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Public Service Commission of Wisconsin
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Wisconsin PSC 5-EI-148
Advanced Renewable Tariff Investigation
StormFisher Biogas Responses
February 17, 2009

Overview:
THIS IS AN INVESTIGATION to examine whether and how to expand the availability and use of advanced renewable tariffs (ART) in Wisconsin and promote greater uniformity in the ARTs offered by Wisconsin electric utilities.

The Governor's Task Force on Global Warming issued a final report in July 2008 recommending that the state of Wisconsin develop and implement an advanced renewable tariff policy. More specifically, the Task Force recommended that the Commission convene a docket to determine the production costs of various distributed renewable resources such as solar, wind, small hydro, landfill gas, biogas, and other biomass sources.

The Commission has previously approved experimental renewable tariffs for some Wisconsin utilities on an individual case-by-case basis. In a recent rate case, the Commission decided to open this investigation into whether it should establish more uniform ARTs across all Wisconsin electric utilities.

The Commission requests responses from interested stakeholders to the questions listed below. It is not necessary for each respondent to answer every question. Wisconsin electric utilities are especially urged to respond.

ART Experience to Date in Wisconsin and Elsewhere

1. Wisconsin utilities for whom the Commission has previously approved an experimental ART are asked to respond to Questions 1.a. through 1.e.
a. How did the utility decide upon the design and price of each ART?
b. What effect did each ART have in terms of number of participating customers, enrolled capacity, and actual generation?
c. To date, how would the total cost to the utility of each ART compare to market rates for electricity and market rates for electricity generated from renewable resources?
d. What effect, if any, have ARTs had on utility rates, voluntary "green power" prices, and utility returns?
e. What contribution has each ART made toward utility compliance with renewable portfolio standard obligations?

2. Research and Experience Outside Wisconsin
a. Can you identify any research or reference documents that you believe will enhance the Commission's understanding of ART design issues and/or the actual documented effects of ARTs outside Wisconsin? Please provide enough information for Commission staff to locate such documents; it is not necessary to provide copies.

- *An Overview of Renewable Energy in Ontario.* Publicly available: http://www.ivey.uwo.ca/LawrenceCentre/energy/Overview_Renewable_Energy.pdf
- *Recommendations for Renewable Energy (Biogas) Policy Implementation in Wisconsin.* Not publicly available: enclosed
- *Proposed RESOP Rates for On-Farm Biogas Systems in Ontario.* Not publicly available: enclosed
- FMENCS. April 2004. "*Amending the Renewable Energy Sources Act (EEG) – Key Details about the Act passed by Bundestag*." Publically available.
- Preusser, S, 2006. "*Biogas Policies and Technologies in Germany*". Publically available.
- Suzuki, D. 2004. *"Smart Generation: Powering Ontario with Renewable Energy."* Publically available: http://www.davidsuzuki.org/Publications/smart_generation.asp

Costs of Producing Electricity from Renewable Resources

3. What might it cost the typical customer of a Wisconsin electric utility to construct /install a new renewable energy system using each of the following technologies? What might the typical customer's lifetime operation and maintenance costs be? Please be explicit about sources of data, assumptions, and how costs might vary based on system size, location, or other variables.

a. Solar Photovoltaics (PV)
b. Wind
c. Landfill Gas
d. Biogas other than Landfill Gas

With respect to capital costs of d.: Biogas other than Landfill Gas, CRA's estimates are consistent with our own figures, specifically:

- *<50 kW systems $6,000 - $10,000/kW*
- *<100 kW systems $6,000 - $8,000/kW*
- *<250 kW systems $5,000 - $7,500/kW*
- *<1 MW systems $3,000 - $6,000/kW*

With respect to operating costs of d.: Biogas other than Landfill Gas, we believe the proxies provided in the PlanET Biogas report prepared for RESOP in Ontario are generally accurate.

- *100 kW systems C$0.0216/kWh*
- *250 kW systems C$0.0191/kWh*
- *750 kW systems C$0.0166/kWh*
- *1,600 kW systems C$0.0123/kWh*

e. Biomass
f. Hydroelectric
g. Any other renewable electricity technologies for which data are available

4. How much energy (in kilowatt-hours (kwh) will be produced over the useful life of a typical customer-owned renewable energy system in Wisconsin using each of the following technologies? Please be explicit about sources of data, assumptions, and how production might vary based on system size, location, or other variables.

a. Solar
b. Wind
c. Landfill Gas
d. Biogas other than Landfill Gas
e. Biomass
f. Hydroelectric
g. Any other renewable electricity technologies for which data are available

Biogas plants are base load, continuous power and, as such, can reliably be expected to operate for 8,000 hours per year, allowing a safe allowance of 760 hours' maintenance and offline time. As biogas plants require some of their own power to operate ("parasitic load"), typically 97% of the nameplate capacity of the plant reaches the grid. The lifetime, for financial planning purposes, of a biogas plant is typically 20 years, although in practice these facilities can last far longer when properly maintained and refurbished.

