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Energy Efficiency in "Deregulated" Markets

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Energy Efficiency in Regulated and Deregulated Markets

1. Introduction and Thesis

The efficient use of electricity is a moral and environmental concern of contested economic validity. Opponents argue that the pursuit of energy efficiency is the pursuit of economic inefficiency. Proponents counter that the pursuit of economic efficiency in the electricity sector is an environmental disaster, due to market failures caused by environmental externalities and transaction costs. In the interests of brevity, this paper focuses solely on end use efficiency, not generation or distribution efficiency. This paper takes the position that there is merit in the pursuit of end-use energy efficiency measures in the electric sector (often called Demand Side Management, abbreviated to DSM). Energy efficiency measures can be effective tools to correct market failures and achieve environmental goals, both in regulated and deregulated markets. Although they are useful tools, energy efficiency measures are certainly not the only tools needed to correct these failures and achieve environmental goals.

This paper also explores the effect of the new deregulatory era on the achievement of energy efficiency, arguing that this worthwhile goal can and should be kept. The new deregulated environment has created a different market for electricity, but one that still has problems from an environmental and an economic point of view. An effective policy must provide incentives to the actors best suited to overcome market failures in the new regulatory environment, and must be developed in a way that harmonizes energy efficiency policy with new environmental policies (particularly the development of emissions trading markets and renewable portfolio standards).

Part Two of this paper defines energy efficiency. Although there are multiple conflicting definitions of energy efficiency, here the term is used here in a hybrid economic and environmental sense. That is, energy efficiency policies aim at setting social use of electricity at the level that would be set by consumers in a market where price reflects the true social cost of electricity in the absence of information and transaction costs. Since that price does not exist and likely cannot be ascertained precisely, energy efficiency measures seek to approximate that price and level of impact.

Part Three separates and identifies the relevant features of the regulated and deregulated eras. “Deregulation” does not signal the end of regulation in the electricity sector but instead represents a new regulatory regime that requires an end to vertically integrated electric monopolies to allow a greater degree of competition, particularly in electricity generation. Distribution is still monopolized, often operated by a regulated non-profit corporation, and retail supply is also monopolized in most American jurisdictions. Thus there is a substantial role for regulators in a deregulated electricity sector.   However, energy efficiency measures developed in the regulated past of the electricity industry require re-examination and change during the new era of deregulation.

After establishing what energy efficiency, regulation, and deregulation mean, Part Four examines the policy justifications for energy efficiency regulations. The underlying assumption of this section is that there has always been a role for environmental policy in the regulation of the electricity sector. Determining the optimal way to provide electricity has always been treated by our society as a multi-criteria problem because it is a political problem – the interests of capitalists, consumers, and those affected by the environmental disruption (air pollution, dams) of electricity production are in conflict. Environmental considerations have always been and will always be a part of electricity policy.

Most justifications for energy efficiency involve market imperfections, although energy security is often mentioned. But the core question of any electricity policy in a capitalistic society is the optimal price for electricity. In both a regulated and deregulated market, private actors will step in, where there is sufficient profit, to pursue energy efficiency measures. Thus the core regulatory concern in a regulated or deregulated market should be correcting distortions in the price of electricity caused by poor regulation, unavoidable structural flaws in the market, or externalities. In particular, environmental externalities are a serious consideration given that most of our electricity comes from fossil fuel combustion, nuclear power, and large hydro.

But even if environmental externalities were adequately accounted for in electricity prices, there is a problem with social response to price signals in the electricity market. High transaction and information costs mean that price signals do not necessarily induce the expected response. Electricity users seem to demand high rates of return on efficiency investments – often 30% or greater. In other words, demand is less elastic than one would think it ought to be for a number of reasons. Some key reasons are the high information and transaction costs encountered by end users. Electricity use is rarely a central business or home maintenance concern. Gaining the information necessary to make energy saving decisions is expensive. Further, decision makers must sort through numerous ways to invest their money. Combined, these facts mean that decision makers set high hurdles for efficiency investments.

Having examined the market failures and environmental externalities that motivate energy efficiency policy, I move on to consider the practical solutions to these problems that have been used by regulators. Part Five of this paper provides an overview of end use energy efficiency in a regulated market. Some of the inefficiencies of the regulated era were consequences of regulation, while others were consequences of market failures and externalities that had nothing to do with regulation. Cost based ratemaking complicated efforts at end use efficiency because of the perverse incentives of utilities.

Despite the complexities of energy efficiency policy in a regulated market, empirical evidence suggests that such policies were, in total, of net social benefit, although some were far more effective than others. There is little dispute that government information provision programs aimed at lowering information costs to end users were of net social benefit. While there is considerably more debate about the cost effectiveness of utility

DSM programs, it seems fair to conclude that utilities successfully encouraged customers to pursue many cost effective measures, and some that were likely not cost effective.

Part Six considers the changes of deregulation. Much of what was learned about energy efficiency in the past is still valid today. Despite facial change in the deregulatory era, the fundamentals of energy efficiency policy have largely stayed the same because deregulation typically does not mean retail competition. The principle of least social cost investment that lay behind avoided-cost measures can be used under a new name – often "Strategic Energy Assessment" or "Resource Portfolio Management".

Where deregulation has meant retail competition there are new considerations related to consumer response to price signals and the lack of a monopoly utility to manage a portfolio of resources, but many of the core considerations are the same as in monopolized markets. The problems of transaction costs and environmental externalities loom large in both markets.

The most significant change induced by deregulation is the end of the "avoided-cost" variation on traditional cost-based ratemaking that was used to induce energy efficiency and renewable energy measures. In practice, deregulation means that regulators move from being the key coordinator of other actors to playing a more secondary role. Prices take on the central coordinating function in the place of regulators, and regulators must instead seek to influence prices – either directly through taxes and charges, or indirectly through substantive rules (such as environmental market mechanisms) that have an effect on price.

However, the price signals regulators want to send in a deregulated market are not primarily conservation signals. The primary concern of regulators in a deregulated market is to avoid the structural problem – highly inelastic (short term) demand and supply, leading to the ability of suppliers to game the market by withholding power. The tools to deal with these inelasticities are long term supply contracts and better information to consumers about bottlenecks in the system.[1] Retail price reforms seek primarily to tackle this problem, and thus the price signals sent to consumers are aimed at decreasing peak demand, not lowering overall demand. Hence deregulation coincides with a move to Real Time Pricing (RTP).

RTP and similar price signals are likely to lead to increased efficiency of electricity use, but not to socially optimal demand for electricity. There will still be space for end use energy efficiency measures, whether these take the form of market based environmental mechanisms (like pollution taxes), information provision, or more traditional DSM options. Empirical evidence from California suggests that price signals for peak periods tend to induce load shifting and only a negligible overall load reduction.[2] Thus RTP promises to increase the efficiency of electricity use by reducing the use of very expensive kilowatts. This is undoubtedly a good thing. However, it also means that to the extent that price in a deregulated market does not match marginal social costs there

[1] Paul L. Joskow, *California's Electricity Crisis*, 17 Oxford Review of Economic Policy 365, 386-7 (2001).
[2] See part 5 infra.

will be a less than optimal outcome. And, given that the overall effect of RTP is to lower average electricity prices, the incentive to invest in energy efficiency measures is also lower. In other words, RTP without accounting for externalities does little to improve environmental outcomes, and may even exacerbate problems.

Thus to the extent that price cannot be suitably adjusted, or that price adjustments fail to counter the high transaction and information costs involved in trying to change electricity consumption patterns, the option to dictate performance and let price follow should be kept open by regulators through the use of a variety of sensitively used policy tools, such as emissions trading (ET) or energy efficiency portfolio standards (EEPS). What is certain is that these transaction and information costs can be reduced cost-effectively – that is, some existing programs at the utility and federal level that target these problems show economic gains for society well above their costs.

2. Defining Energy Efficiency

Energy efficiency has no universally agreed definition. Engineers think of energy efficiency from a thermodynamic perspective – maximizing the fit between the quality and quantity of energy needed to perform a task and the quality and quantity of energy embedded in our resources. Many environmentalists argue that it means reduced use of electricity from harmful sources[3] without too much regard for the marginal cost of electricity. An economic definition would seem straightforward – the use of electricity in quantities consistent with the outcome of a perfect market. Still others believe in a hybrid economic and environmental answer – the use of electricity at a level set by consumers in a market where price reflects the true social cost in the absence of information and transaction costs, and since that price does not exist and likely cannot be ascertained precisely, measures to approximate that price and level of impact. This could also be thought of as the economic definition of energy efficiency – I separate it only because there could be good faith disputes about whether the information and transaction costs should be considered part of the "true" economic cost, or an obstacle to overcome on the way to better environmental outcomes. Here I use energy efficiency to mean this last definition – a hybrid economic and environmental answer that accepts a progressive role for interfering with an otherwise functional market to reduce transaction and information costs.

The efficiency of the electricity system has three parts – generation efficiency, transmission efficiency, and end use efficiency. Generation efficiency means extracting as much energy from energy bearing resources as is economically efficient at a site where those resources are used to power the turbines or fuel cells that create an electric current. Transmission efficiency is the reduction of line losses to the most economically efficient level possible, as well as the planning and siting of energy sources in relation to human settlements to minimize transmission distances. In the interests of brevity, neither of

[3] Of course there is no agreement on what constitutes a harmful source. Natural gas, nuclear power, waste to energy, large dams, and some small dams are all considered "good" sources of energy by some and "bad" sources by others.

these two areas is considered directly in this paper, except in so much as infrastructure investment can be obviated by the promotion of end use efficiency. Instead this paper is focused largely on the last area, end use efficiency – reducing the electricity drawn from the grid by consumers without affecting their quality of life, such that electricity is used at a rate consistent with the marginal social cost of providing it. Generation and transmission efficiency are often referred to as supply side efficiency. End use efficiency is often referred to as demand side management (DSM).

These three parts are nonetheless related, and to some extent I must touch on supply side efficiency. Integrated Resource Planning (IRP), a central component of energy efficiency planning under our former regulatory regime is essentially a combination of DSM and supply side investment efficiency to try and optimize resource use across all three aspects of the electric system. In a nutshell, IRP is an attempt to include an economically efficient role for reductions of end use electricity consumption in the planning of transmission and generation capital investments. Those investments in infrastructure that are more expensive than the implementation of measures that will reduce electricity consumption or reduce the growth of the electric load can be avoided. Instead, the funds that would have been used to expand transmission and generation are invested in DSM.

