DISCUSSION PAPER

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The Brattle Group

Energy Efficiency: The Belle of the Ball in Bali

The Role for Energy Suppliers

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Speaker after speaker at the United Nations Conference on Climate Change in Bali last December insisted that energy efficiency was the key to meeting the UN's targets for early and sharp reductions in greenhouse gas emissions. However, energy efficiency has failed to deliver promised savings in the past, especially amongst smaller customers. What explains this past failure and what must be done to succeed this time?

This paper explores an important reason why energy efficiency has delivered less than expected results in developed countries. The reason is that electricity and gas retail suppliers often have a clear incentive to promote increased consumption of energy, as opposed to having an incentive to promote energy efficiency. One way forward is to give them an incentive to promote, or at least not discourage, energy efficiency.

Can energy suppliers realistically be the agents of change? A growing number would like to be. Whether they want to play this role or not, emerging policies in the United States and the European Union aim to give them a central role in the promotion of energy efficiency. Where energy suppliers do not promote energy efficiency effectively, regulators are threatening to impose penalties. In the U.S., some states have created publicly-owned energy efficiency companies to replace electric utilities in the role of promoter of energy efficiency.

This paper offers guidance as these new policies are being designed and helps explain their implications for energy suppliers.

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Section 1 explains the importance of improved energy efficiency.

Section 2 discusses a number of reasons why energy efficiency has not delivered on its promise in the past, especially for smaller customers in developed countries.

Section 3 describes some disconnected and early reforms in the U.S. and the E.U. that aim to make energy suppliers the promoters of energy efficiency among small customers. There is no single model that applies to all cases. What is needed, and offered here, are economic regulatory guidelines that can be applied in specific circumstances.

Section 4 offers conclusions and recommendations concerning public policy and forward-looking corporate strategy to facilitate the transition to more intelligent consumption of energy.

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Section 1 | THE IMPORTANCE OF ENERGY EFFICIENCY

Energy use can be reduced through energy conservation, which involves using less energy to obtain a lesser service, for instance by turning down the thermostat. Another important source of energy savings, and the focus of this paper, is improved energy efficiency, which involves using less energy to obtain the same level of service, for instance by installing insulation or double glazing.

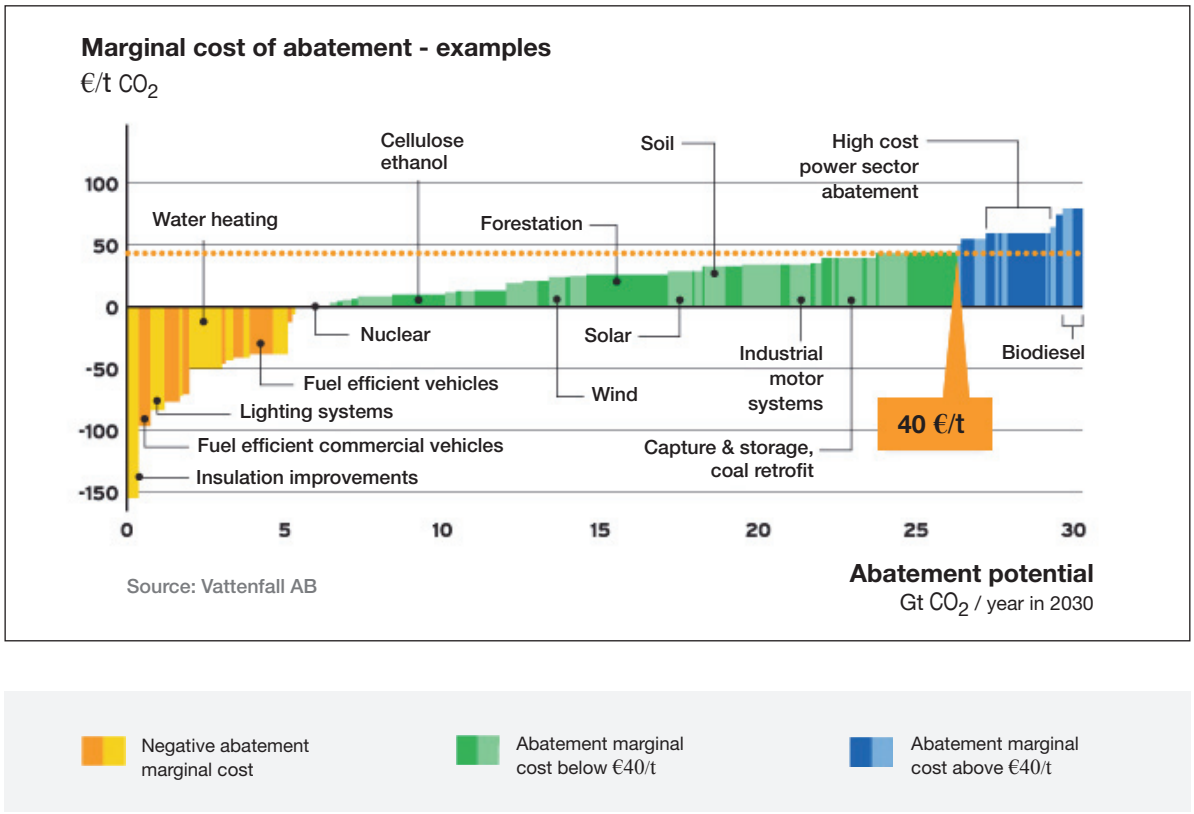
Improved energy efficiency is the single most important way to reduce emissions in the short term. The International Energy Agency (IEA) forecasts in its Reference Scenario that energy-related CO_2 emissions will increase 57% by 2030. In their Alternative Policy Scenario, where IEA governments are assumed to adopt least-cost measures to cut emissions, improved end-use efficiency accounts for two-thirds of avoided emissions in 2030.[1]