StormFisher is developing a 4.8 MW facility in Wisconsin, and believes that it could develop another 10 MW should energy offtake prices reach levels and terms seen in Ontario. As such, we believe the total lifetime power output of the 4.8 MW facility would be 744,960 MWh and the total aggregate output of a combined 14.8 MW installed base would be 2,296,960 MWh over 20 years.

ART Policy Issues

5. What should the goals and objectives of an ART policy be?

a. What would you consider to be the primary purpose of an ART policy? Is the primary purpose to accelerate renewable energy installations, lower the cost of renewable energy, help utilities meet renewable portfolio standard (RPS) obligations, increase the diversity of installed renewables, reduce greenhouse gas emissions, or something else?

The primary purpose, from our standpoint as a developer, of an ART is to make projects financeable from both an equity and debt standpoint. In our case, the private equity company that provides all of our equity financing will only opt to invest in a project if there are long-term power offtake contracts in place, guaranteed by a strong counterparty like a government or a Fortune 500 company.

Financeability of projects is the key factor that drives the acceleration of renewable energy installations. As more renewable energy installations are put in place, utilities are provided more green energy to apply to RPS quotas, greenhouse gas emissions are reduced, and equipment and processes become more standardized, thus lowering the cost of renewable energy. Selecting a tiered pricing system based on different technologies (e.g. wind is less expensive than biogas, which in turn is less expensive than solar) ensures a diversity of

technologies used, and therefore a diversity in geographic proliferation and availability of renewable supply under different conditions.

Beyond the energy-specific benefits of the ART policy, biogas in particular provides additional benefits to the state's environment. Wisconsin is home to 1.25 million dairy cows that each produce an average of 30 tonnes of manure per year, for a total of 37.5 million tonnes per year. With the right incentives, like the ART policy, in place, the problem of odour, ground water runoff, greenhouse gases, pathogens and weed seed spread becomes a solution of green energy and organic fertilizer. In this respect, biogas stands alone among other renewables, as its environmental benefits reach beyond just the provision of green energy.

b. Considering the primary purpose of the ART policy, what short- and long-term goals might be appropriate? In other words, how should the success of an ART policy be measured?
Success of the ART policy should be measured along the following criteria:

- *% increase in RPS targets met versus years where ART policy was not in place*
- *Direct investment in the state*
- *New industries created in the state (e.g. solar manufacturing)*
- *New jobs created*

c. Should the Commission establish ARTs for all electric utilities regulated by the Commission, all investor-owned utilities or all Class A utilities? Why or why not?

The commission should establish ARTs for all electric utilities regulated by the commission so that it will create an even playing field for all potential renewable energy developers within the state, regardless of the location of facilities.

d. What role, if any, should small, customer-owned renewables play in helping utilities meet RPS obligations?

Programs like net metering, demand side management and conservation should play a role in helping meet RPS obligations. With the right incentives in place, particularly with respect to demand side management and conservation, these can contribute as much to the RPS goals as renewable energy can. These should be considered alongside an ART policy.

Should utilities seek to meet RPS obligations at the lowest possible price, or should other factors be considered?

Other factors need to be considered, particularly when the power is produced, where power is needed, and where the resource is available. Wind and solar are intermittent forms of power that do not contribute to the base load energy needs of an electrical system and are therefore of lower value to the system.

In Europe, where there are more than 5,000 biogas plants in operation as a result of the implementation of an ART policy, price 'adders' were provided to this form of energy because it

is distributed, can be located near population (and therefore demand) centers, and because it produces renewable energy in the form of heat in addition to electricity.

In terms of resource, Wisconsin's most abundant and available resource is manure—more so than wind or solar. At present, the majority of this resource is not beneficially used. An ART policy should reflect the state's need for this resource to be converted into energy.

What ART structure would best complement an RPS?

A feed-in tariff, with a fixed price and an inflation escalator, guaranteed by the state for 20 years, is the ART structure that has been adopted by European governments and the government of Ontario and would be appropriate in Wisconsin.

e. What role, if any, should small, customer-owned renewables play in helping utilities reduce greenhouse gases?

Net metering with small, customer-owned renewables can help to reduce greenhouse gases in the same way that it can help to meet the state's RPS.

Should utilities seek to reduce greenhouse gases at the lowest possible price, or should other factors be considered?

No opinion

What ART structure would best incentivize the reduction of greenhouse gases?

