

Green energy tariffs in the UK's liberalised household electricity market: Model or Muddle?

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Abstract

This paper examines the UK mechanisms for ensuring future investment in renewable energy through consumer adoption of green energy tariffs and the Renewable Obligation Certificate (ROC) system. Using a national survey and focus groups the stated willingness by UK customers to pay a premium for renewable or green energy and actual take-up of such tariffs is assessed. Substantial differences between willingness to pay for and the adoption of green energy tariffs are reported. This disparity is linked to a range of factors including consumer confusion, lack of supply, complexities of constructing 'green source' tariffs under the ROC system and a lack of customer trust. It is concluded that the re-definition of the green energy market in favour of 'green source' tariffs, greater direct compliance with the Renewable Obligation by addressing supply constraints, and efforts in providing clearer information and choices for consumers via a compulsory green energy accreditation scheme are required if willing consumers' are to contribute to investment in renewable energy.

Keywords: Green energy; energy policy; willingness to pay

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1. Introduction: UK energy policy context

This study considers the UK mechanisms by which investment in renewable generating capacity can be provided; the payment of a 'green' premium by individual customers and the Renewable Obligations Certificate (ROC) system. This study proposes this system has had only limited success in harnessing customers increasing willingness to pay for green energy. This lack of success is viewed to arise from consumer confusion, a poorly defined 'green' energy market, a lack of supply, limited marketing efforts, complexities of constructing meaningful 'additional' 'green source' tariffs under the ROC system and a lack of customer trust in UK electricity firms. The paper concludes the provision of clearer consumer information and product choices, the re-definition and regulation of the green energy market, and measures to the alleviate supply shortage by addressing impediments to the implementation of renewable energy projects may alleviate this situation.

It is timely to investigate the funding source for investment in renewable energy and the willingness of customers to contribute to this development given their potential importance to energy policy. Initially, UK energy policy, articulated in the UK 'Energy White Paper' (2003), states that the four 'pillars' of energy policy are "... the environment, energy reliability, affordable energy for the poorest, and competitive markets for our businesses, industries and households" (DTI 2003, p.3). These environmental and energy reliability goals are also emphasised in the later UK Energy Review of 2006 (DTI 2006) and White Paper (DTI 2007a) which prioritise 'energy security' and 'climate change' (DTI 2006, p.4).

Furthermore, the UK government has established that approximately half of the 12.5% reduction in carbon dioxide (CO₂) emissions required by 2008-12 will be achieved in the household sector (DTI 2003). These emission reductions are to be

achieved through greater energy efficiency and the use of renewable energy. Consequently, demands for greater investment in renewable energy have grown as policy makers become increasingly concerned with the energy generation needs and environmental protection. Subsequently deciding who will pay for new renewable energy capacity and the regulatory mechanism to deliver this additional investment, are increasingly pressing policy concerns.

Whatever mechanism is used to support renewable energy investment, individuals will ultimately pay for most of this investment. The overriding question is which individuals should pay. Simplistically, all individuals or *citizens* (Batley *et al* 2001) could pay for this investment or alternatively a self-selecting group of *consumers* could carry a large proportion of the burden. Specifically, the required investment in renewable sources of energy could develop from four sources. First, government could directly subsidise renewable investments from general taxation. This approach is unlikely to be pursued given concerns about the inefficiency of subsidies and given that politicians are reluctant to raise taxation. Second, there could be a levy on electricity consumers. Prior to the 2002, this method of financing renewable energy investment was employed in the UK through the Non-Fossil Fuel Obligation (NFFO); a system involving a levy on consumers' electricity bills (Batley *et al.* 2001). This approach is considered problematic due to conflicts with the existing fuel poverty and affordability goals of UK energy policy. However, large levels of wind energy deployment in Denmark, Germany and Spain have been associated with 'feed in tariffs' (Soderholm and Klaassen, 2007) which guarantee a preferential price for electricity from renewables with the cost being spread to all consumers. Third, payment for this investment could come from the generating industry by imposing targets on the amount of electricity it sources from renewable energy. However, the

costs of this development would invariably be passed on to individuals through higher spot electricity prices. Lastly, those consumers that could afford higher tariffs and wished to receive energy produced from renewable sources could choose to pay a premium for such energy, by switching to a green energy tariff.

The UK government, not wishing to pay for this investment from general taxation or to impose a universal increase in domestic energy prices has focused attention on the last two options. The third option where renewable investment is mandated on the generating industry has developed since 2002 as the Renewable Obligation, also known as the Renewable Obligations Certificate (ROC) system. This mechanism encourages investment in renewable energy by placing a commitment on electricity suppliers to source a rising proportion of their electricity from renewable sources (DTI 2006). Incentives within this system are provided by the requirements for an electricity supplier to purchase extra certificates in the open market or pay into a buy-out fund when they do not have sufficient ROCs.

The last option for renewable energy investment funding is from consumers able and willing to pay a premium for their domestic electricity needs from renewable sources. This form of funding is also implicitly supported via the process of introducing competition in the domestic market and more explicitly through the UK energy regulator OFGEM (OFGEM 2005, OFGEM 2007b). Funding renewable energy investment through this process is contingent on whether consumers are willing to pay for green energy tariffs and on the existence of market impediments which may prevent them actually choosing such products.

