Integrating Green Energy and Energy Efficiency:

A Viable Option for New England's Competitive Electricity Markets?

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Executive Summary

The introduction of electricity competition into New England has brought with it green energy options for consumers. Although consumers are pleased with the environmentally friendly nature of the product, the cost has remained uncompetitive with traditional non-renewable energy options. While green energy has the effect of raising a consumer's monthly electricity costs, energy efficiency has the effect of lowering them. The paper develops a theoretical framework for integrating green energy and energy efficiency, and tests the assumptions by analyzing actual green offerings in New England. None of the green energy offerings integrate energy efficiency into their renewable energy mix. An analysis of leading green energy certification programs in New England shows that energy efficiency is not included as a certifiable renewables component, however a pilot program is being developed in Pennsylvania incorporating energy efficiency into the certified green energy offerings. In addition to certification problems, there are several other barriers to bundling the products, including renewables portfolio standards, disclosure labeling, corporate competencies, and consumer price sensitivity. Strategic recommendations are suggested for making the integration of green energy and energy efficiency a viable option in New England's competitive electricity markets.

1. Overview

As states have introduced competition into their electric markets, environmentally preferable or "green" options have been developed for consumers. Consumers are able to choose electricity made from cleaner sources, such as solar or wind, but this choice comes with a price surcharge. While consumer surveys have demonstrated a willingness to purchase green products, consumers have not been shown to put their money where their mouth is when purchasing green energy. The higher cost remains prohibitive. For example, Public Service of Colorado found that while consumer surveys indicated that more than 70% of customers would pay more for renewable power, less than 8% actually subscribed to the offer.[1] Energy efficiency may provide a solution to consumers by providing an environmentally preferable means of lowering their electricity costs. By bundling higher cost green energy with lower cost energy efficiency, one could envision a truly competitive option to traditional energy.

The objective of this paper is to explore the issues surrounding the bundling of green energy with energy efficiency. The scope is limited to electricity in the New England states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

1.1 Electricity Competition in New England

New England is one of the forerunners in the area of electric competition. Five of the six New England states have enacted electricity competition laws, while the sixth state, Vermont, is considering competition. In 1998, Massachusetts and Rhode Island became the first states to open their markets to full retail access. The default standard offer prices were set at low prices relative to wholesale, making it difficult for marketers to compete. For example, at the beginning of Massachusetts competition, incumbent utilities offered service at 2.8 cents/kWh. Standard offers in Massachusetts have just recently increased to about wholesale price levels. The historical wholesale price of electricity in New England has been between 3.5 and 4 cents/kWh.[2] Because of these low prices, switching rates in New England have been far less than in other regions. Tables 1-3 show a compilation of Massachusetts and Rhode Island standard and default service rates, while Tables 4 and 5 list switching statistics. The rates have been gradually increasing since competition began, and only now are the rates such that competition is feasible. The low amount of switching activity in New England can be seen in Figures 1 and 2. A few green energy providers have entered the New England markets, despite the small margins, and their offerings are analyzed in Chapter 2.

1.2 Energy Efficiency in a Competitive Market

Initially, it was expected that energy efficiency would play an important role in the competitive marketplace. For utilities, energy efficiency services provided a way of attracting and retaining customers. Energy service companies (ESCOs) energy efficiency provided profitable niches in performance contracting, energy efficiency loans, and the leasing of equipment.[3] In fact, a number of utilities acquired partial interests, or even complete ownership, of ESCOs in anticipation of these benefits.

Energy efficiency has not played the large competitive role anticipated for several reasons. The reasoning can be explained both from a demand-side and a supply-side point of view. On the demand side, the number of customers switching to a competitive power supplier has not been high enough to make competitive marketers a viable alternative. Tables 2 and 3 show the switching statistics in the fully open retail markets of Massachusetts and Rhode Island. In both cases, total switching rates were less than 1% of all customers as of December 1999.

A second demand reason is that consumers have been wary of package deals. Consumers have experienced a lack of value in package deals from such services as cellular phones and cable television, and have felt that they may be paying too much for package deals of energy. Research at Lawrence Berkeley National Labs has shown that consumers continue to believe that the main benefits of direct access are from savings off the electricity commodity, even

though services such as energy efficiency can save a customer 10-30%, usually far more than the commodity savings.[4] This points to inadequate marketing of energy efficiency by ESCOs and competitive utilities.

