the disclosure of information related to the consumer’s purchased electricity (referred to as “*electricity disclosure*”) is becoming an integral component of liberalized markets.

The primary function of disclosure in an open market is not necessarily any intervention into consumer demand but rather satisfaction of the consumer’s elementary right towards

information related to their supply. Thus it makes sense to introduce disclosure even in markets without full consumer choice.

Beyond being a pre-requisite for efficient market functioning, disclosure will enable consumers to choose between products that possess different characteristics. This product differentiation is a side-benefit of disclosure, where the tracking of electricity assigns each kWh an origin, and therefore a multitude of characteristics. Since the exact array of characteristics depends on the design of the disclosure scheme, disclosure enables a sophisticated and reliable system of product differentiation based on a large variety of characteristics. Characteristics that may be considered favorable include products with low carbon emissions and products with no nuclear content. The most obvious generating source with these characteristics is electricity generated from renewable sources, sometimes termed green electricity. Depending on the design of the scheme a disclosure scheme would allow suppliers to offer products such as “locally produced”, “low-carbon”, nuclear free”, and “saving national jobs”.

Differentiated electricity products such as ‘green’ products already exist in many states and countries that allow consumers to identify their preferred products. Where disclosure is different is that it identifies the characteristics of all electricity sources.

Early evidence with disclosure from Austria and the USA shows that there was no immediate rush towards green electricity after the introduction of disclosure. In addition, research also does not predict dramatic short-term shifts toward renewable electricity products as a result of consumer pressure due to disclosure (See 4CE study later in the paper). However, the authors of this paper would like to argue that the long-term market reactions maybe different, or, at least, somewhat stronger. Furthermore, disclosure will allow other policy measures to be implemented that may have a positive environmental and efficiency affect on the supply market. These other policies would have been more difficult to introduce without disclosure.

This paper will briefly describe disclosure to date and then provide evidence of consumers’ latent interest in the source of the energy they use. An outline will be given of the methodology used to estimate consumer interest in electricity disclosure and likely response to disclosure. Finally, this paper will conclude by providing an assessment of the likely impacts of disclosure on consumers, how it will enable other policy to be implemented and the interaction of disclosure with existing policy.

The 4CE Project

This paper draws from the experience of the 4CE (Consumer Choice and Carbon Consciousness for Electricity) project, which was supported by the European Commission through the Altener Program. The purpose of the project was to examine methods to introduce a disclosure scheme, opportunities for consumers to respond to such a scheme, and how it would fit into overall energy policy. The project was led by Oxford University’s Environmental Change Institute, and was executed in collaboration of the Stockholm Environment Institute, the Central European University, the Austrian Energy Agency (EVA), IT Power from the UK, and the Oeko Institute from Germany. The final report has now been published (Boardman *et al* 2003). This fundamental research provided results that enabled the EU to make an informed choice when finalizing the type of disclosure needed for a liberalized EU market.

Disclosure Schemes to Date and Experience

In 2003, the European Union passed a new directive (2003/54/EC) that set the framework for the full liberalization of all electricity markets in the EU. The directive includes annexes about issues such as consumer protection. According to the directive, European suppliers will be mandated to disclose information about the source of their electricity supply to their consumers.¹ The EU will have electricity disclosure by 2005, along with the mechanisms for a fully liberalized electricity and gas market.

By the time the EU had proposed a scheme, around half of the US states had proposals for disclosing information to consumers. From the US experience it should be noted that these early projects were not combined with full consumer choice, and several states where disclosure has been introduced have not advanced with market opening. In addition, liberalization in many states of the US has been loaded with concurrent problems such as price fluctuations, capacity shortages and blackouts. Therefore consumer attention has not concentrated on the ancillary attributes of electricity, including its environmental implications, but rather on its basic characteristics such as supply security and price stability.

Austria implemented disclosure in advance of the rest of Europe, and a first assessment was positive. The method of implementation meant that the impact on the generation supply side and on the demand side was limited. Some supply companies created in principle two main set of products within their portfolios – “green products” for sale to the residential sector, “dirty products” for the non-residential sector. This was the main reason for the EU deciding on portfolio data to be entered onto the disclosure label, rather than only the product information.² The positive message from this example is that consumers did demand ‘green’ products, and that suppliers responded to this change in demand – albeit in a way that had little impact on the supply side.