An ART that contemplates as many forms of renewable generation as possible and with contract terms that appeal to developers will maximize the opportunity to procure as many Renewable Energy Credits (RECs) as possible, and thereby provide evidence of the maximum available greenhouse gas offset. RECs (but not other environmental attributes) should become the property of the utility as part of the ART.

6. What are desirable and appropriate design structures?

a. Should the ART directly target new capacity and new generation?

ARTs are typically designed only to target new capacity and new generation, with the expectation that project proponents who have entered into previous contracts for already-built renewable energy installations entered into contracts that already provide lucrative rates of return.

b. How can ART payment levels be structured such that producers are not undercompensated or overcompensated over the duration of the contract?

ART payment levels must account for the type of technology used as well as the size of the projects. The best way to accomplish this, as the Ontario Power Authority has discovered, is to speak directly with developers of renewable energy systems in each sub-segment and gain an

appreciation for not only the cost of installed capacity per kW, but just as importantly, the cost of capital and their required rates of return. For example, given the credit crisis that exists in the world today, financial returns must be higher than they were prior to September 2008, as debt is less available and risk of any investment is perceived as higher.

With respect to the long-term nature of the contract, it is important to ensure that the price per kWh rises at pace with inflation.

c. Is long-term forecasting of renewable technology economics reliable enough to offer price guarantees? How should long-term forecasting affect ART structures?

Long-term forecasting of any energy pricing is extremely difficult, as has been demonstrated with wildly fluctuating oil and natural gas prices over the past few years. However, developers of renewable energy systems are required to invest massive amounts of capital at the front end of a project and therefore require certainty of offtake price for a fixed period of time to achieve financing. If these expensive installations were subject to spot market pricing, they would not be built.

d. How should the availability of financial incentives for renewable technologies through the Focus on Energy program and voluntary utility programs affect decisions regarding ART payment amounts?

The financial incentives currently provided by Focus on Energy for biogas projects can have a significant impact on smaller scale projects. However these grants are capped at low amounts (typically $250,000), and therefore have little to no impact on medium to larger scale projects. Furthermore, although grant funds can be drivers for initial project development, without favorable feed-in tariffs, the cost to operate and maintain many facilities exceeds the revenue stream provided through existing buy back rates and long term sustainable renewable energy growth will not occur. Intelligent project developers will build because there is demand for the power they produce, at a price that is fair, rather than to attempt to capture government funding.

7. Other Policy Questions

a. Are there any legal issues which constrain the Commission's ability to develop and implement an ART policy?

None, as far as we are aware.

b. What effects might ARTs have on jobs, fossil fuel imports, and agriculture?

A report prepared by CRA notes that for each $1.00 spent to acquire energy resources from outside a community, only about $0.33 of economic activity is generated within the community. On the other hand, each $1.00 spent within the community produces, through the economic 'multiplier effect', approximately $1.67 of local economic activity. The group further estimates creation of direct employment as follows:

AVERAGE EMPLOYMENT FOR DIFFERENT ENERGY TECHNOLOGIES

	Average Employment Over Life of Facility (jobs/MWa)		
Energy Technology	***Construction, Manufacturing, Installation***	***O&M and Processing***	***Total Employment***
Biomass - high estimate	0.4	2.44	2.84
Biomass - low estimate	0.4	0.38	0.78

In terms of effects on agriculture, biogas in particular provides:

- *opportunities for farmers to own, operate or become partner in renewable energy installations;*
- *improved manure management solutions;*
- *opportunity to reduce odour, pathogens and weed seeds.*

Finally, biogas produces a natural gas replacement, which obviates the need for foreign fossil energy on a 1:1basis.

c. Should utilities allow customers to voluntarily choose to purchase electricity generated from a specific technology (e.g., solar PV)?

The costs of delivering such a program from the utility's side and to maintain the correct supply : demand ratio would make this unwieldy.

ART Design Issues

8. Overall Tariff Structure

a. Should ARTs offer a fixed price (e.g., lO$/kWh), a fixed premium (e.g., 4$/kWh above the Locational Marginal Price), a hybrid of the two structures, or some other structure?

The ART should offer a fixed price that escalates with inflation. Project proponents are generally not able to raise financing based on contracts with floating prices, notwithstanding any premiums, on electricity-generating projects, given the localized nature of electricity markets relative to natural gas markets, for example.

b. How might an ART be designed to incorporate components of both a fixed price structure and a fixed premium structure?

Not a recommended course of action as these projects are likely unable to achieve project financeability, especially given current market conditions.

c. Should customers be able to choose between a fixed rate and a fixed premium when signing an ART contract?

No opinion

9. Program Size Limitations

a. Should the Commission limit the total program size of all ART offerings for the state as a whole, for individual utilities, and/or for specific technologies? If so, why?