On the supply side, ESCOs have not operated as fully integrated parts of the competitive utilities.[5] In most cases, the utilities have been prevented from operating as fully integrated entities due to regulatory restrictions aimed at curbing the market power of utilities. The energy efficiency parts of the competitive utility have been forced to work in parallel, rather than in synergy, with the retail supply part of the business.

A second supply reason is that ESCOs have a unique way of operating and there is a lack of expertise for packaging energy efficiency and supply.[6] ESCOs tend to operate like construction companies, with tightly defined operations and the tendency to seek moderate profitability. The ESCO community does not have extra capital around to experiment with how a true supply / energy efficiency product ought to work.[7] Their ultimate concern is with the bottom-line.

There is still potential for the integration of energy efficiency into competitive markets. The keys are to have a functional, integrated competitive market, coupled with supplier expertise and customer satisfaction that there is value in the products.

1.3 Green Energy as an Alternative to Traditional Options

Green energy has introduced product differentiation in a commodity market. Marketers of energy have been able to tap into the growing environmental movement among consumers. Consumers, in turn, have been empowered to make a choice when purchasing their energy.

How does green energy work? When a consumer purchases green electricity, the ESP cannot guarantee that the electrons coming out of the consumer's electrical outlet contain 100% green electrons. This is due to the limitations of physics; electrons move along the path of least resistance. What the ESP does guarantee, however, is that the company will supply an amount of green electricity to the grid equivalent to the consumer's electricity usage. While the consumer cannot know that the electrons in his/her home are green, the consumer can rest assured that less fossil energy is being used to create electricity, and thus the consumer is helping to create a more sustainable environment.

While there are impartial organizations that certify energy products as green, there is no standard legal definition for green energy. Generally, green energy offerings have a renewable energy component, but there may be a fossil fuel component as well. In addition, the renewable components have different degrees of "perceived greenness" depending on the source location, age, and means of generation.[8] Thus it is very important to not only critically analyze the energy offerings of ESPs, but also to understand what the impartial

organizations define green energy to be. This is analyzed in Chapter 3 of the paper.

1.4 Motivations for Integrating Green Energy and Energy Efficiency

Green energy and energy efficiency appear to a good target for integration for reasons of cost and environmental preference. Green energy typically costs 1-2 cents / kWh higher than traditional fossil generated energy. (See Chapter 2 for actual figures.) Thus green energy has the effect of increasing a consumer's electricity bill. Because green energy displaces otherwise used fossil energy, however, there are environmental benefits to using green energy.

Energy efficiency, on the other hand, has the effect of decreasing one's electricity costs. Rubinstein et al. conducted extensive research on energy efficiency measures that could be integrated into Pennsylvania's green energy program. (See Table 6) Energy efficiency measures typically reduce a consumer's electricity bill by 3-4 cents / kWh. Energy efficiency can also be marketed for its environmental benefits. Snell et al. showed that there is potential for environmental benefits becoming a sales paradigm for the energy efficiency industry.[9]

From a theoretical point of view, it appears that bundling green energy and energy efficiency does have potential. It could produce a product that is

both environmentally preferable and cost competitive with traditional fossil-generated energy. But does theory match reality?

2. Green Offerings in New England

2.1 Overview

Green energy offerings in New England have been fairly limited. Standard utility offerings in states such as Massachusetts and Rhode Island have been priced extremely low (in some cases, below wholesale), making it difficult for green energy marketers to compete against the traditional utilities. These standard rates will be increasing in the near future. In Massachusetts, the default price has already been raised to about wholesale price levels. Green offerings have been introduced in Connecticut, Maine, and Massachusetts with not much initial success.

2.2 AllEnergy

AllEnergy <http://www.allenergy.com/regen/regen.html> offers a renewable power upgrade known as "ReGen". AllEnergy was formed in 1997 as a joint venture between New England Electric System and Eastern Enterprises. This offering supplements, rather than replaces, a utility's generation product. Thus the environmental quality of the energy supply is upgraded without requiring the customer to switch electricity providers. Customers can purchase

2,000 kWh blocks of ReGen for $8 for the first block, and $6 for each additional block. AllEnergy supplies the majority of its power through a landfill gas project, but plans to add PV and wind in the future. AllEnergy's ReGen product is presently only marketed as wholesale. The company does not yet sell directly to the retail market (either energy supply or energy efficiency), but may do so in the near future. The ReGen product has been brokered by such organizations as Essential.com and the Massachusetts Energy Consumers Alliance.