This paper will examine these options; the financing of renewable energy investment by concerned customers and the Renewable Obligations Certificate (ROC) system. To achieve this goal the study is undertaken in five parts. After this

introduction, a review of previous research on willingness to pay for green tariffs and actual adoption of such tariffs is presented. Section three defines the UK green energy market. The data used in the study, the forms of analysis and the findings from the national survey and focus groups are considered in section four. Lastly a discussion of the results is provided, conclusions are drawn, and policy implications are forwarded.

2. Past research on willingness to pay and actual adoption of green energy

A variety of international evidence as to the willingness to pay for green energy and the adoption of green energy sources has developed in the USA, Europe and the UK. Evidence of customer willingness to pay, the take up of renewable or green energy tariffs and the possible impediments to adoption of green energy tariffs are reviewed for each of these areas.

US surveys of willingness to pay for renewable energy (Fahrar and Houston 1996, Roe *et al* 2001, Wiser 2003, Zarnikau 2003) have all found evidence of a relatively high stated demand for paying a premium for green energy. Specifically Fahrar and Houston (1996) and Zarnikau (2003) found that 40% to 70% of US consumers would be willing to pay premium for green energy from renewable sources. Despite this high level of customer intent, the actual take up of green energy provision has been relatively low with average rates estimated to be at or below 2% (Bird *et al.* 2007, Wiser 2003, Wiser and Pickle 1997, Zarnikau 2003), though some of the best performing program have achieved penetration rates of between 5 and 17% (Bird *et al.* 2007, p.6). A range of explanations for this large divergence between stated and actual behaviour has been forwarded including free rider problems (Wiser and Pickle 1997); upward bias in contingent valuation (Gossling *et al.* 2005, Wiser 2003); bandwagon effects; the need for a critical mass of green customers and

reciprocity; lack of knowledge as to green power availability; hesitancy in switching electricity supplier; distrust of energy product suppliers and cost concerns (Wiser 2003).

High levels of willingness to pay for energy from renewable sources are also presented in the European research. Devries (2004) recorded that substantial differences between consumers' willingness to pay exist across the European Union nations. Specifically, over half of consumers in Luxembourg, the Netherlands, Sweden and Denmark claim to be willing to pay a 'green' premium, ranging from 5% to over 25% of total energy costs. Corresponding figures for southern European nations display a much lower willingness to pay.

Different rates of take up of 'green' energy tariffs are also observed in Europe. While most European nations have appreciated only modest levels of green energy tariff adoption by consumers, some exceptions do exist. For example, Markard and Truffer (2006) estimated that, within the Netherlands, take up of green energy tariffs in 2001 was approximately 11%, a figure rising to 26% in 2003. Reasons forwarded to explain this divergence of stated and actual consumer behaviour in European green energy markets included a lack of knowledge and trust and the high search costs involved in switching (Salmela and Varho 2006). Some commentators have indicated that this increased take up of green energy tariffs in the Netherlands (from 140,000 customers in 2000 to 775,000 customers in 2002) has been "fuelled by tax exemptions for green electricity and heavy advertising by utilities" (Bird *et al.* 2002). However, the tax breaks that so incentivised green energy tariff adoption in the Netherlands were removed by the Dutch government in 2003, as they had resulted in utilities importing renewable energy rather than substantially increasing domestic generation (van Rooijen and van Wees 2006).

Currently, UK research into whether individuals are prepared to pay a premium for energy generated from renewable sources and the actual adoption of green energy tariffs has been limited. Within this literature Fouquet (1998), Batley *et al.* (2001) Devries (2004) and Graham (2006) report that 20%, 35%, 40% and 64% of UK customers respectively are willing to pay a premium for green energy at different time periods. As the first UK green tariffs were introduced in 1989 (Bird *et al.* 2002), it is apparent that differences over time in willingness to pay may be linked to increasing awareness of environmental issues.

Despite this rising willingness to pay for renewable energy, estimates of the take up of green energy tariffs have been very low in the UK. Bird *et al.* (2002, p.531) indicated approximately 45,000 customers (0.2% of households) in 2001 had taken up a green energy tariff, while Graham (2006, p.2) estimated that this had grown to 200,000 (under 1% of households) by 2006. More recently, the Domestic Retail Market Report (OFGEM 2007a, p.15) notes that "... large suppliers have signed up a total of 290,000 accounts on green tariffs" in the UK, representing a substantial increase from the estimates of 2001. If the UK's new entrant green energy suppliers are unlikely to be counted as 'large suppliers', we estimated that the number of accounts could be as an absolute maximum up to 340,000. This would still represent only about 1.5% of households, still far behind the market leader, the Netherlands.

This divergence between low green energy take up and high willingness to pay for green energy in the UK has been linked to consumer confusion, a lack of trust of utility firms and the need for effective green energy guidelines for green power retailers (Boardman *et al* 2006, Graham 2006). Consumer confusion has been viewed to arise from both the lack of accurate and clear information and the overly complex regulatory frameworks surrounding green electricity provision and investment (see

Graham 2006, Boardman et al 2006 and Section 3, below). Additionally, trust concerns and a low public perception of the motivations of the electricity generators and distributors have also been associated with the low take up of energy tariffs. Illustrating the links between these trust, information and customer confusion issues, Boardman *et al* (2006), noted “*Consumers can be confused by spurious claims, misleading use of statistics and at worst mis-selling, either via advertising or direct marketing. The result has been a lack of confidence in the system, contributing to the continually poor uptake of green electricity schemes by domestic consumers*”. Recent focus group evidence from the UK (Ipsos MORI, 2008) has noted a broader range of barriers to the adoption of green tariffs, including the perception that they are costlier; lack of awareness of green tariff offerings; trust related issues; confusion related to tariff and generating technology choices and concerns about switching supplier. This research also found that consumers associated green tariffs with electricity from renewable energy.

