Energy Efficiency in Regulated and Deregulated Markets

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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 electricity sector. Those measures are often called demand side management or 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

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actors who are best suited to overcome market failures in the new regulatory environment. Those incentives 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 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 perfect market where price reflects the true social cost of electricity. Since that price does not exist, and cannot be ascertained precisely, energy efficiency measures seek to approximate it.

Part Three identifies the relevant features of the regulated and deregulated eras. "Deregulation" does not signal the end of regulation in the electricity sector. It 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. 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 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. 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, and 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.

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 demand high rates of return on efficiency investments, often 30% or greater. In other words, demand is less elastic than one would think 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 regulators used to solve these problems. 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 an energy efficiency policy in a regulated market, empirical evidence suggests that such policies were 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, utilities successfully encouraged customers to pursue many cost effective measures although these policies were not optimal.

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

Where retail competition has occurred, there are new considerations related to consumer response to price signals and the lack of a monopoly utility to manage a portfolio of resources. However, 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 are not the key coordinators of other actors but play a 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.

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 of highly inelastic short-term demand and supply that leads to the ability of suppliers to game the market by withholding power. Long-term supply contracts and giving better information to consumers about bottlenecks in the system help deal with those inelasticities.[1] Retail price reforms seek primarily to tackle this problem, and 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 effi-

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[1] Paul L. Joskow, *California's Electricity Crisis*, 17 OXFORD REV. ECON. POL'Y 365, 386-87 (2001).

ciency measures. Those measures may be 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 will be a less than optimal outcome. 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, regulators should continue to use policy tools such as emissions trading and energy efficiency portfolios (EEPS) to dictate performance and price when prices cannot be suitably adjusted or fail to account for high transaction and information costs. What is certain is that these transaction and information costs can be reduced cost-effectively. Existing programs at the utility and federal level targeting these problems show economic gains for society well above their costs.

2.

DEFINING ENERGY EFFICIENCY

Energy efficiency has no universally agreed definition. Engineers approach energy efficiency from a thermodynamic perspective. They believe that energy efficiency means 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 energy efficiency means reducing the use of electricity from harmful sources[3] without too much regard for the marginal cost of electricity. An economic definition of energy efficiency, which would seem straightforward, is the use of electricity in quantities consistent with the outcome of a functional market, one that includes information and transaction costs. Still others believe in a hybrid eco-

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[2] *See infra* pt. 5.

[3] Of course, there is no agreement on which sources are harmful. 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.

nomic and environmental answer and define it as the use of electricity at a level set by consumers in a perfect market (one without transaction and information costs) where price reflects true social cost. Since that price does not exist and likely cannot be ascertained precisely, the hybrid definition uses measures to approximate that price and level of impact. Some people think of this as an alternate economic definition of energy efficiency. I separate it only because there are good faith disputes about whether information and transaction costs should be considered part of the "true" economic cost or as obstacles to overcome on the way to better environmental outcomes. In this paper, I will use the hybrid economic and environmental definition that accepts a progressive role for interfering with an otherwise functional market to reduce transaction and information costs.

The possible efficiencies of the electricity system can be divided into generation efficiency, transmission efficiency, and end-use efficiency. Generation efficiency means economically and efficiently extracting energy from resources to power turbines or fuel cells and create an electric current. Transmission efficiency is the reduction of line losses to the most economically efficient level possible. This includes minimizing transmission distances through the planning and siting of energy generation near human settlements. Generation and transmission efficiency are often referred to as supply side efficiency. This paper will not consider these areas of energy efficiency except when infrastructure investment can be obviated by the promotion of end-use efficiency. Instead, this paper focuses on end-use efficiency, which is achieved by reducing the electricity drawn from the grid by consumers without affecting their quality of life. A key goal is to ensure that electricity is used at a rate consistent with the true marginal social cost of providing it. As noted earlier, end-use efficiency is often referred to as demand side management (DSM).

These three types of efficiency (generation, transmission, and distribution) 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 that tries to optimize resource use across all three aspects of the electric system. Essentially, IRP attempts to include an economically efficient role for reductions of end-use electricity consumption in the planning of generation and transmission capital investments. Infrastructure investments that are more expensive than measures reducing electricity consumption or 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 is a broad term for a large number of measures. The measures taken depend on the interests of the actors. They can be classified in many ways. A simple way to break the measures down is into three broad groups: performance standards, technology standards, and information provision measures.

Performance standards set a target, then compel a party to meet the target. 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 a performance standard 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.

Technology standards mandate a specific course of action. For example, a regulator may mandate that a utility use an electric cable that minimizes the amount of electricity lost 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 (a technological standard) than it is to verify that the home is only losing a certain amount of heat through its walls (a performance standard).

Information provision measures help overcome information barriers. By way of example, one possible measure is to impose a duty upon a utility to inform its customers about their electricity consumption relative to some yardstick, normally their own past consumption or the consumption of similar but better performing consumers.

Another convenient way to 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. They also include the rate charges used to finance the above methods.

Private sector conservation measures are performed or suggested by for-profit entities that advise clients on reducing their electric bill or 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 savings over a period of time. Similarly, an environmental consultant may help a client to implement conservation measures and build private renewable energy generation facilities. In addition to all of techniques used by utilities, they also include fuel switching and self-generation technologies that are more environmentally friendly, or at least no worse, than existing utility technologies. The energy efficiency of self-generation 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, such as load shifting and interruptible power, are conducted by utilities or private actors. 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

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[4] *See* Scott F. Bertschi, Comment, *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 & Patricia M. Herman, *How Much DSM is Really There? A Market Perspective*, 24(4) ENERGY POL'Y 323, 326 (1996). The categorization scheme is mine.

shifting, a cut in peak demand of 15% on average, and to a negligible reduction in overall load for the monitored periods.[5]

Decentralized and Renewable Energy as Energy Efficiency Measures

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

One aspect of renewable energy is decentralized generation with net metering. From the grid-centric point of view, this is a type of efficiency measure because a typical consumer of energy actually becomes a generator of electricity who may sell net electricity back to the grid. A consumer might decide that this is desirable for fiscal or other reasons including security of supply, personal or political desire to be "green," or to receive tax incentives. For example, some industrial factories produce a combustible byproduct that is burned onsite to generate power for the facility. So long as the onsite generation is held to the same pollution control standards as large generating plants, the environmental impact is at least neutral. If the source of the onsite electricity is a low-pollution source, then it is a net environmental benefit.

Energy efficiency is often used as a way of reducing environmental externalities such as greenhouse gas emissions or emission of toxins from power plants. This concern with reducing environmental externalities also intersects with "renewable energy," a catchall term for the sources of fuel with lower externalities meant to replace the undesirable sources with higher externalities.