One of the quandaries in developed countries is the comparative expense between improving energy efficiency in existing structures and equipment versus new construction and equipment. For example, retrofitting a home or commercial building to achieve any given level of energy consumption per square foot is typically much more expensive than erecting a new building subject to that same constraint. Given the relatively slow rates of growth, and thus of new building construction, in developed countries in comparison to developing countries, the much bigger bang for the buck, i.e., marginal efficiency of investment, is in developing countries.

1. Paul Waide, *International standards to develop and promote energy efficiency and renewable energy sources*, International Energy Agency, WEC 2007 session on International Standards for Energy Efficiency and Renewable Energy Sources, Rome, 12 November 2007.

In developed countries, energy efficiency is nevertheless one of the cheapest ways to reduce CO_2 emissions. The Vattenfall graphic (Figure 1) shows that the most significant low- or no-cost opportunities, at least in developed countries, lie in the residential and commercial sector; for instance in insulation, lighting systems and water heating. Therefore, in developed countries, it makes sense to focus on improving the energy efficiency of those customers.

Figure 1 GLOBAL COST CURVE



To get an idea of the potential to improve energy efficiency, consider that California's energy consumption per capita has stayed approximately constant for about 30 years, while average U.S. consumption rose 50%.[2] Energy efficiency is only one of the reasons for the flat energy consumption per capita in California. Total industrial energy consumption was virtually unchanged, which reflects a change in the structure of the economy towards services. Nevertheless, by comparison to other states, California's record on energy efficiency improvements is very good.

2. *Promoting Energy Efficiency Investments, Case Studies in the Residential Sector*, OECD/IEA and AFD, 2008, page 106. Energy efficiency is only one of the reasons for the flat energy consumption per capita in California.

Section 2 | DÉJÀ VU – HAVE WE NOT BEEN HERE BEFORE?

Political enthusiasm for energy efficiency is not new — it was very much in fashion after oil prices rose in the 1970's. Indeed, energy efficiency improved quite dramatically in response to two factors: policy measures, e.g., CAFE standards, and energy price increases. The results lowered energy consumption and CO_2 emissions below what they would otherwise have been, and thereby somewhat postponed their climate change consequences. According to the IEA, annual energy use in the main IEA countries is now 56% lower than it would have been without the savings that were realized as a result of the measures introduced after 1973.[3]

However, when world energy prices in real terms began to decline in the 1990's, the beneficial effect of earlier policies was offset by the increased demand resulting from lower energy prices, which still did not reflect environmental externalities. Furthermore, governments devoted fewer resources to promoting energy efficiency and more to promoting liberalisation, which drove down energy prices even further. Since 1990, the rate of efficiency improvement in IEA countries has been lower than in the two previous decades.