However, in order to be able to judge the longer-term impact of disclosure, it is important to observe its market influence in mature, well-functioning, open markets. Disclosure can only have a positive impact in terms of consumer choice in markets where the primary expectations towards electricity, i.e. security of supply and predictable price trends, are met. In addition, disclosure can best work in markets where consumers are used to the concept of electricity product choice, where they have well-established routines for obtaining information about products and suppliers and for making a switch. Finally, it is important that the market be mature enough for suppliers to create new products should new market niches emerge, and for consumers within that new market niche to access the new products without significant transaction costs.

Hence, the US experience can be taken into account for judging the potential implications on consumer behavior only to a limited extent. Whereas European liberalization has been less

¹Member States are obliged to ‘ensure that electricity suppliers specify in ... the bills and in promotional materials made available to final customers:

(a) the contribution of each energy source to the overall fuel mix of the supplier over the preceding year;
(b) at least the reference to existing reference sources,..., where information on the environmental impact, in terms of at least emissions of CO₂ and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year is publicly available.

²Portfolio disclosure means that the disclosed information refers to all electricity sold to the to final consumers by a supplier (a supplier has only one “portfolio disclosure”), whereas product disclosure refers only to one specific electricity product (a supplier can have different electricity products and therefore different “product disclosures”). See 4CE task 1 for detailed discussions on different options.

flawed, there are few markets, if any, where it can be claimed that the open market has become mature; that is, where consumers can pay attention to the non-price characteristics of electricity during their product choice and exercise their preferences by finding the product that meets their preferences within a wider product and supplier portfolio. Until such a mature market exists, the full impact of disclosure will not be felt. This will take a few more years.

So the question is: will disclosure transform electricity markets? Various tasks within the 4CE project provide insights into answering this question.

Methodology of Assessing Consumer Attitudes and Beliefs

To understand the likely response by consumers and SMEs (small and medium size enterprises) to disclosure, three main approaches were used. The methodology included undertaking focus groups in five European countries, interviews with large non-residential customers, then a large telephone survey in 10 European countries. The focus groups allowed issues to be identified, both to inform the research and, more importantly, to shape the subsequent telephone survey. In outline, the process was to undertake:

- Focus groups with residential and non-residential customers in the five partner countries (Austria, Germany, Hungary, Sweden and the UK);
- Individual interviews with a number of large non-domestic electricity customers in the five partner countries;
- A telephone survey across 10 European countries.

The telephone survey was carried out in 10 European countries: Austria, France, Germany, Greece, Hungary, Italy, Poland, Spain, Sweden, UK. 200 households and 100 Small and Medium Enterprises (SMEs) were interviewed in each country, giving a total of 3000 interviews in all. Soft quotas were set on the following criteria: age, number of people in the household, social class, region and gender, to help ensure that the results from the survey were representative.³ Amongst other objectives, some of the main aims of the survey were to understand:

- Consumers' knowledge of energy and climate change;
- Consumer demand for disclosure; and
- Consumer reaction if/when disclosure was introduced.

³The questionnaire used in the telephone survey was piloted on 10 households and 10 SMEs in the UK before it was finalized and translated. The translations were carried out through ORC International and checked by native speakers from each country to ensure appropriate language and terms were used throughout. For the domestic customers, telephone numbers were selected at random from a database and checked to ensure that the numbers were valid and were domestic not business numbers. For the SMEs, telephone numbers were selected at random from the Dunn & Bradstreet database, which also provided information on company size, region and Standard Industry Code. Company size was used as the soft quota in the selection of the SME sample.

Consumers Respond

Consumer Attitudes to Energy, Knowledge of Climate Change

Prior to checking consumer attitudes towards disclosure, the survey enquired about attitudes to energy and climate change, including consumer knowledge. The purpose was two-fold—first to obtain an understanding of the panel, and second to cross-check the results of a couple of questions with other studies (such as Eurobarometer, and British Social Attitudes survey). Generally consumers already have a positive attitude towards the environment, and a good understanding that fossil fuels contribute to climate change (Table 1).

Table 1. ‘Every Time We Use Coal, Oil or Gas, We Contribute To Climate Change’ – Domestic Customers (%)

	Weighted Total	Au	F	G	Gr	Hu	I	P	Sp	Sw	UK
Agree strongly	34	47	30	27	45	40	44	30	46	60	27
Agree	45	35	44	48	40	48	35	60	36	29	54
Neither	7	10	7	12	6	1	8	1	7	5	5
Disagree	6	5	10	7	5	6	4	4	4	2	7
Disagree strongly	2	3	3	2	1	1	3	1	1	1	3
Don’t know	5	2	8	3	4	3	7	4	8	3	6

Sample size: 2003 households

However, many consumers are still confused by the mechanisms by which climate change is occurring. For instance, many consumers (70%) in the survey thought (incorrectly) that the hole in the ozone layer caused climate change. This result of the 4CE survey was the same as found by other research (e.g. BSA 2000). Similarly a significant number of people (39%) believed that nuclear power was responsible for emitting greenhouse gases. However, as will be shown later, this uncertain understanding generally does not affect consumers’ desires to choose electricity products with low environmental impact.