Some economists suggest minimizing environmental externalities by internalizing their costs 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 way of tackling pollution alongside the promotion of renewable energy and pollution taxes. However, those promoting the creation of markets in tradable

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[5] Charles River Associates, *Impact Evaluation of the California Statewide Pricing Pilot, Final Report* (March 16, 2005), *available at* http://www.energy.ca.gov/demandresponse/documents/group3_final_reports/2005-03-24_SPP_FINAL_REP.PDF.

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 the close of the 1980s, American electricity markets were all regulated monopolies. Both entry and price were regulated by state and federal government law.[6] Several important changes occurred in sequence that led to less regulation. First, in the 1980s the Federal Energy Regulatory Commission (FERC) changed their policies to favor competition.[7] Congress subsequently passed the Energy Policy Act of 1992,[8] which lowered entry barriers for new generation technologies.[9] Two years later the California Public Utilities Commission began to restructure the electricity sector in California.[10] In 1996, the 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 monopolist owns the generating capacity, the high voltage transmission grid, and the lower voltage distribution network going to individual consumers. The monopolist also contracts directly with those consumers to provide electricity. In this market, a utility's rate is set by a regulator, who endeavors through cost-based ratemaking, to set a "fair" price for electricity. In a monopolized market, the electric utility faces a downward sloping demand curve, and its 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 by underproducing

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[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).

[9] Moot, *supra* note 6, at 274.

[10] *Id.*

[11] *Id.*

relative to market demand. A regulator tries to prevent this from happening by providing 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 essentially has no incentive to reduce the electricity consumption of its users. It is incentivized to include every possible allowable cost and encourage demand growth 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 Independent System Operator (ISO) is put in charge of the transmission grid and 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, and out-of-state generators are allowed to "wheel in" power to allow for generation competition. 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]

The retail end of the market is a far murkier story. Retail competition is promising but has not occurred in most jurisdictions. Although 24 states passed retail competition laws, eight repealed or suspended them since the California Energy Crisis in June 2000. Every other state that had been considering retail competition dropped the issue by 2004.[13] In those states that allow retail competition, it seems to be unsuccessful. Despite large expendi-

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[12] For example, in Ontario, Canada, the crown monopoly, Ontario Hydro, was disassembled and control of the grid was placed in the hands of the Independent Market Operator (IMO). The generating assets of the corporation were privatized as Ontario Power Generation, which was then forced to privatize some assets immediately and have no more than 30% of the province's generating capacity over the next few years. Another example is California. See Joskow, *supra* note 1.

[13] Moot, *supra* note 6, at 299.

tures 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 suggests that the push for deregulation occurred in large part because of the potential to get lower cost electricity, particularly from new natural gas facilities, in a competitive market.[15] This push for greater retail competition was initially supported by politicians seeking to pass on the benefits of lower prices to voters.[16] This rationale began to fade because the price gaps between regulated and deregulated prices were not sufficiently large to stimulate political entrepreneurs. Utility companies continued the push for retail competition because they wanted the ability to recover stranded debt from consumers. In exchange for allowing retail competition, the utilities were allowed to charge all of the "stranded" liabilities of their generating assets to whoever purchased power in the market because regulators established a debt charge that was competitively neutral.[17] When the energy crisis in California came, it drove a stake into the political future of retail competition. Retail price caps were maintained and were instantly reinstated in the San Diego Gas & Electric service area.[18] Despite economists' suggestions that sufficient long-term contracting would prevent massive price fluctuations in variable rates,[19] other states have not allowed consumers to experience variable rates.

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 to help them avoid paying high spot prices for electricity. Consumers are also incentivized to use less electricity when it has a high price. On the other hand, if competition eventually leads to lower

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[14] Harry M. Trebing, *Electricity: Changes and Issues*, 17 REV. INDUS. ORG. 61, 72 (2000).

[15] *See* Moot, *supra* note 6, at 299-300.

[16] *Id.* at 289.

[17] *Id.* at 297.

[18] Severin Borenstein, *The Trouble With Electricity Markets: Understanding California's Restructuring Disaster*, 16(1) J. ECON. PERSP. 191, 193 (2002).

[19] *See id.* at 204-205.

prices, it renders energy efficiency less attractive. In a market without adjustments for uncompensated environmental externalities, the price of power can be expected to stay far below social cost. Consequently, 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 over a several month period. The end-user is not aware of how many kilowatt-hours of power are used at any given time or date except over the several month period. Therefore, the marginal cost set by a 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 approaching fast.[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. The spot price changes with the daily and seasonal peaks in demand. The highly variable wholesale spot price drives home the fact that 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 an additional unit of a good produced to the purchaser. A marginal cost signal would tell the consumer who demands kilowatts at a peak period that the kilowatts she is asking for are very expensive. However, most consumers are completely unaware of the current price of electricity when they flip a switch. They know only how much they are billed during their total use over the several month billing period. Similarly, suppliers do not know when each kilowatt-

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[20] However, some large consumers in the regulated market were given time of use rates, variable rates that do change within a billing period.

[21] Advanced metering pilot projects have been tried in California, and the California Energy Commission maintains a website where readers may download documents discussing demand response and advanced metering. California Energy Commission, *Recent Papers on Advanced Metering Design, Costs and Benefits of Deployment*, *at* http://www.energy.ca.gov/demandresponse/documents/index.html.

hour was demanded, only how much electricity each customer demanded over the entire period.

The lack of RTP is important because it means that consumers cannot react to daily or weekly high prices by curtailing demand. RTP may become more common because 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 both regulated and deregulated markets[24]. Competition and RTP are often mentioned together because competition creates a greater need for RTP. Competition in generation allows generators to behave strategically and collectively withhold power to drive up the price. Enabling consumers to avoid rigid consumption and instead respond to higher prices is therefore an important counterbalance. However, RTP and competition are separate analytical issues.

Overall, deregulation means competitive generation, monopolized transmission, and largely monopolized retail provision. However, the development of competitive retail or RTP in some jurisdictions might end the retail provision monopoly.

4.

WHY ENGAGE IN ENERGY EFFICIENCY AT ALL?

Overview

This section examines the theoretical justifications for an energy efficiency policy. Since applying an energy efficiency policy requires intervening into a functioning electricity market, it should be justified by market failures that need adjustment. Proponents of energy efficiency policies have spent considerable time developing such justifications, some more heavily contested than others. The key justifications presented are (1) energy security, (2) environmental externalities, and (3) other market failures.

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[22] *See infra* pt. 5.

[23] Fred Beck & Eric Martinot, *Renewable Energy Policies and Barriers*, in ENCYLOPEDIA OF ENERGY 19, 19 (Cutler J. Cleveland, ed., 2004).

[24] In regulated markets the "real time price" is not a market price but what is conventionally called a "time of use" rate, a regulated rate that is set higher for peak demand hours and lower for off peak hours. While it isn't a market price, the time of use rate does capture the central idea of variable pricing.

