

Electric Rate Impacts Resulting from the Advanced Renewable Tariff Provisions of the Clean Energy Jobs Act (AB 649/ SB 450)

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If adopted, the Clean Energy Jobs Act (CEJA) will have a profound effect on Wisconsin's energy landscape. The policies codified in the bill would unleash millions of dollars in investment capital and direct them into sustainable energy investments that would support future job growth and business entrepreneurship while enhancing the ability of Wisconsin's traditional industries to compete globally and locally. Taken together, these policies will drive the harnessing of Wisconsin's renewable resources, ranging from utility-scale wind energy projects on the large end to farm-sized biogas and home-sized solar systems on the small end.

A critically important provision in the CEJA is a requirement on larger electric providers to offer to purchase locally produced renewable electricity using an innovative mechanism known as Advanced Renewable Tariffs (ARTs). ARTs are also known as renewable buyback rates and feed-in-tariffs.

These are technology-specific buyback rates that provide a fixed purchase price for the electricity produced over a period of 10 to 20 years, set at levels sufficient to recover installation costs along with a modest profit. Now available in more than a dozen nations in Europe as well as the Province of Ontario, ARTs have shown to be singularly effective in stimulating considerable growth in small-scale production of distributed renewable electricity.

Unlike standard buyback rates, ARTs use a production-cost-based methodology, based on the production costs of the applicable renewable energy technologies and sizes, to determine the rates. Thus, the rates will be set differently for solar, wind, biomass, biogas and other renewable generators.

Except in rare circumstances, net energy billing (or net billing) is a poor substitute for ARTs. The reason is simple to understand: the customer's retail electric rate, which sets the price for the electrons exported to the distribution grid, is not linked to the production costs of a renewable energy system. Moreover, the maximum size of a system qualifying for net energy billing is 20 kilowatts, which is far too small to support biogas and biomass energy systems. Net energy billing provides too meager a return to support solar electric systems.

The Problem for Small Renewable Generators

There is currently no market-based pricing mechanism available for the value added by renewable energy. Small renewable electricity generators find it uneconomical to sell power to an electric provider through a competitive solicitation process. In conformity with the Public Utility Regulatory Power Act of 1978 (PURPA), all electricity generators, irrespective of size and resource used, are paid the wholesale price as set by the regional grid operator, which is generally assumed to represent the marginal cost of the next increment of electricity on the system (also defined as the avoided cost of power).

However, today's wholesale prices have little to do with the costs of building a new source of renewable generation. They are much more influenced by the operating costs of legacy coal plants built in the 1960's and 1970's, whose original construction costs have been fully recovered and are no longer a part of the utility's cost structure. It simply is not possible to finance and build a small-scale renewable generating unit when wholesale power prices are set by the operating costs of a 40-year-old coal-fired power plant. As long as these legacy plants remain the default sources for additional electricity in the Midwest region, state utilities will be disinclined to buy back electricity from small scale renewable energy producers at rates that are high enough to encourage continued investment.

Although the State of Wisconsin and the federal government offer grants and tax credits to small renewable generators, these incentives are generally insufficient by themselves to attract debt financing or equity investors. For example, a 600 kW farm anaerobic digester electricity generation system producing about 4,000,000 kWh/year may cost \$2,000,000 to install. This system would have annual operations and maintenance (O&M) costs of \$0.025/kWh, solids sales revenue of \$40,000/year and environmental credit payments (methane offsets) of \$20,000/year. **Table 1** shows the simple payback periods for this system utilizing available grants and incentives with a typical avoided cost buyback rate compared with an "adequate incentive" buyback rate:

Table 1.

Incentive Types	Avoided Cost Electric Buyback Rate = \$0.05/kWh	ART Electric Buyback Rate = \$0.11/kWh
No Grants	11.6 years	4.8 years
\$250,000 Focus on Energy Grant	10.2 years	4.2 years
\$500,000 USDA REAP Grant	8.7 years	3.6 years
\$250,000 Focus on Energy Grant <i>plus</i> \$500,000 USDA REAP Grant	7.3 years	3.0 years

The use of a renewable tariff yields a simple payback period that is more likely to attract sustained investment in these generation systems, even without grants and incentives. Grants

and incentives come and go over time. Their availability is limited and the competition for these funds is often fierce. If the demand for available dollars exceeds supply, some deserving projects will go unfunded. The transactional cost of applying for and administering grants and incentives is high. Moreover, grants and incentives do not provide the transparency, longevity and certainty that substantially drive market development of small-scale renewable generation. Renewable tariffs are a more natural market-based means of valuing the benefits of using renewable energy to generate electricity.