2.3 Connecticut Energy Cooperative

Connecticut Energy Cooperative <http://www.energyforme.com> is a non-profit energy cooperative marketing renewable energy to residents of Connecticut. To get itself launched, the organization relied on strategic alliances with Cooperative Development Institute for strategic business planning, Cooperative Pioneers for technical and marketing support, North Carolina EMC (a large rural electric cooperative) for a 24-hour call center, and the National Rural Utility Cooperative Finance Corporation for debt financing.[10] In addition, the Cooperative received a $500,000 loan from the Connecticut Clean Energy Fund. The organization markets a product known as "Ecowatt". Ecowatt consists of 6% wind power, 27% methane gas from landfills, and 67% from hydropower. The cost of Ecowatt is 1.5 cents/kWh higher than Connecticut Energy Cooperative's traditional energy product and the product is Green-E

certified. The Cooperative has begun a program known as the "Innovation, Conservation and Efficiency Program" (ICE). ICE shows Cooperative members how to introduce efficiency into homes and business. There is no integration between Ecowatt and ICE; the products are marketed and priced as separate entities. The cooperative is non-profit; 20% of surplus goes back as rebates to members, and 80% goes toward the development of energy efficiency and renewable energy programs. A solar PV product is planned for roll out next year.

2.4 Energy Atlantic

Energy Atlantic <http://www.energyatlantic.com> is the largest competitive electricity provider in Maine. The company markets a product known as "PureGreen". The company does not have a standard renewable energy mix for its green offerings. Rather, it claims that the sources of PureGreen are biomass, wind and hydro, and that the mix will vary from time to time. The cost of PureGreen is 1 cent/kWh higher than the traditional energy product. Energy Atlantic does not have any energy efficiency options.

2.5 Green Mountain Energy

Green Mountain Energy <http://www.greenmountain.com> is a national green power marketer, with products sold in California and Pennsylvania.

Green Mountain entered the Connecticut market in February. The company's product mix includes 5.5% wind, 44.5% Class II renewables (biomass and hydropower), and 50% non-renewables. The price premium for their product is 0.5 – 1.0 cents / kWh higher than the standard offer rates of Connecticut Light and Power, and United Illuminating. Green Mountain's product is Green-E certified. The company offers energy conservation tips on its homepage, but does not market any integrated energy supply / energy efficiency products.

2.6 Religions Organizations: An Emerging Trend

An emerging trend in green offerings is the use of faith-based organizations as aggregators. Maine Interfaith Power and Light began business in early 2000 as an independent electricity aggregator.[11] The group is made up of a number of organizations, including the Maine Council of Churches, Episcopal Diocese of Maine, Maine Conference of the United Church of Christ, and the New England Conference of the United Methodist Church. The organization is in the process of soliciting proposals from suppliers. It appears that the product will not include any energy efficiency.

Another faith-based organization, Episcopal Power and Light <http://www.theregenerationproject.org>, is searching for a supplier for Massachusetts and Connecticut. The group currently aggregates energy in California, where it has a contract with Green Mountain Power. Green Mountain has agreed to rebate $250 to any church that signs up for a Green Mountain product, and will pay churches $35 for each parishioner household that signs up. Massachusetts and Connecticut have a total of 400 Episcopal churches.

2.7 Conclusions

Green energy is beginning to penetrate the New England market, but is still in its infancy. Energy efficiency is not being marketed as a package with green energy products. Consumers are paying a premium of about 1 cent/kWh

higher than traditional energy products. Thus while green energy companies are doing a good job at capturing the altruistic consumer, there is still potential to capture the cost-conscious consumer. The standard offer prices in New England have been fairly low, and competitive suppliers have been reluctant to enter the market. As these prices will increase in the upcoming years, look for more suppliers to enter the market.

3. Certification Programs

3.1 Overview

Green certification programs serve several purposes.[12] Firstly, they build an understanding of renewables. This means that they can serve as an education tool for consumers interested in renewable energy. Second, they ensure people get what they pay for if they buy certified "green" electricity. There are no legal definitions for "green" electricity. Certification can provide a disclosure and auditing mechanism so that consumers know how much "green" they are receiving. Thirdly, certification programs can help shape the renewables market. Thus certification could enhance the likelihood of bundling energy efficiency with other forms of renewables to create an integrated green energy product.

