# Energy Efficiency and Conservation: Opportunities, Obstacles, and Experiences

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Energy efficiency and conservation can bring to mind many images, including the one of President Jimmy Carter in 1977, wearing a cardigan sweater and leveling with the American public on the urgent need for conservation. He announced, "[W]ith the exception of preventing war, [the energy crisis] is the greatest challenge our country will face during our lifetimes."[1] Nearly thirty years later, with skyrocketing oil prices, the mounting effects of global warming, and an uncertain energy future, we still face this great challenge. Today, as in the 1970s, energy efficiency and conservation offer some of the best and most cost-effective solutions to this mounting crisis. This paper offers an introduction to the benefits and current opportunities for energy efficiency and conservation, as well as identifies obstacles and examples to help inform future action and advocacy.

## I. BENEFITS OF ENERGY EFFICIENCY AND CONSERVATION

There are many benefits to meeting our power needs with less energy. Some are obvious. Using less power avoids the cost and pollution of new power plants.[2] It also lowers overall energy costs and improves system reliability.[3] Investing in energy efficiency results in achieving energy needs

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1. President Jimmy Carter, The President's Proposed Energy Policy Speech, (Apr. 18, 1977), *available at* http://www.pbs.org/wgbh/amex/carter/filmmore/ps_energy.html.

2. *See, e.g.*, Edan Rotenberg, *Energy Efficiency in Regulated and Deregulated Markets*, 24 UCLA J. ENVTL. L. & POL'Y 259, 263–64 (2006), *available at* http://lsr.nellco.org/cgi/viewcontent.cgi?article=1013&context=yale/student (incorporating environmental and economic benefits in the definition of energy efficiency).

3. *See, e.g.*, PAUL PETERSON ET. AL., SYNAPSE ENERGY ECONOMICS INC., INCORPORATING ENERGY EFFICIENCY INTO THE ISO NEW ENGLAND FORWARD CAPACITY MARKET: ENSURING CAPACITY MARKET PROPERLY VALUES ENERGY EFFICIENCY RESOURCES 10–11 (June 5, 2006), *available at* http://www.iso-ne.com/committees/comm_wkgrps/othr/drg/mtrls/06-05-06_synapse_report_energy-efficiency-in-new-england-fcm-rev06-012-report.pdf (discussing greater reliability of the

for about one-third to one-half the cost of buying more power on the open market.[4] More efficiency also reduces load, wear, and maintenance needs on the entire electrical system, allowing improved reliability of our power grid.[5]

The benefits from energy efficiency and conservation also extend beyond benefits to those who reduce consumption and have lower energy bills. Improving efficiency lowers overall demand on the system and can thereby lower the wholesale market clearing price for electricity because less energy is needed.[6] A lower clearing price allows lower electric prices for all customers.[7] This is particularly important in places like Vermont where the long-term contracts for two-thirds of the State's energy supply, from Hydro Quebec and Vermont Yankee, will expire in the next decade, and will most likely be replaced with more expensive power from the wholesale market.[8]

Energy efficiency and conservation also reduces pollution and other negative environmental effects.[9] Forty percent of the carbon pollution in the United States is produced by power plants.[10] Achieving a high standard of energy efficiency avoids burning the fossil fuels normally needed to meet increasing power needs, and therefore, allows our energy needs to be met at

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grid system and lower capacity costs as benefits of energy efficiency).

4. *See, e.g.*, CYNTHIA ROGERS ET AL., FUNDING AND SAVINGS FOR ENERGY EFFICIENCY PROGRAMS FOR PROGRAM YEARS 2000 THROUGH 2004 10 (2005), http://www.fypower.org/pdf/CEC%20_Trends2000-04.pdf (comparing the average costs of an energy efficiency program with the costs of three supply generation alternatives in California); *see also* Energy Conservation: Program for Consumer Products Representative Average Unit Cost of Energy, 71 Fed. Reg. 9806 (Dep't of Energy Feb. 27, 2006) (providing price data on the average unit costs of energy for five residential energy sources, with electricity as the most costly, and natural gas as the least costly source).

5. *E.g.*, PAUL PETERSON ET. AL., *supra* note 5, at 8–11(discussing the benefits of energy efficiency on load serving entities in terms of reductions in transmission loads and capacity costs, as well as increased reliability of transmission grids).

6. *See id.* at 10 (discussing the "downward pressure on the capacity clear price" as a result of including energy efficiency measures in the bidding portfolios of customers and energy service companies).