To summarise, this international literature presents a consistent picture of an increasing willingness to pay for energy from renewable or green sources, and relatively low levels of take up of green energy tariffs offered by electricity firms in most nations. Some exceptions have been identified, including the Netherlands where take up of green energy tariffs is some 80 times greater than the UK. While some of this difference may result from cultural differences, this higher take up of green energy tariffs has also been linked with tax incentives and vigorous marketing by the electricity suppliers. The reasons for this miss-match between demand and take up of green energy are diverse, vary internationally and centre on consumer comprehension and motivations, the importance of firm marketing and tax incentives.

This study extends this current UK literature in a number of regards. Initially a national survey is employed for the first time, to assess the willingness to adopt green energy tariffs, the take up of these tariffs and the possible impediments to this adoption. Secondly, this data collection is also complimented by the use of a number of focus groups undertaken through the UK to further explore consumer views of the green energy market. Lastly, this work updates the previous survey evidence in this area.

3. The UK Green energy market

Any attempt to understand the UK's 'green energy' market requires consideration of a range of issues. Initially, the current level of renewable energy generation needs to be quantified. Secondly, a clear definition of what is a green energy product is required. This can be problematic as the UK green energy market has been characterised by product heterogeneity. Finally, in part due to this heterogeneity there have been growing concerns about the green energy market which has resulted in government-led consultations on green energy tariffs. These different concerns will be discussed sequentially.

3.1. Compliance with the Renewable Obligation

In the UK green energy tariffs are offered by the incumbent electricity distribution companies and a number of new entrants. These firms are committed under the Renewable Obligation to source 6.7% of all energy from renewable sources in 2006/7, rising to 15.4% in 2015/16 (DTI 2006, DTI 2007a). Within this system, most forms of renewable energy generation will lead to the issue of Renewable Obligation Certificates (ROCs). At present the level of generation of renewable

energy is far below that indicated by this system with England and Wales producing 68% of its requirement, Scotland 85% of its requirement, and Northern Ireland only 9% of its requirement (OFGEM 2007c and OFGEM 2007d). Overall, the UK Renewable Obligation for the year ending March 2007 is 21,629,676 MWh whilst the level of renewable production is 14,612,654 MWh, representing a 32% shortfall nationally. Currently the level of this shortfall in financial terms, assuming a buy-out value of £33.24 per shortfall renewable obligation certificate, is £233,245,811 for the entire UK (OFGEM 2007c, 2007d). This is known as the buy-out fund and it is re-distributed proportionally to holders of ROCs after the compliance date, thereby incentivising further investment in renewables.

These figures clearly indicate that on aggregate Renewable Obligation targets are being missed. Indeed the UK government has reported that electricity from Renewable Obligation eligible sources stood at around 4% of all UK production (DTI 2007a) in 2006, a figure significantly behind the 5.5% obligation for this year (OFGEM 2006). This considerable shortfall indicates most UK electricity distributors would find it difficult, if not find it impossible, to provide green energy tariffs derived from renewables to a substantial proportion of the UK population.

3.2. Current green energy offerings

To accommodate the low level of renewable energy supply, many UK electricity firms have issued green energy tariffs in a range of forms. Acknowledging this development, Energywatch (2007) categorise green energy tariffs in the UK into five broad categories, which suppliers market in combination or individually:

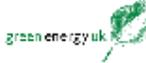
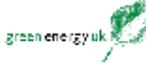
- **Green Source** (The energy supplier guarantees to buy between 10% and 100% of energy generated by renewable sources for every unit of electricity used by the consumer);
- **Green Source Large Hydro** (The supplier matches every unit of electricity used by the consumer with hydro-electric generated electricity);
- **Green Fund New Renewables** (Electricity may not be derived from renewable energy, yet funds are invested in renewable generation projects);
- **Green Fund Other Renewables** (These tariffs provide funds to support environmental causes or new research and development projects);
- **Carbon Offsets** (Supplier makes a donation to a carbon reduction project in the UK or internationally in order to offset the impact of the households' carbon footprint).

These green energy tariffs are generally regarded as being higher cost than the conventional tariffs. Recent evidence (Dale *et al.* 2004) supports the notion that the most competitive renewable energy source is wind energy, and this is around 5% more expensive than conventional forms of generation.

To illustrate the breadth of choice, variety and costs of green energy tariffs available to UK customers, available green tariffs in the Eastern region of the UK are shown in Table 1. The Eastern region for energy supply is one of twelve energy regions in the UK and is deemed to mirror the characteristics observed in the other eleven regions of the UK. Table 1 is based on a hypothetical customer supplied by the incumbent energy distributor in the Eastern region. The hypothetical customer has an NR4 postal code and an annual consumption of 3300 kWh, which translates into an annual expenditure on electricity of £332. He/she, according to a price comparison

website, UKGreenPower.co.uk, could switch to a green tariff and save money in five out of the ten tariffs available. Should customers in the Eastern region choose their green supplier at random they would on average pay a 2.1% premium, a figure consistent with past estimates of between 2% to 10% (Bird *et al.* 2002).