End Use Efficiency – DSM

DSM itself is a broad term for a large number of measures. The measures taken depend on the interests of the actors, and can be classified any number of ways – by who implements them, by the nature of the problem they try to address, etc. A simple way to break them down is into three broad groups: performance standards, technology standards, and information provision measures.

Performance standards set a target and then require the compelled party to meet it. This group of measures gains popularity in a market based system, where a regulator can essentially set a performance standard for the market by trying to manipulate the price or create a market for a good such as “pollution reduction”. A public example of this would be an Energy Efficiency Portfolio Standard (EEPS), in which a government compels a utility to implement any actions they choose which collectively reduce electricity demand by consumers to a predetermined target. A private example of this is a “performance contract”, in which a private entity approaches an electricity user and offers to reduce their electricity consumption from present levels to an agreed target, in exchange for a share of the savings achieved.

A technology standard mandates a specific course of action. For example, a regulator may mandate which type of electric cable a utility can use because the regulator believes that this cable will allow only a minimal amount of electricity loss to resistance. Technology standards are often equated with “command and control” regulation, but often have lower administrative costs than performance standards. For example, it is simpler to mandate the use of a certain standard of home insulation than it is to verify that the home is only losing a certain amount of heat through its walls.

Information provision measures exist to overcome information barriers. These rules mandate, for example, that a utility present to its customers information about their electricity consumption relative to some yardstick – their own past consumption, or the consumption of similar but better performing consumers.

Another convenient way to quickly classify DSM measures is by market structure and actor: [4]

Utility conservation measures are typically forced upon a monopoly provider by regulators. These measures include information provision to customers, rebates, direct installation of energy efficient appliances or energy saving devices, and giveaways of such products, as well as the rate charges used to finance the above methods.

Private sector conservation measures are performed or suggested by for profit entitities that advise clients on how to either reduce their electric bill or reduce their environmental impact. This often takes the shape of "performance contracting". A private actor (sometimes a utility subsidiary), often referred to as an energy service company (ESCO), will contract with a client to reduce their electricity bill and take a share of the energy savings over a period of time. Similary an environmental consultant will help a client to implement conservation measures and build private renewable energy generation facilities. The actual techniques here include all of those used by utilities as well as fuel switching and self generation using technologies that are more environmentally friendly, or at least no worse, than existing utility technologies. But the area of self generation as an energy efficiency measure will not be explored in this paper since it raises new regulatory issues related to licensing, siting, net metering, and utility exit fees.

Peak load reduction measures – conducted by either utilities or private actors, this includes load shifting and interruptible power. Load shifting means convincing users to engage in energy intensive activities at non-peak hours. Interruptible power means contracting with customers to allow the utility to stop providing power or reduce the power level provided under certain conditions (for example at peak periods). It is unclear that load shifting or interrupting power reduce overall power use for a customer, they simply smooth the variability of customer demand. In recent variable pricing experiments in California, peak prices eight times greater than normal prices led overwhelmingly to load shifting (a cut in peak demand of 15% on average), and to a negligible reduction in overall load for the monitored periods.[5]

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[4] Scott F. Bertschi, Integrated Resource Planning and Demandside Management in Electric Utility Regulation: Public Utility Panacea or a Waste of Energy?, 43 Emory L. J. 815, 843-45 (1994); John H. Chamberlin and Patricia M. Herman, How Much DSM is Really There? A Market Perspective, 24(4) Energy Policy 323, 326 (1996). The categorization scheme is mine.

[5] Charles River Associates, *Impact Evaluation of the California Statewide Pricing Pilot, Final Report* 4, March 16, 2005. Available at http://www.energy.ca.gov/demandresponse. (CRA Report); personal communication with Michael Messenger, Demand Response Project Manager, California Energy Commission.

Decentralized & Renewable Energy and Energy Efficiency

New generation is not an efficiency measure in general. However, while energy efficiency should be seen as distinct from renewable energy, the two are often related in regulatory policy discussions for several reasons.

One aspect of renewable energy is decentralized generation with net metering (the option for the generator to sell extra electricity back to the grid). This is a type of efficiency measure – a consumer decides that it is worth it to them, for fiscal or other reasons (security of supply, personal or political desire to be "green", tax incentives) to produce some of their own electricity. In industry this may happen where a factory produces a combustible byproduct that can be burned on site to generate power for the facility. So long as the on site generation is held to the same pollution control standards as large generating plants, the environmental impact is at least neutral. And if the source of the on-site electricity is a low-pollution source then it is a net environmental benefit.

Another intersection between renewables and efficiency is that energy efficiency is often used as a way of reducing environmental externalities such as greenhouse gas emissions, or the gaseous, solid, or liquid emission of toxins from power plants. This concern with reducing environmental externalities also intersects with "renewable energy", which is a catch all term for the sources of fuel with lower externalities meant to replace the undesirable sources with higher externalities.

In economic theory these environmental externalities should be dealt with by internalizing their cost through pollution taxes or other measures. In reality this is politically difficult to accomplish and the optimal taxes cannot be calculated. Since reduced demand for electricity will, ceteris paribus, indirectly lead to reductions in negative environmental impacts, environmentalists look at energy efficiency as an important second best way of tackling pollution alongside the promotion of renewable energy and pollution taxes. Additionally, those promoting the creation of markets in tradable pollution and renewable energy credits worry about the impact of energy efficiency measures on the integrity of their commodities.

3. Defining Regulation and Deregulation

Until very recently American electricity markets were all regulated monopolies. That is, until the close of the 1980s both entry and price were regulated by state and federal government law.[6] But several important changes occurred in sequence. First, the Federal Energy Regulatory Commission (FERC) began, in the 1980's, to change their policies to a more pro-competitive stance.[7] Congress subsequently passed the Energy Policy Act of 1992.[8] This lowered entry barriers for new generation technologies.[9] Two years later the

[6] John S. Moot, *Economic Theories of Regulation and Electricity Restructuring*, 25 Energy L. J. 273, 274 (2004).
[7] *Id*.
[8] Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (1992).

California Public Utilities Commission began to restructure the electricity sector in California[10], and in 1996 FERC took another step to encourage competition in the generation sector by ordering all utilities to provide full access to their grids.[11] This section explores the difference between the market structure prevalent in the 1960s to 1980s, and the market trends since the mid 1990s.

The Regulated Market

A regulated electricity market is characterized by the existence of a vertically integrated electricity monopolist. That is, one firm owns the generating capacity, the high voltage transmission grid, the lower voltage distribution network going to individual consumers, and contracts directly with those consumers to provide electricity. In this market a utility's rate is set by a regulator, who endeavours through cost-based ratemaking to set a "fair" price for electricity. Since the market is monopolized the electric utility faces a downward sloping demand curve, and thus the monopolist's marginal revenue is less than the price. Like any rational monopolist in this situation, the utility should restrict quantity to increase price and maximize total revenue - meaning that they will underproduce relative to market demand. Instead of allowing this to unfold, the regulator tries to provide a rate of compensation that approximates the average cost of the utility.

Cost-based ratemaking tries to ascertain the costs incurred by the utility, tack on a reasonable profit, and then divide this cost amongst the utility's customers in some fashion. Under this basic system a utility has essentially no incentive to reduce the electricity consumption of its users. Its incentive is to include every possible cost that will be allowed, and encourage the growth of demand to justify increased capacity investment. As will be explored below, encouraging energy efficiency in a regulated market often involves manipulating the utility's compensation formula to avoid this problem.

The "Deregulated" Market

A deregulated market is characterized primarily by the dismemberment of vertically integrated utilities in an attempt to create competitive generation markets. The transmission grid is put in charge of an Independent System Operator (ISO), who then opens access to the grid equally to all qualified generators. The generation arm of the business is either spun off or forced to sell assets, while generators from outside of the state are allowed to "wheel in" power. Generation is expected to become competitive. Transmission remains a regulated monopoly because to date no one has been convinced that it makes sense to have competing power lines to the same customers.[12]

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[9] Moot, *supra* note 8 at 274.
[10] *Id*.
[11] *Id*.
[12] An example of this is my home province of Ontario, in which the crown monopoly (Ontario Hydro) was disassembled, control of the grid was placed in the hands of the Independent Market Operator (IMO); and the generating assets of the corporation were privatized as Ontario Power Generation, which was then

The retail end of the market is a far murkier story. Retail competitition is an interesting possibility, but has not come to pass in most jurisdictions. Although 24 states passed retail competition laws, 8 repealed or suspended them since June 2000 (the California Energy Crisis), and every other state that had been considering retail competititon dropped the issue as of 2004.[13] Retail competition in some of those states that allow it seems to be unsuccessful – despite large expenditures by competitors very few customers were initially lured from the incumbent utility.[14]

An "economic theory of regulation" explanation for the rise and fall of the retail competition movement has been proposed.[15] On this view, the push to deregulate came in large part because of the potential to get lower cost electricity (particularly from new facilities burning natural gas) in a competitive market. Within this was a push to allow retail competition, at first supported by politicians seeking to allow voters to capture the benefits of lower prices.[16] As this rationale began to fade because the price gaps between regulated and deregulated prices were not sufficiently large to stimulate political entrepeneurs, the push to retail competition was continued by utilities who wanted the ability to recover stranded debt from consumers – the utilities would, in exchange for allowing retail competition, be allowed to charge all of the "stranded" liabilities of their generating assets to whoever purchased power in the market because regulators would establish a debt charge that was competitively neutral.[17] Then came the energy crisis in California. Politically this drove a stake into the future of retail competition – retail price caps were maintained, and in the service areas of San Diego Gas & Electric they were instantly reinstated.[18] Other states have not yet toyed with the idea of allowing consumers to experience variable rates, despite the suggestions of economists that with sufficient long term contracting variable rates should not generate massive price fluctuations.[19]

Competitive generation presents an interesting dilemma for energy efficiency. On the one hand, the first deregulatory experiment in California showed disastrous markets plagued by highly inelastic supply and demand. Energy efficiency can be attractive in such an environment. Just as electricity retailers can choose to lock into long term contracts to control price volatility, they can also choose to pay for efficiency measures or load shifting if they feel that this will help them avoid paying high spot prices for electricity. The same incentive to avoid using electricity is also felt by consumers when high prices are passed on. On the other hand, if competition eventually leads to lower prices it renders energy efficiency less attractive. In a market without adjustments for

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forced to privatize some assets immediately and aim to have no more than 30% of the province's generating capacity over the next few years. Another example is California. See Joskow, *supra* note 2.