7. *Id.*

8. *See, e.g.*, The McGraw-Hill Companies, *Vermont Regulators Looks to Head off 'NIMBY' to Avert Possible Strife Over Future Contracts*, ELECTRIC UTILITY WEEK, Aug. 21, 2006, Supply § at 24, *available at* 2006 WLNR 15435141 (noting that "energy insiders have become anxious about what Vermont will do when 600 [megawatts] of power contracts expire between Vermont's utilities and its two major suppliers, Vermont Yankee and Hydro Quebec.").

9. *See, e.g.*, Union of Concern Scientists, http://www.ucsusa.org/clean_energy/fossil_fuels/the-hidden-cost-of-fossil-fuels.html (last visited Oct. 10, 2006) (discussing the hidden costs and environmental impacts of fossil fuels).

10. National Environmental Trust, Ignoring Carbon Pollution Means More Global Warming and Higher Costs, http://www.net.org/proactive/newsroom/release.vtml?id=27277 (last visited Nov. 14, 2006).

a lower cost and with less environmental impact than continuing to build and buy more supply from new generation.[11]

## II. BARRIERS TO ENERGY EFFICIENCY

If energy efficiency and conservation have so many benefits, why is its use limited? Despite expansion of efficiency and conservation efforts over the past thirty years, many regulatory and market barriers still exist that deter greater reliance on efficiency.

The structure for buying and selling power does not reward efficiency. Most consumers and utilities are "rational" beings and act to minimize costs and maximize profits.[12] Generators make money from selling electricity.[13] If demand is reduced, they sell less electricity and make less money.[14] Generators are also paid for having capacity available, as well as simply supplying energy.[15] Similar capacity payments are not available for efficiency, but efforts are underway in some regions to develop a Forward Capacity Market (FCM) that would allow efficiency to fairly compete with generation to meet a region's energy needs.[16] Additionally, some generators also receive a premium in the form of Reliability Must Run (RMR) contracts. These contracts ensure local reliability by giving the

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11. *See e.g.,* Union of Concern Scientists, *supra* note 11 (identifying costs associated with the extraction, generation, transportation, and supply protection of fossil fuel, along with the less monetized environmental impacts, including global warming, and air, water, land, and heat pollution).

12. *See* Edan Rotenberg, *supra* note 2, at 284 (explaining that "from an economic point of view, the information gap between consumers and utilities is economically efficient, a rational response to the cost of that information.").

13. *See id.* at 268–69 (discussing how in monopolistic markets without regulation, electric utilities will rationally act to "increase price and maximize total revenue by underproducing relative to market demand.").

14. *See id.* (noting that cost-based ratemaking tries to undo the incentives for utilities to earn increased profits through increased consumption)*; see also* RICHARD COWART, REGULATORY ASSISTANCE PROJECT, EFFICIENT RELIABILITY: THE CRITICAL ROLE OF DEMAND-SIDE RESOURCES IN POWER SYSTEMS AND MARKETS 29–32 (2001), http://www.raponline.org/showpdf.asp?PDF_URL='Pubs/General/EffReli%2Epdf' (discussing the impact of energy efficiency on utility profits).

15. *See, e.g.,* Gürcan Gülen, *Resource Adequacy and Capacity Schemes*, CENTER FOR ENERGY ECONOMICS THINKCORNER (2002), http://www.beg.utexas.edu/energyecon/thinkcorner/Capacity_payments.pdf (analyzing capacity markets, capacity payments, and energy only markets as solutions for maintaining grid reliability and decreasing price volatility); *see also* Energy Information Administration Glossary, http://www.eia.doe.gov/glossary/glossary_g.htm#gen_nameplate (last visited Oct. 10, 2006) (defining generator capacity as "[t]he maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, adjusted for ambient conditions.").

16. *See, e.g.,* ISO New England, Demand Resources Group http://www.iso-ne.com/committees/comm_wkgrps/othr/drg/index.html (last visited Oct. 10, 2006) (noting the NE-ISO Demand Resources Group's effort to develop recommendations for rules governing the treatment and evaluation of energy efficiency in a FCM).

Independent System Operator (ISO)[17] "the right to call on the [power plant] units" in return for fixed payments to the generators.[18] While these payments benefit generators, they make electricity more expensive for everyone and discourage efficiency even when it can meet capacity needs at a lower cost.[19]

Most utility regulation also fails to reward efficiency. Traditionally, electric utility rates are a function of the cost of providing electric service to customers.[20] A rate proceeding establishes the revenue requirement for the utility to meet electricity needs in its service territory, and sets rates based on that revenue requirement.[21] A utility's profit is then linked to the amount of electricity it sells.[22] As soon as rates are set, the utility's actual revenues and profits are driven by sales.[23] The more electricity a utility sells, the more money it makes–generally an additional five cents per kilowatt-hour (kWh) to its bottom-line profits.[24] In the wholesale market, selling more electricity also often equals more profit, creating a disincentive for efficiency.[25] Base load and intermediate load generators benefit from being able to sell all of their output at a high market-clearing price.[26] To the

17. *See* EnerNoc, Inc., Glossary of Terms, http://www.enernoc.com/resources/glossary.htm (last visited Oct. 10, 2006) (defining an ISO as "[a]n independent organization that is responsible for coordinating, controlling, and monitoring the operation of the electrical power system in a particular geographic area.").