This raises an important question: in the absence of a policy environment that positively and consistently favors improvements in energy efficiency, will the market deliver the energy efficiency savings modelled by engineering studies, such as the Vattenfall study summarized in Figure 1? Those models show that improved energy efficiency provides the lowest marginal cost of CO_2 abatement and that the marginal costs of many energy efficiency initiatives are lower than the marginal economic benefits, even before adding in the cost of CO_2 externalities. Furthermore, this net benefit rises along with energy prices. Still, many customers do not take advantage of these apparent and growing net benefits. To address this, policies must distinguish between different consumers.

At one extreme, large energy consumers are usually able to see and exploit the potential benefits of energy efficiency investments, even more so as energy prices rise. In some cases, governmental subsidies or tax incentives are used to improve the economics of various energy efficiency investments.

At the other extreme, small- and medium-sized enterprises and domestic customers do not so readily pursue the opportunities for energy efficiency savings. This is where direct regulatory intervention has a greater role to play and where regulators are assigning a role to energy suppliers to promote energy efficiency.

There are at least two possible explanations for why these smaller customers do not invest in what would appear to be economic energy efficiency improvements. One is that the real potential for economically attractive measures is lower than studies have predicted, perhaps due to transactions or other costs not reflected in the engineering studies. A second

3. *Promoting Energy Efficiency Investments, Case Studies in the Residential Sector*, OECD/IEA and AFD, 2008, page 19.

is that one or more of the following barriers hinder investing in economically justified energy savings:

- *Inadequate information about the economic benefits of efficiency investments.*
- *Split incentives, for example between the landlord who would make the investment and the tenant who would benefit but does not realize it and is therefore unwilling to pay a higher rent.*
- *Financial limitations, such as budget constraints. Energy efficiency improvements are only one of many possible investments and they may not always have a rate of return as high as other investments.*
- *Higher internal discount rates than used in the engineering studies.*
- *Risk aversion.*
- *Energy prices that do not reflect the full costs, including environmental externalities, of energy.*

To overcome these problems for smaller customers, government codes and standards for appliances and buildings have been shown to produce major efficiency gains. The California Public Utilities Commission argues that building and appliance efficiency standards are largely responsible for limiting electricity-related CO_2 emissions in that state.[4]

Many countries have adopted climate change and energy policies that place increasing emphasis on energy efficiency and especially on standards. For instance, the E.U. policy to save 20% of energy by 2020 puts significant emphasis on appliance, equipment, fuel efficiency and building standards, as well as on education and the use of fiscal instruments to promote energy efficiency investment.[5]

This leads to two further questions: (1) Will policies of this kind be implemented on a sustained basis or fade away as in the 1990's; and (2) Are there other important policies that will address the problem of energy inefficiency among small customers?

Regarding the first question, the answer is almost certainly yes, they will be sustained. Given that oil prices are hovering around $100/barrel and that there is widespread and continuing concern about energy security and climate change, governments in the major consuming countries are likely to put more, not less, emphasis on energy efficiency.

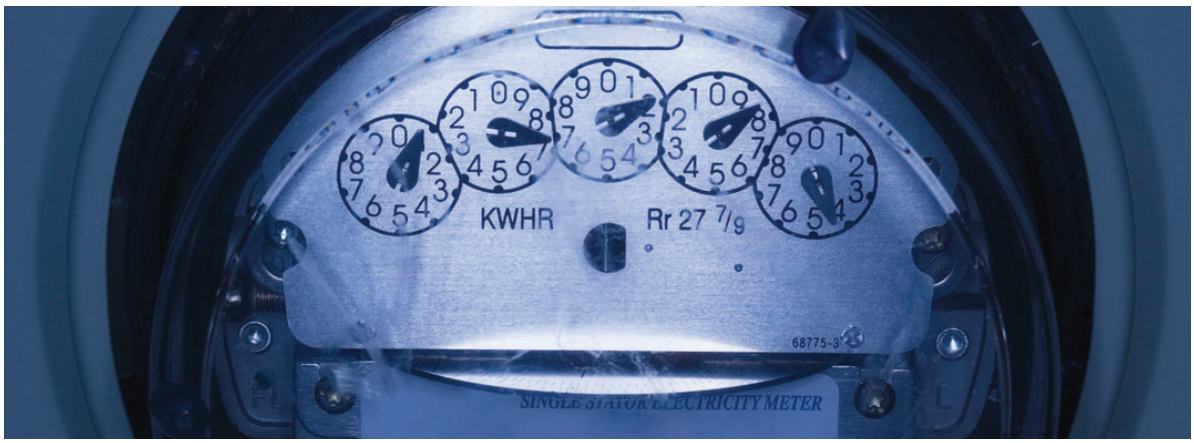
As to the second question, there are two important sets of policy measures that deserve more attention. The first is to ensure that customers see and can respond to prices that fully reflect the marginal costs of energy, including the cost of CO_2 emissions. Prices that are below those costs encourage excess consumption and weaken the incentive to invest in energy efficiency.