[13] Moot, *supra* note 8 at 299.

[14] Harry M. Trebing, Electricity: Changes and Issues, 17 Review of Industrial Organizations 61, 72 (2000).

[15] John S. Moot, *supra* note 7 at 299.

[16] *Id.* at 289.

[17] *Id*. at 297.

[18] Severin Borenstein, The Trouble With Electricity Markets: Understanding California's Restructuring Disaster, 16(1) Journal of Economic Perspectives 191, 193 (2002).

[19] *Id*. at 204-205.

uncompensated environmental externalities the price of power can be expected to stay far below social cost, meaning that many socially desirable efficiency measures will not be performed.

As a final note, it is very important to distinguish between marginal cost pricing in a competitive retail market and Real Time Pricing (RTP). The two are independent – one can have RTP without competitive pricing, or a competitive retail market without RTP. Currently, almost all homes and buildings have meters that record aggregate electricity use for a period of several months. The unit of electricity being supplied to the end user, therefore, is not individual kilowatt hours, but aggregate kilowatt hours over a several month block, with no indication of the time or date upon which that power was used. So the marginal cost set by our (hypothetical) competitive retail market is the marginal cost of providing several months of electricity.[20] Providing consumers with RTP requires a new generation of metering and communication technology, but the transition to this new generation technology seems to be fast approaching.[21]

In contrast to the aggregate nature of retail electricity prices, the marginal cost in the spot markets depends essentially on hourly demand and the production decisions of generators – and thus changes with the daily and seasonal peaks in demand. Thus the "marginal" cost in the retail market is a very strange thing. Typically we think of marginal cost pricing not only as the price derived in a perfectly competitive market, but also as a price signal that accurately conveys the cost of the last unit of a good produced to the purchaser. On the conventional view a marginal cost signal would tell the consumer who demands kilowatts at a peak period that these are very expensive kilowatts she is asking for. But most consumers are completely unaware of the current price of electricity when they flip a switch. They know only what they are billed for their total use over the several month billing period. And while suppliers know how much electricity each customer has demanded over this period, they don't know when each kilowatt hour was demanded.

The lack of RTP is important because it means that consumers cannot react to daily or weekly high prices by curtailing demand. But RTP may become more common as a consequence of deregulation - experiments are currently under way in California[22], and RTP is already offered to large customers in New York and parts of Canada.[23] RTP is a function of technology, and can be used in a regulated market as easily as it can in a market without price controls. Competition and RTP are often mentioned together because competition creates a need for RTP. Competition in generation allows generators to behave strategically and withhold power to drive up the price. Enabling

[20] This is not a full story. Some large consumers in the regulated market were given time of use rates, variable rates that do change within a billing period.

[21] Michael Messenger, *Will the Advanced Metering Initiative and the Introduction of Dynamic Pricing Rates Effect the Content and Management of Utility Rate Cases in California and Beyond?*, Presentation for Managing the Modern Utility Rate Case, February 17th & 18th, 2005, Las Vegas, Nevada.

[22] See infra part 5.

[23] Fred Beck and Eric Martinot, Renewable Energy Policies and Barriers, p.19, in Cutler J. Cleveland, ed., *Encylopedia of Energy*, Academic Press/Elsevier Science, 2004

consumers to avoid rigid consumption and instead respond to higher prices is therefore an important counterbalance. But RTP and competition are separate analytical issues.

In sum, deregulation seems to mean competitive generation, monopolized transmission, and largely monopolized retail provision, with the possible development of competitive retail and/or RTP in some jurisdictions.

4. Why Engage in Energy Efficiency at all?

Overview

This section examines the theoretical justifications for energy efficiency policy. Since energy efficiency policy is an intervention into a functioning electricity market, it should be justified by some market failures that explain why the current market mechanism is in need of adjustment. Proponents of energy efficiency policies have spent considerable energy developing such justifications, some of which are heavily contested (especially by economists), while others are more widely accepted. The key justifications presented are (1) energy security, (2) environmental externalities, and (3) other market failures.

Energy Security

Although not directly an economic argument, this has been the most politically visible reason expounded by proponents of energy efficiency to take advantage of public concern. Historically, this is the origin of energy efficiency programs after the oil scares of 1973 and 1979.[24] The key difficulty with this argument is that it might justify driving smaller cars but doesn't work well for the electric sector. Today, after regulatory encouragement and market forces at work for 20 years, oil powers an extremely small part of electric generation.[25] What is more, dependence on foreign oil or on imported natural gas can easily be reduced by increased use of coal – an environmentally undesirable outcome under present business practices, though happily, change is on the horizon.[26]

Energy security is a red herring, but it has phenomenal political traction. There are two more logical reasons to engage in energy conservation measures put forward by

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[24] Ronald J. Sutherland, The Economics of Energy Conservation Policy, 24(4) Energy Policy 361, 362.

[25] For example, President Carter's Coal Conversion Policy that encouraged utilities to switch from oil to coal. *See* Bertschi, *supra* note 5 at 824.

[26] There is great potential for more expensive but far more environmentally friendly forms of coal use on the horizon. Coal gasification technologies already exist. Technologies that are moving out of the trial stages exist that will allow the gas stream to be separated into separate components. The result is a cleaner burning fuel stream that, when subjected to existing pollution control technologies, will be close to zero-emission. The carbon can be separated out during this process and sequestered. Thomas Homer-Dixon and S. Julio Freedmann, *Out of the Energy Box*, 83(6) Foreign Affairs 72 (2004).

advocates. Both are market failures. The first reason to engage in energy conservation is the failure of the market to account for environmental externalities in electricity prices. This argument is a "wrong price" argument –that electricity is priced incorrectly from a social point of view. The second argument centers on a variety of structural flaws and transaction and information costs that create imperfect markets.   Here the issue is the "wrong" reaction – the price signal is lost or distorted on the way to the consumer.

The Wrong Price - Environmental Externalities & Perverse Subsidies

There is one very strong reason to engage in energy efficiency measures: the existence of environmental externalities. There is widespread agreement that environmental externalities exist in electricity generation.[27] Environmental concerns are therefore a critical consideration in any electricity sector policy.

This is hardly new. The provision of electricity is a multi-criteria problem. The manner in which electricity is to be provided is expected to be affordable for consumers, universally available, profitable for the investor owned utilities, dependable for all, not environmentally damaging in general, and in particular respectful of existing uses of communal environmental resources such as farmland downwind of powerplants or rivers that are used for both hydroelectric generation and transport. Since the dawn of electricity regulation, up through the National Energy Policy Act in the late 1970s, PURPA, and into the deregulatory era there have always been at least two *stated* goals for electricity policy – affordable power and environmental protection.[28] Admittedly the goal of affordability tends to dominate, but states and the FERC have used a variety of tools to promote environmental ends in electricity policy, including certification and siting of plants, mandatory environmental impact analysis, resource planning and conservation measures.[29]

Environmental externalities are price distortions – the price of fossil fuels seems cheap relative to their social cost because part of their social cost is not included in the purchase price.

Environmental externalities can be divided many ways, but the simplest for our purposes is into three categories. First, there are those externalities that we are aware of and feel secure that we can quantify with a reasonably certain margin of error. Examples of this would be the best studied negative health effects of oxides of sulfur and nitrogen, ozone, and large sized (10 microns and greater) particulate matter from fossil fuel combustion, or the injury, loss of life, and increased occurrence of lung disease in coal miners.

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[27] Sutherland, *supra* note 26 at 367; Rudy Perkins, Note: Electricity Deregulation, Environmental Externalities and the Limitations of Price, 39 B.C. L. Rev. 993, 994(1998); Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics* 641, Pearson Prentice Hall, New Jersey, Sixth Edition (2004).
[28] Perkins, *supra* note 29 at 997-1005.
[29] Michael Dworkin, David Farnsworth and Jason Rich, Symposium Article: The Environmental Duties of Public Utility Commissioners, 18 Pace Envtl. L. Rev. 325 (2001) (collecting groups of states that regulate certification, siting, environmental analysis, and plan resource, conservation, and restructuring measures to effect environmental goals).

A second category of externalities are those we are aware of but whose costs we cannot quantify completely – either because we lack information about the chain of causality or we lack market prices for the impacted goods and attempts to develop hedonic prices have not clearly led to an accepted answer. Examples include the global warming related costs of carbon dioxide, the impact of mercury from coal burning on mental retardation in fetuses and small children, the extinction of species and loss of habitat caused by water and air pollution, etc.

The third category of externalities are those whose existence we are only now getting hints of or simply don't know about at all. Until relatively recently most of the potential effects of releasing carbon dioxide fell into this category, and many still do. This third category is a bogeyman of sorts because one can always claim that there are new troubles around the corner. But given the human experience of industrialization and environmental degradation over the past 200 years some degree of awareness that there will be future problems is not paranoid but simply a realistic, safe and conservative assumption. The implication is not that we should stop growing our economy or exploring new technologies, rather that we should keep one eye open for the first signs of unanticipated impacts.

The first type of externality can be considered internalizable because, at least in principle, the type of injury, causal path, and value of the injury are known and therefore can be traced back to the relevant transactions. Of course, to the extent that the injuries occur far in the future and to unknown people with unknown values there are argument about discount rates and appropriate prices, but this is the type of externality with the smallest burden. The second and third types of externalities are largely uninternalizable. Without adequate knowledge of the types of injuries sustained, their approximate value, and the causal mechanisms involved, tracing a quantifiable injury back to a specific transaction becomes near impossible.

All forms of electricity generation, including the renewable ones, have externalities associated with them over the life cycle of the generation process – construction of generation equipment, use, and disposal. Unfortunately, electricity generation from centralized fossil fuel burning power plants is both the dominant form of electricity generation and has the highest known and quantified externalities.

One typical set of figures puts the costs as follows[30]:

Generation Technology	**External cost in cents per kWh**
Solar	0-0.4
Wind	0-0.1
Biomass	0-0.7
Waste to energy	4.0
Coal	2.5-2.8

[30] Steven Ferrey, Exit Strategy: State Legal Discretion to Environmentally Sculpt the Deregulating Electricity Environment, 26 Harv. Envtl. L. Rev. 109, 121-30 (2002) (citing primarily Pace Univ. Ctr. for Envtl. Legal Stud., Environmental Costs of Electricity (1990)).