Energy Security

Although not directly an economic argument, energy security has been the most politically visible reason expounded by proponents of energy efficiency. It also takes advantage of public concern. Some energy efficiency programs originated as a response to the oil scares of 1973 and 1979.[25] The energy security argument is that we are too dependent on foreign oil. The argument's major flaw is that it might justify driving smaller cars but does not work well for the electric sector. After regulatory encouragement and market forces at work for 20 years, oil currently powers an extremely small part of electric generation.[26] Furthermore, dependence on foreign oil or natural gas can easily be reduced by increased use of coal, an environmentally undesirable outcome under present business practices. However, this might change in the future.[27]

Energy security is a red herring, but it has phenomenal political traction. The two more logical reasons to engage in energy conservation put forward by advocates are both related to market failures. The first reason is the failure of the market to account for environmental externalities in electricity prices. The proponents of the "wrong price" argument believe that electricity is priced incorrectly from a social point of view. On this view the price is wrong because environmental externalities are not included. The second argument centers on a variety of structural flaws, including transaction and information costs, that create imperfect markets. Here the issue is the "wrong reaction" because the price signal is lost or distorted when it reaches the consumer. On this view, other market failures beyond the existence of environmental externalities critically distort consumers choices.

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[25] Ronald J. Sutherland, *The Economics of Energy Conservation Policy*, 24(4) ENERGY POL'Y 361, 362.

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

[27] There is great potential for more environmentally friendly, but more expensive, forms of coal use on the horizon. Coal gasification technologies already exist. Technologies that separate the gas stream and carbon are moving out of the trial stages. The result is a cleaner burning fuel stream that is close to zero-emission after being subjected to existing pollution control technologies. S. Julio Freedmann & Thomas Homer-Dixon, *Out of the Energy Box*, 83(6) FOREIGN AFF. 72 (2004).

The Wrong Price - Environmental Externalities & Perverse Subsidies

The existence of environmental externalities is one very strong reason to engage in energy efficiency. There is widespread agreement that environmental externalities exist in electricity generation.[28] Environmental concerns are therefore a critical consideration in any electricity sector policy.

This idea is hardly new. Electricity provision is expected to be dependable and affordable for all potential consumers; profitable for the investor owned utilities; not environmentally damaging in general; and, in particular, respectful of existing uses of communal environmental resources such as farmland that is downwind from power plants or rivers used for both hydroelectric generation and transport. Since the dawn of electricity regulation, through the National Energy Policy Act in the late 1970s, the Public Utilities Regulatory Policies Act (PURPA), and into the deregulatory era, there have always been at least two *stated* goals for electricity policy: affordable power and environmental protection.[29] Admittedly, affordability tends to dominate, but states and the FERC have used a variety of tools to promote environmental ends in electricity policy. Those tools include certification and siting of plants, mandatory environmental impact analysis, resource planning, and conservation measures.[30]

The absence of environmental externalities in cost leads to 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 into three categories. First, there are those externalities that we are aware of and can quantify with a reasonably certain margin of error. Examples of this would be the negative health effects of nitrogen and sulfur oxides; ozone; 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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[28] *See* Sutherland, *supra* note 25, 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 & DANIEL L. RUBINFELD, MICROECONOMICS 641, (6th ed. 2005).

[29] Perkins, *supra* note 28, at 997-998.

[30] Michael Dworkin et al., 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 is those we are aware of but whose costs we cannot quantify completely. They cannot be quantified completely because we either lack information about the chain of causality or lack market prices for the impacted goods. Attempts to develop hedonic prices have not clearly led to an accepted market price. Examples of this second category include the costs of carbon dioxide related to global warming; the impact of mercury from coal burning on mental retardation in fetuses and small children; and the extinction of species and loss of habitat caused by water and air pollution.

The third category of externalities are those whose existence we are only now discovering or have yet to discover. Until recently, most of the effects of releasing carbon dioxide into the atmosphere fell into this category. Some argue that this third category is too broad because it encompasses externalities that may not exist. After all, one can always claim that there are new troubles around the corner. But given the human experience of industrialization and environmental degradation over the last 200 years, some recognition that there might be other undiscovered externalities is not paranoid but simply a realistic, safe, and conservative assumption. This does not imply that we should stop expanding our economy or exploring new technologies. Instead, it reminds us that that we should keep one eye open for the first signs of unanticipated impacts.

The first type of externality could be internalized because, 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 arguments about discount rates and appropriate prices. However, this is the type of externality with the smallest burden. The second and third types of externalities cannot be easily \internalized. Without adequate knowledge of the types of injuries sustained, their approximate value, and the causal mechanisms involved, it is almost impossible to trace a quantifiable injury back to a specific transaction.

All forms of electricity generation, including renewable ones, are associated with externalities over the life cycle of the generation process. This life cycle includes the 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[31]:

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
Oil	2.5-6.7
Natural gas	0.7-1.0
Nuclear	2.91

These figures are disputable because they account for only a limited number of externalities.[32] Secondly, they assume certain levels of pollution control technologies or none at all, depending on the source.[33] Nonetheless, the external costs of oil, coal, and waste-to-energy add considerably to their costs. Even natural gas displays a significant external cost relative to the price of the gas itself.

In theory, these externalities are best dealt with through a pollution tax, but a pollution tax is difficult to establish. Proponents of energy efficiency measures argue that a reduction in electricity consumption also reduces pollution, and that 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.

However, the externalities that cannot be internalized 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 it enters into our food

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[31] Steven Ferrey, *Exit Strategy: State Legal Discretion to Environmentally Sculpt the Deregulating Electricity Environment*, 26 HARV. ENVTL. L. REV. 109, 124-28 (2002) (citing *Environmental Costs of Electricity*, Pace Univ. Ctr. for Envtl. Legal Stud., at 38-36 (1990)).

[32] *Id.* at 124-27.

[33] *Id.*

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.

Risk analysis is one policy tool that is often used in this kind of situation. When the monetary costs cannot be calculated, 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. We can then 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 and a consumer of electricity reduces consumption through energy efficiency, the consumer, the performance contractor, the retail distributor, and the generator may all try to capture the pollution reduction for themselves. The pollution reductions of improved efficiency must be accounted for in any future pollution market because those making the reductions deserve credit. In addition, when those reductions occur, many parties may try to claim their value and perhaps cause disputes about the credibility of achieved pollution reductions.

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. It will also explain why there is 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 multiyear study on human options to prevent dangerous anthropogenic interference with our climate.[34] The study's framework is based on what

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[34] Robert Socolow, Presentation to the U.C. Berkeley Physics Department (Nov. 2003) (summary of the presentation available at http://www.physics.berkeley.edu/news/Fall_2004.pdf).