18. CALIFORNIA ISO, RELIABILITY MUST-RUN ("RMR") STUDY METHODOLOGY 2 (2004), http://www.caiso.com/docs/2004/05/20/200405201155626868.pdf.

19. *See, e.g.*, Gülen *supra* note 15 (concluding that capacity payments result in incorrect price signals and promote market inefficiency); *see also* Connecticut Power and Light Glossary, http://www.cl-p.com/clpcommon/pdfs/companyinfo/RestructuringGlossary.pdf (explaining that in southwest Connecticut, where transmission congestion prevents cost efficient generation, RMR contracts require consumers to make additional payments to the utilities based on taxes and maintenance and operating costs, to ensure reliable operation "even if only for a few peak demand periods.").

20. *See, e.g.*, JAMES C. BONBRIGHT ET AL., PRINCIPLES OF PUBLIC UTILITY RATES 68 (Public Utilities Reports, Inc. 2d ed. 1988) (explaining how the public utility concept of ratemaking "implies that the service should be offered for sale . . . [and] that the sale prices should bear a fairly definite relationship to cost . . . .").

21. *See id.* at 10 (noting that a characteristic of public utilities involves supplying a "given geographic area" and providing services at "prescribed, regulated prices").

22. *See id.* at 68, 180 (discussing the relationship between sales and returns, and the role of profits in a regulated industry).

23. *See id.* at 68 (explaining that sale prices should bear a definite relationship to profits as well as cost of services).

24. *See, e.g.*, *Regulatory Reform: Removing the Disincentives to Utility Investment in Energy Efficiency* ISSUELETTER (Regulatory Assistance Project, Montpellier, V.T.) Sept. 2005, at 2, *available at* http://www.raponline.org/Pubs/IssueLtr/RAP2005%2D09%2Epdf [hereinafter Regulatory Assistance Project, *Removing the Disincentives*] (noting the traditional regulatory system's incentive for utilities increase profits by selling more energy).

25. *See id.* at 1–3 (discussing how traditional ratemaking results in disincentives for acquiring energy efficiency).

26. *See* COWART, *supra* note 14, at 32 (discussing the "indirect" interaction between "price,

extent efficiency measures lower demand, and thus lower market-clearing prices, a generator's profits will also be lower and it will not have any incentive to encourage energy efficiency.[27]

Rate structures and the price of electricity also often fail to encourage efficiency. The cost of power varies by season, time of day, weather, type of power and location, as well as by the economy and politics in places both near and far from where either power or fuel originate.[28] Most of these variables are not specifically reflected in rates that would allow a customer to adjust demand or energy use based on the cost of power.[29] Instead, most bills have a stable price for power that provides no incentive to use less power.[30] For example, there is no economic incentive to use less power on a hot summer day when power is expensive, or to avoid running all electrical equipment at the same time, even if such use forces a utility to acquire more and higher-cost power to meet the demand. Better alignment of electricity prices with the real cost of power would encourage efficiency because customers would be paying more when it costs more to supply electricity, such as during peak hours or seasons.[31]

Custom, practice, and utility expertise also result in less reliance on efficiency and conservation to meet power needs. If more power is needed, the general practice has been to build a new generation plant, purchase more power, and build more transmission capability to meet those needs.[32] These are what electricity suppliers know best how to do, and it is often the first or only solution proffered.[33]

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supply, and demand" in wholesale power markets).

27. *See* PAUL PETERSON ET AL., *supra* note 3, at 9–11 (discussing the effects of energy efficiency on load and capacity clearing prices).

28. *See, e.g.*, Texas-New Mexico Power Company, http://www.tnpe.com/nm/energy.asp (last visited Oct. 10, 2006) (providing examples of factors that affect customers' electric bills).

29. *See id.* (offering customers guidance on how to estimate and reduce energy costs).

30. *See, e.g.*, GALEN BARBOSE ET AL., KILLING TWO BIRDS WITH ONE STONE: CAN REAL-TIME PRICING SUPPORT RETAIL COMPETITION AND DEMAND RESPONSE? ES-1 (2006), http://drrc.lbl.gov/pubs/59739.pdf (noting the utilities' traditional practice of fixing prices over months or years in a manner that represents average supply costs).

