STATUS OF HYDROPOWER IN ELECTRIC UTILITY INDUSTRY'S GREEN PRICING PROGRAMS

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Acronyms

APX	Automated Power Exchange
BPA	Bonneville Power Administration
CRS	Center for Resource Solutions
DOE	Department of Energy
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 1992
EWG	Exempt Wholesale Generator
FERC	Federal Energy Regulatory Commission
HRC	Hydropower Reform Coalition
IOU	Investor Owned Utilities
IPP	Independent Power Producer
IRP	Integrated Resource Planning
ISO	Independent System Operator
ISO	Independent System Operators
KWh	Kilowatt hours
LIHI	Low Impact Hydropower Institute
MWh	Megawatt hours
NARUC	National Association of Regulatory Utility Commissioners
NEPOOL	New England Power Pool
PUC	Public Utilities Commission
PURPA	Public Utility Regulatory Policies Act of 1978
QF	Qualifying Facilities
REC	Renewable Energy Credit/Certificate
RPS	Renewable Portfolio Standard
SBC	System Benefit Charges
WAPA	Western Area Power Administration

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I. Hydropower and Green-Pricing Programs- Need for Transparency

In 2008, about 850 electric utilities, a quarter of the electric utilities in the United States, offered green-pricing programs. Green pricing is "an optional utility service that allows customers an opportunity to support a greater level of utility company investment in renewable-energy technologies. Participating customers pay a premium on their electric bill to cover the incremental cost of the additional renewable energy."[1]

At least 80 utilities in the United States currently include hydroelectricity in their green-pricing program. Hydropower Reform Coalition (HRC) does not dispute that moving water is a renewable-energy source, but extracting the energy is usually damaging to the local environment – hydropower's low greenhouse-gas emissions notwithstanding. Indeed, Congress's pending Renewable Energy Standard excludes conventional hydropower on the principle that its cumulative impacts to the environment outweigh its low greenhouse-gas emissions attribute.

Given the impacts of hydropower facilities are site-specific, HRC supports inclusion of hydroelectricity – whether actual energy or Renewable Energy Certificates (RECs) – in green-pricing programs only from hydropower projects that are certified by the Low-Impact Hydropower Institute (LIHI) or equivalent certification programs. Therefore, while supportive of green-pricing programs in principle, HRC-member organizations require assurance that any hydroelectricity contained in green-pricing product offered by the utility in their individual members' communities be sourced from a hydropower facility that meets the standards established by LIHI; otherwise, the HRC-member organizations will not be able to recommend participation in the program to their own members.

Consumers desire information about the facilities from which green-pricing programs source energy and/or RECs to be assured the generators are indeed environmentally superior and thus worthy of their financial (and moral) support. Consequently, when deciding whether to participate in green-pricing programs in which hydroelectricity comprises a portion of the green-power product, consumers should be able to verify to their own satisfaction that the hydropower project from which energy or RECs are sourced has a negligible impact on the environment. The problem is that virtually no utility discloses the specific hydropower projects from which energy or RECs are sourced for use in its green-pricing program.

In this paper, HRC examines the changes in the electric utility industry that gave rise to green-power programs and green-pricing in particular; describes the evolution of green-pricing programs in the United States; and analyzes the transparency of the chain-of-custody for green-pricing programs that offer hydroelectricity.

II. Electric Utility Industry: Challenges and Reforms

To understand the rationale for and evolution of green-pricing programs, it is necessary to examine the changing landscape of the electric utility industry during the 1980s and 1990s. The first green-pricing programs were established in the mid-1990s just as restructuring and deregulation of the electric-utility

industry promised competitive electricity markets throughout the country. "Restructuring" is the break up of electric utilities' historic monopoly ownership and control over generation, while opening up access to utility owned transmission and distribution systems; whereas "deregulation" refers primarily to establishing competition among electric-power producers in wholesale or retail power sales markets, which in turn depended upon restructuring to provide for non-utility ownership of generation.[2] Deregulation does not mean that government is abdicating regulatory authority over utilities, rather that the regulatory regime accommodates price competition on a regulated playing field. Hence "de-regulation" should more aptly have been termed "re-regulation."[3]

Impetus for Restructuring

Restructuring was a response to increasing electric rates in the 1970s. Utility monopoly ownership and control over electric power plants was rooted in the economy of scale of large, central-station, power plants: by virtue of huge capital investment in expensive generating equipment and associated facilities, one company could produce power more economically than could competitive firms. Many companies in the same market would not enjoy the large market of diverse customers, and they would be limited to using smaller and less-efficient equipment. Thus, the rationale for a regulated monopoly was that all customers would benefit if only one company produced power for an entire market.

Until the 1970s, this rationale proved correct, as new and bigger power plants steadily reduced the average cost of electricity. Beginning in the 1970s, however, electric rates began to rise due to increasing costs of construction, increased fuel prices, and overbuilding.* Increasing rates and the consequent loss of confidence in utility management fomented ratepayer unrest. As a result, the ratepayers' perception of the economy of large-scale, power plants flip-flopped from cost-effective to costly, and this coincided with an interest in renewable energy, which held promise for stabilizing electricity prices.[4]

The challenge to the electric-supply paradigm was intensified by other, yet related, political, economic, and environmental developments and events in the 1970s:

- Earth Day grabbed the attention of millions on April 22, 1970. "Environmentalism" emerged as the term describing a broad social and political movement to protect the natural world. Environmental and public health agencies warned of the adverse impacts of coal and nuclear power plants, such as air pollution, acid rain, and nuclear waste.
- Increasing evidence of destructive impacts of man-made capital on natural capital and human welfare coupled with increasing distrust of large, scale, multi-national corporations buoyed critiques of traditional economic theory, exemplified by British economist E.F. Schumacher's book "Small is Beautiful," published in 1973.
- With the surprise OPEC oil embargo of 1973, Americans would no longer take energy security for granted. The oil crisis revealed the inadequacy of federal energy policy and planning and provoked calls for energy independence. The calls for energy independence included everything from increasing exploration and production of oil and gas from U.S. soil, to conservation and developing and deploying renewable-energy technologies.

* Increases in cost of construction were due to increases in real costs of labor and materials; inflation; interest rates on plant construction financing, and new environmental regulations (Clean Air Act and Clean Water Act); greatest impact was on the cost of nuclear power facilities.

- In 1977, an electricity black out left some 9 million people in New York City without power for up to 25 hours, throwing open the question of the reliability of the current electrical grid.
- 1979, gasoline shortages rekindled the alarm over U.S. energy insecurity.
- Finally in 1979, an accident at 3-Mile Island nuclear plant put an end to the construction of new nuclear power plants.

Challenging the Electric-Supply Paradigm

Growing concern in the 1970s about the negative economic, environmental, economic, public health and national security aspects of the large-scale, electric-power plants sparked intense interest in alternatives, especially small-scale, renewable energy technologies, and conservation, which the Carter administration officially promoted through Department of Energy (DOE) solar initiatives.

Indeed, many proponents of renewable energy technologies at this time envisioned energy independence as independence from the utility grid, and thus advocated such emerging technologies as photovoltaic arrays and small wind turbines. In addition to support for such technology, the Department of Energy supported research and demonstration of utility-scale technology, especially ocean-thermal, solar-thermal, wind, and geothermal. Even more significant, the Carter administration and Congress directed Western Area Power Administration (WAPA) and the Bonneville Power Administration (BPA) to develop conservation and renewable programs.[5] In turn, BPA and WAPA required its customers to develop conservation and renewable energy plans.*

The reorientation of WAPA and BPA power-supply planning during the Carter administration coincided with the electric utility industry – then reeling from having built unnecessary power plants due to inaccurate load forecasts – acknowledging the construction of large power plants may not be the most cost-effective option. Thus, the utility industry experimented with more sophisticated forecasting and planning approaches and techniques, embodied in Integrated Resource Planning (IRP). The IRP is a method to internalize and quantify costs and benefits among a range of energy-supply options and includes conservation and efficiency measures in the calculus.

Nonetheless, the Carter administration and Congress were apparently unwilling to rely upon electric utilities alone – IRP notwithstanding – to ensure that more cost-effective, more environmentally benign and fuel oil-free, power supplies were brought on line and enacted the Public Utility Regulatory Policies Act of 1978 (PURPA), which started the restructuring and deregulation train down the tracks.

Restructuring/Deregulation - Federal Actions

PURPA allowed non-utility ownership of electric generation for the first time by establishing a class of non-utility, electricity-generating companies called "qualifying facilities" (QFs). QFs are exempt from many federal and state regulatory requirements, including federal and state rate regulation and oversight by the Securities and Exchange Commission. FERC set the required criteria for QFs, including ownership, energy source, operating methods, and efficiency. It is estimated that PURPA brought about 25,000 MW of

* Apparently, Tennessee Valley Authority, one of the three federal power agencies, was not required to develop conservation and renewable energy programs.

electric supply on line during the 1980s from qualified facilities owned by independent power producers.[+] Utilities could participate in ownership, but were initially restricted to less than 50% ownership in the qualifying facilities.[6] PURPA demonstrated that non-utility companies could produce power as cheaply or even more cheaply as regulated utilities, undermining the rationale for granting electric utilities monopoly ownership and control.