3.2 Green-E

Green-E <http://www.green-e.org> is by far the largest and most well

known green energy certification program. The program is administered by the Center for Resource Solutions of San Francisco California, a non-profit organization funded primarily by foundations and state/local governments. Green-E requires that at least 50% of the electricity come from renewable sources including solar, small or low-impact hydro-electric, wind, biomass, and/or geothermal facilities. If the electricity has a non-renewable portion, the air emissions from that portion must be equal to or lower than conventional electricity.

Green-E certified electricity providers are required to abide by a code of conduct. This includes full disclosure of the percentage and type of renewables used in the electricity mix, pricing in a standard format, independent audits, and review of advertising claims. Certified products are allowed to use the Green-E logo in marketing campaigns.

Energy efficiency is not allowed to be part of the New England Green-E certified mix. Green-E, however, has begun a pilot program in Pennsylvania, whereby marketers can use energy efficiency as part of their green energy mix. In the first year, up to half of the "renewable resource" can come from energy efficiency, but that percentage is gradually phased out to zero following the fifth year. The purpose of the use of energy efficiency was not pricing, but rather to allow Pennsylvania to build up its base of renewable energy resources. When Green-E was introduced to Pennsylvania, 98% of Pennsylvania's energy came from the traditional dirty sources.[13] With energy efficiency being allowed to

count as renewables for an interim period, Pennsylvania has been able to increase the renewable energy generation in the state to better meet portfolio standards.

Currently two Green-E certified products are available in New England: Connecticut Energy Cooperative's EcoWatt, and Green Mountain Energy. These products are only available in Connecticut.

3.3 Power Scorecard

Power Scorecard <http://www.powerscorecard.com> is a program administered by the Center for Environmental Legal Studies at Pace University School of Law. The program is co-sponsored by the Environmental Defense Fund, Izaak Walton League, National Resources Defense Council, Northwest Energy Coalition, and Union of Concerned Scientists. The program currently only rates green offerings in California and Pennsylvania, but plans to begin rating green offerings in New England starting this summer.

Power Scorecard rates the relative environmental impacts of the fuels and technology used to produce an electricity product. It measures the impacts of generating facilities on eight environmental criteria: global climate change, smog, acid rain, air toxics, water consumption, water pollution, land impacts, and fuel cycle/solid waste. The score is calculated as the weighted average of the criteria, with global climate change weighted higher than the other criteria.

It would appear that energy efficiency integrated offerings would not be helped by Power Scorecard. The ratings only take into account generating facilities, and not any green energy packages. In order to provide a more realistic rating of a green energy / energy efficiency offering, Power Scorecard would need to rate the entire green energy package, not just the generating portion.

3.4 Scientific Certification Systems

Scientific Certification Systems (SCS) <http: / / www.scs1.com> is an independent third party certification and consulting company. SCS has developed a protocol for certifying individual generators as having low environmental impacts based on life cycle assessments from fuel extraction and processing through waste disposal. Results are compared to a standard baseline according to various impact criteria. When a product is better in every criterion than the baseline, the product can be certified as environmentally preferable. Similar to the Power Scorecard ratings, energy efficiency is not part of the rating criteria of SCS certification.

3.5 Conclusions

For the New England market, energy efficiency is not part of the renewable energy definition for green-certified products. Green-E is beginning

to take energy efficiency into account in Pennsylvania, but even there, energy efficiency will be phased out of the criteria in five years. Companies marketing a green energy product are concerned with certification in order to gain credibility with consumers. For an integrated green energy / energy efficiency product to have any chance of success, the green certification programs will need to allow for energy efficiency to be a part of the certification package.

4. Regulatory Policies as Barriers to Integration

4.1 Renewables Portfolio Standard

The Renewables Portfolio Standard (RPS) is a requirement that a minimum percentage of each ESP's resource portfolio come from renewable energy.[14] RPSs have been included in the restructuring of Connecticut, Maine, and Massachusetts and a summary of the New England RPSs can be found in Table 7. The RPS uses market mechanisms to make sure that electricity is derived from renewable sources. ESPs can generate the necessary amount of renewable energy themselves, purchase it from another provider, or buy credits from other providers who have exceeded the RPS. In Connecticut, RPSs were signed in to law in 1998 with the law revised in 1999.[15] Portfolio requirements for Classes I and II renewables are currently in place. In Maine, RPSs were part of the restructuring legislation, but toned down by the Public Utilities Commission.[16] The Maine RPS has not been implemented yet. Legislation is