Socolow calls 'stabilization wedges.' 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 much higher carbon levels in the atmosphere will therefore require curtailing growth in emissions as well as cutting emissions below current levels. Socolow's target is a reduction of at least 15 billion tons of carbon equivalent per year by 2050. He considers a billion tons to be a single 'wedge,' a small piece of the larger effort to avoid more dramatic climate change. This level of reduction aims at stabilizing the carbon content of the atmosphere well above today's 350 parts per million (ppm) but below the possible levels of 550 ppm or higher that some analysts project may be reached by next century.[35] 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,[36] Socolow concludes that a price of $100 per ton would be needed to reach this wedge.[37] A typical 1000-megawatt coal plant, without some sort of carbon sequestration technology, emits 1.5 million tons of carbon per year.[38] With a few simplifying assumptions, the $100 per ton needed under this scenario computes to approximately 2 cents per kWh.[39] That is, under a set of conservative assumptions, global warming in itself should add approximately 2 cents per kWh to current electricity prices.

Environmental externalities exist and are real. They prompt serious discussions about the appropriate cost of electricity that in turn affects 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 that includes a necessary role for energy efficiency.

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[35] *Id.*

[36] This is, to put it lightly, a mild contribution on a per capita basis. America is currently responsible for approximately 25% of the world's carbon emissions, and the two largest shares of that 25% are generated by coal burning and vehicle use. Energy Information Administration Carbon Emissions Data, *Total Carbon Dioxide Emissions, All Countries, 1980-2003, available at* http://www.eia.doe.gov/emeu/international/total.html#IntlCarbon; *2005 U.S. National Greenhouse Gas Emissions Inventory, available at* http://yosemite.epa.gov/oar/globalwarming.nsf/content.html.

[37] Elizabeth Kolbert, *The Climate of Man III*, NEW YORKER, May 9, 2005, at 55.

[38] *Id.* at 55.

[39] *Id.* at 56.

Nevertheless, environmental externalities are not the only price distortion. There are also large public subsidies for the use of fossil fuels: budgetary transfers, tax incentives, R&D, liability insurance provision, public leases, rights of way, waste disposal, and project financing or fuel risk guarantees.[40] The World Bank and International Energy Agency estimate that annual public subsidies for fossil fuels range between $100 and $200 billion worldwide, with a high level of uncertainty.[41] This is relative to the global expenditure of approximately $1 trillion on fossil fuels in 2004.[42] This results in a massive distortion of the price of fossil fuels and consequently in the social cost of electricity generated from fossil fuels.

The basic theoretical conclusion is that the true social cost of electricity needs to account for environmental externalities and public subsidies. 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

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

Conservation proponents base their position on 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.

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[40] Beck and Martinot, *supra* note 23, at 4

[41] *Id.*

[42] *Id.*

"(3) Energy efficiency investments that are estimated to be cost-effective should be encouraged by government policy and utility programmes."[43]

In sum, the economic counterargument to this is that the current outcome may be the economically efficient outcome when judged by people's willingness to pay and by looking at the tradeoffs amongst all the factors in a decision.[44] Those factors include sunk costs and the input of energy, capital, and labor. On this view, transaction and information costs are real and no less legitimate than other costs. Energy inefficiencies are signs of a functioning market because the scarce time of consumers is properly valued.

This debate is somewhat misleading. While the economists who hold this view may technically be correct about transaction costs, those costs should not be taken as fixed. The empirical reality is that information and transaction costs can and should be reduced at a net social benefit. Whether utilities or the government should do this is an interesting question. The federal government's Energy Star program has been successful at overcoming information barriers that have no local dimension. However, in theory a utility is the best-placed entity to pursue a localized subset of energy efficiency measures since they can capture savings in infrastructure investment and target their efforts to capture efficiency savings to certain locations within their grid.

Conservationists and economists that oppose energy efficiency measures tend to agree that regulation causes some of the market failures that energy efficiency measures are supposed to address. Economists point to utility prices fixed at average instead of marginal costs.[45] Economists argue that the solution to this type of problem is competitive retail and energy generation markets, not regulation on top of regulation. However, environmentalists argue that many market barriers are not regulatory. Those barriers are structural problems of electricity production and consumption. They also argue that those barriers are the effects of information and transaction costs that can be reduced cost-effectively.

One of the barriers most often listed by environmentalists is cross subsidies. A cross subsidy is a traditional cost-based

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[43] Sutherland, *supra* note 25 at 362 (collecting the work of proponents including Steven Nadel, Eric Hirst, Ralph Cavanagh, Amory Lovins, and David Moskovitz).

[44] *Id.* at 366.

[45] *Id.*

ratemaking tool that solves the problem created by a natural monopoly by setting the price the utility charges at the utility's average cost (thereby subsidizing some consumers at the expense of others). Without marginal cost pricing, consumers are not actually aware what their electricity really costs society. This could still be a problem even with full internalization of externalities. Assuming that there is some cross-subsidization amongst consumers, the subsidized customers are incentivized to use too much electricity.[46]

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.[47] However, deregulation has not meant competitive retail pricing for most classes of retail customers, nor does it appear to be in the offing despite earlier talk of 'retail wheeling.'[48]

Split incentives are another barrier cited by environmentalists. A split incentive results when decisions about electricity investments in end-use efficiency are made by people who do not pay the electric bills, such as landlords, architects and builders. Critics argue that in a functioning market, an energy efficient house should command a price premium.[49] Supporters of energy efficiency respond that the house would command a price premium only in a perfectly competitive market without information asymmetries or transaction costs. Critics respond that 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 do. A differential between the efficiency of private homes and rental units is a predicted result of split incentives (since landlords don't pay electric bills).[50] Regulators regard split incentives as a real phenomenon despite debates over their existence. In recent work, both the EPA and the National Commission on Energy Policy cite split incentives as a market barrier

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[46] Bertschi, *supra* note 4, at 827-28.

[47] *Id.*

[48] *See infra* pt. 5.

[49] Bertschi, *supra* note 4, at 828.

[50] Sutherland, *supra* note 25, at 365.

to energy efficiency.[51] Split incentives are also an accepted justification for energy efficiency in Europe.[52]

Transaction costs and information costs are the final barriers to energy efficiency cited by environmentalists. They are that 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. However, 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 the least incentive to reduce generation capacity investment, is also the most efficient saver of electricity. Indeed, in markets where deregulation looks imminent, utilities have been quick to develop subsidiaries that capitalize on their technical knowledge to do performance contracting.[53]

Consumers face substantial transaction and information costs. The EPA asserts that, although manufacturers make claims about energy efficiency that are available to consumers, the information is often incomplete and inconsistent.[54] This leaves residential consumers to sort between products ranging from small appliances to houses. These products come with a large range of upfront costs and potential energy savings, including some contingent upon certain installation and design details that are largely beyond the consumer's understanding.[55] In the commercial sector, a key issue is often corporate commitment because high-level financial decision makers do not see electricity as a key business issue or a controllable category of costs.[56] However, efficiency gains clearly exist to be captured. Over 50% of the avoided greenhouse gas emissions that the EPA has achieved through its Energy Star program in the past 10 years, a proxy for energy saved that includes both heat and electricity savings, has come from what the EPA calls "Superior Energy Manage-

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[51] U.S. EPA, *Energy Star - The Power to Protect the Environment Through Energy Efficiency* (2003), at 2, *available at* http://www.energystar.gov/ia/partners/downloads/energy_star_report_aug_2003.pdf; Nat'l Comm'n Energy Pol'y, *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges* (2004), at 30, *available at* http://64.70.252.93/newfiles/Final_Report/index.pdf.