The second set of policy measures that deserve greater attention is that of the incentives facing energy supply companies and their shareholders. A number of policies designed with the best of intentions to promote energy efficiency have been promulgated in various jurisdictions in the E.U. and the U.S. A sample of these measures is discussed below.

Unfortunately, many of these policies often are less than effective and, even where appropriate and useful, are often very specific to the jurisdiction in which they are being applied. Thus, following the presentation of the illustrative energy efficiency initiatives, we suggest some general guidelines for designing policies that are likely to be more broadly effective in promoting energy efficiency.

4. *Promoting Energy Efficiency Investments, Case Studies in the Residential Sector*, OECD/IEA and AFD, 2008, page 101. The OECD/IEA cites various CPUC reports.
5. European Commission, Directorate-General for Energy and Transport, Memo, October 2006. http://ec.europa.eu/energy/action_plan_energy_efficiency/doc/memo_en.pdf (accessed 3 April 2008).

Section 3 | CHANGING INCENTIVES FOR ENERGY SUPPLY COMPANIES



The problem

Energy supply companies traditionally have not had good incentives to promote improved energy efficiency amongst their customers. Intuitively, this is simple to understand: companies that make money selling energy do not have an obvious incentive to help customers consume less of it. Companies will usually find short term results negatively affected by a reduction in consumption. This is true for regulated (monopoly) energy supply companies and for competing retail suppliers in deregulated markets, although the particular disincentives are slightly different.

The problem for public policy is that these supply companies are in a pivotal position to influence their consumers to encourage an efficient use of energy, but are often not motivated to do so.

It is interesting to distinguish between competitive and regulated retail markets. In the latter, especially in the U.S., regulators set retail tariffs and are able to adjust the remuneration of the local utilities to encourage energy efficiency measures. In competitive retail markets, where competitive prices have replaced regulated tariffs (as in the UK), regulators do not have the tariff instrument and therefore tend to rely on other instruments, in particular: obligations, persuasion and penalties. With few exceptions, neither the regulated model nor the competitive retail model is working very effectively in promoting energy efficiency, largely due to poor incentives. Policy makers continue to search for a solution.

Regulated retail markets

In regulated retail markets, energy suppliers will usually benefit from selling more energy because of the economics of the sector and the design of utility regulation.

1. ***Loss of revenue***. Regulated electric and gas utilities face high fixed costs to build, operate and maintain their systems. If regulation requires them to recover their fixed costs through volume-related charges, lower consumption will, absent countervailing measures, penalize them by lowering revenue and profits. Energy efficiency programs are designed precisely to reduce consumption, thereby potentially lowering profitability.

2. ***Additional costs***. Investment in energy efficiency measures, e.g., installing meters, education and monitoring, will initially raise the supply company's

costs. Even if the investment will lower society's costs in the longer term — through lower consumption — the supply company would only make this investment if it had a reasonable prospect of full cost recovery.

3. ***Regulatory lag and second round price effects***. There is usually a regulatory lag (typically one or more years) before tariffs can rise to reflect reduced consumption and/or increased costs. During that period the utility has to live with lower revenues and/or higher costs. When tariffs do rise, they reduce consumption further. So the utility gets a double hit: first from the program directly reducing revenues and raising costs, and then through the reduced consumption resulting from the price effect. That is why it has been suggested that energy efficiency programs should be financed through changes in non-volumetric charges, i.e., customer and similar charges. The problem with this solution is the potential for a politically-sensitive impact on low-volume customers who are also low-income households.