While PURPA exempted QFs from most state PUC regulations, PUCs retained authority to set the contract price and approve the contracts between the regulated utility and the QF owner, and the QFs were only able to sell energy to the utility, not directly to utility customers. A competitive electricity market where customers can choose their supplier is known as "customer-choice". PURPA certainly, however, advanced the case of those regulators and ratepayers who advocated restructuring and deregulation.[7]

PURPA encouraged the Congress to enact further change through the Energy Policy Act of 1992 (EPACT).[8] EPACT established the framework for the competitive, wholesale, electricity-generation market and a new class of electric producers. Exempt Wholesale Generator (EWG). EWGs were exempt from regulatory constraints of the Public Utility Holding Company Act of 1935. EWGs are utilities and non-utilities selling electricity to regulated utilities in competitive regional marketplaces. EPACT gave FERC authority to facilitate competition from EWGs.

Consequently, in 1996, FERC ordered utilities to file non-discriminatory, open-access tariffs that offered others the same electricity transmission service they provide for themselves. In conjunction with FERC's establishing competitive, wholesale-power markets, access to the regional transmission grids created regional power pools and Independent System Operators (ISO) in order to improve reliability and efficiencies in operations and planning and to coordinate regional transmission.

Independent generators have the ability to sell into the pools or enter into bilateral agreements with utilities to provide for specific requirements. Most independent power producers that sell electricity on the wholesale market at market-based rates and do not have franchised service territories are EWGs, not subject to many of the FERC requirements applicable to traditional utilities.[9] FERC, however, did not completely withdraw from regulation of wholesale power markets. As the former FERC chair explained "while FERC used to control the exercise of market power by setting cost-based rates for individual sellers, the agency now analyzes the market power of individual sellers and sets rules of general applicability that are enforced through the enforcement powers recently granted to FERC by Congress."[10]

States Mull Customer-Choice

By 1996, in response to federal policies and industry pressure, 44 states began to examine utility restructuring and deregulation.[11] The federal actions pursuant to PURPA and EPACT were sufficient to consummate competitive, wholesale-power markets, but establishing competitive, retail-power markets requires state action. The energy industry, anticipating substantial profits from retail market, was chomping at the bit for the states to act.[12] Utility regulators were understandably leery of abandoning consumers to the unknown volatility of the market for a service as essential as electricity.[13]

[+] Most of the capacity incentivized by PURPA was fossil-fueled cogeneration (about MW) , then conventional hydro (about MW), and a very small amount of non-hydro renewables, mainly wind and biomass. The expectation that PURPA would incentivize non-hydro renewables, such as wind and photovoltaics, went unfulfilled.

State PUCs were of two minds regarding customer-choice: On the one hand, restructuring might decrease or at least stabilize electricity prices and might increase investment in renewables and conservation. On the other hand, the breakup of utility monopoly ownership and control might arguably negate the utility's statutory obligation to provide energy.[14] Furthermore, in many states, the PUC did not regulate publicly owned utilities and electric cooperatives to the same extent that they did the investor-owned utilities. Thus, the PUC could order retail competition only for IOUs. Even though IOUs serve about 70% of all U.S. electric customers,[15] the likelihood that a competitive market for IOU customers but not for others within a state would cause confusion and uncertainty among all electric customers – with the potential for political backlash – was a strong deterrent to implementing customer-choice.[16] PUCs were also concerned about the difficulty in changing the company operations and physical infrastructure to implement customer-choice. For these reasons, many states decided against implementing retail competition.*

Restructuring/Deregulation Among the States

From 1996 to 2000, of the 44 states considering restructuring/deregulation, only 22 states and the District of Columbia passed legislation and regulations to restructure their electric utilities and deregulate electricity markets.+

Many states were under pressure from large industrial customers to take immediate action to allow them to shop for cheaper power. In 1998, California, Massachusetts, and New Hampshire were the first states to authorize full retail competition for all customers, while the other states all did so within the next two to three years.[17]

Some states did consider halfway measures such as retail-wheeling pilot programs. "Retail wheeling" is the sale of electricity by a utility (or some other supplier, such as an independent power supplier) to a consumer in another electric utility's service territory. Although these pilot programs were conceived and promoted as an experimental approach to simulate competitive markets in order to gauge the effect on customers and utilities, they were mainly for the benefit of industrial customers who wanted the freedom to shop for better electricity prices. Critics argued that pilot retail-wheeling programs would simply shift higher-price power to commercial and residential customers, without producing substantial investments in renewables.[18] For example, Wisconsin largest electric utilities envisioned selling low-cost Wisconsin power to large Illinois companies that were paying 40% more for their electricity. Retail wheeling would have Wisconsin's utilities selling its power at a higher rate to out-of-state companies and pocketing the profit. Wisconsin ratepayer would eventually pay higher rates due to higher cost power filling the gap from selling in-state power to industrial customers in Illinois. Moreover, under the retail-wheeling scheme, Wisconsin utilities would simply step-up output from existing coal-fired power plants, with no incentive to invest in renewables. Wisconsin ratepayers prevailed and Wisconsin did not proceed with retail-wheeling.[19]

Indeed, ratepayer and PUC concern that customer-choice would have not have a positive effect on rates and might likely have a negative effect was undoubtedly a major part of the calculation by more than half of

* Ultimately, most states that decided to implement customer-choice maintained the utility's obligation to serve as the default provider for customers who do not choose an independent supplier.

+ Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Ohio, Michigan, Illinois, Texas, Virginia, Arkansas, New Mexico, Arizona, Nevada, California, Oregon, and Montana.

the states that refused to take the path to customer-choice. It was also the reason that eight states terminated restructuring and deregulation by 2008: They concluded that customer-choice led to market power concentrated in a handful of energy companies. For instance, in California – immediately upon deregulation – Enron manipulated supply to increase prices and state regulators were powerless to stop them. As at least one analyst observed at the time, the fact that utilities in deregulated states routinely sold their power plants for two or three times their book value should have been an indication that the purchasers of these plants, such as Enron, clearly expected huge rates of return from their new investments.[20]

By 2008, however, only fourteen states, including the District of Columbia, retained competitive retail markets.* Eight other states suspended deregulation and repealed or amended laws and regulations governing competition and energy procurements by regulated utilities.+ Further, in 2008, Delaware, Illinois, and Ohio enacted legislation directing regulators to implement regulations that continue to provide customers the right to choose alternative energy suppliers, but also allow the utilities to return to building their own generation capacity, subject to a competitive procurement process. Additionally, Illinois created a new governmental entity with power procurement authority, including the authority to build new capacity.[21] Thus, most states simply did not agree that competitive retail markets would have a beneficial impact on electricity prices.

Net Impact of Restructuring/Deregulation on Electric Utility Industry

The rationale for competition in the retail market was primarily to keep electric rates lower than would be the case under traditional monopoly control and ownership. Those states that retained customer choice believe that is the case, Enron not withstanding; those states that did not adopt customer choice do not. This disagreement is also mirrored in the wholesale power market. FERC argues that competition in the wholesale power markets "assure just and reasonable wholesale power prices" and has shifted costs of overbuilding from consumers to market participants.[22] Others, including the American Public Power Association disagree, believing the current structure and operation of regional wholesale power markets "provide opportunities for the owners of unregulated generation to earn excess profits and have produced increasing and volatile prices, while offering no protections for consumers."[23]

While the effect of restructuring and deregulation on pricing is debated, the effect on ownership is not. Since 1992, the effect of the federal and state actions on ownership of electric power supply has been more far-reaching: By 2007, 1,738 non-utilities own 43% of the total electric-power capacity; 2,009 public utilities own about 8%; 9 federal utilities own about 7%; 883 electric cooperatives own about 2%; and 210 investor-owned electric utilities own about 38 percent.[24] During this period total electricity generation in the United States grew about 37%.[25] Of the total generating capacity added to meet growing demand, about 37% was coal-fired, about 43% natural gas-fired, about 17% nuclear, and only about 3% non-hydro renewable

* Those customers that choose not to participate in the market continue to purchase from their utility. However, some, or all, of the energy portion of the retail price of electricity they pay is determined through competitive bidding processes.

+ Virginia, Arkansas, New Mexico, Arizona, Nevada, California, Oregon, and Montana.

energy. The increase in non-hydro, renewable power capacity was about 98.5% wind-electric and 1.5% from photovoltaics.*

Net Impact of Restructuring/Deregulation on Deployment of Renewables

DOE had earlier concluded that restructuring/deregulation would probably not increase the deployment of renewables.[26] In part, the market share of renewable power did not increase significantly due to a steep decline in the price of oil and gas in the 1980s and 1990s. Also, with the establishment of regional wholesale power markets, IPPs and EWGS could build large scale, efficient, fossil-fuel, power plants that might not have been cost-effective for traditional utilities serving limited service territories.

Virtually, all federal government initiatives after the Carter administration were focused on benefited the traditional, electric-generating supply. Renewable Portfolio Standards (RPS), System Benefit Charges (SBC) and Green-Pricing programs were responses by states to accelerate deployment of renewables, once it had become apparent that the federal government had no plan to do so in the post-Carter era, but these made little headway against the obstacles confronting renewables.