31. *See id.* at 1 (hailing RTP for its ability to result in more accurate price signaling).

32. *See, e.g.*, *Removing the Disincentives*, *supra* note 24, at 2–3 (noting how lost revenues deter a commission's willingness to mandate energy efficiency as opposed to "more costly new generation.").

33. *See, e.g.*, Petition of Vermont Electric Power Co., Docket No. 6860 (VT PSB Jan. 28, 2005) (final order), *available at* http://www.state.vt.us/psb/6860fnl012805.pdf (permitting a large scale transmission project despite analysis showing that efficiency investments could meet needs at lower societal cost. Due to uncertainty of availability of facilities, the Public Service Board did not pursue efficiency and distributed generation alternatives because the Board determined that region's power needs could not be met in a timely manner to avoid the transmission project).

## III. TOOLS FOR EFFICIENCY

While there are many barriers to having efficiency and conservation resources meet more of our energy needs, these barriers are not insurmountable and there are many tools available to use less power. These tools fall into two categories. The first includes "gadgets" or "better mousetraps." These are more efficient technologies that allow us to have the same or comparable service while using less power. The second includes various regulatory and market structures that encourage more efficiency.

### *A. More Efficient Technologies*

Available efficiency technologies allow for a significant reduction in energy consumption. These technologies require consumers to perform simple actions, such as replacing home appliances, home or commercial lighting, and industrial engines and fans with more efficient models. In almost every instance, the same service is provided–lighting to the same lumens standard, cooling or heating to the same temperature, or meeting the same industrial output.[34] Improved technology allows these activities while using less power. Energy Star, a joint program set up by the United States Environmental Protection Agency and United States Department of Energy to promote energy efficiency, explains the significant effect of using efficient technologies:

> If every American home changed out just 5 high-use light fixtures or the bulbs in them with ones that have earned the ENERGY STAR [label], each family would save more than $60 every year in energy costs, and together we'd keep more than one trillion pounds of greenhouse gases out of our air–equal to the emissions of 8 million cars. That's a $6 billion energy savings for Americans, equivalent to the annual output of more than 21 power plants.[35]

These technological tools reduce electricity use, and while important, are but one component in improving efficiency on the demand *and* supply side.

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34. Energy Star, Compact Florescent Light Bulbs, http://www.energystar.gov/index.cfm?c=cfls.pr_cfls (last visited October 10, 2006).

35. *See* Energy Star, Light Bulbs and Fixtures, http://www.energystar.gov/index.cfm?c=lighting.pr_lighting (last visited Oct. 10, 2006) (noting that Energy Star compact fluorescent light bulbs generate 70% less heat than conventional bulbs, which leads to lower home cooling costs).

Another example of a tool for reducing electricity demand is the growing use by some businesses and municipalities of energy services contracts to implement comprehensive energy efficiency systems. Under these contracts, a business provides energy services and is paid based on performance.[36] For instance, the Montpelier School District in Montpelier, Vermont, recently contracted with a consulting firm to make major energy-saving improvements in the heating and cooling systems at its schools.[37] The total cost for the efficiency investments is $1,200,006, and will pay for itself through energy savings and reduced operating costs over a period of 10 years.[38]

An innovation regarding supply-side efficiency is Combined Heat and Power (CHP), which is local, on-site generation that provides heat & electricity. Proponents of CHP point out that conventional electricity generation is "inherently inefficient, [and] convert[s] only about a third of the fuel's potential energy into usable energy."[39] They go on to explain that CHP incorporates more "intrinsic efficiency" and provides a better option for "the bottom line and the environment" because it "produces both electricity and useable heat–convert[ing] as much as 90% of the fuel into usable energy."[40] The significant increase in efficiency with CHP results in lower fuel consumption and reduced emissions compared with the separate generation of heat and power.[41] For example, the North Country Hospital in Newport, Vermont, installed a CHP in the form of a wood chip co-generation system.[42] Because of the skyrocketing prices of oil and gas, the anticipated monetary savings for installing this CHP system will be about $328,000 per year.[43] In addition, this system will reduce stress on the grid,

36. *See e.g.*, CAL. DEP'T OF GENERAL SERVICES, STATE ADMIN. MANUAL ENERGY: SERVICE CONTRACTS, 6876 (1998), *available at* http://sam.dgs.ca.gov/TOC/6000/6867.htm ("The energy service contract is the legal loan agreement that defines the project and ensures repayment of the borrowed monies. The [Department of General Services] is required to repay the loan regardless of the success of the project. This is necessary to assure bondholders they will be repaid.").