4. ***Distribution effects***. Regulators are usually concerned about the differential impact on customers, such as the impact on low-income customers just described. Energy efficiency investments will typically not benefit all customers to the same degree; those that save energy will gain, but those that do not participate may have to pay higher tariffs, at least initially. Regulators are particularly sensitive to the reverse Robin Hood effect, poor customers financing the energy efficiency improvements of higher income consumers.

Deregulated retail markets

5. ***Retail competition incentives***. In deregulated retail markets, competing retailers may also have weak incentives to promote efficiency. These retail companies are built and raise capital on the business model of selling units of power or gas, not units of energy service. Their entire business model is based on growing sales, with positive margins. In addition, they have their own fixed costs, including customer information and billing systems, to recover through increased sales. By lowering sales, conservation and energy efficiency lower profits, raise average retail costs and postpone the point where the retail company breaks even.

In both deregulated and regulated retail markets, the owners of the distribution network assets face the same concern about fixed costs described earlier. They often have poor incentives to promote reduced consumption. This problem is especially acute where the revenues for the distribution network business (separate from retail) are determined on the basis of circulating energy, not by reference to the cost of fixed assets. If distribution network companies are themselves affiliated with retail companies, the incentive to encourage energy efficiency improvements is especially weak.

The poor alignment of incentives in regulated and deregulated markets discourages the promotion of energy efficiency. Energy supply companies have detailed information about customer usage and have direct contact with those customers. With the right incentives and skills, these companies should be able and willing to promote efficient energy use. Indeed, a growing number of supply companies are beginning to see the promotion of energy efficiency as a new focus of their corporate strategy and are seeking regulatory incentives that are consistent with this goal.

With the wrong incentives, however, supply companies in both systems are in a position to block progress. For instance, they can fail to pass on information to customers about opportunities to save energy, and generally hinder other energy service companies and competing suppliers from selling energy-saving products.

The challenge is to design a regulatory framework that at least neutralizes the supply company bias against improved energy efficiency, and preferably introduces incentives to promote efficient use of energy.

The beginning of the answer – examples from the U.S. and the E.U.

The potential for regulatory reform to promote energy efficiency is significant and we are just beginning to understand the range of possibilities. There is no model that applies to all circumstances. The following is a brief summary of some of the early measures being introduced in the U.S. and the E.U. At the end of the section we suggest some guidelines that can be used to assess and design policies, and fine-tuned to specific local circumstances.

United States

In the U.S., regulatory reform usually involves adjusting the methods for setting the allowed rate of return on investment for regulated utilities. Examples of reforms include:

1. *Decoupling*: This separates a utility's fixed cost recovery from its sales so as to guarantee fixed cost recovery if sales decline because of improved efficiency. Utilities are more likely to invest in efficiency measures if they do not sacrifice the recovery of fixed costs they have already incurred.

2. *Split savings*: This allows utilities to share the net benefits of any customer energy savings with their shareholders, and thereby gives the utility an incentive to encourage energy efficiency.

3. *Payment of avoided costs*: The utility avoids building a plant and is permitted to be paid, for each kWh sold, most of the avoided costs of supply.

4. *Bonus return on equity on capitalized energy efficiency investments*: The regulator capitalizes the energy efficiency expenditures as a regulatory asset, which then earns the allowed return on equity, sometimes at a higher (bonus) rate of return.

5. *Integrated resource planning*: Resource plans are increasingly looking beyond traditional generation resources to now include energy efficiency, demand response and renewable energy. Resources are evaluated against both cost and environmental objectives, in part by considering likely future carbon allowance prices. In the majority of states, utilities remain vertically integrated, and they must submit resource plans to their state commissions periodically. However, even where utility planning was replaced by market-based provision of electricity supply, resource planning has been reinstated.

6. *Energy efficiency utilities*: In some states, policy makers have decided to create energy efficiency utilities. For instance, Efficiency Vermont is a non-profit entity that provides technical assistance and financial incentives to Vermont households and businesses in order to help them reduce their energy costs with energy-efficient equipment, lighting and approaches to construction and renovation.[6] This organization is funded by an energy efficiency charge on electric bills in Vermont and has replaced most electric utilities in the state in the provision of energy efficiency services.