Lawrence Berkeley Laboratory identified several other related factors impeding a market for renewable-energy power supplies in either retail or wholesale power markets:

- Protracted direct-access, phase-ins that favor larger customers. Direct access processing and service fees that erect barriers for new participants (via high costs, lack of parity between marketers and utilities, etc.)
- Stranded-cost recovery.
- Transmission pricing, ancillary services, and bidding rules that penalize intermittent, low-capacity factor, distant renewable generators.
- Insufficient unbundling of revenue-cycle services (metering, billing, etc.).
- No mandatory fuel source and/or emissions disclosure.
- Power- pooling structures that do not allow direct bilateral contracts (but do allow contracts-for-differences and other financial contracts).
- Lack of customer education on renewable energy.
- Insufficient definition(s) of "green power."[27]

In other words, as much as the energy "shocks" and other events of the 1970s challenged the electric-supply paradigm of large-scale, central-station power plants and fostered expectations of a paradigm shift to small-scale, distributed, renewable-energy systems – the paradigm persisted. It persisted due to a paradigm shift in the electric-utility industry from monopolistic to oligopolistic – more diverse ownership and greater market access by traders and customers. Ironically, therefore, the changes – mainly by the federal government intervention in regional wholesale-power markets – was crucial to resurrecting the economic advantage of large, central -station, power plants. This resurrection militated against incorporating many of the benefits of renewable power plants in the calculus of power-plant acquisition that utility IRP entailed.

* Annual generation from hydro, geothermal, and biomass energy sources remained essentially constant between 1992-2007.

Therefore, increase in wind-electric capacity from 1992 to 2007was due in part to it cost competitiveness: declining cost per installed KW; the federal production tax credit, and increasing cost of natural gas,[28] coupled with the adoption of Renewable Portfolio Standards (RPS) enacted by some states.[29]

III. Green Pricing: An Examination

Evolution of Green Pricing

As already noted, public interest in and governmental support for small-scale, renewable energy systems gathered steam in the 1970s. The federal government and even some states implemented various research, development, and demonstration programs to accelerate commercialization of non-hydro, renewable energy. With passage of PURPA in 1978, renewable energy advocates expected fertile ground for increasing the contribution of renewables in the nation's power-supply mix. Virtually all PURPA-induced renewable development was small, conventional hydropower projects, largely because the only commercially viable renewable-energy systems at that time – wind and photovoltaic – were too expensive. Moreover, virtually all the hydro projects that were developed were undertaken in the early 1980s, when fuel prices were high: the basis for pricing electricity for a PURPA power-purchase contract – the "avoided cost" – is mainly the fuel that the QF would displace. In the late 1970s and early 1980s, oil prices and gas prices were at record highs. Around 1985, however, oil and gas prices had dropped below prices in the early 1970s. At this price, hydro was no longer a profitable PURPA investment; only cogeneration remained "PURPA-viable". Meanwhile, federal support for non-hydro renewable energy research, development, and demonstration had evaporated, which arguably exacerbated the already slow pace of renewable technology commercialization.

By the early 1990s, renewables deployment had fallen far short of expectations, which gave impetus to state PUC consideration of regulatory alternatives to reduce the impediments to renewable energy system deployment – mainly System Benefits Charges, Renewable Portfolio Standard, and Green Pricing.[30] Like PURPA, in most cases, the first two programs established an enforceable mandate to acquire renewables, while green pricing does not.

Many states were not be able to muster the political support to adopt renewable energy mandates through SBC or RPS programs, so many PUCs perceived green pricing to be the only realistic option to encourage renewables. Of course, this stance was self-serving to the extent that PUCs and other agencies could avoid the political challenge of overcoming opposition to regulatory mandates for renewable energy utilization. By eschewing regulatory mandates in favor of a voluntary green-pricing program, politicians and regulators could demonstrate support for renewable energy and avoid political conflict; especially from those ratepayers more concerned about rates than sustainable, low-impact energy – especially large industrial and commercial customers. Given sufficient voluntary participation, green pricing can spur the installation of renewable generation even in the absence of increased demand. Further, green pricing implements PUC policy to provide a variety of service and pricing options to consumers. Ultimately, the PUC can say it did something to address renewable energy while leaving the heavy lifting to those who value clean energy. 31

Utilities, also, supported green pricing because this program fit their objectives of gaining marketing experience, enhancing the corporate image, and fending off regulatory and other pressures:32

- Green pricing creates a perception that the seller understands its market and varies its products and services accordingly.
- Green pricing provides utilities with an inexpensive, low-risk way to enhance their corporate image, especially utilities that had invested in nuclear.
- Green pricing raises money to invest in renewables without raising rates to customers who do not wish to purchase clean power. [33]

First-Generation, Green-Pricing Programs

Between 1993 and 1997, the following utilities established green-pricing programs:

- Traverse City Light And Power
- Detroit Edison Company
- Wisconsin Electric Power Company
- Fort Collins Light & Power
- Portland General Electric
- Sacramento Municipal Utility District
- Niagara Mohawk Power Corporation
- Northern States Power
- Gulf Power Company
- Public Service Company of Colorado
- Gainesville Regional Utilities
- Hawaiian Electric Company.[34]

Acquisition of Renewable Energy

The utilities to pioneer green pricing acquired the energy for these programs either through ownership of the asset or through bi-lateral contracts for the energy. For example, Salem (Oregon) Electric Cooperative bought wind and geothermal energy from Bonneville Power Administration; Wisconsin Electric Power Company bought hydro and biomass energy from Minnesota Power & Light. * [35] In order to justify the premium pricing, the energy provided to the green-pricing program was energy that the utility would not otherwise acquire. As one analyst explained at the time the rationale for the premium "is not because renewables are inherently expensive, but because Green Pricing assumes that a utility is already purchasing all cost-effective renewables as part of its least-cost plan. In fact, the price premium will be based on the difference between the cost of the utility's least-cost plan and a plan that includes more renewables."[36]

* MP&L purchased this hydroelectricity from Manitoba Hydro and Ontario Hydro

Methods of Payment

These green-pricing programs adopted one of three billing approaches described below:[37]

- Green rate or tariff - based on usage (either energy and/or capacity. For instance, Traverse City & Light (Michigan) charged customers $0.0158 /KWh above the normal rate of $0.068 /KWh to purchase electricity from the city-owned wind turbine. Detroit Edison (Michigan) charged a $7.50 monthly fee for each 100 watt increment of capacity from their photovoltaic system and then charged $0.04 /KWh for the energy.
- Standard monthly fee - a fixed fee regardless of capacity or energy. For instance, Sacramento Municipal Utility District (California) customers signed 10-year contracts to pay $4/month for capacity and energy from the utility's photovoltaic system
- Contribution - charitable donation to fund renewable energy supply acquisition. For instance, Public Service Company of Colorado offered customers the option to donate to its Renewable Energy Trust, to fund renewable projects in Colorado by 1) a one-time, lump-sum contribution; 2) pledge a monthly contribution on their utility bill; 3) utility bill is rounded up to the next dollar, donating the extra cents, or 4) a combination of the options.

Green-Power Standard

What makes green-power "green"? As the first green-pricing programs were rolled out, there were questions about what qualified as green power: Is green energy only electricity that is produced from renewable-energy sources, biomass, hydro, solar, wind and geothermal? What about alternative, clean power sources, such as waste-to energy plants, natural gas fuel cells, even though the energy source is not exclusively renewable? On the flip side, are there renewable-energy facilities that should not qualify due to significant environmental impacts – notably conventional hydro? In addition, concern was voiced about whether energy should be purchased outside the utility service area rather than acquire the energy or asset within the service area, even if it were more expensive, which presumably would benefit the local economy and increase public awareness.[38] Program advocates acknowledged that standards for green power would increase program credibility, facilitating marketing and consumer protection. In other words, if customers were uncertain about the energy available at a premium, they were less likely to choose to participate in the utility's green-pricing program.

Concerns about credibility of green-power claims, in general, intensified during deregulation: For instance, in May 1996 the state of New Hampshire instituted its pilot program for customer choice. About two-dozen suppliers competed for about 17,000 residential, commercial and industrial customers. To attract residential customers, several suppliers appealed to environmental values. One supplier – Green Mountain Energy Partners – mailed a spruce seedling to potential customers, and promised those who conserved energy would receive "eco-credits" that could help pay their electric bills. In general, suppliers touted their environmental records, and used imagery to paint their enterprise green.[39] Yet the image did not necessarily square with the reality of Green Mountain Energy Partners relying mainly on hydroelectricity from Hydro-Quebec. Despite Hydro-Quebec extolling its hydro supply as 97.5% greenhouse-gas-free, its projects had been criticized for impairing First Nation lands, and various individuals and environmental organizations objected to marketing this energy as green.[40]

At its annual meeting in November 1996, the National Association of Regulatory Utility Commissioners (NARUC) adopted a "Resolution in Support of Customer 'Right-to-Know' and Product Labeling Standards for the Retail Marketing of Electricity."* [41]

Two policies were advanced as the framework for addressing concerns about the integrity of green-energy claims regardless of whether they were asserted in the context of voluntary or mandatory renewable-energy programs: [42]

- Disclosure of energy resources used in generating electricity should be required of all suppliers. Disclosure provides an objective statement about resources used to supply power by a specific company or under a specific brand name.
- Certification that the electricity offered is consistent with certain preferred resources, technologies or environmental results.

The rationale is that disclosure of basic information about retail power products and certification of environmentally preferred resources and technologies will increase the efficiency of retail electricity markets and protect against green scams and green washing. Both measures are needed to reduce consumer confusion in a complex and unfamiliar market.