37. Kelly Sullivan, *Montpelier Schools Adopt $1.2Million Energy Contract*, TIMES ARGUS, Feb. 17, 2006, § NEWS.

38. *Id.*

39. Tina Kaarsberg & R. Neal Elliott, *Combined Heat and Power: Saving Energy and the Environment*, NORTHEAST MIDWEST INSTITUTE, Apr. 1, 2001, http://www.nemw.org/ERheatpower.htm.

40. *Id.*

41. *See id.* (noting that CHP has the potential to reduce energy costs by 40% and greenhouse gas emissions by 50%).

42. Press Release, North County Health System, North Country Hospital: A Small Hospital Attracting Big Attention (Dec. 2, 2005), *available at* http://www.nchsi.org/press_releases/for_immediate_release_20051202.htm.

43. *Id.*

save countless gallons of oil and gas, and avoid significant pollution and greenhouse gas emissions.[44]

A technological tool to help reduce or shift a consumer's electricity usage is the use of sophisticated smart meters that can closely track usage and power cost.[45] Smart meters look similar to standard digital meters and fit into a standard meter base. They "measure and store electricity consumption data over short time periods, usually an hour."[46] This kind of advanced metering infrastructure is a necessary condition for implementing Real Time Pricing (RTP) and other time-sensitive rate structures discussed below in Part IV.[47] Smart meters allow for the control of certain appliances so that energy use is curtailed during times of high electricity demand or high prices.[48] Some forms of smart meters can connect to appliances, such as clothes dryers, that signal when energy prices are high, allowing a consumer to avoid using such appliances when their use will be more costly.[49] Another alternative is to program smart meters to shut off connected appliances when prices are high, giving the consumer an overall better match between power cost and power price.[50]

## IV. WHOLESALE AND REGULATORY TOOLS TO PROMOTE EFFICIENCY

In addition to technological tools, regulatory and market structures can also help overcome barriers to acquiring more efficiency resources. One tool to acquire efficiency resources is the establishment of an energy

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44. *Id.; see also* Tina Kaarsberg & R. Neal Elliott, *supra* note 39 (noting that CHP will reduce greenhouse gas emissions and help satisfy "future needs for electricity generating capacity.").

45. *See, e.g.*, Jürgen Weiss, Time Based Rates in Vermont, (March 15, 2006), (Workshop on Smart Meters and Time Based Rates presentation), *available at* http://www.state.vt.us/psb/document/ElectricInitiatives/WeissTimeSensitiveRatesinVT.ppt.

46. *Id.*

47. *See id.* (declaring that "RTP and smart metering will come, so let us figure out not 'if' but 'how'!").

48. *See, e.g.*, California Energy Commission's Public Interest Energy Research (PIER) Program, *Energy Efficient and Affordable Small Commercial and Residential Building Research Program*, http://www.archenergy.com/cec-eeb/P3-LoadControls/index.htm (last visited Oct. 10, 2006) (describing a "smart controller" designed to detect a peak demand event and, in response, turn off or turn down the connected appliance); *see also* Patrick Mazza, *Northwest Utilities Looking at Smart Energy Technologies to Control Bills and Improve Service*, CLIMATE SOLUTIONS SMART ENERGY BULLETIN #4, http://www.climatesolutions.org/pubs/pdfs/SmartEnergy4.pdf (comparing supply-side utility radio control measures to demand-side smart meters).

49. *See, e.g.*, Katherine Wang et al., *Power from the People: Demand Response Comes Home*, ROCKY MOUNTAIN INSTITUTE, http://www.rmi.org/sitepages/pid1090.php (describing the "GoodWatts" home management system, which uses broadband technology to send signals from the utility to smart meters, informing owners the occurrence of critical peak-electricity usage).

50. *See id.* (explaining that the "GoodWatts" technology also allows the owner to preprogram the smart meter to shut-off appliances upon receiving a critical peak-electricity usage signal).

efficiency program, funded by a systems benefit charge (SBC). An SBC is defined as a non-bypassable charge on a consumer's electric bill to pay for the costs of certain public benefits, such as low-income assistance and energy efficiency.[51] The amount of the SBC can vary state to state, and ranges from less than one-tenth of a cent per kWh to up to four-tenths of a cent per kWh.[52] Approximately 20 states have an efficiency program funded by an SBC, but many fund only a small portion of the available and cost-effective energy efficiency resources.[53] For example, a 2002 study in Vermont found that increasing the current spending on energy efficiency by a multiple of 10 over the next 10 years would still acquire cost-effective energy efficiency resources.[54] Likewise, when California significantly increased its funding for an efficiency program, it determined the efficiency measures would save enough electricity to avoid building three 500 MW power plants.[55]