Oil	2.5-6.7
Natural gas	0.7-1.0
Nuclear	2.91

These figures are as disputable as all externality figures. First, they account for only a limited number of externalities.[31] Second, they assume certain levels of pollution control technologies or none at all, depending on the source.[32] Nonetheless, even at this limited level, the external costs of oil, coal, and waste to energy add considerably to the costs of power from these sources. Even natural gas displays a significant external cost relative to the price of the gas itself.

While in theory these externalities are best dealt with through a pollution tax, in practice a pollution tax is difficult to establish. Proponents of energy efficiency measures argue that since these measures reduce electricity consumption they also reduce pollution, and that as such the cost of efficiency measures should be compared to the marginal price of electricity, plus the costs of calculated externalities. This is one of the bases of the environmental argument that the cost in “cost-based ratemaking” requires adjustments.

But the uninternalizable externalities discussed above are of relevance too. Taking the figures in the table as a baseline one could add the costs of global warming if they were known, the value of lost species were it calculable, and the costs of mercury loading if we understood more about how mercury moves from air to water and into human food supplies. Even without considering the issue of appropriate discount rates and the calculation of prices in the absence of liquid markets, it is clear that externalities create a difficult consideration for electricity policy that is hard to reduce to dollars.

One policy tool often used in this kind of situation is risk analysis. Where rendering the costs in monetary terms cannot be done, it is still possible to assign some risk factors to the potential consequences of various externalities and then make quantitative decisions about what level of pollution risk we are willing to run. From there we can work backwards. Rather than setting a pollution tax to approximate external costs and letting the market establish the quantity of pollution emitted we can set the quantity of pollution that may be emitted and then allow those that need to emit that pollution to compete for the right to do so and thereby generate a market price for pollution. This is the basic idea behind “cap and trade” programs. Energy efficiency is one factor in such pollution control programs. If pollution has a price then when consumers of electricity reduce their consumption through energy efficiency someone – either the consumer, their performance contractor, the retail distributor, or the generator will capture the benefits of that action and claim the pollution reduction for themselves. The pollution reductions of improved efficiency must be accounted for in any future pollution market – first because those making the reductions deserve credit, and second because since the reductions are of value someone will try to claim them, which can cause disputes about the credibility of achieved pollution reductions.

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[31] *Id.* fns. 67-90.
[32] *Id.*

The discussion to this point has been theoretical, particularly of the currently uninternalized externalities. Thus I wish to present one example to underline the seriousness of the distortion caused by neglect of environmental impacts, and therefore why I feel that there is such room for energy efficiency measures to help fill the gap between the savings achieved in the current market and those that would be achieved in a market where electricity was used at a rate commensurate with its marginal social cost. The example is climate change, a currently uninternalized externality of fossil fuel combustion.

The physicist Robert Socolow has initiated a multi year study on human options to prevent dangerous anthropogenic interference with our climate.[33] The study's framework is based on what Socolow calls 'stabilization wedges'. The idea is that human emissions of carbon into the atmosphere are projected to continue growing over the next 50 years, assuming that no effort is made to affect them. To avoid elevating the level of carbon in the atmosphere too much higher than it already is will therefore require curtailing growth in emissions as well as cutting emissions to below current levels. Socolow's target is a reduction of at least 15 billion tons of carbon equivalent per year by 2050, and he considers each billion tons to be a single 'wedge', a small piece of the larger effort to avoid making climate change any more dramatic than it will already be. This level of reductions aims at stabilizing the carbon content of the atmosphere well above today's 350 ppm, but below the possible levels of 550 ppm or higher that some analysts project may be reached by next century.[34] Thus Socolow defines a 'stabilization wedge' as an action that, by 2050, will lead to the avoidance of 1 billion tons of emitted carbon per year. Assuming that reducing emissions from American coal fired power plants was to constitute only one wedge, or 1/15th of humanity's effort to limit the damage of climate change[35], Socolow has concluded that a price of $100 per ton would be needed to reach this wedge.[36] A typical 1000 megawatt coal plant, without some sort of carbon sequestration technology, emits 1.5 million tons of carbon per year.[37] The $100 per ton needed under this scenario, given a few simplifying assumptions, translates into approximately 2 cents per kwh.[38] That is, under a set of fairly conservative assumptions, and forgetting all the other externalities, global warming in itself should add approximately 2 cents per kwh to current electricity prices.

Thus environmental externalities exist and are real. They prompt serious discussions about the appropriate cost of electricity, which in turn seriously impacts the determination of which energy efficiency policies make economic sense and which do not. Externalities also create an incentive for market based pollution control policies, in which there is a necessary role for energy efficiency.

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[33] Presentation of Robert Socolow at U.C. Berkeley's Physics Department, April 2004.
[34] *Id*.
[35] This is, to put it lightly, a mild contribution on a per capita basis. America is currently responsible for something close to 25% of the world's carbon emissions, and the two largest shares of that 25% are generated by coal burning and vehicle use.
[36] Elizabeth Kolbert, The Climate of Man III, New Yorker 52, 55 (May 9, 2005).
[37] *Id*. at 55.
[38] *Id*. at 56.

But environmental externalities are not the only price distortion. There are also large public subsidies to the use of fossil fuels: budgetary transfers, tax incentives, R&D, liability insurance provision, public leases and rights of way, waste disposal, and project financing or fuel risk guarantees.[39] The World Bank and International Energy Agency provide estimates for annual public subsidies for fossil fuels that range between $100 and $200 billion worldwide with a high level of uncertainty.[40] This is relative to global expenditure of approximately $1 trillion on fossil fuels in 2004.[41] This is a massive distortion in the price of fossil fuels, and therefore in the social cost of electricity generated from fossil fuels.

The basic theoretical conclusion is that environmental externalities and public subsidies need to be accounted for in determining the true social cost of electricity in any market. And given that this is impossible in practice, energy efficiency measures aimed at counteracting this distortion are justifiable.

The “Wrong” Reaction - Barriers Created by Transaction and Information Costs

Internalizing all environmental externalities into the price of electricity, if such a feat were even possible, would not eliminate the case for energy efficiency. For this to be the case, our markets must be perfect markets – with full information, no transaction costs, etc.. This section shows that current markets are not efficient. Theory and experience suggest that information and transaction costs are serious barriers, and, at least in the short run, full marginal cost price signals may not lead to pollution reductions or serious load reductions.

The basic position of conservation proponents can be reduced to three points:

“(1) Market barriers exist and they discourage investments in energy conservation that would otherwise be cost-effective. Or market imperfections preclude private decisions from attaining a level of energy efficiency consistent with economic efficiency.

“(2) The level of energy efficiency investments that have been (and are being) undertaken by normal markets is short of the truly cost effective level, creating an 'energy efficiency gap' that should be closed.

“(3) Energy efficiency investments that are estimated to be cost-effective should be encouraged by govemment policy and utility programmes.”[42]

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[39] Beck and Martinot, *supra* note 25 at 4
[40] *Id*.
[41] *Id*.
[42] Sutherland, *supra* note 26 at 362 (collecting the work of proponents including Steven Nadel, Eric Hirst, Ralph Cavanagh, Amory Lovins, and David Moskovitz).

In summary, the economic counter argument to this general line of reasoning is that the current outcome, when judged by people's willingness to pay, and looking at the tradeoffs amongst all the factors in a decision (input of energy, capital, labour, lower vs. higher sunk costs) may be the economically efficient outcome.[43] Transaction and information costs are not imaginary, they are real and no less legitimate than other costs. Energy inefficiencies are signs of a functioning market – one where the scarce time of consumers is properly valued.

As will be explored below, this debate is somewhat misleading. While the economists who hold this view may technically be correct, the empirical reality is that information and transaction costs can be reduced at a net social benefit. And as such, it should be done. Whether it should be done by utilities or the government is an interesting question. The federal government's Energy Star program has been successful at overcoming information barriers that have no local dimension, but in theory a utility, where it still exists, is the best placed entity to pursue a localized subset of energy efficiency measures since they can capture savings in infrastructure investment and thus may wish to target their efforts to capture efficiency savings to certain locations within their grid.

There is a point of agreement between conservationists and economists that oppose energy efficiency measures. Both groups tend to agree that regulation causes some of the market failures that energy efficiency measures are supposed to address. Economists point, for example, to utility prices fixed at average instead of marginal costs.[44] Economists argue that the solution to this type of problem is competitive retail and energy generation markets, not regulation on top of regulation. But environmentalists argue that many market barriers are not regulatory but are structural problems of our system for production and consumption of electricity, or the effects of information and transaction costs that can be reduced cost-effectively.

The barriers most often listed by environmentalists are:

Cross subsidies – traditional cost-based ratemaking is meant to solve the problem created by a natural monopoly by setting the price the utility charges at the utility's average cost. Thus without marginal cost pricing consumers are not actually aware what their electricity really costs society. Even with full internalization of externalities, this could be a problem. Assuming that there is some cross-subsidization amongst consumers, the subsidized customers are incentivized to use too much electricity.[45]

Critics point out that this is an argument for abolishing rate regulation or at least cross-subsidization, not for creating market distorting conservation requirements to fix an existing market distortion.[46] But note that deregulation has not meant competitive retail

[43] Sutherland, *supra* note 26 at 366.
[44] *Id.*
[45] Bertschi, *supra* note 5 at 827-28.
[46] *Id.*

pricing for most classes of retail customers, nor does it appear to be in the offing, despite earlier talk of 'retail wheeling'.[47]

Split Incentives – Decisions about electricity investments in end use efficiency are often made by people who don't pay the electric bills - such as landlords, architects and builders. Critics argue that in a functioning market the more efficient house should command a price premium.[48] Supporters of energy efficiency respond that while this would be true in a perfectly competitive market without information asymmetries or transaction costs, that world only exists in textbooks. Critics respond that, in the real world, there is little evidence from the rental housing market to support the hypothesis that rental units have lower levels of energy efficiency than private units.[49] Despite the existence of a debate over split incentives, they are regarded as a real phenomenon by regulators. In recent work both the EPA and the National Commission on Energy Policy cite split incentives as a market barrier to energy efficiency.[50] Split incentives are also an accepted justification for energy efficiency in Europe.[51]

Transaction costs and information costs – The cost to individuals, particularly residential consumers, in time and effort to develop the expertise necessary to implement energy efficiency measures are large relative to the potential benefits they will see. But the needed expertise and proprietary knowledge are actually in the hands of the utility. Thus much regulation is designed to deal with the paradox that the party with the least incentive to engage in energy conservation and reduction of generation capacity investment is also the most efficient saver of electricity. Indeed, in markets where deregulation looks imminent utilities have been quick to develop subsidiary companies that capitalize on their technical knowledge to do performance contracting.[52]