Disclosure

As of 2005, 24 states required disclosure: disclosure applied to all utilities in 18 states and the District of Columbia, while applying only to IOUs in 6 states.[43] Disclosure requires that suppliers tell consumers about what type of resource is used to generate the electricity being used, not the specific facilities, however. Thus, in a state requiring disclosure, such as California, the utility offering a green-pricing program must identify the resource mix of the program: x% solar; x% wind; x% geothermal, x% hydro. California's disclosure statute also requires all retail electricity suppliers to file annual reports with the California Energy Commission to include kilowatt-hours purchased by generator and fuel type. [44]

Certification

The primary driver for certification were nascent, mandatory RPS programs; not voluntary green-pricing programs, which are usually not regulated by the state. While RPS varies from state to state, the statutes specify the RPS-eligible energy sources and the criteria for RPS eligible facilities. Usually, the generator applies to the state PUC to certify the facility as RPS-qualified. Certification is especially important when the energy in question is neither generated by the utility nor secured through bi-lateral contracts with the generator, but rather is purchased through spot and wholesale-power markets. The certification process proved crucial to the feasibility and viability of Renewable Energy Certificates (RECs) to meet RPS mandates and to facilitate growth of green-pricing programs across the country.

Renewable Energy Certificates

As the green-power market grew, delivery of green-energy to retail suppliers became increasingly problematic given the geographic and physical limitations of commodity electricity. Direct ownership and/or

* "RESOLVED, That the NARUC supports initiatives leading to minimum, enforceable, uniform standards for the form and content of disclosure and labeling that would allow retail and wholesale customers to easily compare price, price variability, resource mix, and environmental characteristics of their electricity purchases. . ."

direct power purchase contracts became the exception not the rule especially in green-pricing programs. The expanding green-power market in turn created the market for Renewable Energy Certificates, initially known as Renewable Energy Credits. A REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. Rather than obtain the actual electricity from a renewable-energy facility, utilities contracted for the purchase of RECs.

A REC can be sold separately from the underlying physical electricity associated with a renewable-based generation source.[45] The electricity is the tangible product produced from renewable energy, while the REC is primarily the intangible environmental benefits that purport to accompany the electricity. Ostensibly, the higher cost of electricity generated from renewable energy can be understood as the cost of providing the environmental attributes of clean electricity and this is the basis for the green-power program "premium." The electricity and its intangible benefits can be sold together as one product, or the electricity can be separated (unbundled) from its intangible benefits, which are then sold as separate products. One REC represents the environmental attributes of one-megawatt hour of renewable electricity, which are marketed and sold separate from an actual megawatt hour of electricity. Thus, the actual energy can be sold to one utility, while the RECs can be sold to another utility. While the megawatt hour of energy is used immediately, the associated REC can be kept in suspended animation until sometime in the future when it is "re-united" with another megawatt hour of electricity that is used by the REC's current owner, at which point the REC is extinguished.

A REC, then, can be conceptualized as a "deed" of intangible property whose ownership can change hands until the owner re-unites the intangible benefits of the REC with electricity, at which point the "deed" of intangible property is, thereby, extinguished.

Evolution of RECs

The major benchmarks in the REC evolution:[46]

- When electricity markets in California (and Massachusetts, and Rhode Island) opened to retail choice in 1998, the company Automated Power Exchange (APX) opened a separate market for green power, which was a wholesale market for scheduled electricity deliveries, designed to serve electric service providers seeking to differentiate themselves and their products. The APX Green Power Market traded electricity generated by renewables as defined by the California legislation. Recognizing the greater flexibility and market liquidity of separating the environmental attributes from the commodity, APX began operating a market for "green tickets" in May 1999 (APX 1999). These wholesale green tickets were purchased and rebundled with commodity electricity for retail green power sales.
- In May 1998, All Energy Marketing Company in Massachusetts launched its *Regen* product, which was sold separately from electricity. This product qualified as the first retail REC product, although it was called neither green power nor certificates, but a "renewable upgrade service.
- In June 1999, the Texas Legislature adopted Senate Bill 7, a restructuring law that included a renewable portfolio standard. The law also resulted in the first renewable energy credit trading program in the United States. The Texas PUC adopted rules for a credit-trading program in December 1999.
- In May 2000, Bonneville Environmental Foundation made its first sale of *Green Tags* to the U.S. Environmental Protection Agency (EPA).

- In 2001, Sterling Planet launched a national green certificates product, which they touted as an "unprecedented opportunity for millions of Americans to choose green energy without leaving their current electric utility."

REC Market

Since RECs represent the environmental attributes of each MWh of renewable electricity, they can be transacted and sold separate from electricity service. RECs sold separately also overcome the problem of the temporal mismatch between generation profile and demand profile. From 2002 to 2003, there was a four-fold increase in purchases of these so-called "unbundled" RECs by utilities for their green-pricing customers. In addition, RECs represented about one-third of green-pricing sales in 2003, compared to 11% in 2002.[47] Other benefits of RECs from the utility perspective are:[48]

- Transactions are uncomplicated due to direct purchase from a REC marketer that does not require long-term contracts.
- Readily accommodates program expansion; as demand grows, the utility buys more RECs.
- Certified RECs increase credibility of the utility's environmental commitment.
- Avoids the complexities in integrating renewable electricity into your generation system.

At the same time, utilities acknowledged that RECs have some potential drawbacks, mainly:49

- Since REC prices are market-based, the price of RECs may unexpectedly increase.
- When the green-pricing product is comprised mainly or wholly of RECs, the program may be less attractive to potential buyers, because RECs are hard to understand and the consumer may be less likely to participate if the renewable electricity is not actually being generated by or purchased by the utility.
- The renewable energy sourced from is not readily discerned.

REC Transactions

RECs have become the standard currency for both mandatory and voluntary green-power programs. To supply these products and to substantiate green power marketing claims, marketers and utilities purchase and retire RECs. RECs are available from REC marketers who purchase RECs from renewable generators and then resell them to utilities or end users (a few have their own generation as well). Some are active only at the wholesale level (that is, they sell only to utilities and to large end users), whereas others are largely retail vendors. Some marketers are nonprofits, some are utility subsidiaries, and some are for-profit companies. REC brokers facilitate market transactions. Brokers generally do not take ownership of the RECs at any point; rather, they act as matchmakers between sellers and buyers.[50] Brokers list offers and bid prices for various types of RECs-differentiated by geographic location, generation type, and vintage.*

Prices can range from a national renewable blend product (lowest cost) to a specific region or technology product (highest cost). Vintage is also a variable in pricing RECs. "Vintage" is the month and year when the renewable-sourced electricity was generated and supplied to the grid and the corresponding REC

* For example, Evolution Markets. http://new.evomarkets.com/index.php?page=Renewable_Energy-Markets-Renewable_Energy_Certific

created. Depending on the certifying agency, there may be specific requirements around the vintage of a REC as it applies to its sale.[51] Contracts for RECs at a specified price are typically multi-month contracts, albeit any time period can be negotiated, including multi-year contracts.

Of course, the REC market depends upon the trust of buyers and sellers in the integrity of each REC. Most RECS are sold in the mandatory RPS market. When RECs are used for state RPS compliance, the state utility commissions typically require certification of the renewable-energy facilities from which RECs are sourced and each REC is assigned a serial number. In the past few years, REC tracking systems have also been implemented in many areas of the country that can verify compliance with renewable energy requirements and protect against trading abuses and misrepresentations.* To obtain RECs, a generator must register with the tracking system and provide essential information about facility characteristics, which may be verified by the tracking system administrator. When the registered generator (or its control area or independent system operator) reports its generation, the tracking system issues electronic certificates for each verified (metered) MWh generator. Each certificate carries a serial number and identifies the particular attributes of the generator, such as the renewable-energy source, facility location, facility vintage, emissions. In addition, these tracking systems record changes of certificate ownership and retire certificates to avoid one certificate being used for more than one purpose (i.e., double counting).[52] Tracking systems also provide reports to regulators and market participants on wholesale transactions."[53]

Usually, as mentioned above, RECs sold in the voluntary, green-pricing market, however, are not subject to state certification requirements and are not assigned serial numbers, albeit RECs that have been RPS certified can be sold in the voluntary market, subject to one-time use only, of course. Voluntary certification programs are available to the voluntary REC market. Green-e is the most widely used voluntary REC certification and verification program. As the green-pricing program market for RECs increased, the Center for Resource Solutions (CRS), which had been involved with green- energy products since 1997, saw a need to establish certification and verification standards that would apply to RECs in the voluntary market.[54] Green-e adopted a national standard for REC products in 2002.[55] Green-e is the most widely used voluntary REC certification/verification program, with more than a 60% market share of all voluntary renewable energy sold through the end of 2006.[56] Green-e is a fee-based program; there is an annual fee for certification of renewable-energy products and a volumetric fee based on the number of MWh.[57]

REC Chain-of-Custody Transparency

When a utility purchases energy directly from a renewable-energy generator for its green-pricing program, the utility can readily identify the specific facility that is sourced. When a utility acquires RECs, the generator is identified in the REC. Most utilities, however, do not disclose the specific facilities from which the obtain energy and/or RECs.+ Even if the utility's customer were to request information about specific facilities from the utility, the utility may be prohibited by its contract with the REC seller from providing said information.[58] In any event, the utility is not required by law to provide this information, albeit some states require utilities to disclose the generic type of energy resource and proportion of each resource that comprise the green-pricing program product. The consumer might then request the information directly from the REC seller, but REC seller is likely to refuse to provide that information.[59]

* The tracking systems are organized in five regions; together the tracking systems encompass the entire continental states, except for New York, which is developing its own system. (http://www.epa.gov/grnpower/gpmarket/tracking.htm).

+ Usually, all publicly available information about a utility green-pricing program is posted on the utility's web site.