This is a significantly different model than those described above and effectively amounts to a political decision to take energy efficiency out of the hands of utilities. The move towards non-profit energy efficiency utilities suggests disappointment with the traditional utility approach to energy efficiency.

6. About Us – Efficiency Vermont. http://www.efficiencyvermont.com/pages/Common/AboutUs/ (accessed 3 April 2008).

European Union

In the E.U., where all customers have the right to choose their retail supplier,[7] regulatory reform has focused on: (a) giving obligations to retail suppliers or distribution network companies, (b) creating secondary "white certificate" markets and (c) influencing customers directly. Examples of these reforms include the following:

1. ***Obligations on energy suppliers***. The Energy Efficiency Commitment[8] obliges competing energy suppliers in the UK to undertake energy efficiency measures, such as the installation of insulation and double glazing, with at least 50% aimed at poor households. Failure to do so could lead to penalties for retailers. Assessments of this policy suggest that it has delivered savings, but less than expected given the level of investment. Compliance is measured on inputs, e.g., number of houses insulated, rather than outputs (energy or CO_2 saved) and investments are apparently not converted into the expected savings.

2. ***White Certificate Markets***. White certificates certify that a certain amount of energy reduction has been obtained. To hold the required volume of certificates, retail companies can act alone or in partnership to support customer investment in efficiency projects, or buy certificates from registered vendors of efficiency products. Energy savings are thus expected at the lowest possible cost. White certificates exist in the UK, Italy and France and are under consideration in Denmark and the Netherlands. The level of trading in white certificate markets is quite limited thus far, but the potential is quite large.[9]

3. ***More with less***.[10] The Netherlands is introducing a new policy to improve energy efficiency in homes. Energy retailers and builders will actively promote energy efficiency measures to households, such as loft insulation and high efficiency boilers. Energy companies will make it easier for customers to calculate and see the net value of efficiency investments. Customer bills will reflect estimated energy savings immediately, whereas normally customers would have to wait a year until consumption had actually fallen. Although there are targets, this scheme is voluntary and, at least initially, there are no explicit penalties.

4. ***Smart meters***. Smart meters send price signals (when markets generate them or regulators differentiate prices by time of day or season) to enable customers to save money by changing their consumption patterns, and are generally believed to lower consumption.[11] In some countries, governments oblige retailers and/or distribution network owners to install smart meters and/or information displays to give customers more information about their consumption. In others, the government favors a fully competitive market for metering, with customers choosing the meter of their choice (usually from a retail company that offers a supply contract as well).

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7. The "right" to choose a retail supplier does not always mean that customers have much of a choice. In some countries, for instance, the retail tariffs are substantially lower than the full costs of supply, so there is no incentive to leave the tariff and no effective retail competition.

8. For a description of this policy, see Carbon Emissions Reduction Target April 2008 – March 2011, Consultation Proposals, May 2007, http://www.defra.gov.uk/corporate/consult/cert2008-11/consultation.pdf (accessed 3 April 2008). For a critical assessment of this program, see *Climate change: the citizen's agenda*, Eighth Report of Session 2006-07, House of Commons: Environment, Food and Rural Affairs Committee, Volume I, 23 July 2007, pages 34-38.

9. *Promoting Energy Efficiency Investments, Case Studies in the Residential Sector*, OECD/IEA and AFD, 2008, page 134.

10. www.meer-met-minder is the Dutch website. The latest news is that the Dutch are doing about 30 trial projects in 2008. This experience will be used for the full program in 2009. By 2011, they hope to have installed efficiency measures in 210,000 to 300,000 homes.

11. The impact of smart metering on energy consumption remains unclear. Proponents argue that it can achieve very significant reductions (on the order of 10%), while others believe the effect is much smaller (1-2%), or even that smart metering can increase consumption and emissions. The UK energy regulator Ofgem is currently conducting a very large-scale trial involving 23,000 households over two years, which should provide valuable information.

5. ***Customer focused approaches to CO_2.*** Another approach is to give customers a direct incentive to lower CO_2 emissions. In the UK, one proposal would give each customer a CO_2 emissions target and make customers responsible for meeting that target. If they stay below the cap, they can sell the emission rights to others, and if they exceed the limit, they must buy emission rights from others, or pay a penalty. Energy suppliers (and others) may manage the accounts for their respective customers and share in any savings.