Other regulatory or market tools in the form of "demand response" are available to reduce energy use at key times.[56] Demand response reshapes the load over a day to take the stress out of the system for peak hours of demand.[57] Demand response could be used to reduce the barriers to efficiency created by RMR contracts.[58] Contracts for demand response

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51. *See, e.g.*, THE BUSINESS COUNCIL FOR SUSTAINABLE ENERGY, ENERGY AT THE STATE LEVEL 22–23 (2004), http://www.energycommission.org/files/finalReport/IV.3.a%20-%20Energy%20 at%20State%20Level.pdf (discussing various state SBC programs).

52. HOWARD GELLER, UTILITY ENERGY EFFICIENCY PROGRAMS AND SYSTEMS BENEFIT CHARGES IN THE SOUTHWEST, SOUTHWEST ENERGY EFFICIENCY PROJECT 4 (2002), www.swenergy. org/pubs/system_benefit_charges.pdf.

53. *Id.*

54. OPTIMAL ENERGY, INC., VERMONT DEPARTMENT OF PUBLIC SERVICE, ELECTRIC AND ECONOMIC IMPACTS OF MAXIMUM ACHIEVABLE STATEWIDE EFFICIENCY SAVINGS 2003–2012, RESULTS ANALYSIS AND SUMMARY, PUBLIC REVIEW OF DRAFT 2–3, tbl.6 (2003), http://publicservice. vermont.gov/energy-efficiency/ee_files/efficiency/eval/eeu_2002report/att1.pdf (noting that spending up to $150 million in 2003 dollars, almost ten times the $17.5 million budget under 30 VT. STAT. ANN. § 209(d)(4) prior to 2005, is both cost effective and achievable).

55. Brian Prusnek, Energy Efficiency in California: Energy for the Future (Dec. 6, 2005) (Presentation to the Minnesota Public Utilities Commission), *available at* http://www.raponline.org/ Conferences/Minnesota/Presentations/PrusnekCAEEMinnesota.pdf.

56. *See, e.g.*, EDISON ELECTRIC INSTITUTE, COMMENTS TO U.S. DOE DEMAND RESPONSE REPORT TO CONGRESS 1–2 (2005), http://www.eei.org/about_EEI/advocacy_activities/U.S._ Department_of_Energy/051122DOE-DR-Comments-v4.pdf (explaining the fundamental properties of demand response).

57. *See, e.g.*, COWART supra note 14, at 65 (providing a graphical example of the "[i]mpact of demand reductions on wholesale energy clearing prices in the New England Regional Power Pool on June 7, 1999.").

58. *See Devon Power, LLC et al.*, 103 FERC ¶ 61,082 at 9 (April 25, 2003 Order) *available at* http://www.caiso.com/docs/2003/04/29/2003042911470312232.pdf (denying power company's request to recover full cost-of-service cost through an RMR contract, and condemning RMR contracts because they "suppress market-clearing prices, increase uplift payments, and make it difficult for new generators

mechanisms can be formed by an industry or large consumer contracting with an ISO to shut down on request for the sake of reliability, thereby reducing or eliminating the need and cost of RMR contracts.[59]

Another set of available market tools currently being developed by Independent System Operator-New England (ISO-NE) are rules for the Forward Capacity Market (FCM).[60] As the result of a Federal Energy Regulatory Commission (FERC) settlement proceeding involving charges for Locational Installed Capacity (LICAP), the FCM must include a distinct methodology to fully integrate energy efficiency as a resource for meeting the region's capacity needs.[61] ISO-NE Demand Resource Group has drafted FCM rules to define various kinds of Demand Resources (DR) and their respective capacity values and to determine criteria to ensure financial assurance and performance mechanisms.[62] Once developed, efficiency resources should be able to fairly compete and be compensated for the capacity they provide, just as generators are now paid for providing capacity.[63]

Locational Marginal Pricing (LMP) is another tool that encourages efficiency by aligning prices with higher costs incurred as a result of transmission congestion.[64] LMP is a market pricing approach used to

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to profitably enter the market . . . . In short, extensive use of RMR contracts undermines effective market performance.").

59. *See id.* at 10 (encouraging demand response mechanisms to reduce to promote competitive market behavior and emphasizing that RMR contracts "should be a last resort" for suppliers to recover costs).

60. ISO New England, Demand Resources Group's Proposed Measurement and Verification Provisions for FCM Rule (Final Draft), http://www.iso-ne.com/committees/comm_wkgrps/othr /drg/mtrls/FCM_DR_Measurement_and_Verification_092106.doc (last visited Oct. 10, 2006) [hereinafter Draft FCM Rule].