Further, if RECs are Green-e certified, Green-e knows "who sold it, who purchased it, where that energy was generated until there is no doubt where they came from and who owns them."[60] Nonetheless, the only information that Green-e publicly discloses are the types of renewable-energy sources,[61] stating that confidentiality agreements with REC marketers and brokers prevent it from disclosing the specific facilities it has certified.[62] Unfortunately, Green-e does not provide any greater degree of transparency than those states with disclosure requirements.

Finally, although the generators from which RECs are sourced are registered with the regional tracking system, the database is not readily accessible or discernable and, in any event, does not link generators with the ultimate REC owners. For instance, Green-e publishes a partial list of generators that have submitted tracking attestations and who are sources of Green-e certified RECs, but the listing is neither complete nor does it tie a particular generator to green-pricing program that purchased those RECs.[63]

The Presence of Hydro in Green-Pricing Programs

Utility Transparency

The Green Power Network, a project of the Department of Energy's National Renewable Energy Laboratory maintains a web listing of green-pricing programs and the types of energy resources that are sourced.[64] Research by HRC of those utilities listed by the Green Power Network as sourcing hydropower for green pricing reveals:

- Twelve investor owned utilities, 52 municipal utilities, three G&Ts (serving 69 member coops and municipals), and one federal power authority (Bonneville Power Authority) do not currently source from hydropower.
- 12 investor-owned utilities, 150 municipal utilities, four public utility districts, 26 cooperatives, one Generation and Transmission Cooperative (serving 16 member coops) currently include hydropower in their green-pricing program (see Appendix I).
- Of those utilities currently sourcing hydropower, only three investor-owned utilities, one municipal, one public utility district and one cooperative identify the specific hydropower facilities.
- HRC contacted the ten utilities that actually purchase hydroelectric power for their green-pricing program for the names of the facilities: Four responded with information (two no longer purchase hydropower; two identified hydropower facilities).
- Interestingly some utilities identify the wind and solar projects but not the hydro facilities that comprise their green- power product.

Marketer Transparency

Because HRC was unable to contact every utility individually and because six of the ten utilities HRC did contact chose not to respond, HRC also attempted to obtain this information from REC marketers. There are 15 REC marketers currently selling Green-e RECs sourced from hydropower projects.

- None of the REC marketing companies' websites identified any specific hydropower projects from which RECs are sourced (see Appendix II).
- HRC contacted three of the largest REC marketers to request information about the specific hydropower projects: 1) Sterling Planet and Powerex would not provide the names of any

hydropower facilities from which the RECs market are sourced, citing this information as proprietary and explaining the release of this information would be of benefit to their competitors. 2) Community Energy provided HRC with a list of hydropower facilities from which its RECs have historically been sourced.*

- Community Energy provided the names of 26 facilities, installed capacity and nearby town. After further research, HRC succeeded in identifying 1) the river in which the power plant is sited; 2) dimensions of the dam; 3) the mode of operation; and 4) FERC jurisdiction for all but three power plants (see Appendix III). HRC did not attempt to independently ascertain the historic and ongoing environmental impacts associated with these projects.

Certification Transparency

Green-e refused HRC's request to provide any information about the hydropower generators which Green-e has certified. As mentioned above, Green-e explained that confidentiality agreements with its clients – the REC marketers – prohibit Green-e from publicly disclosing the specific hydropower facilities. Yet, the Green-e website contains a web page entitled "Tracking Attestations Received:" a chart of the individual renewable-energy facilities that Green-e has certified that are tracked by the various regional power pool and ISOs' (independent system operator) tracking systems. This list of facilities includes wind, solar, geothermal, and biomass projects, but no hydropower project listed.* Supposedly, all Green-e certified generators are tracked by the appropriate regional tracking system. For example, the NEPOOL public database of generators includes a Green-e certified hydropower project (Valley Hydro, NE-ISO asset #14623).

IV. Conclusion- Caveat Emptor!

Fundamentally, the lack of transparency in green-pricing programs about specific hydropower plants goes against the grain of informed consumer choice, which is the hallmark of these programs: green pricing is predicated on customers' interest in supporting development of green energy. Utilities and many of their customers believe renewable-energy generators are intrinsically "green and clean," and, consequently, do not see the need to disclose the specific facilities sourced in the green-pricing program.

Yet, there is certainly disagreement about whether all hydropower is clean and green as can be discerned by a comparison of state hydropower eligibility in state Renewable Energy Portfolio Standards (RPS). A few states do not place any eligibility restrictions on hydropower; however, most do by stipulating only hydropower plants of a certain installed capacity or less as eligible. Since most states do not regulate utility green-pricing programs, RPS criteria do not apply to green pricing in those states. Nonetheless, state RPS influences utility and customer perception of renewable energy and can have a bearing on the energy and/or RECs that are available to green-power programs.

* Community Energy markets Green-e RECs, but apparently its hydropower RECs are not Green-e certified.

* This listing of generators by Green-e does not square with its aforementioned contention that it cannot reveal generators that have been Green-e certified due to confidentiality agreements with its client REC marketers.

While there is awareness that many hydropower projects have significant environmental impacts and should no be considered clean and green – lack of greenhouse-gas emissions notwithstanding – there is as yet no common standard among state RPS programs or utility green-pricing programs by which to certify a particular hydropower project. What is common is the presumption that size and/or capacity matters when it comes to judging the green quotient of hydropower. Yet the size criterion is fundamentally illogical: if a hydropower plant greater than say 30 MW is not acceptable, then the impacts from seven 5 MW hydropower plants should not be acceptable. Clearly, size is not a valid proxy for impacts. Environmental impacts are site and project specific rather than size specific. Consequently, hydropower plants must be assessed on a case-by-case basis, which is why transparency in green-pricing programs is essential.

As indicated above, HRC, however, was not able to independently evaluate the specific hydropower. Serendipitously, while researching the hydropower facilities from which Community Energy has historically sourced its RECs, HRC learned that the operation of four projects impair their respective water bodies. Given that HRC was unable to identify most of the hydropower plants currently sourced in green-pricing programs across the nation, HRC recommends:

- Customers should decline to participate in green-pricing programs that do not disclose the particular hydropower plants that are sourced.
- All states require utilities to disclose the individual hydropower project sourced for voluntary green-pricing programs.

The lack of transparency undermines the credibility of the utilities, the independent certifying agency, the REC brokers and REC marketers. Nonetheless, even if there were to be transparency, HRC does not agree that size is an acceptable criterion. HRC advocates instead that only LIHI-certified projects be eligible for green-pricing programs.

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APPENDICES

HYDRO IN GREEN-PRICING PROGRAMS
(as of July 2009)

STATE	UTILITY	UTILITY TYPE	PROGRAM NAME	PROGRAM WEB ADDRESS	PROGRAM CONTACT	ENERGY SOURCED	PREMIUM	HYDRO PROJECTS	NOTES
AR	Arkansas Valley Cooperative Corp. G&T; G&T provides green-pricing program to 16 distriibution cooperatives (view comment for list of cooperatives).	Cooperative (Generation and Transmission, G&T)	Green Power Program is housed and operated by G&T for all its member distribution cooperatives.	http://www.aecc.com/green_power.shtml	None identified (other than customer service) Each cooperative has separate contact (typically, customer service)	Energy purchase RECs	$5.00 monthly per 100 KWh "block"	Hydro projects not identified	Premium will be deposited into "Greenpowerfund," established in 2008. Fund to be used 1) to build green-power facilities that the cooperatives determine are feasible, including hydro; 2) to purchase green power from the electricity market, if it is affordable and available; 3) to further help the cooperatives educate members about ways to make their homes and businesses more energy efficient. *Requested information on specific projects,(voice mail Doug White, 7/09/09) no reply received .*
AZ	Salt River Project-Agricultural Improvement and Power District	Public utility district	EarthWise Energy	http://www.srpnet.com/environment/earthwise/home.aspx	Lori Singleton, Environmental Initiatives Manager lasingle@srpnet.com	Utility-owned generation	Contribution in $3.00 increments	Arizona Falls	Project is identified at website. Hydropower project is 750 KW facility located in the Arizona canal, owned and operated by SRP. Apparently FERC non-jurisdictional. Green-pricing premium is unclear. From the information presented on the website, It appears the premium is a monthly contribution that is not tied to either blocks of energy or customer usage.
CA	Burbank Water and Power	Municipal	Green Energy Champion	http://www.burbankwaterandpower.com	John Joyce 818-238-3653	Energy purchase	$.02 KWh	Hydro projects not identified	Renewable power purchased from existing sources; utility may also build own sources. According to published program information, hydroelectric power is from small projects"with no damage to the stream or wildlife." Currently the program does not source from hydro facilities, but will if source becomes available. (John Joyce, personal communication (phone), 7/08/09)
CA	Sacramento Muncipal Utility District	Municipal	Greenergy	http://smud.org/community-environment/greenhome.html	Mike Zannakis 916-452-3211 MZannak@smud.org	Utility-owned generation Energy purchase RECs	$6.00 monthly for 100% of KWH from renewables $3.00 monthly for 50% of KWh from	Hydro projects not identified	Majority of renewable energy is purchased
CT	Connecticut Light & Power	Investor owned	CT Clean Energy Options	http://www.cl-p.com/home/saveenergy/goinggreen/cleanenergyoptions.aspx	None identified	RECs	1) SterlingPlanet premium 100% at $0.0115/ KWh 50% at $0.00575/ KWh or 2) Community Energy premium 100% at $0.013 per kWh ot 50% at $0.0065 per kWh	Hydro projects not identified	Consumers choose between the two REC providers that participate in the Clean Energy Options program: a) SterlingPlanet (http://www.sterlingplanet.com) b) Community Energy (www.newwindenergy.com). SterlingPlanet and Community Energy RECs differ in the energy-sources comprise their RECs. Premiums differ depending upon which provider the consumer chooses.
CT	United Illuminating	Investor owned	CT Clean Energy Options	http://www.uinet.com/uinet/connect/UINet/Top+Navigator/Customer+Care/Electric+Suppliers+-+Aggregators+Licensed+by+the+DPUC+to+Provide+Electricity+to+Connecticut+Residential+Customers	None identified (other than customer service)	RECs	1) SterlingPlanet premium 100% at $0.0115/ KWh 50% at $0.00575/ KWh or 2) Community Energy premium 100% at $0.013 per kWh ot 50% at $0.0065 per kWh	Hydro projects not identified	Consumers choose between the two REC providers that participate in the Clean Energy Options program: a) SterlingPlanet (http://www.sterlingplanet.com) b) Community Energy (www.newwindenergy.com). SterlingPlanet and Community Energy RECs differ in the energy-sources comprise their RECs. Premiums differ depending upon which provider the consumer chooses.