[52] Norbert Wohlgemuth, *Renewable Energy and Energy Efficiency in Liberalized European Electricity Markets*, 10 EUR. ENV'T 1, 4 (2000).

[53] Chamberlin and Herman, *supra* note 4, at 328.

[54] Energy Star, *supra* note 51, at 3.

[55] *Id.*

[56] Energy Star, *supra* note 51, at 9.

ment."[57] This is the EPA's term for a series of actions that combined lower transaction and information costs for business decision makers. Some of those actions include contacting top decision makers to convince them of the possible gains from saving energy as well as providing benchmarks and other measurement tools for these companies to use.[58]

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 consumers want to see a payback on their investment at an annual rate of 30% or greater when they install energy efficient technologies.[59] The recent National Commission on Energy Policy report concludes, "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%."[60] 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."[61] The reasons for these high discount rates are unclear and may reflect any number of market imperfections or cognitive biases.[62] The discount rates may also reflect income levels, but explaining everything away as a function of poverty is simplistic (with all due respect to Ackham's Razor). Studies of other economic areas of life finding similar discount rates as a function of income would be convincing.

By contrast, utilities do not expect a return over 15% 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. 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 substi-

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[57] *Id.* at 14

[58] *Id.* at 10.

[59] Bertschi, *supra* note 4, at 828-29

[60] NCEP Paper, *supra* note 51, at 31.

[61] Paul L. Joskow, *Utility Subsidized Energy Efficiency Programs*, 20 ANN. REV. OF ENERGY & ENV'T 526, 531 (1995).

[62] *Id.*

tute its investment into new capacity with reductions in energy consumption that would obviate the need for such investment.

Again, from an economic point of view, the information gap between consumers and utilities is economically efficient,[63] a rational response to the cost of that information. This view holds there is still a limited role for regulatory interference in the market. 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 under-produced by the private market.[64] 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 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.

Overall, opponents of energy efficiency policies often agree with proponents on some key issues, such as the existence of environmental externalities and other market failures. However, opponents often hold that while it is true that markets for electricity suffer from market failures, regulation primarily causes these failures. Thus, the answer to promote energy efficiency is fixing prices through deregulation, not more regulation.[65] Energy efficiency proponents debate the extent to which market failures are purely the result of regulation, argue that environmental externalities are important, and that transaction and information costs can be reduced by regulation whose benefits outweigh its costs.[66]

Opponents of energy efficiency policies argue that environmental externalities, while real, ought to be dealt with through market mechanisms.[67] 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 include the highly politicized and largely invalid belief that energy efficiency will cure American

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[63] Sutherland, *supra* note 25, at 364.

[64] *Id.*

[65] Bertschi, *supra* note 4, at 828.

[66] *See* Joseph Eto, Suzie Kito, Leslie Shown & Richard Sonnenblick, *Where Did the Money Go? The Cost and Performance of the Largest Commercial Sector DSM Programs*, 21(2) THE ENERGY J. 23, 42 (2000); Perkins, *supra* note 28, at 994.

[67] Sutherland, *supra* note 25, at 369; Bertschi, *supra* note 4, at 850-51.

dependence on foreign oil, the contested disputes around a variety of regulatory and structural market failures, and the strong 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 that 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 make improvements. Though these third parties lower costs and thereby make a greater number of efficiency measures possible, there are still barriers. By far the actor best suited to engage in efficiency measures is the utility. The utility has the technical expertise of a third party expert combined with the savings of a distributor. Reduced demand means that less investment in infrastructure capacity is needed, adding a new type of savings that is unavailable to every other actor. However, under traditional cost-based ratemaking, it is against the interests of utilities to engage in the pursuit of electricity use savings.

Regulators deal with this fundamental difficulty by developing different plans that all affect the different areas of regulatory policy: environmental regulations, infrastructure planning requirements, retail rates, and subsidies.[68] Each area will be dealt with below.

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.*[69] and *Duquesne Light Co. v. Barasch*[70] told regulators

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[68] David Nichols, *The Role of Regulators: Energy Efficiency*, 18 PACE ENVTL. L. REV. 295, 296-97 (2001).

[69] Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591 (1944).

[70] Duquenes Light Co. v. Barasch, 488 U.S. 299 (1989).

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 make it difficult to bring new capacity on line[71] 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 called Integrated Resource Planning (IRP).[72] IRP is a requirement that some party, typically either the local electricity commission or the vertically integrated utility, forecast demand.[73] Then the regulator, the utility, or an outside consultant develops a plan to meet projected demand based on reaching the least cost outcome, drawing on both supply side (new generation) and demand side measures.[74] Most regulations required the combination of supply and demand side measures to achieve the least-cost outcome.[75] DSM measures were pursued to the extent that the regulator believed, or the party charged with planning argued, they were cheaper than developing new capacity or generation on existing equipment. IRP is a technique used commonly around the United States and internationally. It has remained in use in some states that have not restructured while other non-restructured states have allowed IRP legislation to lapse.[76]

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[71] Joskow, *supra* note 1, at 374-75.

[72] Bertschi, *supra* note 4, at 829-30.

[73] *Id.* at 832-33.

[74] Nichols, *supra* note 68, at 297.

[75] *Id.*

[76] *Id.*

More inventively, some jurisdictions also adjusted the "least cost outcome" to account for environmental externalities.[77] This controversial policy ultimately was not long lived. Experimentation with "environmental adders" accounting for externalized costs began in the late 1980s and early 1990s in jurisdictions like California and Massachusetts and ended rather quickly.[78] In Massachusetts, the department of public utilities, acting under authority delegated from the state legislature, led the attempt to account for externalities. The Massachusetts Supreme Court ruled against the program, finding that it was beyond the scope of authority delegated to the regulator by the state legislature.[79] In California, the legislature authorized the Public Utility Commission (PUC) to include the value of environmental costs in calculations of the cost-effectiveness of energy resources.[80] 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.[81]

Rate Structure

The second area where regulators can promote energy efficiency is in the calculation of retail rates. As discussed in Section 3, retail rates under traditional cost-based ratemaking do not reflect marginal costs. Commentators have suggested modifying regulated prices by time of use rates, also known as peak load pricing, and inclining blocks.[82] Time of use rates refer to rates that increase in blocks when demand for electricity is highest and are in common use.[83] 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 for residential consumers. These customers would actually pay the marginal cost of power.[84] Inclining blocks are the inverse

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[77] Perkins, *supra* note 28, at 1018-19.

[78] *Id.* at 1021.