Table 1: Switching to a Green Tariff in the Eastern region¹

Supplier	Tariff	£ Annual cost	£ Saving	%
 Click Energy From British Gas	<i>Click Energy – Green Tariff</i>	262	70	21%
 npower	<i>Juice from Greenpeace & npower</i>	293	39	12%
 ScottishPower gas and electricity	<i>Green Energy H2o</i>	312	20	6%
 ScottishPower gas and electricity	<i>Green Energy Fund</i>	322	10	3%
 EDFENERGY	<i>Green</i>	329	3	1%
 ecotricity earth's natural energy	<i>Green - New (Wind Energy)</i>	342	-10	-3%
 ecotricity earth's natural energy	<i>Green - Old (Matched Energy)</i>	359	-27	-8%
 green energy uk	<i>Green Energy +10</i>	365	-33	-10%
 Good Energy 100% renewable electricity	<i>Standard</i>	401	-69	-21%
 green energy uk	<i>Green Energy 100</i>	404	-72	-22%
Average		338.9	-6.9	-2.1%

The degree of tariff heterogeneity in the UK has led to debate as to what is regarded as ‘genuinely’ green energy or a green tariff. This tariff heterogeneity has, however, been linked to the customer confusion and lack of trust (discussed in section

¹ Table 1 is adapted from results obtained on <http://www.ukgreenpower.co.uk>. Calculations were performed on July 31, 2006.

2) that appears to be contributing to the very large divergence between tariff take up and stated willingness to pay (Boardman *et al.* 2006, Graham 2006). These concerns have led to two recent government consultations (OFGEM 2005, OFGEM 2007b) on the green energy market.

3.3. OFGEM consultations on green energy offerings

The current consultation (OFGEM 2007b) is centred on a number of issues; namely, should there be new guidelines and should these be voluntary or compulsory; should they encompass non-domestic users as well as domestic users; how best can transparency be achieved; should there be an independent accreditation scheme; and most critically how, if at all, should guarantee of origin and additionality be provided? These last two issues are addressed in turn.

The guarantee of origin is concerned with ensuring that Green Source tariffs do in fact derive their electricity from renewables and that each kWh from renewables is sold only once. What is required, therefore, is a mechanism that ensures that for each kWh sold under such a tariff the supplying firm has sourced a kWh from renewables sources. A complication in the UK is the presence of three mechanisms of certifying renewable energy output that could be used to provide guarantee of origin. These three mechanisms of possible certification are: Renewable Obligation Certificates (ROCs), Levy Exemption Certificates (LECs), and Renewable Electricity Guarantee of Origin (REGO) certificates.

Owing to the existence of multiple certificates and the absence of compulsion to use one of them to provide guarantee of origin, there is the potential for double or triple counting of the environmental benefit of one unit of renewable output. Hence, a supplier could use the LEC for a business customer, the ROC to comply with the

renewable obligation and the REGO to guarantee origin for a domestic customer. Davenport (2004, p.4) provides a further relevant example noting that “[t]he key issue for LECs is that due to the detachment between the Domestic and the Business market, there is no overseeing body that checks that LECs are not used in both markets, potentially providing a “double” value to the holder”. Most industry insiders are adamant that these practices do not occur and OFGEM (2005, pp.21-31) lists relevant legal and regulatory safeguards deterring false claims by suppliers. However, even if these practices are not common, it is evident that the very possibility that they might be, has served to undermine market confidence.

In any event, most suppliers currently use REGOs to guarantee origin for their Green Source tariffs and, indeed, most responses to the OFGEM consultation seem to point to REGOs providing the preferred mechanism via which to ensure guarantee of origin. What appears to be missing in the current regime is a requirement to use REGOs for this purpose; such an obligation would ensure universality of participation that includes both domestic and business customers, thereby precluding the possibility of double/triple counting and engendering consumer confidence.

The issues related to additionality are more complex than those relating to guarantee of origin. The early concerns with additionality related to the interaction between the Renewable Obligation and green tariffs, with the government stipulating (DTI cited by OFGEM 2005 p.15) that green supply offerings “should not be used to meet a supplier’s costs in fulfilling their [Renewable] obligation but rather the intention is that any green tariff should lead to additional generation, over and above a suppliers obligation”. It is evident that this definition of ‘additionality’ came before the introduction of Carbon Offset and Green Fund Tariffs and that, originally, the government’s understanding of green energy equated to Green Source tariffs.

The rationale for providing a range of tariffs which differ markedly in their green credentials has been vigorously defended by the issuing firms. Defending the issue of providing Green Fund and Carbon Offset tariffs, Centirca (2007), a major energy generator, argues that guaranteeing supply as renewable is unnecessary; rather, what is needed is a voluntary accreditation mechanism for grading tariffs' 'greenness', irrespective of tariff type. This movement to a wider definition of green tariffs and additionality has also been supported by the regulator. OFGEM (2005, p.15), while acknowledging that Carbon Offset and Green Fund offerings fall outside the government's original definition of green supply, views these types of tariffs as green energy as there is "... provision of a clearly identified environmental benefit not directly related to alternative energy". Agreeing on mechanism to prove additionality under such a broad, heterogeneous and dynamic tariff structures will be extremely challenging, a point highlighted by the discussion that follows on the challenges of proving additionality for Green Source tariffs alone. It remains to be seen if a consensus can be reached on a system that simultaneously accredits the additionality of Green Source, Carbon Offset and Green Fund tariffs.