The transaction and information costs faced by consumers are substantial. EPA asserts that manufacturers make claims about energy efficiency, and thus information is available to consumers, but the information is often incomplete and inconsistent.[53] This leaves residential consumers to sort between products, from small appliances to houses, with a large range of up front costs and potential energy savings, and with some of the savings contingent upon certain installation and design details that are largely beyond the consumer's understanding.[54] In the commercial sector a key issue is often corporate commitment – high level financial decision makers do not see electricity as a key business issue and do not perceive it to be a controllable category of costs.[55] However

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[47] see *infra* Part 5.
[48] Bertschi, *supra* note 5 at 828.
[49] Sutherland, *supra* note 26 at 365.
[50] EPA, *Energy Star – The Power to Protect the Environment Through Energy Efficiency* 2. Available at www.epa.gov. (EPA Energy Star Paper); National Commission on Energy Policy, *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges* 31, Washington, DC (2004) (NCEP Paper).
[51] Norbert Wohlgemuth, Renewable Energy and Energy Efficiency in Liberalized European Electricity Markets, 10 European Environment 1, 4 (2000).
[52] Chamberlin and Herman, *supra* note 5 at 328-30.
[53] EPA Energy Star Paper, *supra* note 52 at 3.
[54] *Id*.
[55] EPA Energy Star Paper, *supra* note 52 at 10; personal communication with Dan Esty.

efficiency gains clearly exist to be captured. Over 50% of the avoided greenhouse gas emissions that EPA has achieved through its Energy Star program in the past 10 years (a proxy for energy saved, which includes both heat and electricity savings) has come from what the EPA calls "Superior Energy Management".[56] This is the EPA's term for a series of actions that combined lower transaction and information costs for business decision makers – including contacting top decision makers to convince them of the possible gains from saving energy and providing benchmarks and other measurement tools for these companies to use.[57]

The difference between the information and transaction costs faced by utilities and consumers creates a phenomenon known as the payback gap. As a function of the market barriers they face, individuals and businesses have a higher expected return than utilities. Surveys show that for consumers to install energy efficient technologies they want to see a payback on their investment at an annual rate of 30% or greater.[58] The recent National Commission on Energy Policy report concludes that "considerable empirical evidence indicates that consumers and business managers routinely forego efficiency opportunities with payback times as short as 6 months to three years – effectively demanding annual rates of return on efficiency investments in excess of 40-100%."[59] Without quantifying the figure, the economist Paul Joskow has also concluded that "there is fairly compelling evidence that consumers use what appear to be very high implicit discount rates when they evaluate energy-efficiency investments."[60] The reasons for these high discount rates are unclear, and may reflect any number of market imperfections or cognitive biases.[61]

Utilities, by contrast, do not expect a return much over 15% at most on their investments in generation capacity. Thus many efficiency improvements that could be done by the homeowner will instead by replaced by new generation capacity built by the utility. And since under cost based ratemaking a utility has no incentive to reduce its rate base and is incentivized to over-invest in capital (the Averch-Johnson effect), it will not voluntarily choose to substitute its investment into new capacity with reductions in energy consumption that would obviate the need for such investment.

But again, from an economic point of view the information gap between consumers and utilities is economically efficient,[62] a rational response to the cost of that information. On this view there is still a role for regulatory interference in the market, but it is limited. Regulators ought to interfere if energy efficiency information has the characteristic of being a public good, that is, of benefit to society and likely to be underproduced by the private market.[63] Or put differently, if a regulation can reduce information and transaction costs greater in value than the cost of the regulation itself, this is a step

[56] EPA Energy Star Paper, *supra* note 52 at 14
[57] *Id*. at 10.
[58] Bertschi, *supra* note 5 at 828-29
[59] NCEP Paper, *supra* note 52 at 31.
[60] Paul L. Joskow, *Utility Subsidized Energy Efficiency Programs*, 20 Annual Review of Energy and the Environment 526, 531 (1995).
[61] *Id*.
[62] Sutherland, *supra* note 26 at 364.
[63] *Id*.

towards correcting a market failure. If the implementation of the regulation will cost society more than the value of the information and transaction costs it overcome, the regulator should not act.

In conclusion, opponents of energy efficiency policies often agree with proponents on some key issues, such as the existence of environmental externalities and other market failures. But opponents often hold that while it is true that markets for electricity suffer from market failures, these are caused primarily by regulation - thus the answer is not further regulation to promote energy efficiency but fixing prices through deregulation.[64] Energy efficiency proponents debate the extent to which market failures are purely the result of regulation – arguing that environmental externalities are important, and that transaction and information costs can be reduced by regulation whose benefits outweigh its costs.[65]

Opponents of energy efficiency policies argue that environmental externalities, while real, ought to be dealt with through market mechanisms.[66] Proponents of energy efficiency feel that energy efficiency is a necessary addition to the stable of measures used to combat environmental externalities in practice.

In sum, there are strong policy considerations behind the pursuit of energy efficiency. These range from the highly politicized and largely invalid belief that energy efficiency will cure American dependence on foreign oil, to the contested disputes around a variety of regulatory and structural market failures, to the considerations surrounding environmental externalities. These policy drivers have combined in the past to create a role for energy efficiency in the regulated electricity sector.

5. Energy Efficiency under regulation

This section examines what energy efficiency has meant in practice under regulation. It also examines the empirical debate about whether energy efficiency measures taken in the regulated era have worked, and have been cost justified.

The fundamental problem of energy efficiency under regulation is this: all the incentives are in the wrong places. Homeowners are limited for the reasons discussed above to finding only a very small number of energy efficiency improvements to be cost effective. Transactions costs also make it difficult for outside third parties with more knowledge than homeowners. To be sure, these third parties lower costs and thereby make a greater number of efficiency measures possible, but there are still barriers faced. By far the best suited actor to engage in efficiency measures is the utility. The utility has the technical expertise of the third party expert combined with the savings of a distributor – reduced demand means less investment in infrastructure capacity is needed, adding a whole new type of saving to the mix that is unavailable to every other actor. But under traditional

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[64] Bertschi, *supra* note 5 at 828.

[65] Joseph Eto, Suzie Kito, Leslie Shown, and Richard Sonnenblick, Where Did the Money Go? The Cost and Performance of the Largest Commercial Sector DSM Programs, 21(2) The Energy Journal 23, 42 (2000); Perkins, *supra* note 29 at 994.

[66] Sutherland, *supra* note 26 at 369; Bertschi, *supra* note 5 at 850-51.

cost-based ratemaking it is against the interests of utilities to engage in the pursuit of electricity use savings.

To deal with this fundamental difficulty regulators developed different plans that all impact four different areas of regulatory policy: environmental regulations, infrastructure planning requirements, retail rates, and subsidies.[67] Regulators have had a relatively free hand from courts to work on these issues, even where policy interventions affect the price of electricity. The "hands off" attitude adopted by the Supreme Court in cases like *Federal Power Commission v. Hope Natural Gas Co*[68] or *Duquesne Light Co. v. Barasch*[69] told regulators that the court would not find constitutional obstacles to their efforts. While Congress, the President, and voters might hold regulators politically accountable, the courts generally would not interfere.

Environmental Regulations

Environmental regulations are generally outside the scope of this paper, but they are relevant in so much as environmental regulations, in particular siting requirements, can either make it difficult to bring new capacity on line,[70] or can raise the cost of electricity generation. Either outcome affects energy efficiency policy by making it more of a physical necessity or more cost effective. In brief, both outcomes have happened. Over the past 40 years regulators have tightened siting requirements and demanded pollution control that in turn raised the cost of electricity generation from fossil fuels and nuclear power.

Planning

Planning requirements are generally given the name Integrated Resource Planning (IRP).[71] IRP is a requirement that some party, typically either the local electricity commission or the vertically integrated utility, forecast demand.[72] The regulator, the utility, or an outside consultant would then develop a plan to meet projected demand based on reaching the least cost outcome, drawing on both supply side (new generation) and demand side measures.[73] Most regulations required the combination of supply and demand side measures so as to achieve the least-cost outcome.[74] That is, DSM measures were to be pursued to the extent that the regulator believed (or the party charged with planning would argue) that they were cheaper than developing new capacity or even generating electricity on existing equipment. IRP is a technique used commonly around

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[67] David Nichols, The Role of Regulators: Energy Efficiency, 18 Pace Envtl. L. Rev. 295, 296-97 (2001).
[68] 320 U.S. 591 (1944).
[69] 488 U.S. 299 (1989).
[70] Joskow, *supra* note 2 at 374-5.
[71] Bertschi, *supra* note 5 at 829-830.
[72] Bertschi, *supra* note 5 at 834-35.
[73] Nichols, *supra* note 69 at 297.
[74] *Id.*

the United States and internationally – it has remained in use in some states that have not restructured, whereas other non-restructured states have allowed IRP legislation to lapse.[75]

More inventively, in some jurisdictions the "least cost outcome" was also adjusted to account for environmental externalities.[76] This was a controversial policy that ultimately was not long lived. Experimentation with "environmental adders" to account for externalized costs began in the late 1980's and early 1990's in jurisdictions like California and Massachusetts and was rather quickly over.[77] In Massachusetts the attempt to account for externalities was led by the state's department of public utilities acting under authority delegated from the state legislature. The Massachusetts Supreme Judicial Court ruled against the program, finding that it was beyond the scope of authority delegated to the regulator by the state legislature.[78] In California the effort was lead by the legislature, who authorized the Public Utility Commission (PUC) to include the value of environmental costs in calculations of the cost-effectiveness of energy resources.[79] When the PUC tried to implement this by adding environmental benefits or subtracting environmental costs to calculate set asides for Qualifying Facilities under PURPA the FERC held their actions to be a violation of the law, suggesting that the state could better achieve its environmental goals through support of renewable energy and pollution taxes.[80]

Rate Structure

If planning is the first large area in which regulators could interfere to promote energy efficiency, the second is in the calculation of retail rates. As discussed in Part 3, retail rates under traditional cost-based ratemaking do not reflect marginal costs. Two techniques have been suggested by commentators to modify regulated prices – time of use rates (or peak load pricing) and inclining blocks.[81] Time of use rates refer to rates that increase in blocks when demand for electricity is highest, and are in common use.[82] In their purest form time of use rates go from being a fixed two or three stage type of pricing to real-time retail rates for industrial, commercial, and perhaps some day even residential consumers, thus actually making these customers pay the marginal cost of power.[83] Inclining blocks are the inverse of bulk purchase discounts – rather than rewarding customers for consuming more electricity, an escalating rate is charged – the more power consumed the more expensive the next kWh becomes. This is a method already in use in California after the electricity crisis.[84]

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[75] Nichols, *supra* note 69 at 297.
[76] Perkins, *supra* note 29 at 1018-19.
[77] *Id.* at 1021.
[78] *Mass. Elec. Co. v. Dept. of Pub. Utils.*, 643 N.E.2d 1029, 1034 (1994).
[79] Perkins, *supra* note 29 at 1021-22 (citing Cal. Pub. Util. Code §701.1(c)).
[80] *Id*. at 1022 (citing *Southern Cal. Edison Co.*, 71 F.E.R.C. 61,269 at 62,080 (June 2, 1995)).
[81] Nichols, *supra* note 69 at 300; Bertschi, *supra* note 5 at 842.
[82] Borenstein, *supra* note 20 at 204.
[83] *Id.*
[84] Personal experience.