The Need for Action

As a general proposition, the smaller the generating facility, the less likely it is owned by a utility. Utilities tend to favor bulk generation facilities that employ economies of scale to produce electricity at a lower cost. Renewable power plants owned by utilities—such as large wind projects—are sized to serve their entire territory, not just a particular distribution area. For that reason utilities have shown little appetite for owning and operating distributed generation facilities powered with solar, biogas, wind, and hydro.

Several utilities in Wisconsin offer renewable energy buyback rates to customers that approach real-world production costs. However, their programs are limited in scope and usually achieve full subscribership within several months of the initial offering. When these offerings are fully subscribed, the utility discontinues the buyback rate, which triggers a fall-off in demand for that generator type. The absence of long-term market support poses significant uncertainties to small renewable energy businesses, such as solar installers, small wind turbine manufacturers and design-contractors of anaerobic digester systems for food processors and farms.

Advanced Renewable Tariffs as Specified by the CEJA

As currently drafted, the CEJA bill directs the Public Service Commission of Wisconsin (PSCW) to order investor-owned and municipal electric utilities that sell at retail to offer to purchase electricity generated at new small-scale renewable energy facilities, within the utility's service territory, under standard purchase terms and conditions prescribed by PSCW.

The CEJA specifies that the purpose of renewable tariffs is to maximize the development and deployment of distributed renewable energy generation technologies used at renewable facilities *without unreasonable impacts on electric utility rates*.

As defined in the CEJA, “renewable energy” is electricity derived from a renewable facility. A “renewable facility” is an electric generating facility that is a small-scale facility that derives energy from any of the following:

- Photovoltaic energy.
- Wind power.
- Gas made from a renewable resource.
- Any other renewable resource specified by PSCW.

In addition, the CEJA authorizes the PSCW to limit the requirement of an electric utility to purchase renewable energy under a renewable tariff order if PSCW finds that the limit is consistent with the purpose of the provisions identified above. The PSCW may base the limit on any of the following:

- The number or total installed generating capacity of renewable facilities from which the utility must purchase renewable energy.
- The total amount of renewable energy that the utility must purchase.

The CEJA vests the PSCW with the authority to set prices paid for renewable energy, and further directs the agency to consider the following factors when setting prices:

- The cost of producing renewable energy at the type of facility.
- A reasonable rate of return on investment for the type of facility.
- State and federal financial incentives that are available to owners or operators of the type of facility.

The PSCW is directed to: (1) determine a schedule of payments for the renewable energy, over a sufficient period of time, to allow for recovery of the construction and operation costs for the type of facility; and (2) set a maximum limit on the generating capacity for the type of facility. The PSCW may also include in a renewable tariff other conditions, including any of the following:

- Requirements for adjusting the standard purchase terms described above based on changes in operating costs for a type of facility.
- Different prices for renewable energy generated at the same type of facilities that have different generating capacities.

The CEJA also specifies that, in general, an electric utility purchasing renewable energy under a renewable tariff acquires, in addition to the renewable energy, the renewable resource credits associated with the generation of that energy.

PSCW Staff Analysis of a Possible “Adequate Incentive” Advanced Renewable Tariff

The PSCW issued a Notice of Investigation on January 15, 2009, opening docket 5-EI-148, *Investigation on the Commission’s Own Motion Regarding Advanced Renewable Tariff Development*. The stated purpose of the investigation was to examine whether and how to expand the availability and use of ARTs in Wisconsin as well as promote greater uniformity in the ARTs offered by Wisconsin electric utilities.

Commission staff used information in the record, information available in reference documents mentioned in the record, and other information it compiled to analyze the hypothetical production costs of each of the renewable technologies. The analysis is based on a simple spreadsheet model. The sole purpose of the analysis was to develop preliminary values that can be used to inform the policy choices before the Commission.

Initial tariff prices were determined abiding by the principle that a very large number of utility customers might be able to install renewable technologies with no financial risk whatsoever, and

the near certainty of profit. However, the utility’s other customers or shareholders would pay a significant price (at least in the short term) for that financial security.

To address the cost issue, Commission staff then analyzed a variety of scenarios for each of the renewable technologies to determine how sensitive the cost calculations are to the underlying assumptions. One of the purposes of the sensitivity analyses was to ascertain whether the Commission could justify lower ART prices that would reduce the overall cost of the program to ratepayers, while still providing an adequate incentive for distributed renewable generation. **Table 2** is a compilation of prices for each technology and each size category that might, in the opinion of Commission staff based on its preliminary analysis, provide an adequate incentive.