Most of the discussion surrounding proof of additionality for Green Source tariffs has centred on the Renewable Obligation and the related ROCs, given their potential to incentivise further deployment of renewables. Accordingly, one possible way of ensuring additionality would be to retire ROCs over and above the Renewable Obligation commitment. Since ROCs have a monetary value, their retirement will demonstrate an additional expenditure by the suppliers, since the suppliers can now not use that ROC to comply with the Renewable Obligation. The result will be that the supplier will either have to purchase an additional ROC in the open market or it will have to make an additional contribution to the buy-out fund in order to meet its

Renewable Obligation. Since the buy-out fund is re-distributed proportionally to holders of ROCs, the net effect of either option is to increase the value of ROCs. Since ROCs are issued with most forms of renewable energy generation, this price rise will have the effect of incentivising investment in additional renewable generating capacity. However, as noted by Tovey (2007), there is an important distinction to be made between direct and buy-out compliance with the Renewable Obligation, with those that meet their compliance largely via buy-out unlikely to be able to create tariffs that are meaningfully additional. For instance, in an extreme case, and assuming there is no obligation to guarantee origin, a supplier could buy ROCs to prove additionality for its green tariffs without having sourced any renewable energy as part of its fuel mix.

As was noted earlier in Section 3.1., aggregate direct compliance (as opposed to compliance via buy-out) is well short of Renewable Obligation commitment, meaning that the preponderance of large energy suppliers would be unable to construct meaningfully ‘additional’ green energy tariffs. A possible compromise suggested by Tovey (2007) would be that suppliers that are not below the industry weighted average of *direct* compliance would then be able to prove additionality via the retirement of ROC. Another related issue is how many ROCs should be retired since a number of the contributions to the consultation have noted that retiring 100% of ROCs to match the green electricity supplied would make these tariffs too expensive. Graham (2006, p.8), for example, estimates that for an average household, 100% ROC retirement would add around £200 to their annual electricity bill. Whatever percentage of ROCs are retired, it would seem vital that, in order to avoid a free rider problem, the percentage should be consistent across green tariffs or

differences should be reflected in some form of banded star rating system that would make up part of an accreditation scheme.

A good deal of work has already been undertaken in terms of understanding labeling/accreditation regimes: Bird *et al.* (2002), Boardman *et al.* (2006), Kåberger (2003) and Wüstenhagen *et al.* (2003). Thus, what appears to be missing from the UK green energy market is the confidence and certainty that would be achieved via a mandatory audited accreditation scheme encompassing all categories of customers (domestic and non-domestic). The accreditation system should stipulate that REGOs are the only accepted guaranteed of origin for Green Source tariffs with a transparent ownership register (Davenport, 2004) providing the confidence that sales are matched by an equivalent amount of REGOS. As noted earlier, this would preclude the possibility of double/triple counting and engender confidence in the market. The scheme should also ensure additionality for Green Source tariffs via the retirement of an agreed proportion of ROCs by qualifying firms (those that have a direct Renewable Obligation compliance over a set threshold).

In summary, the current UK mechanism for ensuring renewable energy investment relies on individual customers purchasing green energy tariffs, often at a premium price, and electricity generators fulfilling their obligations, under the Renewable Obligation. Insufficient levels of renewable energy generation indicate that most energy firms would be unable to offer a substantial proportion of customers a renewables-based green energy tariff. Further, many green energy tariffs have been offered by the energy firms which are linked only partially, if at all, to electricity generated from renewable energy. This practice has also been supported by the UK energy regulator. Subsequently, the link between customer consumption and consumers' desire to incentivise further investment in renewable energy is

increasingly opaque. Related concerns about the green market have resulted in a consultation that has centred on the issues of proving additionality and guarantee of origin. It is evident that a compulsory accreditation system that ensures guarantee of origin with REGOs and additionality with ROC retirements is required to engender confidence in the market. It is less clear, however, what proportion of ROC should be retired, pointing to the complexities of creating meaningfully additional tariffs under the ROC system.

4. Data used, forms of analysis and study findings of the study

The data for this study was provided by a national telephone survey, which was complemented with a number of focus groups undertaken between June and August 2003. These focus groups were conducted in London, Norwich, Leicester, Manchester and Aberdeen. While the survey and focus groups used cover a broad range of questions relating to energy use and environmental attitudes, evidence reported in this survey focuses on aspects of 'green' energy take up. To address this issue attention is placed on the reasons UK customers forward for changing their electricity supplier and what sources of information prompted them to undertake this action. The design of the survey questionnaire drew on the iterative process of examining past surveys of a similar nature, while reflecting contemporary energy policy concerns.

The sample to be surveyed was randomly selected from two large databases derived from the electoral roll, which included all persons registered to vote in the UK. This sampling population included a 'person' database containing details of 39,922,315 adults in the UK, and a property database containing 22,358,147 records on UK households. The contact sample included basic information, name, age,

address, telephone number, and a number of lifestyle variables collected by Claritas through its market research and modelling of the UK population. The survey imported 11,007 randomly selected contacts which were contacted by telephone. As some contacts required several attempts a total of 34,273 calls were made resulting in 8,006 contacts with individuals and 1,800 completed interviews.