currently under consideration to change the RPS to a Systems Benefit Charge (SBC) to fund renewables through a utility rate charge. The proposed start date of the legislation is March 2002. RPSs are schedule for implementation in Massachusetts in 2003 pending regulatory agency developments[17]. Similar to the problem with Power Scorecard, while the RPS credits renewables generation, it does not credit energy efficiency. Because the RPS is a state-imposed requirement, RPSs as currently defined could negatively affect the marketing of an integrated green energy / energy efficiency product.

4.2 Disclosure Labeling

As a form of certification, a number of states are beginning to introduce disclosure labeling. (See Figure 3) Certification programs, such as Green-E, also require such a form. The labels have several components including: generation price, length of contract, renewable supply mix, and air emissions. Generation price is defined in terms of cents per kWh of electricity used. This could aversely affect a green energy / energy efficiency bundled product. In general, energy efficiency costs more on a cents per kWh basis, but results in a lower overall electricity bill. On a head-to-head basis, such a label could be deceiving to a consumer because although the cents per kWh cost might be higher for an integrated green energy / energy efficiency product, the overall cost would be lower. This is because energy efficiency reduces the amount of electricity that a

customer uses. In a bundled product, the cost per kWh goes up because the cost of the energy efficiency measures has to be recovered in the per kWh charge, but the total bill goes down because the customer uses less electricity. In addition, the label has no space for energy efficiency. If consumers were to make a purchasing decision based on labels alone, there would be no advantage to the ESP for including energy efficiency into the green energy mix.

5. Additional Obstacles

5.1 Corporate Competencies

One reason that green power retailers, and ESPs in general, have not been bundling energy efficiency with their products is that they lack the corporate competencies to provide both energy efficiency and electricity supply. The technical, economic, and management skills necessary to run a successful green power business are different than those necessary to run a successful energy efficiency business. This is true for both green and non-green power retailers. This is a major obstacle that will need to be overcome.

5.2 Price Sensitivity of Consumers

From one standpoint, price sensitivity of consumers could be said to favor the integration of green energy and energy efficiency. An integrated energy efficiency / green energy product would be cheaper than a stand alone green

energy product in terms of the overall bill. The price, however, can also be a barrier. Certification programs and regulatory agencies like to quote prices in cents / kWh. This hurts an integrated product because the price per kWh is higher than a stand alone product. The price is also impacted by the low standard offer prices in New England.

6. Strategic Recommendations

6.1 Brand Identity

Increasing the brand awareness of energy efficiency could assist in its integration with green energy offerings. A way to address this issue is co-branding between a green certification program such as Green-E and an energy efficiency certification program such as EnergyStar. In such an offering, energy efficiency could become part of the 50% renewables content required for Green-E certification. In return, the energy suppliers would agree to use certified EnergyStar products for the energy efficiency initiatives. Manufacturers could develop marketing initiatives with the energy suppliers, and customers could purchase the green energy and energy efficiency in a bundle, thereby lowering their overall energy costs.

6.2 Green Power Standards

There is no legal definition for the word “green” when used in green

energy claims. Green power is whatever the ESP defines green power to be. With Green-E gaining more power as the certification program of choice, green power is being defined as what the Center for Resource Solutions says it is, not necessarily what it should be. State and federal governments need to develop legally enforceable definitions of green energy. Alternatively, Green-E needs to be more amenable to definitions of green energy other than their own, i.e. ones that include energy efficiency.

6.3 Government Incentives

State governments could provide incentives such as rebates or subsidies to customers choosing green energy options. In a market such as New England where standard offer prices are so low, government incentives could provide motivation for customers to switch to a green energy supplier. Coupled with government incentives, a combined green energy / energy efficiency offering could command a much greater share of the electricity market.

6.4 Consumer Preferences Drive Competitive Markets

In the end, it must be said that consumer preferences drive competitive markets. In a commodity market such as electricity, ESPs are price takers. Marketing value-added products to consumers can create a competitive advantage to suppliers. Consumers, however, need to feel comfortable with the

product they are receiving. They require a recognized name and a cost competitive solution to their energy needs.