This list is not exhaustive, but it provides an idea of the direction of change. However, there is no approach that applies in all circumstances. In view of this, below we propose some guidelines for designing and assessing new regulations of this kind and for ensuring that they suit the local conditions.

Suggested guidelines to provide incentives for energy suppliers to promote energy efficiency

1. ***Regulatory policy should start by getting energy prices "right"***. In a competitive energy market with a parallel CO_2 emissions market, retail energy prices will normally reflect the underlying wholesale prices of energy, including the market prices for emissions. In a regulated market, tariffs should reflect those same cost concepts, whether based on short-term markets (where they exist) or estimates of marginal costs. Regulated tariffs that do not reflect these costs will discourage efforts to improve energy efficiency. This is a problem in the U.S. in particular because there is no market price (or market) for emissions.

2. ***The regulator must ensure that the economic benefits of the proposed efficiency measure outweigh the costs to society***. Environmental benefits need to be included explicitly in the analysis. This raises a number of questions, including what price of carbon to use in the calculation, and whether there are other specific social objectives or constraints. The UK, for instance, uses a "shadow price of carbon" that is above the current market price in order to inform the cost benefit analysis.[12] The UK also aims to promote energy efficiency among the poorest members of the population.

3. ***Where possible, utilize measures that show success in reductions actually achieved, that is, "outputs" rather than "inputs"***. Measures are more effective when they focus on outputs, such as reduced CO_2 emissions, rather than inputs, such as installation of insulation. This suggests the need to monitor and evaluate the measures to determine whether they are achieving the estimated levels of improvement and, when not, finding out why not.

4. ***Provide incentives to keep the economic costs as low as possible***. Typically, a measure that promotes competition is likely to drive down costs. The use of secondary markets, such as the white certificates market, is one mechanism. In such a market, a company with a high cost of achieving energy saving among its customers can purchase certificates from companies that are more efficient. Where there is no competition, other incentives may be required to keep costs as low as possible.

12. The Social Cost Of Carbon And The Shadow Price Of Carbon: What They Are, And How To Use Them In Economic Appraisal In The UK, Economics Group, Defra, December 2007, http://www.defra.gov.uk/environment/climatechange/research/carboncost/pdf/background.pdf (3 April 2008).

5. ***Measures should encourage companies to accept or promote ambitious targets and experimentation, rather than encourage conservatism***. A policy that penalizes not meeting targets, but that does not reward exceeding them, may encourage conservative forecasts and measures. This is indeed one of the most difficult policy challenges of all. Reviews of the UK Energy Efficiency Commitment have been critical because the targets have been considered too conservative.

6. ***Regulators should better understand energy consumer psychology***. Regulators should encourage experiments as part of a pragmatic, evidence-based approach to finding policies that encourage efficiency. Economists understand that individual economic behaviour can depend on complicated psychological mechanisms. Policy should allow for this by using the same kind of techniques that advertisers and marketers use to affect consumer choice and behaviour. Empirical techniques include detailed statistical analysis (discrete choice modelling) and focus groups.

7. ***The assessment should consider how the proposed efficiency measures will affect the distribution of costs and benefits over time***. It is important to model the cash flows of the energy supply company and the impact of changing prices on the consumption of participating and other customers. Given the importance of shareholder incentives, it is especially important to model the impact on the risk and return facing those shareholders.

8. ***Any program that is implemented by a utility will require some form of monitoring and evaluation***. A mechanism is required that holds energy suppliers to their goals and rewards them appropriately. Monitoring and evaluation requires knowing what is out there now, which few energy suppliers or regulators do. One of the first steps is simply gathering data to understand the state of building and equipment stock, in order to develop an appropriate baseline against which to evaluate the success of the programs.

In addition, the monitoring and evaluation needs to understand how the technology has operated, but it also needs to understand the customer component. For example, if a program has not met its market penetration goals, consumers need to be contacted, using surveys and focus groups to find out why it has not. If a technology is not producing the results it is supposed to, again, there needs to be an analysis of how consumers have used the technology to understand why. One of the failures of past energy efficiency programs has been the neglect of the user component in their assessments and an understanding of how to modify those programs in the light of such information.

Section 4 | CONCLUSIONS: A WAY FORWARD

The aim of this paper has been to examine how policy makers and regulators are promoting energy efficiency among smaller customers by changing the incentives faced by energy suppliers. This raises some wider questions, which have implications for policy makers and energy supply companies.