While this process has been generally successful in providing a sample representative of the UK population, it is acknowledged that some biases were observed. Initially the sample is skewed towards older age groups with persons aged under 34 being under represented as 7% of sample respondents compared with 33% nationally. Second, the sample group contains 58% female respondents compared with 51% nationally. Third, a large proportion (46%) of the sample respondents own their home outright; a figure above the national average (27%). The sample is broadly representative of UK income.

The key findings from the national survey are presented in Table 2. Within Table 2 the willingness to pay for green energy is presented, together with the reasons forwarded for switching electricity supplier and the information which prompted the change in supplier. This information is used to aid understanding of why UK take up of green energy tariffs has been historically so low.

The survey indicates that 42% of respondents either agreed or strongly agreed with the statement “I would be willing to pay 5% to 10% more for ‘green’ electricity from a renewable source such as wind, hydro or solar power”. Though actual adoption figures for the UK in 2003, the year of the survey, are not available, the adoption can be implied from the survey to be around 0.3%. Further the key driver for UK customers to change electricity supplier appears to be financial with over 40% of the respondents reporting they switch to save money. The information that has prompted

such changes in electricity supplier appears to fundamentally relate to the marketing of the electricity tariff, where contacts with sales persons, particularly personal communication, appear to be the key driver when switching electricity supplier. Overall 59.3% of those who had switched supplier had been, in part, persuaded by some form of direct sales, thereby incurring no 'search costs'. Furthermore, anecdotal evidence would seem to show that the large incumbent suppliers' marketing of green tariffs has been limited. This raises the spectre that green energy tariff adoption has been low because the large incumbents have not marketed them aggressively.

To complement the survey a number of focus groups were undertaken. The focus groups were used to explore, in a more detailed fashion, issues raised within the survey. Focus group participants were gathered from the survey respondents and had expressed a willingness to be involved in further research. The focus group conversations were transcribed and all references and related associations to green energy were coded and analysed using a grounded theory approach through an iterative process of reading, coding and verification. Issues of concern are identified through this assessment, when these are discussed in the majority of focus groups (the one exception being the definition of green energy), and by more than one individual in each of these groups. Further emphasis has been placed on those topics which have been considered for a substantial portion of the focus group discussion. Key themes arising from these focus groups include cost, the marketing of energy tariffs and provision of information, inertia in switching decisions, the definition of green energy, and the trust in system of providing green energy. These themes are discussed in turn.

Table 2 Survey Findings

I would be willing to pay 5% to 10% more for green electricity		Freq.	% of sample
	Strongly Agree	229	15%
	Agree	315	27%
	Neither	404	22%
	Disagree	484	18%
	Strongly Disagree	276	13%
	Don't Know	92	5%
	Total	1800	
Reason for switching		Freq.	% of sample
To use a 'green' tariff		5	0.3%
To save money		754	41.9%
Because they offered a special tariff which was suitable for me		81	4.5%
Because I felt the supplier I switched to better suited my needs		53	2.9%
Because of poor service from my previous supplier		71	3.9%
Because I was fed up with my previous supplier		55	3.1%
Other		29	1.6%
To combine gas & electric suppliers		38	2.1%
Persuaded by Sales person		35	1.9%
Offered an incentive to move (points/airmiles etc)		8	0.4%
Total responses		1129	
Source of switching information		Freq.	% of sample
Information from salesperson at door		423	39.3%
Read leaflet		116	10.8%
Information from salesperson on phone		113	10.5%
Already used them before/Returned back to them		82	7.6%
Friend/family told me about it		72	6.7%
Saw an advert		70	6.5%
Approached by a salesperson whilst out		52	4.8%
Read article in newspaper/ magazine		37	3.4%
Looked them up on the internet		34	3.2%
Other		26	2.4%
Advice from independent company		24	2.2%
Already heard of them/Local suppliers		10	0.9%
Yellow Pages		7	0.6%
Energywatch		6	0.6%
Already supplied the house when we moved in		5	0.5%
Total responses		1077	100.0%

Cost: Cost has been a consistent issue considered in all the focus groups when discussing the choice of energy tariff. It has been generally agreed that cost is a very important issue for most people when choosing a particular energy tariff. Further it has been reported repeatedly that while environmental issues are important to most people, these concerns are often subsidiary to cost considerations. For example a Norwich participant indicated “...*the majority of people in this country would be more interested in saving money, than saving the environment.*” Further a limited number of participants indicated that the key to developing greater take up of green energy tariffs was the provision of financial incentives. Indeed, assessments of energy supply which were based on cost are considered by some participants to have a positive dimension as cost is readily comprehended. On this issue a Manchester participant indicated, “*I still believe cost is something that people can latch onto more easily than just about anything else. Lets see more information on the extent to which we could save money by reducing our energy use and then this might have a greater impact on the population as a whole*”.