7. Concluding Remarks

In conclusion, integrating green energy with energy efficiency is indeed a viable alternative to traditional electricity options in New England. The integration could have both economic and environmental advantages. Green power offerings have not incorporated energy efficiency, most probably due to certification and state regulatory restrictions. Restrictions also exist with regard to corporate competencies and consumer price sensitivity. A co-branding strategy appears to be the best approach to integration, however there are other public policy mechanisms that could also impact its success.

8. Notes

Table 1: Massachusetts Standard Offer Prices (¢/kWh)

Company	1998	1999	2000	2001
Boston Edison	3.2	3.7	4.5	6.2
Cambridge Electric	2.8	3.5	3.8	5.1
Commonwealth Electric	2.8	3.5	3.8	5.1
Fitchburg Gas & Electric	2.8	3.5	3.8	5.1
Massachusetts Electric	3.2	3.7	3.8	5.4
Western Massachusetts Electric	2.8	3.1	4.6	7.3

Note: Standard offer is tendered to those customers who have not chosen a competitive provider. Source: U.S. Department of Energy / Peregrine Energy[18]

Table 2: Massachusetts Default Service Prices (¢/kWh)

Company	Time Period	Res.	Com.	Ind.
Boston Edison	Jan. 2001 to June 2001	7.0	7.0	7.0
Cambridge Electric	Jan. 2001 to June 2001	6.7	6.7	6.7
Commonwealth Elec.	Jan. 2001 to June 2001	7.0	7.0	7.0
Fitchburg Gas & Elec.	Jan. 2001 to June 2001	8.0	8.0	7.7
Massachusetts Electric	Dec. 2000 to Apr. 2001	6.4	6.5	5.4
Western Mass. Elec.	Feb. 2001 to June 2001	7.9	7.9	7.8

Note: Default service is tendered to new customers and those customers who have switched to a competitive provider and switched back to the utility. Source: U.S. Department of Energy / Peregrine Energy[19]

Table 3: Narragansett Electric (RI) Last Resort Service Prices

Month	Price (¢ / kWh)
Jan. 2001	7.775
Feb. 2001	8.925
Mar. 2001	8.505
Apr. 2001	7.875

Note: Standard Offer Price is 5.9¢ / kWh in 2001. Last resort service is tendered to those customers who have switched to a competitive provider and switched back to the utility. Source: U.S. Department of Energy / Peregrine Energy[20]

Table 4: Massachusetts Switching Statistics

(as of 11/30/00 -- after 33 months of competition)

Customer Class	No. of Customers	% of Customers
Residential	2,484	0.1%
Small Commercial and Industrial	1,417	0.6%
Medium Commercial and Industrial	758	1.6%
Large Commercial and Industrial	438	7.1%
TOTAL	*5,461*	*0.2%*

Source: U.S. Department of Energy / Peregrine Energy[21]

Table 5: Rhode Island Switching Statistics

(as of 12/31/99 -- after 24 months of competition)

Customer Class	No. of Customers	% of Customers
Residential	676	0.2%
General Commercial and Industrial	774	1.5%
Large Commercial and Industrial	74	3.7%
TOTAL	*1,524*	*0.3%*

Source: U.S. Department of Energy / Peregrine Energy[22]

Table 6: Overall Savings of Energy-Efficiency Measures

End Use	Energy-Efficiency Measure	Overall Savings Value (kWh)
Lighting	CFL screw-in	90
	High-efficiency torchiere	1,544
	Fluorescent hardwire (MF)	224
	High-efficiency outdoor lighting w/ controls	477
	LED exit signs	2,759
Water Heating	Low-flow showerhead	577
	Faucet aerator	73
	Water heater blanket	337
	Water heater pipe insulation	120
	High-efficiency water heater	1,317
	Solar water heater	4,500-15,200
Appliances	High-efficiency refrigerator	1,530
	High-efficiency clothes washer	4,421
	High-efficiency dishwasher	517
Space Conditioning	Air-source heat pump	4,707
	Geothermal heat pump	14,490
	High-efficiency central AC	1,296
	High-efficiency room AC	349
Energy Supply	Photovalic system	36/sq ft

Source: Adapted from Rubenstein et al.[23]