Desire for Disclosure Information

In addition to consumers showing a concern for the environment, most consumers were in favor of having information on the source of the electricity they purchased, or would potentially purchase. Approximately 80% of residential consumers and 60% of small and medium sized enterprises (SMEs) would like to see the fuel mix and environmental impact of their electricity (Figure 1). As an example of the detail, Table 2 shows the data by the 10 EU countries.

Figure 1. Percentage of Respondents In Support Of an Electricity Label

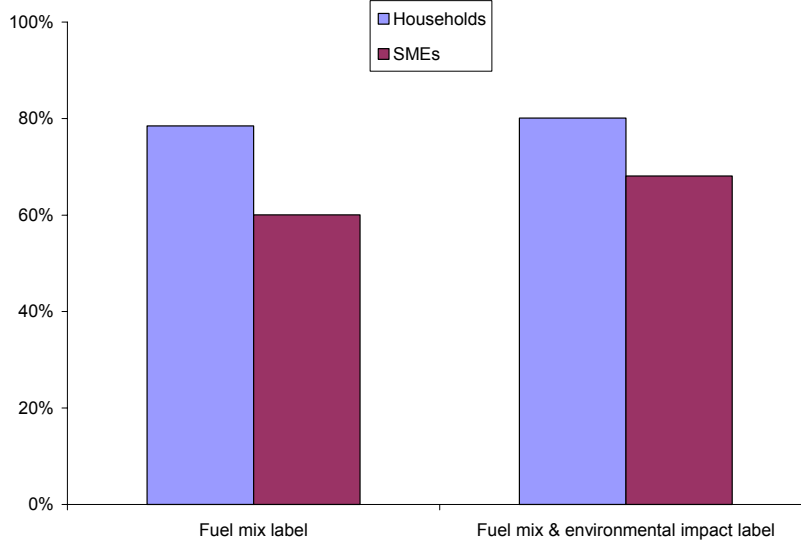


Table 2. Usefulness of a Label with Fuel Mix and Environmental Impact – Domestic Customers (%)

	Weighted Total	Au	F	G	Gr	Hu	I	P	Sp	Sw	UK
Extremely useful	39	46	41	34	66	40	50	14	59	21	32
Useful	41	33	43	39	24	53	36	55	28	46	50
Neither	9	13	9	15	9	1	6	9	10	14	4
Not very useful	6	6	5	6	2	5	3	13	1	10	8
Not at all useful	4	3	3	4	-	-	4	6	1	9	5
Don't know	2	-	1	1	1	-	4	1	1	2	2

Sample size: 2003 households

How Will Consumers Respond To Information on Their Electricity Purchase?

The full effect of introducing disclosure cannot be determined with any degree of certainty until a period of time following implementation has passed. Consumers will take time to respond to this new information, while any demanded changes will take time to be reflected on the supply side. In the absence of reliable long term post-implementation review of disclosure, the 4CE project attempted to estimate the likely change in consumer demand as a result of the implementation of disclosure.

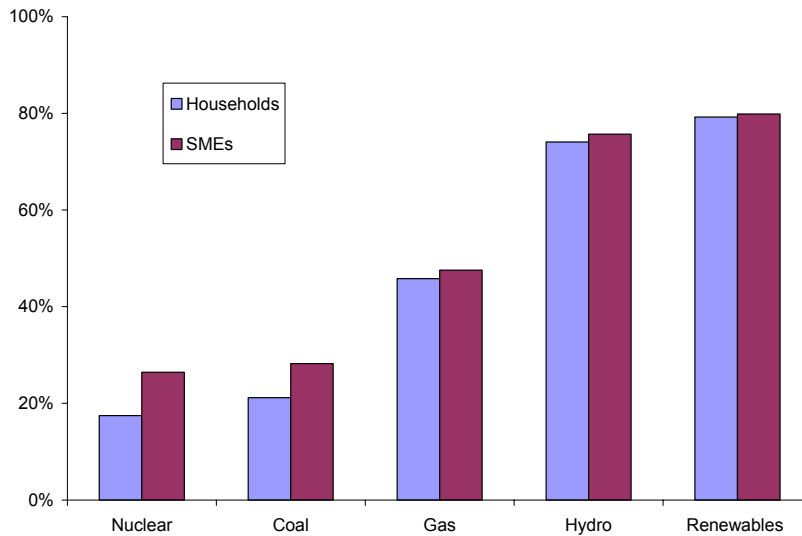
Consumers' preference for different fuel sources was revealed by the telephone survey. The telephone surveys showed, for both residential consumers and SMEs, that the unit price was still a large driver in their purchasing criteria (Table 3). However, the survey also showed that consumers had a strong preference for electricity with a low climate change impact and a low/no nuclear component. This is reflected in a similar question asked about preference for certain fuel types (Figure 2), where electricity from renewable sources is preferred over electricity generated from fossil fuels or nuclear sources.