Table 2. Possible “Adequate Incentive” ART Prices for a 10-Year Contracts (cents/kWh)

Technology	Category 1 (≤20 kW)	Category 2 (20-200 kW)	Category 3 (200 kW-1 MW)	Category 4 (1-5 MW)
Solar PV	30.0	25.0	Standard ³	Standard
Wind	Net metering ⁴	12.0	10.5	9.2
Biogas	Net metering	10.7	10.5	9.3 (1-2 MW) 8.4 (2-5 MW)
Biomass (solid)	Net metering	10.0	10.0	10.0
Landfill Gas	Net metering	Standard	Standard	Standard
Hydro	Net metering	Standard	Standard	Standard
Other renewables	Net metering	Standard	Standard	Standard

Source: Briefing Memorandum Statement of the Proceeding - Docket 5-EI-148, May 20, 2009, PSCW.

Wisconsin Electric Rate Impacts Resulting from an “Adequate Incentive”-Based Advanced Renewable Tariff with a Program Size Set at 1.5% of Retail Electricity Sales

The CEJA specifies that the purpose of renewable tariffs is to maximize the development and deployment of small-scale renewable electricity generation *without unreasonable impacts on electric utility rates*. It would be useful to know the retail electric rate impacts that would result from a renewable tariff program.

As an example, assume that the initial program size is set at 1.5% of each electric provider’s retail energy sales and the maximum generator capacity eligible for the program is 5 MW per project. This program size is a maximum cumulative amount of electricity, in kilowatt-hours (kWh), which would receive a renewable tariff. **Table 3** provides much of the necessary data to determine a program size and ART tariff in terms of electricity revenue (\$), electricity sales (MWh) and average electricity prices (\$/MWh) for each of Wisconsin’s investor-owned utilities. The “average electricity prices” are an average of the retail prices paid by residential, commercial and industrial customer classes. These averages are also assumed to take into account on- and off-peak rates proportioned over the on- and off-peak hours in each rate offering.

Table 3.

Electric Utility	Class of Ownership	Number of Consumers	Revenue \$	Sales MWh	Average Price \$/MWh
Madison Gas & Electric Co	Investor Owned	137,561	331,931,000	3,350,021	99.10
Northern States Power Co	Investor Owned	246,396	464,392,000	6,229,285	74.50
Wisconsin Electric Power Co	Investor Owned	1,078,129	2,296,300,000	25,954,656	88.50
Wisconsin Power & Light Co	Investor Owned	450,393	951,408,000	10,843,809	87.70
Wisconsin Public Service Corp	Investor Owned	423,823	886,552,000	10,812,224	82.00

Source: Energy Information Agency (EIA) 2007

Based on the 2007 Energy Information Agency data in **Table 3**, the electricity generation amounting to 1.5% of all electricity sales for each investor-owned utility is shown in **Table 4**.

Table 4.

DG	Electric Sales, %	ART kWh
MG&E	1.50%	50,250,315
NSP	1.50%	93,439,275
WEPCO	1.50%	389,319,840
WP&L	1.50%	162,657,135
WPS	1.50%	162,183,360

A renewable tariff program's electricity generation must be proportioned among the renewable technologies which are eligible for the program. For the purposes of this simple analysis, the proportions shown in **Table 5** are assumed. The percentage of solar electric (PV) is kept low since it is the most expensive of the renewable technologies on an energy basis. Assigning a low percentage of PV will assist in minimizing retail electric rate impact of a renewable tariff program.

Table 5.

PV	5%
Wind	35%
Biogas	45%
Biomass (solid)	15%

As a proxy, the “adequate incentive” ART prices for 10-year contracts (from the Briefing Memorandum Statement of the Proceeding - Docket 5-EI-148, May 20, 2009, PSCW) are assumed. These renewable tariff prices are shown in **Table 6** and are used to determine the cost contributed by each renewable technologies generation to a fully subscribed tariff program.

Table 6.

DG	ART Rate \$/kWh
PV	0.250
Wind	0.120
Biogas	0.110
Biomass (solid)	0.100

ART Program Impacts on Retail Electricity Rates

The retail rate impact analysis tables for each utility can be found in the appendix of this document. Each of the utilities’ avoided cost buyback rates are found in the analysis tables. *It should be noted that this analysis assesses the rate impacts over and above the avoided cost buyback rates that are required to be paid by a utility under PURPA.* Performing the analysis using this method isolates the actual rate increases, thereby, providing realistic estimates of true impacts from renewable tariffs.

A summary of the retail rate increases for each utility’s fully subscribed renewable tariff program, based on 1.5% of electric sales program size, can be found in **Table 7**. Depending on the utility, the annual retail rate increases range from 0.98% to 1.36%. Also shown in **Table 7**, these retail rate increases correspond to an increase in the *annual* electric bills for a typical Wisconsin household (10,000 kWh/year usage) that range from \$8.12 to \$11.07. Some of the electric utilities have already met a portion of their program obligations with voluntary ART rates. Therefore, the rate impacts would be accordingly less than indicated for a 1.5% program. It should be kept in mind that these rate impacts correspond to a fully subscribed program. The initial impacts would be less during program ramp-up.