Marketing: The marketing of green energy tariffs and provision of information was raised in most of the focus group discussions. In particular the perceived robust approach to selling energy tariffs, including persistent telesales and intrusive and aggressive tactics of doorstep sellers of electricity supply drew most discussion. Further the associated provision of information was raised as a concern in all focus groups. The principal elements of these discussions concerned the lack of easily interpreted metrics which were adopted by all market participants, the limited amount of easily understood information provided on company communications such as bills, and the confusing array of different energy tariffs. Specifically the limited ability to compare different energy tariffs and requirement to provide simple and easy

understood information was prominent in these discussions. For example a Norwich participant indicated: *“Getting comparative costs, it was difficult, they mix percentages with fractions, 30% of these does a quarter. They use over a five year period, over a three year and when it comes to energy supplies some quoted in therms, some in cubic metres, some in kilowatt hours, you have to do a lot of arithmetic and have more knowledge than I’ve got to make a like by like comparison”*. Further a participant from Leicester suggested types of information which would be more useful when assessing energy tariffs, indicating they *“Would like to see information on costs, paybacks and the environmental benefits as well. I don’t understand kWh and would find cost, simple units and units of CO2 saving useful.”*

Switching Behaviour: The issue of inertia when switching energy tariffs was raised within most focus group discussions with many participants indicating this was an impediment to the adoption of green energy tariffs. Key concerns raised in these discussions included the lack of perceived financial incentives to switch energy tariffs and the perceived high financial cost of switching energy tariffs. For example a participant at the Leicester focus group indicated *“I don’t think I would change because I’ve heard so many people who’ve changed their suppliers and had so much difficulty – I would stay the same even if there was a cheaper supplier.”*

Definition of green energy: This issue was only addressed substantially in the Manchester focus group, however, when asked what they thought of when someone mentioned green energy, all the focus group participants talked about some form of renewable energy, with all participants mentioning wind energy. A typical response was: *“Wind power, water power, wave power, biomass, whatever that is. I’ve seen fields of willow growing; I don’t know whether it’s going to be crushed and*

turned into petrol or burned and turned into electricity, and solar energy of course, a great giver of energy.”

Trust: The issue of trust in relation to the UK energy market was discussed in all of the focus groups. These debates considered trust from a range of perspectives. Initially most discussions indicated that the electricity suppliers are obligated to pursue shareholders interest which often conflict with the interests of customers or the environment. On this point a Norwich participant indicated *“I just think that the shareholder profits override green issues.”* This said, some participants, whilst often sharing similar attitudes indicate that they had trust in an energy supplier which had served them well in the past.

Further these discussions also considered other interested parties including concerned charities and environmental groups. These groups were generally rated to be marginally more trustworthy than the energy suppliers. Additionally most of the focus groups considered the role of government in the development of green energy. Most responses suggested the government had an important role in this process and the current efforts to ensure increased investment in renewable energy are closely linked to government actions. Further the commitment of government in the development of renewable energy was repeatedly questioned. For example an Aberdeen participant indicated they considered the government was *“... very half hearted about it. I don’t think they’re fully committed at all”*.

In summary the survey findings indicate a high willingness to pay for green energy and a low take up of green energy tariffs. These findings are consistent with previous UK and international evidence. Further the potential impediments to adopting green energy tariffs were explored using both the survey and focus groups. It was strongly indicated that the cost of such tariffs is a primary concern of most

potential customers. Further the marketing of these products, the provision of clear and comparable information, switching inertia and a low level trust in the system are all identified as impediments to the wider adoption of green energy tariffs.

5. Conclusions and policy implications

It is evident that, in the case of the UK, there has been quite a dramatic increase in the stated willingness to pay for renewable or green energy in the last decade. The current challenge for policy makers and energy companies alike is to transform this potential demand into actual adoption of green energy tariffs. This study indicates this development has been impeded by a range of factors including the low level of renewable energy supply, the cost of tariffs, the marketing and provision of information on green energy, switching inertia and the low level of public trust in systems designed to provide renewable energy.

There are a number of relevant points that arise from these findings. It has been previously demonstrated in nations where take up of green energy has been high that cost, rigorous marketing and the availability of renewable energy are key factors in ensuring increased take up of green energy tariffs. Further the current low level of public trust in this system indicates that reform to the current UK system of ensuring increased investment in renewable energy may be required.

In light of these findings, a number of market failures need to be addressed to achieve greater take up of green energy tariffs and consequently greater investment in renewable energy. These failures include the shortage of supply, the definition of green energy products and regulatory treatment of this sector. They are discussed in turn.

Initially, shortages in the supply of renewable energy and the resultant pent-up demand are holding back green energy tariff-induced investment in renewable energy projects. Indeed these problems of low levels of supply were predicted on the eve of the launch of the Renewable Obligation (Smith and Watson 2002). Key amongst these problems are weak incentives for emerging renewable technologies such as tidal power, difficulties in obtaining planning permission, the favouring of incumbent fossil fuel generators within the operating rules of the wholesale electricity market, and technical and institutional problems when connecting renewable energy to electricity networks.

These problems are acknowledged by the recent UK government White Paper (DTI 2007a) though it is questionable how quickly these constraints will be alleviated. For instance, the first of these issues - the weak incentives for emerging renewable technologies under the Renewable Obligation - is to be confronted with forthcoming legislation on the 'banding' of the Renewable Obligation, thus giving proportionally more ROCs to emerging than to established technologies. However, this development is still subject to a statutory consultation, parliamentary review and is contingent on obtaining State Aid approval from the European Commission. Therefore, changes are unlikely to be implemented before 2009 (DTI 2007b), nearly a decade on from the launch of the Renewable Obligation. This must be contrasted with the high levels of renewable energy (principally wind energy) installed over the last decade by countries such as Denmark, Germany and Spain under regulatory regimes centred around feed-in-tariffs (See Soderholm and Klaassen, 2007)