STATE	UTILITY	UTILITY TYPE	PROGRAM NAME	PROGRAM WEB ADDRESS	PROGRAM CONTACT	ENERGY SOURCED	PREMIUM	HYDRO PROJECTS	NOTES
CO	Holy Cross Energy	Cooperative	Local Renewable Energy Pool	http://www.holycross.com/	None identified (other than customer service)	Energy purchase	$2.33/KWh	Hydro projects not identified	Website lists program, but does not provide any information to consumers about the program
IL	Naperville	Municipal	Renewable Energy Program	http://www.naperville.il.us/renewable.aspx	Michelle Hickey-Fouts MichelleHF@comcast.net 630-281-0184	Energy purchase	200 kWh/$5 monthly 400 kWh/$10 monthly 600 kWh/$15 monthly 800 kWh/$20 monthly 1000 kWh/$25 monthly	Hydro projects not identified	Program states hydroelectricity is from Illinois facilities
KY	Louisville Gas & Electric	Investor owned	Green Energy	Green Energy: http://www.eon-us.com/green	None identified (other than customer service)	RECs	$5/month per 300KWh "block"	Mother Ann Lee Hydroelectric Plant	Project identified at website. Project is 2 MW, run-of-river, LIHI-certified, owned and operated by Lock 7 partners. FERC license 1992 (#539). Green Energy Program is housed and operated by E.ON (http://www.eon-us.com/lge/about_lge.asp), which is the parent company of the utility (http://www.eon-us.com/lge/about_lge.asp) The premiums will be used to purchase Renewable Energy Certificates (RECs) that come from renewable energy sources in Kentucky and
KY	KU	Investor owned	Green Energy	http://www.eon-us.com/green	None identified (other than customer service)	RECs	$5.00/month per 300KWh "block"	Mother Ann Lee Hydroelectric Plant	Project identified at website. Project is 2 MW, run-of-river, LIHI-certified; located on the Kentuck River, Harrodsburg, Kentucky; owned and operated by Lock 7 partners. FERC license 1992 (#539). Green Energy Program is housed and operated by E.ON (http://www.eon-us.com/lge/about_lge.asp), which is the parent company of the utility (http://www.eon-us.com/about_ku.asp). The premiums will be used to purchase Renewable Energy Certificates (RECs) that come from renewable energy sources in Kentucky and
MA	Concord Municipal Light Plant	Municipal	Green Power	http://www.concordnet.org/pages/ConcordMA_LightPlant/index	Dale Cronan dcronan@concordma.gov	Energy purchase	$3.00/month per 300KWh "block"	Powder Mill dam	Project identified at website. Repowering old hydropower plant located on the Assabet River; the 160-kW run-of- the river facility under construction expected to be on line Fall 2009; owned and operated by Acton Hydro. FERC
MA	National Grid	Investor owned	GreenUp	www.NewWindEnergy.com www.greenstart.net www.sterlingplanet.com	Community Energy 1-866-WIND-123 Massachusetts Energy Consumers Alliance 1-800-287-3950 Sterling Planet 877-457-2306	RECs	$0.024 surcharge per kwh used each month	Hydro projects not identified	National Grid's Massachusett's Green-up is transacted through Community Energy, Massachusetts Energy Consumers Alliance, and Sterling Planett; customers choose from among the three providers. Hydro sourced by Massachusetts Energy consumers Alliance is all LIHI certified (see http://www.massenergy.com/Green.Label.html). Hydro sourced by Sterling Planet is either from hydro plants 30 megawatts or less, or facilities relicensed by FERC after 1986, or facilities certified by the Low Impact Hydropower Institute (see https://www.sterlingplanet.com/upload/File/MA_Label.pdf).

STATE	UTILITY	UTILITY TYPE	PROGRAM NAME	PROGRAM WEB ADDRESS	PROGRAM CONTACT	ENERGY SOURCED	PREMIUM	HYDRO PROJECTS	NOTES
MI	Lansing Board of Water and Light	Municipal	Green Wise	http://www.lbwl.com/gwp.asp	None identified (other than customer service)	Utility-owned generation Energy purchase	$7.50/month per 250 KWh "block"	Moore's Park Kleber	Projects not identified on web site. 0.6 MW facility on Grand River at Moore's Park owned operated by City of Lansing. FERC licensed 1994 (#10684) Kleber hydroelectric plant (FERC licensed), 1.76 MW on Black River near Cheboygan, Michigan, owned and operated by Tower Kleber Limited (Ontario Canada). FERC licensed 1994 (#10615). The BWL purchases about 750,000 kWh per month. (Jan Nelson, principal engineer, personal communication (email), 7/10/09).
MN	Xcel, parent company: Northern States Power Co., Public Service Company of Colorado, Southwestern Public Service Company.	Investor owned	Renewable Development Fund	http://www.xcelenergy.com/Company/Environment/Renewable%20Development%20Fund/Pages/RenewableDevelopmentFund.aspx	Timothy Edman RDFstaff@xcelenergy.com 800-354-3060	Utility-owned generation	Contribution	Lower St. Anthony Falls (under construction)	Projects identified at website. 10.3 MW on the Mississippi River, Minneapolis, MN; turbines to be retrofit on existing concrete dam 58-foot high by 213-foot long. FERC license 2006 (#12451) $5 million grant for proposed Crown Hydro hydroproject at Upper St. Anthony Falls Xcel operates in several states (Minnesota, Wisconsin, South Dakota, North Dakota, Colorado, and Texas. Apparently Xcel's green-pricing program is only to contribute to its renewable-energy fund for projects
NC	Dominion North Carolina Power	Investor owned	NC Green Power	http://www.ncgreenpower.org (utility: Dominion Power: http://www.dom.com/dominion-north-carolina-power/customer-service/energy-conservation/green-power.jsp)	919-716-6398 (Green power program phone)	Energy purchases from within the state	$4.00/month per 100 KWh "block" $2.50/month per 100 KWh "block," (when buying at least 100 blocks/month)	4 projects	Projects identififed at website. 365 KW facility; Statesville, NC; Haneline Power (owner) 4 KW facility; Robbinsville, NC; Everett Williams (owner); 2 facilities (no information capacity or location); Mayo Hydropower (owner)
NC	Duke Energy	Investor owned	NC Green Power	http://www.ncgreenpower.org (utility: Duke Energy: http://www.duke-energy.com)	919-716-6398 (Green power program phone)	Energy purchases from within the state	$4.00/month per 100 KWh "block" $2.50/month per 100 KWh "block," (when buying at least 100 blocks/month)	Same 4 projects	Projects identififed at website. 365 KW facility; Statesville, NC; Haneline Power (owner) FERC license status? 4 KW facility; Robbinsville, NC; Everett Williams (owner); FERC license status? 2 facilities (no information capacity or location); Mayo Hydropower (owner). FERC license status?
NC	21 municipal utilities offer NC Green Power (view comment for list of utilities):	Municipal	NC Green Power	http://www.ncgreenpower.org (each utility has own web address)	919-716-6398 (Green power program phone)	Energy purchases from within the state	$4.00/month per 100 KWh "block" $2.50/month per 100 KWh "block," (when buying at least 100 blocks/month)	Same 4 projects	Projects identififed at website. 365 KW facility; Statesville, NC; Haneline Power (owner) 4 KW facility; Robbinsville, NC; Everett Williams (owner); 2 facilities (no information capacity or location); Mayo Hydropower (owner)
NC	22 Cooperatives offering NC Green Power: (view comment for list of participating cooperatives).	Cooperative	NC Green Power	Separate addresses for each cooperative NC Green Power: http://www.ncgreenpower.org	919-716-6401	Energy purchases from within the state	$4.00/month per 100 KWh "block" $2.50/month per 100 KWh "block," (when buying at least 100 blocks/month)	Same 4 projects	Projects identififed at website. 365 KW facility; Statesville, NC; Haneline Power (owner) 4 KW facility; Robbinsville, NC; Everett Williams (owner); 2 facilities (no information capacity or location); Mayo Hydropower (owner)