[79] Mass. Elec. Co. v. Dept. of Pub. Utils., 643 N.E.2d 1029, 1034 (1994).

[80] Perkins, *supra* note 28, at 1021-22 (citing Cal. Pub. Util. Code §701.1(c)).

[81] *Id.* at 1022 (citing *Southern Cal. Edison Co.*, 71 F.E.R.C. 61,269, 62,080 (1995)).

[82] Nichols, *supra* note 68, at 300; Bertschi, *supra* note 4, at 842.

[83] Borenstein, *supra* note 18, at 204.

[84] *Id.*

of bulk purchase discounts. Rather than rewarding customers for consuming more electricity, an escalating rate is charged such that the more power consumed, the more expensive the next kWh becomes. California began to use this method after the electricity crisis.[85]

While inclining blocks are an uncomplicated energy efficiency tool, real time pricing (RTP) is more complicated. This issue is elaborated below, but it should be noted briefly 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 demand depends on several factors. It could be that shaving peak demand 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. RTP doubtless increases the efficiency of electricity use, but this may be in spite of, not because of, its environmental impact.

Subsidy

The last important area 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.[86] Some mechanisms fix the utility's profits based on past experience to assure them their normal rate of return. Then regulators often add incentives 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. The utilities may be further rewarded for meeting certain savings targets.[87]

As discussed earlier, monitoring this structure is problematic 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.[88] Sometimes, the surcharge is a charge

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[85] Author's personal experience.

[86] Bertschi, *supra* note 4, at 844-45

[87] David S. Loughran & Jonathan Kulick, *Demand-Side Management and Energy Efficiency in the United States*, 25(1) ENERGY J. 19, 24 (2004).

[88] *Id.* at 20.

per kWh of use making 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.[89]

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 continue to increase. The optimal course for the utility is therefore to maximize return from existing customers without increasing their electricity use.[90]

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 more debatable. One must perform a cost-benefit analysis to determine 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 energy efficiency measures are overcoming market failures, this does not mean that we have reached an economically optimal point.[91] It does mean that at least the regulatory interventions are doing more good than harm, an important second best outcome.

Utility-Based Measures

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

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[89] Nichols, *supra* note 68, at 300-01.

[90] *Id.* at 301.

[91] Sutherland, *supra* note 25, at 368-69.

activities. The utilities fail to report all of the relevant costs, count savings measures that consumers would have implemented anyway, and attribute overly long lives to the measures they take.[92] 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. However, Joskow indicated skepticism of the sector, concluding that utility subsidized energy efficiency is best understood from a political economic perspective.[93] Joskow views the advent of utility-based energy efficiency programs as a triumph of environmentalists because they advanced their agenda of energy efficiency and renewable energy programs paid for by the public.[94]

Without disputing Joskow's explanation of how these programs developed, one can question whether they have been a good or bad thing. A number of other experts have concluded that while Joskow's methodology was correct, his dataset was too limited. They also noted that it included a number of small and non-representative DSM programs, some explicitly designated as low-income support programs that were never intended to be cost-effective.[95] Applying the same methodology to a data set that includes 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 over report reductions where conditions, such as requiring the use of actual consumption data, make it difficult to do so.[96] 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. They earn a return on them and sometimes regulators further reward them above the set rate of return for meeting certain targets set in terms of watts saved, irrespective of load growth.[97] Thus, utilities under these sorts of

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[92] Paul L. Joskow & Donald B. Morrow, *What Does a Negawatt Really Cost? Evidence From Utility Conservation Programs*, 13(4) ENERGY J. 41 (1992).

[93] Paul L. Joskow, *Utility Subsidized Energy Efficiency Programs*, 20 ANN. REV. OF ENERGY & ENV'T 526, 533 (1995).

[94] *Id.*

[95] Levine et al., *Energy Efficiency Policy and Market Failures*, 20 ANN. REV. OF ENERGY & ENV'T 535, 549 (1995).

[96] *Id.*

[97] Loughran and Kulick, *supra* note 87, at 24.

regulatory schemes have an incentive to over report 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.[98]

Given these potential problems, research has found wide variations in the success and cost of DSM programs.[99] The type of DSM measures introduced and the level at which consumers become eligible for incentives greatly influence the costs and benefits of programs.[100]

Loughran and Kulick, based on a regression comparing data from 324 utilities over time, conclude that utilities do overstate their savings greatly.[101] Utilities claim that energy efficiency measures save energy at a cost of 2 or 3 cents per kWh, lower than the cost of most forms of new generation, while the actual figure varies between 6 and 17 cents per kWh, an extremely large range.[102] However, the researchers also conclude that energy efficiency measures are not invalid per se. They are targeted broadly, instead of at the margin, and thus run into a type of selection bias - the energy efficiency measures often compensate consumers who would have made the investments regardless.[103]

In contrast, other researchers have concluded that energy efficiency measures are highly cost effective.[104] Eto et al. found that efficiency measures reduce 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.[105]

The empirical data point out several things. First, there are highly cost-effective energy efficiency measures available. Second, there are problems incentivizing a utility to affect 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. The data do suggest that there will be a continued role for efficiency measures in a

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[98] *Id.*

[99] *Id.* at 38.

[100] Steven Nadel & Howard Geller, *Utility DSM; What Have We Learned? Where are We Going?*, 24(4) Energy Pol'y 289, 295 (1996).

[101] Loughran and Kulick, *supra* note 87, at 38-39.

[102] *Id.*

[103] *Id.* at 39.

[104] Eto et al., *supra* note 66, at 47.

[105] *Id.*

deregulated market because there are cost-effective savings out there. A key empirical question for the future is whether a deregulated market will achieve those savings on its own or require intervention to overcome informational barriers. If intervention is required, the government may well be the best-placed party.

Governmental Measures

It is abundantly clear that information and transaction costs can be reduced cost-effectively. Our current system of electricity use is far from being economically efficient. Electricity consumers 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 costs of different electric appliances in the long run. 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. The EPA's Energy Star program is a good case study on the effectiveness of these measures in general. It also 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.[106] The program provides appliance labels, stimulus to businesses to consider electricity savings, measurement tools, and similar informational services.[107] The program has been highly cost effective to date for all parties. The EPA reports that the Energy Star program helped energy users, heat and electricity combined, achieve a net savings of $8 billion in 2003, and will see a net savings of $89 billion from 2003-2013.[108] 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 and a greater than $75 dollar saving for energy consumers for a net gain to the economy of over $60.[109]

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[106] 106. EPA Energy Star Paper, *supra* note 51, at 2

[107] 107. *Id.* at 2-10.

[108] 108. Energy Star, *supra* note 51, at 3.

[109] 109. *Id.*

6.