Table 3. Preference for Electricity Associated With a Certain Environmental Impact – Domestic Customers (%)

	Always buy the cheapest	Low level of nuclear waste	Low impact on climate change	Low impact on climate change & some nuclear waste	Low impact on climate change & no nuclear waste	Don't care about Environmental impact
Agree strongly	33	26	40	13	51	4
Agree	26	33	41	27	31	8
Neither	15	8	7	12	7	4
Disagree	18	17	6	27	6	33
Disagree strongly	6	14	3	18	3	49
Don't know	2	4	3	4	2	2

Sample: 2003 households

Figure 2. Likelihood to Buy Electricity Generated From Different Fuel Sources – Domestic Customers and Smes



Although most electricity disclosure schemes have, or will, provide information on the source and environmental impact, many consumers expressed a demand for electricity based on other criteria. For example, 56% of consumers stated a preference for electricity generated from local sources (Table 4). Such a criteria is seen as important as it is perceived as promoting local generation (a positive employment effect), not importing ‘dirty’ sources.

Table 4. Only Want To Buy Locally Generated Electricity – Domestic Customers (%)

	Weighted Total	Au	F	G	Gr	Hu	I	P	Sp	Sw	UK
Agree strongly	23	38	19	18	14	10	32	29	32	24	20
Agree	33	31	39	29	20	35	37	41	30	22	34
Neither	16	17	11	19	21	18	15	11	22	19	12
Disagree	17	13	19	21	23	27	11	13	7	23	25
Disagree strongly	8	3	10	10	23	2	2	3	7	13	7
Don't know	3	-	3	1	1	8	4	2	4	1	4

Sample: 2003 households

Consumers Willingness to Pay More, Affect On Supply

While the earlier questions showed that consumers had a preference for certain types of generating sources, the survey also aimed to assess consumers' willingness to pay more for their favored products.

Consumers in many parts of the liberalized world have been able to choose 'green' products, though the impact to date has generally been small (with some notable exceptions; e.g., the Netherlands, where tax incentives promoted the large uptake of renewable electricity products). This slow uptake is due to a number of reasons. From a consumer perspective, these products are not highly visible, and only the 'green' products are noticed by consumers. Consumers are generally not aware of the content of their 'non-green' products. receive attention. Furthermore, there is a cost to accredit products that is not borne by the non-accredited products. In addition, the transaction costs in some countries, such as Germany, are very high.

By comparison, disclosure means that all electricity products must show their attributes, and there is no comparative advantage by one source not doing so.

The survey showed that, given a hypothetical choice of products, some consumers are willing to pay more for products with good environmental attributes (Table 5). Generally, consumers are willing to pay more for both electricity generated with no-nuclear sources and electricity generated with low impact on climate change. For example, 18% of domestic customers were willing to pay a premium of over 10% for electricity generated from such characteristics.

Table 5. Percentage Extra Willing To Pay – Domestic Customers and SMEs

Premium (%)	Domestic customers (%)		SMEs (%)	
	No nuclear waste	Low impact on climate change	No nuclear waste	Low impact on climate change
0	19	20	27	25
1-5	27	29	26	28
6-10	22	18	19	18
11-25	12	12	8	7
26+	6	6	2	3
Don't know	15	14	18	18

Sample: 2003 households and 1015 companies

Even with this level of willingness to pay more, the additional consumer demand will only pull a relatively small amount of additional renewable generating capacity onto the market in the short to medium term. Using cost-supply curves for different renewable technologies

across the EU (from the EU Elgreen project, Huber *et al* 2001), this is estimated to be about 25 TWh per annum in the medium term (4CE, task 3). This estimate of 25 TWh includes a factor to compensate for the fact that consumers' actual willingness to pay is significantly lower than the stated one (Shulze 1994). These 25 TWh per annum of renewable electricity will replace conventional forms of generation (whether nuclear or fossil fuels is a separate debate), resulting in a direct environmental benefit.