First, policies for promoting energy efficiency through energy suppliers are very different in liberalised retail markets than in regulated ones. Under the U.S.-style rate-of-return regulation of re-

tail tariffs, regulators adjust the method for setting tariffs to provide incentives for local utilities to promote energy efficiency. This provides a degree of flexibility to U.S. state regulators.

In competitive retail markets, on the other hand, the regulator loses this regulatory instrument and has to rely on other tools to encourage energy suppliers to promote energy efficiency. These instruments include persuasion in some cases, but in other cases policy makers are introducing obligations along with the threat of fines or withdrawal of licenses for non-compliance.

Second, there is a growing concern in the U.S. that regulated energy utilities are not delivering the necessary efficiency improvements in a cost effective manner. In some cases, policy makers have chosen to bypass the traditional energy utilities and their regulators by creating new publicly-owned energy efficiency utilities, e.g., Vermont. This latter trend is a challenge to the traditional energy utilities and to their regulators to devise more effective ways to promote energy efficiency.

On the other hand, some states have been successful in providing incentives for their utilities to promote energy efficiency. The California Public Utilities Commission, for instance, allocates about 83% of its funding for energy efficiency programs to utility programs and has designed incentive mechanisms that aim to protect utilities from the potential downside of improved efficiency.

Third, in countries that are committed to liberalised (deregulated) retail markets, one of the great challenges is to make liberalisation compatible with the promotion of energy efficiency and other environmental objectives. In the U.S., as environmental concerns have grown, regulators have re-regulated some retail markets, reducing customer rights to seek alternative suppliers, partly to provide certainty of cost recovery for utilities that are introducing energy efficiency programs. Does improving energy efficiency among small customers lead inexorably to re-regulation? It would seem not.

New environmental challenges are, rather, a commercial opportunity for forward-looking energy supply companies in liberalised retail markets. If these companies are able to understand what customers truly value, and price and sell services accordingly, they may well find that it is profitable to promote energy efficiency. Indeed, some energy suppliers have adopted this approach on the grounds that customers are loyal to energy suppliers who encourage energy efficiency and promote responsible consumption. Some retail suppliers in Europe see the provision of smart meters as a way to capture and/or retain clients, much as the ADSL modems have become a way to capture telecom clients.

One way forward for supply companies is to test their markets, using statistical techniques that reveal how much customers value different characteristics of the products they buy. They might test the proposition that customers are willing to pay more for energy, provided the energy supplier advises them on how to consume it more efficiently and gives them the means to do so.

Fourth, the issue of efficient price signals is central. To promote energy efficiency, prices should reflect the underlying marginal costs, including the cost of environmental externalities such as CO_2 emissions. Furthermore, customers need to see those signals, e.g., through smart metering. Otherwise, customers make inefficient investment and consumption decisions – in particular consuming too much if prices are too low.

Efficient signals are possible under tariff regulation, but regulators are often reluctant to pass on these signals, especially when there is no market price for important externalities like CO_2. If there were a market for CO_2 emissions in the U.S. and utilities were paying for their emissions, then the utilities would insist on passing the cost on to their clients.

Likewise, in a competitive retail market with a parallel CO_2 emissions market as in the E.U., electricity price signals should reflect underlying costs. Unfortunately, regulators are also reluctant to let these price signals reach customers, instead offering below-cost tariffs. These subsidised tariffs undermine liberalisation, and discourage retail competition (if they do not kill it) and investment in energy efficiency.

The wider question is how to ensure that, this time, we succeed in realizing the potential to reduce energy consumption and CO_2 emissions through improved energy efficiency. Broadly speaking, policy makers have thus far concentrated on codes and standards for appliances and buildings, on information campaigns and on overcoming various barriers to investment. While these are necessary measures and have helped to create a market for companies specializing in energy efficiency, it seems that the next and urgent public policy challenge is to change the incentives faced by consumers of electricity and their suppliers.

We should start by setting prices that reflect the full cost of supply, including CO_2 emissions, and ensuring that customers have the ability to respond to those prices. In addition, we should make sure that it is profitable for energy suppliers to promote the intelligent consumption of energy. Energy supply companies have more to gain than to lose by leading the way.

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