STATE	UTILITY	UTILITY TYPE	PROGRAM NAME	PROGRAM WEB ADDRESS	PROGRAM CONTACT	ENERGY SOURCED	PREMIUM	HYDRO PROJECTS	NOTES
NC	Progress Energy	Investor owned	NC Green Power	Progress Energy: http://www.progress-energy.com	919-716-6402	Energy purchases from within the state	$4.00/month per 100 KWh "block" $2.50/month per 100 KWh "block," (when buying at least 100 blocks/month)	Same 4 projects	Projects identififed at website. 365 KW facility; Statesville, NC; Haneline Power (owner) 4 KW facility; Robbinsville, NC; Everett Williams (owner); 2 facilities (no information capacity or location); Mayo Hydropower (owner)
NY	National Grid	Investor owned	GreenUp	www.NewWindEnergy.com www.envirogen.net www.sterlingplanet.com www.greenmountain.com	Community Energy 1-866-WIND-123 EnviroGen 888-828-8358 Green Mountain Energy Electricity 800-810-7300 Sterling Planet 877-457-2306	RECs	Premium varies among providers: Community Energy -- $0.025 surcharge per kwh used each month. EnviroGen -- $0.01 surcharge per kwh used each month. Green Mountain -- $0.015 surcharge per kwh used each month. Sterling Planet -- $0.016 surcharge per kwh used each month.	Hydro projects not identified	National Grid's New York's Green-up is transacted through Community Energy, Enviro Gen, Green Mountain Energy, and Sterling Planett; customers choose from among the four providers. Community Energy does not source from any hydro for its NY GreenUp Program (see https://www.nationalgridus.com/niagaramohawk/non_html/renew_community2.pdf). Envirogen sources RECS from hydro facilities whose output is equal to, or less than 30 megawatts, or facilities re-licensed by FERC after 1986 (see https://www.nationalgridus.com/niagaramohawk/non_html/renew_envirogen.pdf). Green Mountain sources RECs from hydro facilities whose output is equal to or less than 30 megawatts, or facilities relicensed by FERC after 1986, or facilities certified by the Low Impact Hydropower Institute (see https://www.nationalgridus.com/niagaramohawk/non_html/renew_green.pdf). Sterling Planet soureces RECs from hydro facilities whose output is equal to or less than 30 megawatts, or facilities relicensed by FERC after 1986, or facilities certified by the Low Impact
OH	American Municipal Power (AMP) provides green-pricing program to its municipal utilty units. 123 municipal electric systems in six states are units of AMP (view comment for list of members).	Nonprofit wholesale power supplier	Eco Smart	http://amppartners.org/consumers/conservation-sustainability/ecosmart/l	Julia Blankenship Manager of clean energy 614-337-6222 jblankenship@amp-ohio.org.	RECs	$0.013/KWh based on customer usage	Belleville Hydroelectric Station	Project identified at website. 42 MW, run-of- river located on the Ohio River at the Belleville Locks and Dam. FERC license 1989 (#6939) Dam is owned and operated by Army Corps of Engineers, hydro is managed by AMP on behalf of 42 member communities participating in Ohio Municipal Electric Generation Agency Joint Venture 5. Currently, AMP is developing five new hydroelectric projects that will add more than 350 MW of new, renewable generation to the region. These run-of-the-river hydroelectric facilities will be installed on existing dams on the Ohio River. Program literature suggests that it is RECs from the AMP-member hydro plants that are sold to AMP's member customers! If indeed RECs from AMP member projects are sold to AMP-member customers, then some members are paying a premium for the same energy distributed to their fellow customers. HRC requested clarification of this on 7/06/09, but AMP program manager provided no information. As additional hydroelectric projects are developed,
RI	National Grid	Investor owned	GreenUp	www.NewWindEnergy.com www.GreenStart.net*	Community Energy, Inc. 866-WIND-123 People's Power & Light	RECs	$0.024 surcharge per kwh used each month	Hydro projects not identified	National Grid's Rhode Island's Green-up is transacted through Community Energy and People's Power & Light; customers choose between the two providers.

STATE	UTILITY	UTILITY TYPE	PROGRAM NAME	PROGRAM WEB ADDRESS	PROGRAM CONTACT	ENERGY SOURCED	PREMIUM	HYDRO PROJECTS	NOTES
UT	City of St. George	Municipal	Clearn Green Power	http://www.sgcity.org/conservation/	Rene Fleming 435-627-4848 rene.fleming@sgcity.org	Utility-owned generation Energy purchases	$2.95/month per 100 KWh "block"	Pine Valley Jordanelle Dam	Projects not identified. Program brochure (download at http://www.sgcity.org/wp/CleanGreenPowerBrochure.pdf) states that low-impact hydro is sourced for the Clean Green Power program, while the picture of a hydropower facility adorning the brochure is Glen Canyon dam. Hydro in green-pricing program: 1) Pine Valley 650 KW project on water line, owned and operated by the city. FERC exemption (#11218). 2) 4MW power purchase from LIHI-certified Jordanelle Dam, 12 MW storage project on Provo River, Heber City Utah, owned and operated by Central Utah Water Conservancy District. FERC non-juridictional. (Rene Fleming, personal communication (email), 7/09/09)
TX	Bandera Cooperative	Cooperative	Choose to Renew	http://www.banderaelectric.com/choose_to_renew.htm	None identified (other than customer service)	Energy purchase	$0.06426/KWh per 100 KWh "blocks" up to 100% of monthly consumption l	Hydro projects not identified	Program was closed to new participants in 2005 due to lack of new supplies. As of April 2009, Choose to Renew rate of $0.06426 KWh was less than regular rate of $$0.07159. *Requested information about hydro facilities (email*
VA	Applachian Power	Investor owned	Green Pricing Option	https://www.appalachianpower.com/CustomerService/YourBill/GreenPricing/Default.aspx	None identified (other than customer service)	RECs	$1.50/month per 100 KWh "block" (2 blocks minimum)	Summersville	Hydro projects not identified. NREL's Green Power Network states that Summersville hydroelectric is a source of RECs for Appalachian Power's green-pricing program. (http://apps3.eere.energy.gov/greenpower/markets/pricing.shtml?page=2&companyid=696) Summersville is an 80 MW storage projected located on the Gauley River in Nicholas and Fayette counties, WV, owned an operated by Gauley River Partners. FERC license 1992 (#10813). The project is LIHI certified (1995).
VA	Dominion Virginia Power	Investor owned	VA Green Power	http://www.dom.com/dominion-virginia-power/customer-service/energy-conservation/green-power.jsp	None identified (other than customer service)	RECs	100% of monthy use: $0.015/KWh Less than 100%: $2.00 per month per ~133 KWh "block."	Hydro projects not identified	RECs sourced from solar, wind, biomass, and low-impact hydro power generated at facilities located in several Midwestern and Southeastern states within the regions covered by the South Eastern Reliability Council (SERC) and Reliability First Corporation (RFC).
WA	Benton PUD	Public utility district (county)	Green Power	http://www.bentonpud.org/conservation/green_power.php	None identified (other than customer service)	Utility-owned generation Energy purchase	Monthly contribution not tied to any energy quantity	Hydro projects not identified	
WA	Orcas Power Light & Cooperative	Cooperative	Green Power	http://www.opalco.com/energy-efficiency/green-power/fact-sheet/	None identified (other than customer service)	Energy purchase	$4.00/month per 100 KWh "block"	Hydro projects not identified	Orcas has 30 projects interconnected to its grid from which it is purchasing energy for its green-pricing program.
WA	Peninsula Light Company	Cooperative	Green By Choice	http://www.penlight.org/greenpower.asp	None identified (other than customer service)	Energy purchase	$2.80/month per 100 KWh "block"	Packwood Lake	Project identified on website. 27.5 MW run-of- river, located at Packwood Lake, Packwood WA, owned and operated by Energy Northwest. FERC license 1960 (#2244).

NOTES:

1) Green Power Network's web page " "Green Pricing Utility Programs by State" (http://apps3.eere.energy.gov/greenpower/markets/pricing.shtml?page=1) lists the renewable energy sources included in the green-pricing product.

2) HRC researched each utility identified by Green Power Network as sourcing hydropower to determine if hydropower is currently being sourced and if the utility identifiies specific hydro facilities in its program literature.

3) HRC has been able to identify only some of the specific hydropower facilities sourced in utility green-pricing programs.

REC BROKERS/MARKETERS
(Source: Geen-e http://www.green-e.org/base/re_products?cust=#res)
(As of July 2009)

BROKER/MARKETER	WEB ADDRESS	NOTES
3 Degrees	http://www.3degreesinc.com/products/recs/	No projects specified
3 Phases Renewables	http://www.3phasesrenewables.com/recs.html	"low-impact" hydro mentioned on masthead of web page, but no projects are specified nor is there any explanation of "low-impact" hydro.
Blue Star	http://www.bluestarenergy.com/greenpower.html	No information on green-power products on website regarding energy sources for RECs; unable to determine, therefore,whether sourced from hydropower.
CarbonFund	http://www.carbonfund.org/site/business/alt/green_power	No information on green-power products on website regarding energy sources for RECs; unable to determine, therefore,whether sourced from hydropower.
Clear Sky Power	http://www.clearskypower.com/	No information on green-power products on website regarding energy sources for RECs; unable to determine, therefore,whether sourced from hydropower.
Con Edison Solutions	http://www.conedsolutions.com/faqs_green_power.html	Hydropower from small, run-of-the-river facilities located in upstate New York. No projects specified.
Direct Energy	http://www.directenergybusiness.com/makemegreen-faq.php	No projects specified.
Entark Global, Limited	http://www.entark.com	No projects specified.
Good Energy	http://www.goodenergy.com/store/staticPages/New_York_Small_Existing_Hydro_New_York_State_Public_Service_Commission_12_Month_certificate.htm	No projects specified. Two types of RECs: 1) New York 100% Small Existing Hydro New York State Public Service Commission 12 Month Certificate; 2) New York 100% LIHI Existing Hydro New York State Public Service Commission 12 Month Certificate.
Green Energy Marketing	http://www.gotgreenenergy.com/home.html	No projects specified.
Hess Corpporation	http://www.hessenergy.com/green/renewable.aspx	No projects specified.
PEPCO Energy Services	http://www.pepcoenergy.com/NaturalGasElectricity/default.aspx	No projects specified.
Powerex	http://www.powerex.com/offer/pnw.htm	No projects specified.
Sterling Planet	http://www.sterlingplanet.com/upload/File/Sterling%20Planet%203%20Steps%20to%20Carbon%20Neutrality%20Fact%20Sheet.pdf	No projects specified.
GDF Suez Energy Resources NA	http://www.gdfsuezenergyresources.com/Prodserv/prodserv_CarbonManagementSolutions.aspx#labelUnCertifiedREC	No hydro projects specified.