Table 7: Renewables Portfolio Standard Policies in New England

State	Renewables Standard Level
Connecticut	Class I Renewables 2000 0.5% 07/01/2001 0.75% 07/01/2002 1.0% 07/01/2003 1.5% 07/01/2004 2.0% 07/01/2005 2.5% 07/01/2006 3.0% 07/01/2007 4.0% 07/01/2008 5.0% 07/01/2009 6.0% Additional Output from Class I and II Renewables 2000 5.5% 2005 6% 2009 7% Class I renewable energy sources include solar, wind, new sustainable biomass, landfill gas, and fuel cells. Class II renewable energy sources include trash-to-energy facilities, biomass facilities not included in Class I, and certain approved hydro facilities.
Maine	Maine electric providers are required to supply at least 30% of their total retail electric sales with electricity from eligible renewable resources. Eligible resources must be a "small power production facility" that produces electricity using only a primary energy source of biomass, waste, renewable resources, or a combination of these resources and has a production capacity of 80 megawatts or less including any other facilities at the same site.

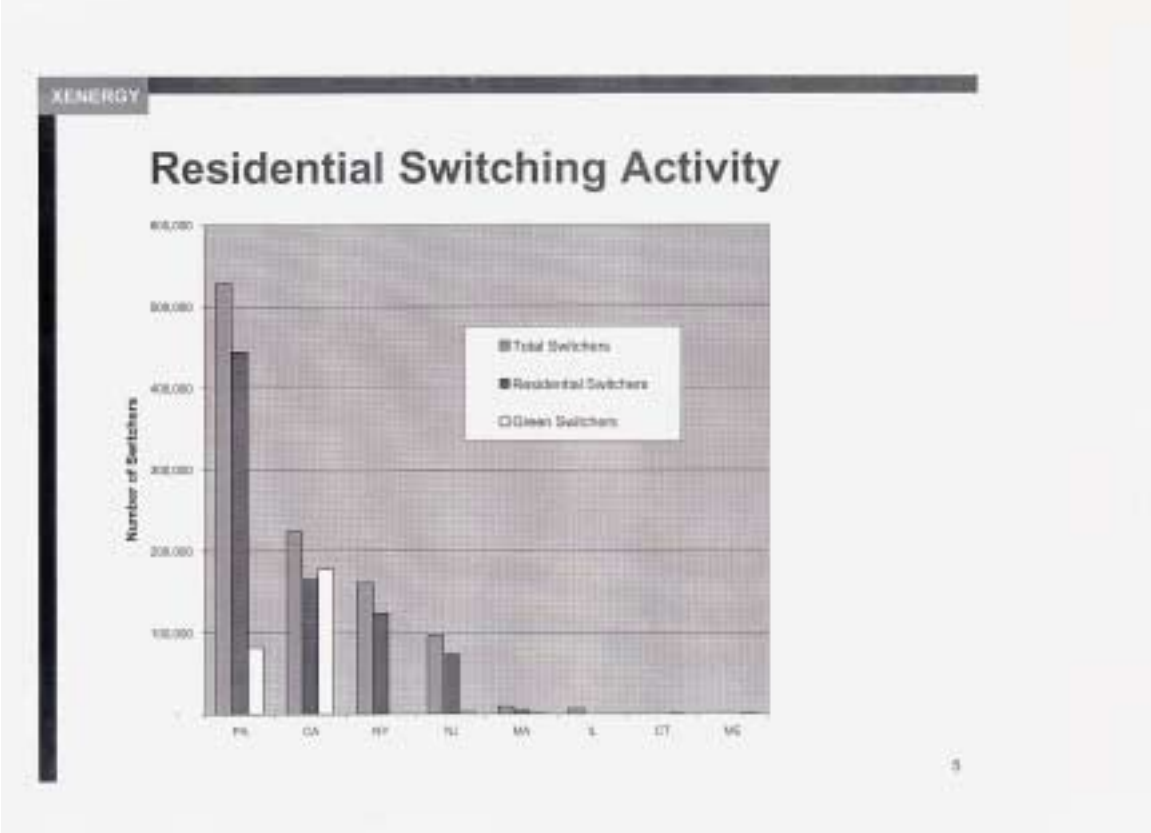
(continued…)

Table 7 (Cont'd): Renewables Portfolio Standard in New England

State	Renewables Standard Level
Massachusetts	New Renewables 2003 1.0% 2004 1.5% 2005 2.0% 2006 2.5% 2007 3.0% 2008 3.5% 2009 4.0% Additional 1.0% each year after until ended by DOER Eligible new renewables include solar; wind; ocean thermal, wave, and tidal; fuel cells using renewable fuels; landfill gas; and low emission biomass.