ENERGY EFFICIENCY UNDER DEREGULATION

To understand how energy efficiency measures work in a deregulated market, it is important first to understand what deregulation means while bearing in mind that energy efficiency will not disappear in a competitive market. It is not true that energy efficiency fails to occur without government intervention. To the extent that energy savings result in profit, 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 when it was profitable.[110] The issue is the price and amount of savings achieved. In a fully deregulated market, one that is competitive and doe not require any actor to meet efficiency standards, the amount of energy conserved depends entirely on the price of electricity. This price determines the energy saving measures 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.

In sum, there are three key features of deregulation that impact the design of energy efficiency policies. Those features are that (1) generation is becoming competitive; (2) retail may become competitive in a few jurisdictions but is still monopolized or price capped, or both, in almost all jurisdictions; and (3) environmental regulations, as in a regulated market, continue to exist and internalize some externalities while not accounting for others. The impact of each of these features is examined separately below.

Competitive Generation

The primary drive of deregulation is to create 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

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[110] Chamberlin & Herman, *supra* note 4, 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).

generating plants. Second, and more importantly, moving to competitive generation creates stronger demand for RTP even without competitive retail markets.

In the past IRP requirements forced vertically integrated 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 plants is less relevant. Most utilities still own some generating assets, so theoretically IRP rules may still have some effect. However, the critical question is not whether a utility owns its own plant but whether there is a monopolist utility at all. Currently IRP is being re-branded as "least cost transmission and distribution," i.e. IRP without generation investment requirements.[111] Some also call it Resource Portfolio Management.[112] This is a logical development for IRP because planning works as well with or without the generators. Transmission and distribution infrastructure is expensive to build. There will be situations in which electricity savings could obviate the need for new power lines. 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 earlier, the structural rigidity of electricity markets creates a strong incentive for generators in a competitive market to behave strategically.[113] Generators can withhold supply to generate far higher prices without fear that demand will drop because demand is highly inelastic under conventional metering and pricing systems.

Creating demand elasticity partially solves this problem. 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. However, RTP can occur with or without competitive retail markets or competitive generation.

The current experience with RTP is limited to some modeling and very little empirical data. The experimental results suggest

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[111] Nichols, *supra* note 68, at 298.

[112] Interview with Ralph Cavanagh, Senior Attorney, NRDC, in New Haven, CT (Apr. 11, 2005).

[113] Borenstein, *supra* note 18, at 204.

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 RTP for 23,000 large customers and led to a drop in peak demand for those customers of 500 megawatts, saving the utilities $250-300m in capacity additions.[114]

The most recent empirical data come from California, where regulators and utility companies cooperated on a two-year experiment with "dynamic pricing."[115] A variety of different variable pricing mechanisms were tried on a pool of some 2,500 customers, both residential and commercial.[116] The pricing mechanisms experimented with were not pure RTP but were very high price signals at peak demand times. Peak loads dropped an average of 15%.[117] Nearly 80% of customers in all categories of the experiment reduced their electric bills and customers overwhelmingly supported a full-scale rollout of RTP.[118] The primary effect of the higher peak prices was to encourage load shifting. In some categories, overall load reductions were seen but were negligible. Virtually the entire peak demand drop was made up for in off peak periods.[119]

The experimental results show that, predictably, RTP works almost exclusively through load shifting. While load shifting is clearly economically beneficial, its environmental impact depends on several factors. A recent paper by Stephen Holland and Erin Mansur concludes that, in the short term, load shifting has a slight positive environmental impact in a market where the peak power that is shaved is from oil or another fossil fuel, as in the mid-Atlantic and Illinois.[120] The overall environmental impact can be slightly negative where it is hydroelectric power that meets peak power demand.[121] Finally, higher off-peak prices encourage older fossil fuel plants to run, in the West, Southeast,

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[114] Beck and Martinot, *supra* note 23, at 19

[115] CRA Report, *supra* note 5, at 4.

[116] *Id.*

[117] *Id.*

[118] 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, in Las Vegas, Nev. (Feb. 17-18, 2005).

[119] CRA Report, *supra* note 5, at 71.

[120] 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.

[121] *Id.*

Great Plains, and Eastern Midwest.[122] 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. This should discourage investment in energy efficiency through, for example, performance contracting. In addition, the increased use of efficiency measures achievable through decreased transaction costs could be cancelled out by decreased electricity costs. In summary, RTP is an effective and popular efficiency measure since 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. However, 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. As noted earlier, most jurisdictions do not have retail competition and even those jurisdictions that have it do not have robust competition. 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 target specific customers. The strong potential for retail competition to emerge makes it worth discussing.

Retail Monopoly

There is little new to say about energy efficiency with regard to a noncompetitive retail sector. First, as discussed above, a regulated utility can still pursue IRP without owning substantial generation assets. The issue is whether the price of kilowatt-hours purchased from generators is greater than 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 retail monopoly will be pushed to RTP.

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[122] *Id.*

As noted earlier, the ideal way to correct the problems caused by average cost pricing is real time marginal cost pricing. If that is not possible, then time of use rates in a regulated retail market are at least something of an 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. Politically, however, deregulation is about lower prices and choice. Since these are popular themes in America, it is not unreasonable to suspect that at some point a competitive retail market may be pushed forward. It has already arrived in a limited number of jurisdictions.

Retail Competition

Some of the problems of the regulated era disappear when retail competition develops. In particular, cross subsidies and average cost pricing should vanish, and consumers should receive price signals that are closer to real time marginal costs. This has not occurred yet because the improved signals are still not perfect and 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 array of choices and claims made by sellers grows. As the EPA points out, information about energy savings and choices are often incomplete and inconsistent.[123] There are fewer actors trying to provide such information in a regulated market. Therefore, in theory, one benefit of regulation should be fewer inconsistencies and a lesser number of purported authorities seeking to profit from a confused customer. The potential for information overload and the varying credibility of sources in a deregulated market suggest credible information provision programs like Energy Star can still be of great importance in a deregulated market.

Price regulation, by definition, largely disappears in a competitive market. A competitive market does not have 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 through sales, not some regulated subsidy that compensates them for earnings lost to efficiency investments. If efficiency gains are to be made, they must be made directly by end-users or by third

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[123] EPA Energy Star Paper, *supra* note 51 at 3.

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 that information and transaction costs impede the functioning of markets, energy efficiency will be even harder to achieve in a competitive market than in a monopolized market however. 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 such as 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. Some have recently repackaged this as Strategic Energy Assessment (SEA).[124] The idea is that rather than setting planning requirements by ordering utilities to make certain investments, regulators will monitor the energy sector as they have in the past. They will use their observations to set benchmarks for environmental, service, and cost performance using other tools. SEA can help determine what new policies should look like. Either the new policies themselves are existing policies from the regulatory era, such as siting restrictions, or new tools, such as market based environmental mechanisms. Even with this new strategic plan in hand, price will still be the major consideration in any attempt to regulate the industry. It is blatantly obvious but bears repeating: in a price-based system of electricity consumption, regulators will continually need to make efforts to bring the price of electricity close to its true social cost. 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. However, if the market price does not track the social cost of electricity because of environmental externalities, some intervention into retail rates is warranted. Regulation internalizes some of the environmental externalities through pollution control measures but does not account for all

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[124] Nichols, *supra* note 68, at 298-99.

of them. For instance, American markets do not adequately account for mercury and carbon where they account for them at all. Thus, regulators will still need to exercise their power to structure the electricity sector. The remaining issue is what tools regulators ought to use.