61. *Devon Power LLC, et al*, 115 FERC ¶ 61340 at 6–7 (June 16, 2006), *available at* http://www.iso-ne.com/regulatory/ferc/orders/2006/jun/er03-563-030_er03-563-055_6-16-06.pdf.

62. Draft FCM Rule, *supra* note 60; *see also Forward Capacity Market Includes Opportunity for Energy Efficiency*, NEWSLETTER (Northeast Energy Efficiency Partnerships, Inc., Lexington, M.A.) (3d Quarter 2006), http://www.neep.org/newsletter/3Q2006/FCM.html (providing a short summary on the market rules ISO Demand Resource Group).

63. Draft FCM Rule, *supra* note 60; *see also Devon Power LLC, et al*, *supra* note 61, at 7 (discussing Forwards Capacity Auctions that will enable the FCM to secure capacity three years in advance of the commitment period to "provide a planning period for new entry and allow potential new capacity to compete in the auctions.").

64. *See e.g.*, KARL MEEUSEN & R. SCOTT POTTER, THE NATIONAL REGULATORY RESEARCH INSTITUTE, COMMISSION PRIMER: LOCATIONAL MARGINAL PRICING 1 (2004), http://www.nrri.ohio-state.edu/dspace/bitstream/2068/3/4/04-16.pdf (providing a "basic overview of LMP" designed for state public utility commissioners ); *see also* ISO NEW ENGLAND, STANDARD MARKET DESIGN: WHOLESALE ELECTRICITY TRADING 2 (2003), http://www.ksg.harvard.edu/hepg/Standard_Mkt_dsgn/ISO. New.Eng_100_hour_Report_3-7-03.pdf (describing LMP as one component of ISO-NE's Standard Market Design, a "major redesign of New England's wholesale electricity marketplace" that aims offer a more accurate reflection of wholesale power cost while providing "guidance for infrastructure

manage efficient use of the transmission system when congestion occurs on the bulk power grid.[65] LMP identifies areas of high congestion and enables regulators to assign a cost of transmission to these locations, which will be higher than transmission to non-congested areas.[66] This price signal allows consumers to know what their power really costs and can encourage the acquisition of efficiency resources and a more efficient use of power.

Real Time Pricing (RTP) is another tool that closely aligns electricity prices with the real cost of providing electricity to a customer. Unlike conventional fixed pricing that relies on the average supply cost over time, RTP enables utilities to charge consumers energy prices that contemporaneously reflect the marginal supply costs.[67] Since higher prices generally occur during peak times, the use of RTP encourages efficiency and allows customers to benefit economically according to their individual energy choices.[68] As a result, RTP sends price signals to encourage consumers to shift power use from peak to off-peak in order to save money.[69] This shift in use would not only save the consumer money, it would lower peak demand; and therefore, lower prices of peak power and the need for additional peak generation in the long run.[70]

The Federal Energy Policy Act of 2005 requires each state public utility commission to consider and make a determination regarding certain standards:

> [E]ach electric utility shall offer each of its customer classes, and provide individual customers upon customer request, a time-based rate schedule under which the rate charged by the electric utility varies during different time periods and reflects the variance, if any, in the utility's costs of generating and purchasing electricity at the wholesale level. The time-based rate schedule shall enable the electric consumer to manage energy use and cost through advanced

investment").

65. KARL MEEUSEN & R. SCOTT POTTER, *supra* note 64, at 9 (defining LMP simply as "the cost of providing the next MW to a specific location in the least-cost manner given transmission constraints.").

66. *Id.* at 9–11.

67. *See, e.g.*, GALEN BARBOSE ET AL., *supra* note 30, at 1 (noting that RTP enables utilities to charge consumers prices that "vary over short time intervals (typically hourly) and are quoted one day or less in advance, to reflect contemporaneous marginal supply costs.").

68. *See id.* (explaining the price incentive RTP provides to consumers to reduce their energy usage when wholesale prices are high).

69. *See id.* at 1 (referring to economists' long held belief that RTP promotes economic efficiency by providing more accurate price signaling to consumers).

70. *See id.* at 11 (discussing peak demand reduction as one of the goals of the RTP program).