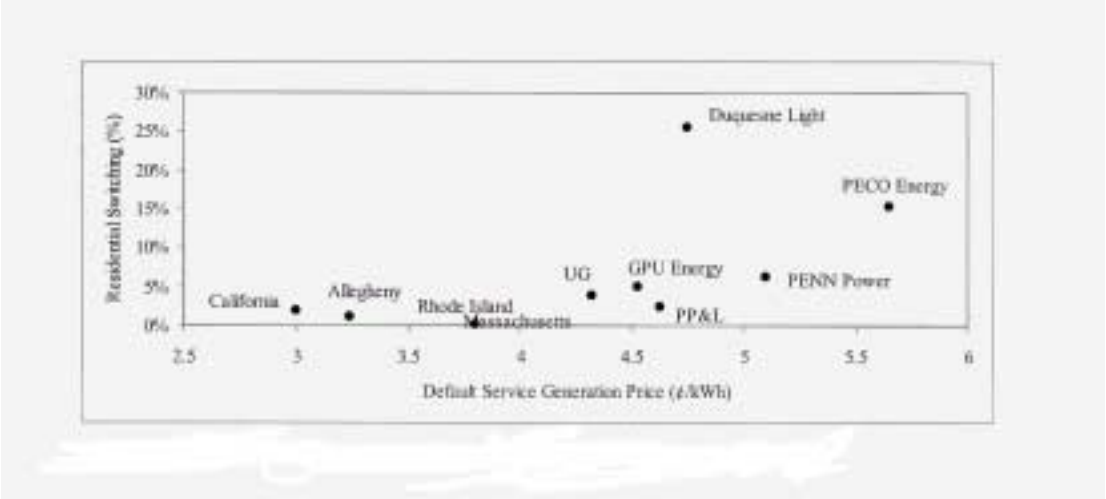
Source: North Carolina State University[24]

Figure 1: Nationwide Switching Activity



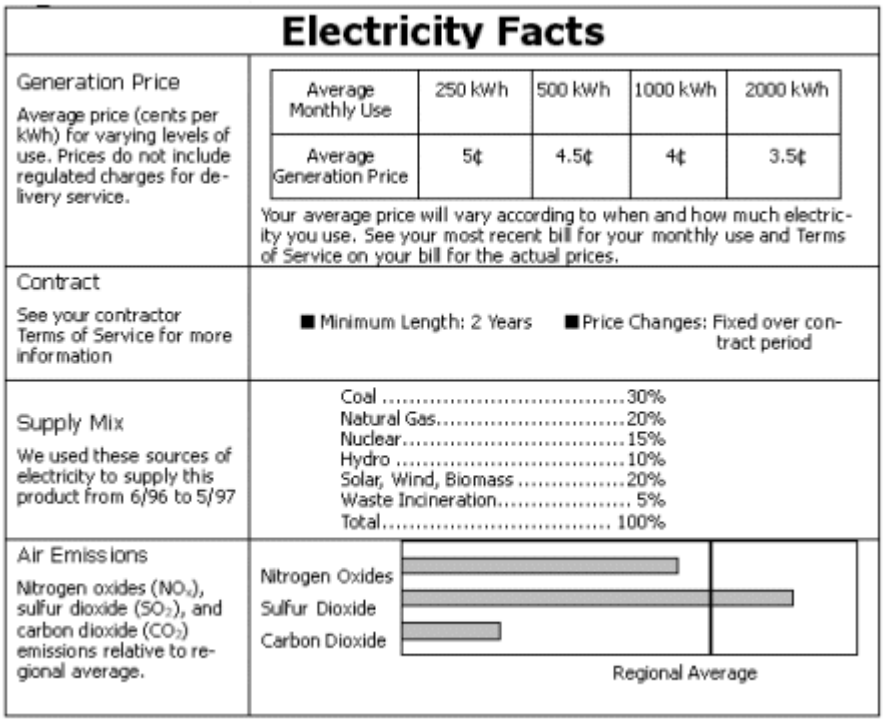
Source: Xenergy[25]

Figure 2: Switching Activity as a Function of Price



Source: Lawrence Berkeley National Laboratory[26]

Figure 3: Sample Disclosure Label



Source: Center for Clean Air Policy[27]

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