Environmental Regulation

Environmental regulation is one important part of the "deregulated" regulatory scheme. Indeed, its importance increases 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. Three market based environmental mechanisms are rising in importance today: pollution taxes, portfolio standards, and emissions trading.

Pollution taxes are an old idea. The "environmental adders" that jurisdictions like California and Massachusetts experimented with are simply hidden pollution taxes.[125] Pollution taxes have been discussed in relation to a host of environmental problems in the last decade. Their performance has been understood since they were introduced by the economist Arthur Cecil Pigou. While pollution taxes do not pose a problem in the abstract, they do empirically and politically.

Empirically it is difficult to determine the true social cost of pollution. While most agree that electricity costs do not reflect externalities, the size of those externalities is contested. Briefly, 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. The fundamental problem of ecology is that you cannot change just one thing. Ecosystems are interconnected and complex systems that we still do not fully understand. The dynamic feedbacks in natural systems, coupled with our uncertainty about the size and nature of material flows between the electricity industry and the environment, mean that we are not sure of the electricity generation's environmental impact. There is a different set of problems when trying to monetize those im-

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[125] *See supra*, section 4.

pacts. One must decide the proper standard to use for hedonic pricing, or the willingness of parties to pay and accept those costs. One must also decide on the appropriate discount rates and develop accurate shadow prices without adequate data about marginal choices. Thus, any attempt to use pollution taxes will require simplifying assumptions and conservative value judgments.

The political problem with pollution taxes is as difficult as the empirical one. Pollution taxes leveled directly on the public are never popular. Occasionally, pollution taxes are hidden in tariffs or levied on industrial polluters. The costs are then passed on (at least partially) in the price of consumer goods. Direct pollution taxes are rare in every environmentally related field. Given the breadth of this subject, I will simply note that, for political reasons, a pollution tax would probably have to be used in the generation market, 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 by 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 works backwards and tries 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). An RPS is a state level policy requiring a certain percentage of a utility's overall, or new, generating capacity or energy sales be derived from renewable resources.[126] Twenty to twenty-one American states have an RPS.[127] The idea has been adapted to create an Energy Efficiency Portfolio Standard (EEPS). Although not as common as

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[126] Rick Saines, Everything You Wanted to Know About RECS, Presentation to the ABA Section of Environment, Energy, and Resources National Teleconference (Nov. 18, 2004) (slideshow available at http://www.abanet.org/environ/committees/renewableenergy/teleconarchives/111804/home.html).

[127] Arizona, California, Colorado, Connecticut, Hawai'i, Illinois, Iowa, Maine, Maryland, Massachusetts, Minnesota, Nevada, New Jersey, New Mexico, New York, Rhode Island, Texas, and Wisconsin as of 2004, *Id.* at slide 7. As of March 2006, three more states are implementing or have recently implemented RPS. Comments of FERC Commissioner Nora Mead Brownell to the attendants of the ABA Section

an RPS, the idea of an EEPS is gaining traction. For instance, Texas already requires that 10% of new load growth be met with energy efficiency.[128]

Emissions trading, or tradable pollution rights, is another commonly discussed environmental market mechanism. 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. The more efficient pollution reducers then sell their pollution licenses to those parties who find it more expensive to reduce their pollution. Gradually the regulator reduces the amount of pollution that each license entitles a party to emit. Pollution reductions are achieved over time at the lowest possible cost since 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 sulfur trading mechanism created to control acid rain.[129] A similar program currently being proposed regulates mercury emissions from utilities.[130]

Although an EEPS is directly related to energy efficiency, neither RPS measures or emissions trading are. However, as 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. 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 setting aside a certain number of licenses reserved for proven efficiency achievements that can be claimed by

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of Environment, Energy, and Resources, Renewable Energy Resources Committee National Teleconference, Mar. 9, 2006.

[128] Nichols, *supra* note 68, at 304.

[129] 42 U.S.C. § 7651 et seq.

[130] 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 (proposed January 30, 2004) (to be codified at 40 C.F.R. pt. 60,63).

the utility paying for them or directly by the customer.[131] 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.[132]

The issue of double counting raises the question of exactly how energy efficiency can be financed or subsidized in a competitive market. Private contractors will finance efficiency measures where it is cost effective, so the question is how to grasp greater efficiency gains than 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.[133] This tax can be charged on a per kWh basis or on a flat per customer basis. The tax charged on a per kWh basis is preferable because it provides a greater incentive to save power.[134]

The consequences of the deregulation process are still not fully known. 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.[135] Some of this debt recovery takes the form of use-insensitive charges when it could, as with a public benefits charge, be tacked on per unit of service demanded.[136] Another issue is exit fees. In a deregulated market, utilities charge these fees to customers who no longer wish to purchase power from the utility. Utilities use these fees to recoup stranded debt too. The fees 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 if it is cost-effective.[137]

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[131] Nichols, *supra* note 68, at 307.

[132] Comments made by Participants in the Panel Discussion of the ABA Section of Environment, Energy, and Resources National Teleconference, New York Session (Nov. 18, 2004).

[133] Nichols, *supra* note 68, at 305.

[134] 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.

[135] Ferrey, *supra* note 31, at 143-44.

[136] Nichols, *supra* note 68, at 300-01.

[137] *See* Ferrey, *supra* note 31, at 143-44.

7.

CONCLUSION

There are valid reasons to pursue energy efficiency. Market failures 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.

However, 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 equivalent to approximately 3% of overall building related energy use, at approximately half the price of providing that much energy.[138] The EPA estimates that the energy efficiency measures they have encouraged over the past 10 years cost 2-4 cents per kilowatt-hour saved.[139] 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.[140] 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 consumer's 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 utilized in the new deregulated environment. The useful techniques include those that are unaffected by market structure and those that are used in parts of the market that are relatively untouched by deregulation.

Regulators seeking to advance environmental goals in the electricity sector must now develop new tools. At the same time, they must also maintain their traditional role as big picture analysts. In particular, environmental regulation promises a new set of policy tools that both justify and advance energy efficiency in a

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[138] NCEP report, *supra* note 51, at 31.

[139] U.S. EPA, *Energy Star and Other Voluntary Programs 2003 Annual Report* (2003), at 10, *available at* http://www.epa.gov/chp/pdf/CPPD2004_web.pdf.

[140] NCEP report, *supra* note 51, at 33.

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 focus on environmental externalities and the price distortions that are still present in the deregulated environment. They must correct those distortions using traditional energy efficiency measures, encouragement of the private sector, and market based environmental mechanisms.