Table 7.

DG	ART kWh	ART Value \$	Retail Rate Increase \$/kWh	Retail Rate Increase, %	ART Impact \$/household per year
MG&E	50,250,315	3,477,322	\$ 0.00097	0.98%	\$ 9.71
NSP	93,439,275	5,055,065	\$ 0.00101	1.36%	\$ 10.11
WEPCO	389,319,840	25,617,245	\$ 0.00088	1.00%	\$ 8.81
WP&L	162,657,135	10,377,525	\$ 0.00111	1.26%	\$ 11.07
WPS	162,183,360	8,984,958	\$ 0.00081	0.99%	\$ 8.12

In conclusion, the low retail electric rate impacts of the renewable tariffs described conform to the purpose and intent of the CEJA - to maximize the development and deployment of small-scale renewable electricity generation without unreasonable impacts on electric utility rates.

About the Author

Mr. Krom is president of L&S Technical Associates, Inc., founded in 1975, a technical consulting company that provides innovative research and development solutions in the fields of renewable energy, physical sciences, technical modeling & process simulation. Mr. Krom has authored numerous renewable energy studies for clients, including the United States Department of Energy, Wisconsin Department of Administration, Energy Center of Wisconsin and Wisconsin Department of Natural Resources. He has also participated in many research and analysis projects, including co-authoring two renewable energy potential studies requested by the Public Service Commission of Wisconsin: (1) *Achievable Potential in Wisconsin 2006-2015*. (November 2005). Energy Center of Wisconsin. ECW. Report Number 236-1 and (2) *Energy Efficiency and Customer-Sited Renewable Resource Potential in Wisconsin – for the years 2012 and 2018*. (August 2009). Report Number 244-1. He has also contributed renewable energy potential analysis for the *Report on Electric Reliability in Dane County*, as part of a collaborative with the American Transmission Company.

From 2001 through 2009, Mr. Krom was the biogas technology and commercial wind energy program manager for Wisconsin’s Focus on Energy Program (www.focusonenergy.com). The duties of this position included development of financial incentives, review of grant applications for all renewable energy technologies and project technical assistance. As a technical grant reviewer for numerous renewable technologies and research topics, Mr. Krom is uniquely positioned to understand the historical trends, current trends and project costs across a wide range of energy applications. As a program manager, he coordinated technology efforts with many Wisconsin state agencies.

Mr. Krom has used his expertise in many of Wisconsin’s seminal activities of renewable energy policy and programs. In this capacity, he is a founder and vice president of the Wisconsin Distributed Resources Collaborative (WIDRC) (www.WisconsinDR.org); and was the technical

issues lead and a committee member of the Wisconsin Public Service Commission's *Distributed Generation Interconnection Advisory Board (PSC 119)* from 2002 - 2004.

As the current lead of the WIDRC "Utility Feed-In Tariff Committee," Mr. Krom is facilitating development of model advanced renewable "feed-in" tariffs for customer-owned renewable electricity and natural gas facilities in Wisconsin. Since 1993, Mr. Krom has also been a board member of RENEW Wisconsin (www.renewwisconsin.org) and served numerous terms as president. RENEW Wisconsin is a nonprofit organization, headquartered in Madison, WI, that promotes clean energy strategies for powering the state's economy in an environmentally responsible manner.

Awards:

- In October 1999, Mr. Krom received RENEW Wisconsin's *Clean Energy Service Award: For Significant Contributions Made by a Public Employee in Advancing a Sustainable Future in Wisconsin*.
- In 2000, Mr. Krom was a recipient of Wisconsin Focus on Energy's *Technical Excellence Award: For Consistent Excellence in Renewable Energy Evaluation in Wisconsin*.
- In September 2006, Mr. Krom received USDA - Rural Development's *Valued Partner Award - for contributing to the success of the 9006 Renewable Energy/Energy Efficiency Program in Wisconsin*.
- The Focus on Energy Biogas Program was chosen as a recipient of the *2008 State Leadership in Clean Energy Award* from the Clean Energy States Alliance (CESA). Mr. Krom was the Focus on Energy Biogas Program manager for this award.

About RENEW Wisconsin

RENEW Wisconsin is an independent, nonprofit 501(c)(3) organization that acts as a catalyst to advance a sustainable energy future through public policy and private sector initiatives. RENEW provides an organized voice for renewable energy producers and purchasers in legislative and regulatory proceedings, educational forums, and utility renewable energy collaboratives. Virtually all of the state's pro-renewable energy policies can be traced back to a proposal drafted by RENEW, including the wind energy siting law (adopted in 2009), the current renewable energy standard (adopted in 2006), and Focus on Energy's renewable energy program (adopted in 1999).