Inclining blocks are an uncomplicated energy efficiency tool. But real time pricing (RTP) is a more complicated story. This issue is elaborated below, (SEE INFRA P._) but in brief it should be noted now that RTP is used to decrease peak loads. While that is doubtless an economically efficient move on its face, the net electricity savings and environmental impact of shaving peak depend on several factors. It could be that shaving peak has a negative environmental impact by decreasing the use of peaking assets with a low environmental impact and increasing the use of non-peak assets with higher environmental impact. Thus RTP doubtless increases the efficiency of electricity use, but this may be in spite of, not because of, its environmental impact.

Subsidy

The last area of importance to discuss in a regulated electricity sector is the creation of subsidies for energy efficiency. This includes the creation of incentives for electric utilities to implement energy efficiency measures. In order to overcome the previously discussed shortcomings of cost-based ratemaking, regulators use revenue adjustment mechanisms.[85] Some mechanisms set the utility's profits as fixed based on past experience to assure them their normal rate of return, and then regulators often add incentives on top for achieving efficiency targets. In other jurisdictions utility expenditures on energy efficiency are considered part of the rate base, so they earn a return on them, and sometimes were further rewarded for meeting certain savings targets.[86]

As discussed earlier, this structure is problematic for monitoring because it encourages utilities to over-report energy savings while actually minimizing them. These extra payments to the utilities need to be financed. Typically this is done through higher electricity prices or a surcharge on consumers bills for energy efficiency measures.[87] In some cases the surcharge is a charge per kWh of use, thus those customers that use the most electricity pay for its conservation. In other cases the fixed charge component of rates is increased and thus every customer in a class pays an equal share.[88]

A third common technique is to increase the time between rate cases and affix a revenue cap on utility earnings. Since rates are set during a rate case and stay unchanged until the next, the utility has an incentive to increase efficiency between rate cases because it captures the lower cost of service delivery. A revenue cap sets the total revenue the utility can extract from each customer during the rate period. The cap discourages the utility from aggressively trying to increase sales since increased sales will not result in increased revenue. While the average cost per unit sold will drop, the total cost will

[85] Bertschi, *supra* note 5 at 844-45
[86] David S. Loughran and Jonathan Kulick, *Demand-Side Management and Energy Efficiency in the United States*, 25(1) Energy Journal 24 (2004).
[87] *Id*. at 20.
[88] Nichols, *supra* note 69 at 300-01.

continue to increase. The optimal course for the utility is therefore to maximize return from existing customers without increasing their electricity use.[89]

The Empirical Debate

An important question, then, is whether energy efficiency policy has actually worked in regulated markets. The answer is a qualified yes. Certainly energy efficiency interventions, run by the federal government and focused on information provision, seem to be strong successes. The success of regulated utilities in reducing electricity demand through either information provision or more extensive (and expensive) intervention, is far more debatable. The question is whether a cost-benefit analysis shows that the energy efficiency measures used to date are worthwhile – that is, whether the measures forced by regulatory intervention to date have resulted in energy savings more valuable than the total cost to all the parties involved in achieving those measures. If this condition holds true, if energy efficiency measures are overcoming market failures, this does not mean that we have reached an economically optimal point.[90] But it does mean that at least the regulatory interventions are doing more good than harm – an important second best outcome.

<u>Utility Based Measures</u>
One of the most frequently cited studies, conducted by Paul Joskow in 1992, found that when energy efficiency measures are conducted by utilities they overstate the benefits of conservation activities by failing to report all of the relevant costs, counting savings measures that consumers would have implemented anyway, and attributing overly long lives to the measures they take.[91] Nonetheless, while the study concluded that utilities overstate the benefits of their programs and understate the costs, it did not conclude that these programs were unjustified even at the reduced benefits and increased costs. Joskow has, however, indicated skepticism of the sector, concluding that utility subsidized energy efficiency is best understood from a political economic perspective.[92] Joskow views the advent of utility based energy efficiency programs as a triumph of environmentalists in capturing the regulated electricity market to advance their agenda of having the public pay for energy efficiency and renewable energy programs they favor.[93]

Without disputing Joskow's explanation of how these programs came to pass, it is possible to question whether they have been a good thing or a bad thing. A number of other experts have concluded that while Joskow's methodology was correct, his dataset was too limited and included a number of small and non-representative DSM programs that included programs explicitly targeted as low-income support programs that were

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[89] *Id.*
[90] Sutherland, *supra* note 26 at 368-69.
[91] Paul L. Joskow and Donald B. Morrow, What Does a Negawatt Really Cost? Evidence From Utility Conservation Programs, 13(4) Energy Journal 41(1992).
[92] Paul L. Joskow, *Utility Subsidized Energy Efficiency Programs*, 20 Annual Review of Energy and the Environment 526, 533 (1995).
[93] *Id.*

never intended to be cost-effective.[94] Using the same methodology with a data set that included only programs reporting actual consumption data from consumers, of a similar nature, and with few unreported costs, results in the conclusion that utilities do not overreport reductions where conditions (such as requiring the use of actual consumption data) make it difficult to do so.[95] Thus while utilities have an incentive to distort results, careful monitoring can prevent this.

Utilities often have an incentive to misreport their achievements because their expenditures on energy efficiency are considered part of the rate base, so they earn a return on them, and sometimes are given a further bonus by regulators that reward them above the set rate of return for meeting certain targets set in terms of watts saved, irrespective of load growth.[96] Thus utilities under these sorts of regulatory schemes have an incentive to overreport energy savings to increase their rate base with regulatory compensation for "losses" incurred by their overstated reductions, while surreptitiously minimizing actual savings so as not to reduce their rate base in reality.[97]

Given these potential problems research has found wide variations in the success and cost of DSM programs.[98] The type of DSM measures introduced and the level at which consumers become eligible for incentives greatly influence the costs and benefits of programs.[99]

Loughran and Kulick, based on a regression comparing data from 324 utilities over time, conclude that utilities do overstate their savings greatly – claiming that energy efficiency measures save energy at a cost of 2 or 3 cents per kWh (lower than the cost of most any form of new generation), while the actual figure varies between 6 and 17 cents per kWh.[100] Given that the price of electricity in the United States is nowhere, I believe, above 11 or 12 cents per kWh, that is quite significant. However the researchers also conclude that energy efficiency measures are not invalid per se, merely that they are targeted overly broadly instead of at the margin and thus run into selection bias – the energy efficiency measures often compensate consumers who would have made the investments regardless.[101]

In contrast, other researchers have concluded that energy efficiency measures are highly cost effective, reducing electricity use at a cost of approximately 3.2 cents per kWh, relative to what it would have cost the utility to provide that electricity through new construction or purchase of power.[102]

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[94] Levine et al., *Energy Efficiency Policy and Market Failures*, 20 Annual Review of Energy and the Environment 535, 549 (1995).
[95] *Id.*, citing Eto et al, supra note 67.
[96] Loughran and Kulick, *supra* note 88 at 24.
[97] *Id*.
[98] *Id*. at 38.
[99] Steven Nadel and Howard Geller, Utility DSM; What Have We Learned? Where are We Going?, 24(4) Energy Policy 289, 295 (1996).
[100] Loughran and Kulick, *supra* note 88 at 38-39.
[101] *Id.* at 39.
[102] Eto et al., *supra* note 67 at 47.

Thus the empirical data points out several things. First, there are highly cost-effective energy efficiency measures available. Second, there are great problems in trying to give a utility the incentive to effectuate them. To date the empirical data have not been sufficiently strong to sway the debate over utility based energy efficiency measures in a regulated world definitively in either direction. But the data do suggest that there will be a continued role for efficiency measures in a deregulated market – there are cost-effective savings out there. A key empirical question for the future is whether under deregulation the market will achieve those savings on its own or not, and who is the best placed party to overcome informational barriers. It may well be the government.

Governmental Measures

It has become abundantly clear that there is scope to reduce information and transaction costs cost-effectively. Our current system of electricity use is far from being economically efficient. Consumers of electricity typically do not know when demand peaks occur, are not aware of how to design buildings and processes to use less electricity, and, especially in the case of residential consumers, understand little about how to compare the long run costs of different electric appliances. These problems are essentially informational barriers, and there is nothing geographically unique about them. This makes them a prime candidate for a single regulatory intervention. EPA's Energy Star program is a good case study of the effectiveness of these measures in general, and raises the question of who is the best placed party to generate efficiency savings. At least on information provision, the government seems to be doing a good job.

The EPA's Energy Star program aims to lower market barriers to energy efficiency by focusing on information gaps, not by subsidizing specific investments.[103] The program provides appliance labels, stimulus to businesses to consider electricity savings, measurement tools, and similar informational services.[104] The program has been highly cost effective to date for all parties. The EPA reports that thanks to the Energy Star program energy users (heat and electricity combined) saw a *net* savings of $8 billion in 2003, and will see a net savings of $89 billion from 2003-2013.[105] From the EPA's point of view the program is money well spent – every federal dollar spent in the program results in more than $15 in private sector investment in energy efficiency, a greater than $75 dollar saving for energy consumers, and therefore a net gain to the economy of over $60.[106]

6. EE under deregulation

[103] EPA Energy Star Paper, *supra* note 52 at 2
[104] *Id*. at 2-10.
[105] EPA Energy Star Annual Report 2003 p.3
[106] *Id*.