HISTORICAL LIST OF FACILITIES SOURCED FOR RECS FOR COMMUNITY ENERGY INC.'S ENERGY PRODUCTS THRU 12/31/2008

(Source: Katherine Barrett, Community Energy, Personal Communication, 7/27/09; Community Energy provided only name, location, and capacity)

FACILITY	LOCATION	WATER WAY	NAMEPLATE CAPACITY	OWNERSHIP	FERC PROJECT #	PROJECT DESCRIPTION	NOTES
[FACILITIES SOURCED FOR RECS FOR CONNECTICUT CLEAN ENERGY OPTIONS]							
Bradford (Smith)	Bradford, VT	Waits River	1.49 MW	Central Vermont Public Service Corporation	2488 (exempt)	run-of-river concrete dam -- 66-foot high by 194-foot long	exemption 1982
East Pittsford	Rutland	East Creek	3.1 MW	Central Vermont Public Service Corporation	unlicensed (non-jurisdictional)	storage earth-filled dam -- 967- foot long by 51-foot high	East Pittford dam and Glen dam comprise what CVPSC calls the "N Rutland Composite" State of Vermont identifies the reach of East Creek affected by the dam on its impaired waters list due to low dissolved oxygen and flow fluctuations.
Fairfax Falls	Farifax, VT	Lamoille River	2.1 MW	Central Vermont Public Service Corporation	2205	run-of-river concrete dam -- 344-foot long by 45-foot high	license 2005
Glen	Rutland	East Creek	2.5 MW	Central Vermont Public Service Corporation	unlicensed (non-jurisdictional)	run-of-river concrete dam -- 31-foot high by 1,755-foot long	Glen dam and East Pittford dam comprise what CVPSC calls the "N Rutland Composite" Glen is run-of-river, but since it functions in tandem with East Pittford, Glen's energy peaks and ebbs with East Pittford storage and release from the Chittenden Reservoir. State of Vermont identifies the reach of East Creek affected by the dam on its impaired waters list due to flow and fish passage threat.
Passumpsic	Passumpsic, VT	Passumpsic River	0.7 MW	Central Vermont Public Service Corporation	2400	run-of-river concrete dam -- 122 -foot long by 10-feet high.	

FACILITY	LOCATION	WATER WAY	NAMEPLATE CAPACITY	OWNERSHIP	FERC PROJECT #	PROJECT DESCRIPTION	NOTES
Patch	Rutland, VT	East Creek	0.3 MW	Central Vermont Public Service Corporation	unlicensed (non-jurisdictional)	run-of-river concrete dam -- 390-foot long by 30-foot high	Patch is run-of-river, but since it functions in tandem with East Pittford, Patch's energy peaks and ebbs with East Pittford storage and release from the Chittenden Reservoir. State of Vermont identifies the reach of East Creek affected by the dam on its impaired waters list due to flow and fish passage threat
Slack Dam	Springfield, VT	Black River	.410 MW	Springfield Hydroelectric Co.	8014 (exempt)	run-of-river concrete dam -- 30-foot high (no information found on length).	exemption 1985
Salisbury	Salisbury, VT	Sucker Brook	1.2 MW	Central Vermont Public Service Corporation	unlicensed (non-jurisdictional)	run-of-river concrete dam -- 8-foot high by 93-foot foot long.	Salisbury is run-of-river, but since it functions in tandem with Silver Lake, Salisbury's energy peaks and ebbs with East Pittford storage and release from Sugar Hill Reservoir. State of Vermont identifies the reach of Leicester River affected by the dam on its impaired waters list due to flow and fish passage threat
Silver Lake	Leicester, VT	Sucker Brook	2.2 MW	Central Vermont Public Service Corporation	11478	Storage for peaking. Silver Lake Project includes Sugar Hill storage reservoir and Goshen dam, Sucker Brook diversion dam, and Silver Lake Development. 1) Goshen dam -- earthen, 60-foot-high, 680-foot-long. 2) Sucker Brook diversion dam -- earthen, 665-foot-long by 38-foot-high. 3) Silver Lake dam -- concrete, 257-foot-long by 30-foot-high.	license 2006 Silver Lake, Salisbury, and Weybridge dams comprise what CVPSC calls the "Middlebury Composite"
Weybridge	Leicester.VT	Otter Creek	3.0 MW	Central Vermont Public Service Corporation	2731	Storage for peaking concrete dam -- 30-foot-high, 302-foot-long concrete	license 2001

FACILITY	LOCATION	WATER WAY	NAMEPLATE CAPACITY	OWNERSHIP	FERC PROJECT #	PROJECT DESCRIPTION	NOTES
[FACILITIES SOURCED FOR RECS FOR NATIONAL GRID GREENUP PROGRAMS]							
Arnold Falls	St. Johnsbury, VT	Passumpsic River	0.5 MW	Central Vermont Public Service Corporation	2399	Two timber crib dams: North dam is 189-foot long by 18-foot high; South dam is 66-foot long by 15-foot high. Timber dams to be replaced with concrete dams beginning in 2009.	license 1994
Glen	West Lebanon, NH	Mascoma River	1.5 MW	Enel North America	8405	no information found on mode of operation or facility	license 1987
Hosiery Mill	Hillsborough, NH	Congtoocook River	1.0 MW	Enel North America	6116	run-of-river (no information found on dam)	license 1984
Kelleys Falls	Manchester	Piscataquog River	.45 MW	Enel North America	3025	storage concrete dam --24-foot high by 220-foot long.	license 1984
Lower Middlebury	Leicester.VT	Otter Creek	2.2 MW	Central Vermont Public Service Corporation	2737	run-of-river concrete dam -- 478 -foot long by 30 -foot high	license 2001
Norway	Norway, ME	Pennesseewassee Stream	0.3 MW	Ridgewood Maine Hydro Partners	UL 90-15 ([non jurisdictional)	no information found on mode of operation or facility	
Pierce Mills	St. Johnsbury, VT	Passumpsic River	0.25 MW	Central Vermont Public Service Corporation	2396	run-of-river concrete dam 93-foot long by 18-foot high	license 1994
South Berwick	South Berwick, ME	Salmon Falls River	1.2 MW	Enel North America	11163	run-of-river concrete gravity dam 290 -foot long by 18 -foot high	license 1997 Community Energy states the anme of the project is Salmon Falls; FERC lists it as South Berwick. according to FERC license, the project has always been operated primarily in a run-of-river mode
Taftsville	Taftsville, VT	Ottauquechee River	0.5 MW	Central Vermont Public Service Corporation	2490	run-of-river concrete gravity dam approximately 220 -foot long and 16 -foot high.	license 1994

FACILITY	LOCATION	WATER WAY	NAMEPLATE CAPACITY	OWNERSHIP	FERC PROJECT #	PROJECT DESCRIPTION	NOTES
[FACILITIES SOURCED FOR RECS FOR NY NATIONAL GRID GREENUP PROGRAMS]							
Groveville	Beacon, NY	Hudson River	0.9 MW	Enel North America	3511	run-of-river concrete dam -- 312-foot long by 45 -foot high	license 1982 inventoried by New York DEC as Glenham Dam
High Falls	Chateaquay, NY	Deer River	1.7 MW	Enel North America	3754 exempt	run-of-river concrete dam 175 -foot long by 25 -foot high	exemption 1983
Mohawk Paper Mills Inc.	Waterford, NY	Mohawk River	3.3 MW	Adirondack Hydro-Fourth Branch, LLC	3605 (exempt)	run-of-river concrete dam -- 600-foot long by 11-foot high	exemption 1983 located at Bock Island
New York State Dam	Waterford, NY	Mohawk River	11.5 MW	NYSD Limited Partnership	7481	mode of operation? concrete dam -- 1950 -foot long by 21 -foot high	license 1987 also known as Champlain Street Dam
Sissonville	Potsdam	Raquette River	3.0 MW	Sissonville Limited Partnership	9260	run-of-river concrete dam 450 -foot long by 20 -foot high.	license 1988
Walden	Walden, NY	Walkill River	2.8 MW	Consolidated Hydro NY, Inc	4428	storage concrete dam -- 165 -foot long by 15 -foot high	license 1982
[FACILITIES SOURCED FOR RECS FOR NJ CLEAN ENERGY OPTIONS]							
Raystownt (William F. Matson)	Huntington, PA	Juniata River	21.0 MW	Alleghany Electric Cooperative	2769	run-of-river earth and rock dam: 225 -foot high (length not provided in LIHI documentation)	license 1982 LIHI certified 2006