While customer adoption of green energy tariffs appears to have the potential to contribute to the considerable expansion of renewable energy generation in the UK, it is evident that the initial provision of renewable energy is a precursor to the

adoption of green energy offerings. Green supply tariffs may also be an important tool because they offer the potential to reconcile conflicting goals of energy policy. Green tariffs can play a part in solving the conundrum of having affordable energy and protecting the most vulnerable consumers, while at the same time helping to pay for the required investment in renewables, since those consumers that can afford to, and are so inclined, can help contribute to this investment by choosing such tariffs. If green consumers are to play such a role in the UK, a dual approach of addressing the impediments to renewables diffusion on the supply side, together with tackling the markets failures on the demand side, is needed. A recent review of the German green energy market experience by Wüstenhagen and Bilharz (2006) points to the importance of tackling the supply side as a precursor to major efforts to promoting the demand-side. In an industry where capacity can take years to implement, such an approach would have been preferable in the UK. This point was re-iterated in the Dutch experience, where very high adoption rates of green tariffs resulted in utilities importing renewable energy rather than substantially increasing domestic generation (van Rooijen and van Wees 2006).

A second concern is the current definition of green energy tariffs and the proliferation of different types of green energy which include tariffs linked and not linked to renewable energy. In particular the innovation of ‘Green Fund’ and ‘Carbon Offsets’ energy tariffs would appear to have added to customer confusion. This point raises concerns for two reasons. Initially this proliferation appears to be linked with the lack of renewable energy supply. Secondly these tariff innovations appear to fail to meet the ‘customer expectation test’, namely and as noted in the focus group results, it appears that consumers associate green energy tariffs with the supply of

energy from renewable sources. It follows, therefore, that the ‘customer expectations test’ can be seen as the direct linking of the guarantee of origin and additionality tests.

Since Ipsos MORI (2008) also found that consumers associate green energy with electricity from renewables, there is mounting evidence to support the notion that a ‘customer expectation test’ leads to the proposal that ‘Green Source’ tariffs should be the only accredited green tariff in the UK. Further support for this proposal arises from a range of observations. First, recent US evidence has indicated consumers are sensitive to definitional differences: Borchers *et al.* (2007) found that willingness to pay differed for different types of renewable energy, with consumers reporting much higher willingness to pay for electricity generated from solar and wind than from biomass and farm methane. Second, nations where adoption has been most successful have tended to be countries where the product offering has been singularly or principally Green Source tariffs (Bird *et.al* 2002). Third, it is not clear why Carbon Offsets and Green Fund tariffs are best delivered by electricity distribution companies. Consumers would presumably be better off switching to the lowest cost conventional tariff and voluntarily contributing to a renewable investment fund. Indeed it is not clear how bundling electricity derived from non-renewable sources with carbon offsets and green fund investment vehicles is benefiting consumers.

Fourth, both the Energy Saving Trust and Friends of the Earth have in the past stopped running rating/accreditation services, with the latter blaming the growing complexity of tariffs for making it too complex and expensive to administer the scheme. Currently, there is no such scheme, though there is the desire to establish one under the guise of the current consultation process (OFGEM 2007b). However, any new scheme is likely to face similar challenges to those experienced by the Friends of the Earth scheme and, in any case, it is increasingly clear that the variety of views

expressed in the consultation means there is unlikely to be a stakeholder consensus on the nature of a new scheme. OFGEM attempted to achieve this consensus in a recent proposal (OFGEM 2007e). The proposal includes continued support for non-renewables based tariffs and a belief that a voluntary accreditation scheme can deliver consumer confidence. These recommendations clearly contradict the evidence presented in this paper and have attracted the ire of independent stakeholders (see for instance WWF-UK 2008). OFGEM now state that they will not publish new green marketing guidelines until the summer of 2008 and they acknowledge that any new certification scheme is unlikely to be in place before the end of the year (OFGEM 2008).

Finally, Green Source tariffs are the tariffs that best fit the consumer solution to helping fund renewable investment. It is clear from the government's original definition of Green Supply (OFGEM 2005; p.15) that the purpose of these tariffs was to allow consumers to contribute to the investment in renewable energy via encouraging additional electricity consumption from renewable energy sources. Broader definitions of green supply may contribute to consumer confusion and weaken the link between consumption and investment in domestic renewable capacity. Indeed, the role of the UK energy regulator OFGEM in this market has been of particular concern. The regulators support for hybrid forms of green energy tariffs appears to act contrary to the aims of UK energy policy.

In sum, establishing confidence in the UK's green energy offerings will require a number of steps, including implementing a compulsory, preferably government run (Boardman *et al.* 2006, p.7), accreditation or certification system that is appropriately audited and in which guarantee of origin, additionality and 'customer expectation' tests are passed. Consumers need to be confident that green energy tariffs

are what *they* think they are; consequently the evidence presented here and in other recent research (Ipsos MORI 2008) suggests that only accredited green tariffs in the UK should be those that derive their electricity from renewables. Furthermore, previous commentators have indicated a mandatory government-sponsored and appropriately audited accreditation scheme is regarded as an important step in developing green energy markets (Bird *et al.* 2002; Boardman *et al.* 2006). As noted above, OFGEMs consultations and deliberations on the UK green energy market that started in 2005 will now drag on well into 2008. With concerns about the functioning of the market dating back to at least 2004 (Davenport 2004), government intervention to re-define and regulate the UK green energy markets in the interest of consumers and energy policy seem increasingly overdue.

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