Beyond Consumers in the Short Term

Other Actors Response to Disclosure

A reason for early introduction of disclosure is that, while consumer impact has been so far limited, disclosure, similarly to other labeling schemes, works through other pathways. When a label is introduced, product suppliers make an increased effort to show a good image by emphasizing the "good" products and often removing their bad ones. This has been a strong effect with energy efficiency labeling schemes (e.g. Winward, Shiellerup & Boardman 1997). US evidence has shown this also for disclosure: suppliers were more encouraged to introduce green products in a disclosed information era, and this is certainly the case for Austria as explained earlier.

Longer-Term Impact

Consumer behavior is slow to change. First, as emphasized above, consumers need to get used to the concept that electricity is a product with multiple attributes, not a utility with a single price attribute. Then, they need to be able to navigate in this new market: obtain information, establish their preferences, and make a choice. They also need to get used to the notion, unless they were aware before, that electricity has important environmental ramifications including climate change, and that even their individual consumption results in sizable emissions. Finally, if the market is to be transformed, consumers need to gain an understanding that they can make a significant influence on this through their product choice. Since all of these concepts require consumer learning which is associated with social and behavioral change, the time component is important: for any desired impact, the scheme needs time to take affect.

The focus group research in the 4CE project has supported this hypothesis. For instance, as one participant in the Hungarian focus groups has expressed it when asked what he would do with this new information: "First, it will end up in the dustbin. Next time, I will take a glance over it. Next time, I will examine it more carefully. Finally, I may base my decision on it."

In addition to the impact of disclosure on the quality of energy supply, there may also be an influence on the quantity of demand. More consumer energy awareness may mean the choice of more energy efficient appliances and houses. When people are more aware of the negative consequences of their electricity consumption, and the order of magnitude of the emissions they personally generate, they may become more conscious of their consumption and emissions. There is some evidence from the focus groups that this may take place, and thus disclosure may also have a positive impact on energy consumption patterns. This effect may be enhanced if additional measures are taken in synergy with disclosure.

Interaction with Other Energy Policies - Market Transformation Toolbox/Strategy

Electricity disclosure will not act in isolation; this policy measure will enable other policies to be introduced, and also interact with existing energy policies.

At a simple level, a disclosure scheme will allow education programs to piggy-back on disclosure, though could of course be done separately. Such education programs could include improving understanding of the link between electricity use and its indirect environmental impact.

However, it is likely that consumers will not be the main driving force for pulling more sustainable forms of energy onto the market in the short term. In many markets, other policies (e.g. the Renewables Obligation in the UK) will substantially drive new renewable energy capacity. Even in such cases, disclosure may still have a roll to play.

In addition to enabling a more sophisticated product differentiation, disclosure also makes it ideal to introduce new policies which can now be verified through the tracking system of the disclosure scheme, or work better combined with a disclosure scheme. Providing industry with information on the carbon and nuclear content of the electricity they use will allow these to be placed in their company reports (whether voluntary or mandatory), which could be used by companies to differentiate themselves from competition in the market place. It could allow the introduction of differential taxation based on the environmental impact of the electricity product they have chosen (such as a carbon/nuclear tax). It may also provide the basis for a downstream emissions trading scheme, where energy users (rather than the emitters) will know their emissions. These downstream actors will be able to choose from introducing efficiency and reduction measures within their control or choose another supplier with lower emissions. The scope for using disclosed information for enabling more sophisticated energy policy is just beginning.

Conclusions

To conclude: why should society pay the costs of a disclosure scheme before a mature power market is established? The main answers are:

- Disclosure is an essential part of a liberalized electricity market;
- Surveys have shown that there is wide-spread demand from both residential and commercial consumers for this information;
- From the present short-term experience there is little evidence that after disclosure there will be a quick transformation towards green electricity as a result of direct consumer action;
- However, the time aspect is important: the long-term impact will be larger;
- Raised awareness of energy and its environmental impact, enhanced by an education program, should have a positive impact on actual use of energy, such as choosing more efficient appliances and homes;
- Disclosure also transforms the market through the suppliers, i.e. through suppliers wanting to look more green (and offering more green products even in non-liberalized markets);
- Beyond market transformation towards pure green, it is important that disclosure enables product differentiation based on a large range of characteristics, thus enabling market

transformation possible in many directions (e.g. lower-carbon; perhaps supporting local employment);

- And finally, electricity disclosure allows other market transformation policies, such as education and taxes, to be introduced; and it is these that may have a significant impact in the long term.

In conclusion, while electricity disclosure will not transform electricity markets in a significant way in the short-term, other benefits of disclosure alone and its potentially stronger long-term benefits clearly justify the introduction of the scheme.

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