> metering and communications technology . . . . Each electric utility . . . shall provide each customer requesting a time-based rate with a time-based meter capable of enabling the utility and customer to offer and receive such rate, respectively.[71]

Under this mandate, the Public Service Board in Vermont recently opened an investigation into the viability of RTP in Vermont and examined opportunities for using smart metering and time-based rate standards.[72]

Apart from RTP, other rate design measures can also support efficiency and conservation. For instance, inclining block rates discourage energy waste by pricing an initial block of energy usage at a specific rate, and the subsequent blocks of usage at correspondingly higher rates.[73] A seasonal rate is another form of rate design that offers different rates by month to reflect the differences in average monthly costs by season.[74] Finally, under a time-of-use (TOU) rate design, prices for peak power are higher than off-peak power.[75] Absent RTP, these rate design measures still work to better align prices with costs and encourage efficiency by providing more accurate price signals to consumers.[76]

Separating utility profits from the amount of electricity sold, or "decoupling," is another tool to eliminate barriers that discourage efficiency and conservation.[77] Decoupling encourages cost-cutting and improves efficiency by removing the disincentive to promote energy efficiency created by the utility's incentive to earn more profits by selling more

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71. 16 U.S.C. § 2621(d)(14)(A), (C) (Supp. I 2006).

72. *See* Vermont Public Service Board, Implementation of the Federal Energy Policy Act of 2005 http://www.state.vt.us/psb/document/ElectricInitiatives/ImplementFEPA2005.htm (last visited Oct. 10, 2006) (noting the Public Service Board "issued a memorandum setting forth the next steps in its process for considering the smart metering and time-based rate standard.").

73. *E.g.*, FREDERICK WESTON & JIM LAZAR, THE REGULATORY ASSISTANCE PROJECT FRAMING PAPER #3: METERING AND RETAIL PRICING 8–9 (2002), http://nedri.raabassociates.org/Articles/NEDRIpaper3final.doc.

74. *See id.* at 9, 19 (discussing seasonally differentiated rates as a "simple and effective, if blunt" tool to encourage consumers to reduce energy consumption during periods of greater demand).

75. *See id.* at 9 (providing an informative discussion on TOU rates).

76. *See id.* at 10 (explaining that "[m]ulti-part rates have in many cases been time-of-use and/or seasonally differentiated as well. The more closely these types of rate designs isolate customer behavior at the time of the system peak demand, the more accurately they convey meaningful pricing information to consumers.").

77. *See e.g.*, Mark Newton Lowry & Lawrence Kaufmann, *Performance-Based Regulation of Utilities*, 23 ENERGY L. J. 399, 422 (2002) (describing the impact of revenue caps on utilities by "a revenue decoupling mechanism"); *see also* Hoff Stauffer & Jürgen Weiss, *A Simple Solution to a Very Old Problem*, THE ELECTRICITY JOURNAL, May, 2006, http://www.energylibrary.org.nz/documents/EnergyLibraryUpdateJune.pdf (calling for "shift[ing] the sales-volume risk from the shareholder to the ratepayer, who can directly control the use of electricity.").

energy.[78] To illustrate, Puget Sound Power and Light (now Puget Sound Energy), in the State of Washington, ran under a decoupling rule prior to deregulation, from 1991 to 1996.[79] During its first year of decoupling, the company's energy savings equaled almost as much as the energy savings attributable to the three previous years combined.[80] In the second year of decoupling, the company's energy savings increased by another 60%.[81] And in Vermont, the State Legislature recently passed a law allowing the Public Service Board to approve alternative forms of regulation, including the decoupling of electricity profits from the volume of sales, as a way to foster energy efficiency.[82] One utility, Green Mountain Power, has already filed a request for approval of an alternative regulation plan that includes decoupling.[83] This is currently being considered by the Vermont Public Service Board.[84]

## VI. CONCLUSION

As the world economy grows, we can choose to meet our energy needs with more dirty power, or we can choose to utilize the power we have in the most efficient manner possible. The cleanest and least-cost solution is the latter. Taking action now to acquire all cost-effective efficiency resources through well-funded efficiency programs, combined with regulatory and market tools to encourage efficiency, will allow us to take a big step towards responsibly meeting our energy needs.

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78. *See, e.g.*, Mark Newton Lowry & Lawrence Kaufmann, *supra* note 77, at 422—23 (describing decoupling as a mechanism that "serves the link between revenue and efforts to market regulated services.").

79. Alan Durning, *Current Thinking: Vigilant Efficiency*, NORTHWEST CURRENT, Feb. 28, 2005, http://www.nwcurrent.com/commentary/1309682.html.

80. *Id.*

81. *Id.*

82. VT. STAT. ANN. tit. 30, § 218d(a)(4) (Supp. 2005).

83. *Petition of Green Mountain Power Corp*, Docket No. 7176 (VT PSB Apr. 14, 2006), *available at* http://www.gmpvt.com/atyourservice/2006ratefiling.shtml.

84. *Id.*