To understand how energy efficiency measures can transition to a deregulated environment, it is important to first understand what deregulation means. Before this, however, one note is in order: energy efficiency will not disappear in a competitive market. It is not the case that without government intervention energy efficiency will fail to happen. To the extent that there is a profit to be made from energy savings, private actors will fill the gap. Indeed, private actors or subsidiaries of existing utilities, often called performance contractors or energy service companies (ESCOs), have been active in regulated markets so long as there was profit to be made.[107] The issue is one of price and the amount of savings achieved. In a fully deregulated market – one with competitive markets and no requirements on any actors to meet any efficiency standards - the amount of energy conserved depends entirely on the price of electricity, which determines which energy saving measures are worth implementing. To the extent that the cost of electricity still does not reflect its true social cost in the deregulated market, we face the same problem as was faced in a regulated market.

Having examined the deregulated context above, we can summarize its salient features as follows:

1. Generation is becoming competitive.
2. Retail is, in a few jurisdictions, trying to become competitive, but is monopolized or price capped (or both) in most jurisdictions.
3. Environmental regulations, as in a regulated market, continue to exist and internalize some externalities while not accounting for others.

This section will examine the impact of these three key features of deregulation on energy efficiency policy.

Competitive Generation

The primary drive of deregulation is the creation of competitive markets for generation. This has several impacts on energy efficiency. First, there is an end to Integrated Resource Planning (IRP) of the type that requires utilities to avoid new plant investments by providing energy efficiency gains. This actually changes relatively little since the utilities still exist and can still engage in IRP without owning generating plants. Second, and more importantly, moving to competitive generation creates stronger demand for RTP, with or without competitive retail markets.

IRP requirements used to force utilities to avoid investment in plants if lower cost investments in DSM could obviate the need for new plants. Now that utilities no longer own significant generating assets, the demand not to invest in new plant is less relevant. Most utilities still own some generating assets, thus in theory IRP rules may still have

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[107] Chamberlin and Herman, *supra* note 5 at 328–30 (noting that utilities have been developing energy service companies in preparation for retail competition and to "sweeten the deal" for large industrial companies who would either install their own generating capacity or contract with a private ESCO).

some effect. But this issue is really a red herring because the critical question is not whether a utility owns its own plant or not, but rather whether there is a monopolist utility at all. IRP is not a dead idea. Currently it is being rebranded as "least cost transmission and distribution" – i.e. IRP without generation investment requirements.[108] It is also called, by some, Resource Portfolio Management.[109] This is a logical development for IRP – planning works as well without the generators as with them. Transmission and distribution infrastructure is expensive to build. There will be situations in which electricity savings could obviate the need for new power lines. And for the utility the choice is simply whether to sign a contract with a generator or pay for DSM. Regulators can still require utilities to analyze the potential for energy savings and make DSM investments where it is cheaper than contracting for electricity.

The real change engendered by competitive generation is a move to RTP. As discussed above, the structural rigidity of electricity markets creates a strong incentive for generators in a competitive market to behave strategically.[110] That is, because demand is highly inelastic under conventional metering and pricing systems, generators can withhold supply to generate far higher prices without fear that demand will drop.

Part of the solution to this problem is to create demand elasticity. Thus competitive generation creates a desire for RTP to limit the ability of generators to game the system. This is why RTP is often discussed in the deregulatory context. In fact RTP can be done with or without competitive retail markets, or, for that matter, with or without competitive generation.

The current experience with RTP is limited, but some modeling and empirical results exist. The experimental results suggest that RTP is certainly popular with customers and tremendously cost effective on its face, leading to large decreases in peak loads. In one recent experiment it cost $35m to set up the experiment for 23,000 large customers, and led to a drop in peak demand for those customers of 500 megawatts, which saved the utilities $250-300m in capacity additions.[111]

The most recent empirical data come from California, where regulators and utility companies cooperated on a two year experiment with "dynamic pricing".[112] A variety of different variable pricing mechanisms were tried on a pool of some 2,500 customers, both residential and commercial.[113] The pricing mechanisms experimented with were not pure RTP but were basically very high price signals at peak demand times. In California peak loads dropped an average of 15%.[114] Nearly 80% of customers in all categories of the experiment reduced their electric bills, and customer support for a full scale rollout of

[108] Nichols, *supra* note 69 at 298.
[109] Personal communication with Ralph Cavanagh.
[110] Severin Borenstein, *supra* note 20 at 204.
[111] Beck and Martinot, *supra* note 25 at 19
[112] CRA Report, *supra* note 6 at 1.
[113] CRA Report, *supra* note 6 at 3.
[114] CRA Report, *supra* note 6; personal communication with Michael Messenger.

RTP was overwhelming.[115] The primary effect of the higher peak prices was to encourage load shifting. In some categories overall load reductions were seen but these were negligible. Virtually all of the peak demand drop was made up for in off peak periods.[116]

The experimental results show that, predictably, RTP works almost exclusively through load shifting. But while load shifting is clearly of facial economic benefit, its environmental impact depends on several factors. In the short term, a recent paper by Stephen Holland and Erin Mansur concludes that load shifting has a slight positive environmental impact in a market where the peak power that is shaved was oil or other fossil fuel production (the mid-Atlantic and Illinois), but that the overall environmental impact can be slightly negative where peak power is met by hydro, and higher off peak prices encourage older fossil fuel plants to run (the West, Southeast, Great Plains, and Eastern Mid-West).[117] Thus to understand the efficiency of load shifting, the added environmental costs, admittedly slight, must be counted against the savings from creating more elastic demand. In the long term, the effect of RTP is to lower average electricity costs, which should discourage investment in energy efficiency, through, for example, performance contracting. Also, the increased use of efficiency measures achievable through decreased transaction costs could be cancelled out by decreased electricity costs. Thus, in summary, RTP is an effective and popular efficiency measure – it creates demand elasticity by providing better information. RTP promises to encourage more efficient energy use through the provision of better information to end users. But in a market where the price of electricity does not reflect externalized costs or hidden subsidies, the net environmental effect of RTP could be negative.

Retail Competition?

Beyond the widespread transition to a competitive generation market, the impact of the deregulatory movement is more varied. It is by no means clear that deregulation leads to competitive retail markets. Retail competition is an open question. As discussed above, most jurisdictions do not have retail competition, and even those jurisdictions that have it do not have robust competition. But RTP and advanced metering technologies may help change that. At the very least, RTP and advanced metering data would allow market participants to better understand the consumer market, segment it, and “cherry pick” the customers they want to target. Since there is strong potential for retail competition to emerge, it is worth discussing.

<u>Retail Monopoly</u>

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[115] Michael Messenger, *Will the Advanced Metering Initiative and the Introduction of Dynamic Pricing Rates Effect the Content and Management of Utility Rate Cases in California and Beyond?*, slides 25-30, Presentation for Managing the Modern Utility Rate Case, February 17th & 18th, 2005, Las Vegas, Nevada.
[116] CRA Report, *supra* note 6 at 7.
[117] Stephen P. Holland and Erin T. Mansur, Is Real-Time Pricing Green?: The Environmental Impacts of Electricity Demand Variance, mimeograph, available at http://www.som.yale.edu/faculty/etm7.

To the extent that competition is not introduced in the retail sector there is little new to say about energy efficiency.

First, as discussed above in “Competitive Generation”, a regulated utility can still pursue IRP without owning substantial generation assets. The question becomes the price of kilowatt hours purchased from generators vs. the price of energy savings achievable. The same manipulations of cost based ratemaking that were practiced in the past can still be practiced.

Second, the advent of competition in electricity generation means that a regulated monopoly will be pushed to RTP. As discussed above, the ideal way to correct the problems caused by average cost pricing is real time marginal cost pricing, and if that is not possible then time of use rates are at least some improvement. Deregulation may improve the efficiency of energy choices by stimulating a move to RTP, even if the retail side of the market is unchanged.

But deregulation is politically sold as being about lower prices and choice – at some point a competitive retail market may be pushed forward. And in a limited number of jurisdictions it has arrived.

Retail Competition

Where retail competition develops some of the problems of the regulated era disappear. In particular, cross subsidies and average cost pricing should be a thing of the past, and thus consumers should receive price signals that are closer to real time marginal costs. But first, the improved signals are still not perfect, and second, the response to price signals is still mitigated by transaction and information costs. Indeed, in a competitive retail market information and transaction costs may even increase. As the EPA points out, often information about energy savings and choices are incomplete and inconsistent.[118] At least in a regulated market there are fewer actors trying to provide such information. One result should be fewer inconsistencies and a lesser number of purported “authorities” seeking to separate the customer and their money.

Price regulation, by definition, largely disappears in a competitive market. There is no longer a regulator who sets a price and can demand that utilities work with customers to achieve all energy savings below that price. Every retail provider sets their own price and earns money solely on the basis of sales, not through some regulated subsidy that compensates them for earnings lost to efficiency investments. Instead, if efficiency gains are to be made they must be made directly by end users, or by third parties that provide energy management services to end users. This means that price is even more important to the achievement of energy efficiency in a deregulated market than it is in a regulated market. To the extent that prices do not reflect social cost, or to the extent that information and transaction costs impede the functioning of markets, energy efficiency will be even harder to achieve in a competitive market than it was in a monopolized

[118] EPA Energy Star Paper, *supra* note 52 at 3

market. In a competitive retail market a regulator can encourage private sector conservation measures, but the achievement of performance contracting will depend critically on the cost of electricity.

Retail competition, therefore, certainly does not mean that the need for planning disappears. A competitive market will still suffer from market failures – environmental externalities, fossil fuel subsidies, lack of RTP, and information and transaction costs. The role of a regulator in the deregulated market will still be to take a macro perspective and optimize the system from a social point of view – an idea recently repackaged as Strategic Energy Assessment (SEA).[119] The idea is that rather than setting planning requirements that end in an order to utilities to make certain investments, instead regulators will monitor the energy sector as they have in the past, but use their observations to set benchmarks for environmental, service, and cost performance through the use of other tools. SEA can be used to determine what new policies should look like – the new policies themselves are either existing policies from the regulatory era such as siting restrictions, or new tools such as market based environmental mechanisms. But even with this new strategic plan in hand, the major consideration in any attempt to regulate the industry will still be price. It is blatantly obvious but bears repeating: in a price based system of electricity consumption regulators will need to continually make efforts to bring the price of electricity close to its true social cost. And where this is not possible, they will need to take other steps to bring consumption down to the level they believe is efficient.

To the extent that utility DSM was used to solve problems caused by a specific regulatory policy it is no longer needed once that regulation is repealed. But to the extent that market price does not track the social cost of electricity because of environmental externalities some intervention into retail rates is warranted. While some regulation exists to internalize externalities through pollution control measures, this by no means accounts for all of the environmental externalities. Currently mercury and carbon, to name but two important pollutants, are inadequately accounted for or completely unaccounted for in American markets. Thus regulators will still be called upon to exercise their power to structure the electric sector. The question then is what tools ought regulators to use.

Environmental Regulation

One important part of the "deregulated" regulatory scheme is environmental regulation. Indeed, this rises in importance as direct price controls and forced investments in energy efficiency through IRP fade. Although conceptually independent from electricity deregulation, a host of new market based environmental mechanisms are currently being discussed that could eventually form a significant element in a deregulated electricity market. There are three market based environmental mechanisms of interest that are rising in importance today: pollution taxes, portfolio standards, and emissions trading.

[119] Nichols, *supra* note 69 at 298-99.

Pollution taxes are an old idea, but they are currently old wine in a new bottle. The "environmental adders" that jurisdictions like California and Massachusetts experimented with are simply hidden pollution taxes.[120] Pollution taxes have been discussed in relation to a host of environmental problems in the last decade. Their performance has been understood since Pigou and is unproblematic in the abstract. The core issues are empirical and political.

The first problem is the empirical one - determining the true social cost of pollution. As discussed above, electricity costs do not reflect externalities, but the size of the externalities that go unreflected is contested. Without entering into an extensive discussion, the problems involved in determining the size of an externality include (1) the uncertainty surrounding the net environmental (non-monetary) impacts of different electricity generating methods, and (2) the uncertainties and assumptions needed to monetize those impacts. On the physical side we have the fundamental problem of ecology – that you cannot change just one thing. Ecosystems, like economies, are interconnected complex systems, and we understand even less about them than we understand about human economies. The dynamic feedbacks in natural systems, coupled with our initial uncertainty about the size and nature of material flows between the electricity industry and the environment mean that we are not exactly sure what we are doing. On the monetary side we have a host of different problems – deciding on the proper standard to use for hedonic pricing (willingness to pay, willingness to accept), deciding on the appropriate discount rates, developing accurate shadow prices without good data about marginal choices, etc. Thus any attempt to use pollution taxes will require simplifying assumptions and conservative value judgments.

The second problem, the political one, is every bit as difficult as the first. Pollution taxes leveled on the public, as opposed to hidden somehow in tariffs or levied on industrial polluters and passed on in the price of consumer goods, are never popular. They are rare in every environmentally related field. My understanding of this phenomenon is very rudimentary. Perhaps they are too transparent and the public really does not value the environment as highly as environmentalists would like them to. Or perhaps there are information gaps that prevent people from understanding the reason or the importance of these taxes to their overall welfare. Or perhaps there are other explanations related to a variety of social-psychological drivers. This is an enormously interesting and broad subject that, in the interests of parsimony, I wish to avoid. Instead it is enough to note that if a pollution tax were to be used, then for political reasons it would have to be used in the wholesale (generation), not the retail market. Alternatively, the currently popular option is to hide the pollution tax as a portfolio standard.

A portfolio standard is essentially a mirror image of a pollution tax. A pollution tax works on the principle of setting the price of a good to achieve a desired quantity. A portfolio standard sets the desired quantity of a good and incidentally results in a market price for that good, thereby ensuring that the desired quantity is delivered in the most efficient way possible. Thus a portfolio standard is simply a way to work backwards and

[120] See *supra*, section 4.

try to set what the regulator believes to be the quantity of saved electricity that would be achieved in an efficient market.

Portfolio standards are the new market based tool directly related to the electricity sector. The idea was originally to create a Renewable Portfolio Standard (RPS) – a state level policy that requires that a certain percentage of a utility's overall or new generating capacity or energy sales be derived from renewable resources.[121] RPS exist in 18 American states.[122] The idea has been adapted to create Energy Efficiency Portfolio Standards (EEPS). Although not as common as an RPS, the idea of an EEPS is gaining traction - Texas already requires that 10% of new load growth be met with energy efficiency.[123]

Another commonly discussed environmental market mechanism is emissions trading (or tradable pollution rights). While portfolio standards essentially create an artificial demand for electricity conservation, emissions trading creates an artificial demand for pollution reduction. Emissions trading requires the establishment of a government licensing program that limits the ability of regulated parties to emit a certain pollutant. The licenses act as a "bubble" on the pollution. Licensed parties may trade their licenses so that those parties who can reduce their pollution emissions at least cost do so while those parties who find it more expensive to reduce their pollution buy licenses from the more efficient pollution reducers. Gradually the regulator reduces the amount of pollution that each license entitles a party to emit. Thus pollution reductions are achieved over time at the lowest possible cost – the market sets the price for the marginal unit of pollution emitted. The familiar American example is Title VI of the Clean Air Act, the sulphur trading mechanism created to control acid rain.[124] A similar program is currently being proposed to regulate mercury emissions from utilities.[125]

Although EEPS are directly related to energy efficiency, neither RPS measures or emissions trading are. However, as was noted above, energy efficiency must be considered in conjunction with both RPS and emissions trading because energy efficiency will lead to pollution reductions through decreased consumption of power from the grid. In a market where pollution reductions have value, someone will try to claim the credit for the achievements of energy efficiency, and if multiple parties claim the credit, a problem called "double counting", the integrity of the market is called into question – you get a market full of lemons. Some analysts advocate energy efficiency set asides under emissions trading – a certain number of licenses reserved for proven efficiency achievements, to be claimed either by the utility paying for them or the

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[121] Rick Saines "Everything You Wanted to Know About RECS", presentation slide 3. ABA Section of Environment, Energy, and Resources National Teleconference, Nov. 18, 2004.

[122] Arizona, California, Colorado, Connecticut, Hawai'i, Illinois, Iowa, Maine, Maryland, Massachusetts, Minnesota, Nevada, New Jersey, New Mexico, New York, Rhode Island, Texas, and Wisconsin. *Id.* at slide 7.

[123] Nichols, *supra* note 69 at 304.

[124] 42 U.S.C. § 7651 et seq.

[125] Proposed National Emissions Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources, Electric Utility Steam Generating Units, 69 Fed. Reg. 4652 (January 30, 2004).

customer directly.[126] But proponents of tradable pollution rights and renewable energy credits are concerned with the impact that energy efficiency measures will have on the value and integrity of these new commodities if energy efficiency proponents succeed in funding energy efficiency through the integration of energy savings from efficiency into other clean energy markets.[127]

The issue of double counting raises the question of exactly how energy efficiency can be financed or subsidized in a competitive market. Again, private contractors will finance efficiency measures where it is cost effective – the question is how to grasp greater efficiency gains that the private market will provide. The predominant answer to this problem is a public benefits charge, a simple tax that originally debuted in the old regulated environment.[128] This tax can be charged on a per kWh basis or on a flat per customer basis, with the former being preferable from an energy efficiency point of view as it provides a greater incentive to save power[129].

A last question about the deregulated era is the consequences of the deregulation process. In particular there is the question of the "stranded debt" that developed under de-regulation. Generally, old utility debt is being recovered from customers, more so than in other formerly deregulated industries.[130] Some of this debt recovery is taking the form of use-insensitive charges when it could, as with a public benefits charge, be tacked on per unit of service demanded.[131] Another issue are exit fees. These are fees charged by utilities in a deregulated market to customers who no longer wish to purchase power from the utility. These fees are being used to recoup stranded debt too. They are a disincentive to decentralized power provision, which since it removes a burden from the grid can be thought of as a form of energy efficiency.[132]

7. Conclusion

There are valid reasons to pursue energy efficiency – market failures that are not only the fault of regulation but of the limitations of markets to properly value environmental externalities. So long as the environment matters, there will be an appropriate role for regulation.

And current practices are far from efficient. A recent study by Resources for the Future estimated that in 2000, appliance standards alone saved an amount of energy (heat and electricity) equivalent to approximately 3% of overall building related energy use, at

[126] Nichols, *supra* note 69 at 307.
[127] Comments made by participants in the panel discussion of the ABA Section of Environment, Energy, and Resources National Teleconference, Nov. 18, 2004.
[128] Nichols, supra note 69 at 298-300.
[129] From an equity or political feasibility point of view a per kWh charge may be disfavoured because it pins more of the burden on those least able to reduce their electricity use, likely residential users.
[130] Ferrey, *supra* note 32 at 143-44.
[131] Nichols, *supra* note 69 at 300-01.
[132] See Ferrey, *supra* note 32.

approximately half the price of providing that much energy.[133] The EPA estimates that the energy efficiency measures they have encouraged over the past 10 years cost 2-4 cents per kilowatt hour saved.[134] Similarly, researchers at Lawrence Berkeley National Laboratory concluded that, at lifecycle costs of 1-5 cents per kilowatt hour, there are combined energy savings achievable over the next few decades in the United States to offset 25% of the projected growth in energy demand from 2010-2030.[135] There is a role for energy efficiency policies in a deregulated market, whether it is a price adjustment by regulation, federal information provision to overcome transaction costs, or a modified form of IRP for monopoly utilities.

The history of deregulation shows that deregulation does not mean the end of regulation – there are strong political interests from consumers rights advocates, utility advocates, and environmentalists for preventing the establishment of fully competitive markets. Some of the techniques used in the old regulated environment can be preserved in the new regulatory (deregulated) environment. The techniques that are still of use are those that are unaffected by market structure and those that are used in parts of the market that are relatively untouched by deregulation.

But regulators seeking to advance environmental goals in the electric sector must now develop new tools. At the same time they must also maintain their traditional role as analysts of the big picture. In particular, environmental regulation promises a new set of policy tools that both justify and advance energy efficiency in a more competitive system. Simultaneously, the move to competitive generation provides an opening for RTP, a price-based approach to the more efficient use of electricity through load shifting. Above all, regulators must maintain a focus on environmental externalities and the price distortions that are still present in the deregulated environment, correcting them through the use of traditional energy efficiency measures, encouragement of the private sector, and market based environmental mechanisms.

[133] NCEP report, *supra* note 52 at 31. The RFF study is available in the technical appendix to the NCEP report.
[134] EPA, *Energy Star and Other Voluntary Programs 2003 Annual Report* 10, available at www.epa.gov.
[135] NCEP report, *supra* note 52 at 33. The LBL study is available in the technical appendix to the NCEP report.