The Commission should not limit the size of the ART, except perhaps to the limits of the state's RPS. Additional limitations will only serve to curb investment.

b. If the Commission limits total program size, what should the basis be for such limits?

Should be based on achieving the state's RPS targets.

Should limits on ARTs be based on participation levels, installed capacity, actual generation, RPS obligations, costs, or something else? Should limits on ARTs be fixed amounts or proportional to total capacity, generation, costs, etc.?

If limits are in place, these should reflect actual grid availability, availability of spend for renewable premiums by utilities, or other truly-limiting metrics. If certain types of renewable energy are to be promoted over others, this should be done not through limits but through pricing differentials and/or 'adders.'

c. If program size limits are imposed, should enrollment be on a "first come, first served" basis or based on some other criteria?

Enrollment should be on a 'first come, first served' basis. However, steps need to be taken to eliminate the threat of 'speculators' who reserve grid capacity and are not strongly committed to developing a project. The bar should be set high for project proponents if they are to be given a position in the grid connection queue. This has been one of the major implementation challenges in Ontario's ART.

10. Covered Renewable Energy Technologies

a. Are there any specific technologies for which all utilities should be required to offer an ART?

Renewables should be defined to include all pertinent technologies and these should form the basis for the ART across the state, for the sake of uniformity and so as not to create iniquities between utilities.

b. On what basis should the Commission decide whether it is appropriate to offer an ART for a given technology?

Best practices in European and Ontario ARTs provide strong definitions of what technologies should be included in ARTs. Generally, these are:

- *Wind*
- *Small hydro*
- *Solar PV*
- *Biogas*
- *Biomass*
- *Landfill gas*

The Commission should follow precedents in this respect.

c. Should the ART be technology-specific or apply to a generic definition of renewables?

The ART apply to a generic definition of renewables.

11. Individual Project Size Limitations
a. What project size limits, if any, are appropriate for each technology, and why?

Generally, size limits are not necessary if there is no cap for the program, but pricing should play an important role. For example, biogas provides base load, distributed power to the grid and solves myriad other issues, while wind only provides intermittent power. A 5 MW biogas plant is not cost competitive with a 100 MW wind farm on a per MW basis, but provides more benefits per MW. As long as these differences are accounted for by separate prices per kWh, this is not an issue.

Electricity generated from biogas plants is limited by the amount of input substrates (manure and other food processing by-products) within a reasonable proximity to a given facility. Typical on-farm systems will be less than 1 MW, but larger farm systems which beneficially utilize other substrates could generate from anywhere between 2 MW and 10 MW. This is based on the largest dairy farms in the state utilizing an appropriate mixture of off-farm substrates for maximum biogas generation (50 to 70 percent).

b. Should project size limits be uniform across utilities?

If project size limits are put in place, they should be uniform across utilities.

12. Contract Duration
a. Should utilities offer the same duration for all ART contracts regardless of the technology?

Yes, utilities should offer the same duration of contract regardless of technology. A 20-year contract would be preferred and would provide more secure returns and alleviate risk to a project lender. The ART should also be tied to an inflationary adjustment factor such as the GDP Implicit Price Deflator published by the Department of Commerce each year.

b. What is the optimum duration for ART contracts and why?

It is virtually impossible to demonstrate satisfactory returns to project financiers on contracts of less than 20 years. This has been the standard for Europe and Ontario.

13. Cost Recovery

a. Why and under what circumstances might it be appropriate for ART costs to be recovered through ordinary rates paid by all customers or a class of customers?
For purposes of answering this question, assume "ART costs" means all costs arising from the administration of the ART.

Ratepayers are important drivers of Wisconsin's RPS and, as such, should be stakeholders in the overall supply mix of the state. As all Wisconsin ratepayers will benefit from the additional benefits of an increased portion of renewable supply—cleaner air, cleaner water, and increased compliance with environmental standards that are on the horizon—all Wisconsin ratepayers should contribute to the cost recovery efforts through ordinary rates.

b. Why and under what circumstances might it be appropriate for ART costs to be recovered through a utility's voluntary renewable energy program?

A voluntary program will see progressive ratepayers shoulder a larger portion of the ART costs, which makes sense from a market supply/demand standpoint.

c. Should utilities have the discretion to choose the best means of cost recovery for each specific tariff, or should the Commission seek a uniform approach?

No opinion.

14. Renewable And Environmental Attributes

a. Should ownership of associated renewable and environmental attributes (such as Renewable Energy Credits or greenhouse gas offsets) be consistent across all ARTs in Wisconsin?

Ownership of RECs should be consistent across all ARTs in Wisconsin. Only the REC portions of renewable energy credits should become title of the utilities, and not non-electricity environmental attributes. For example, some biogas plants create a natural replacement for chemical fertilizer, thereby offsetting greenhouse gases from chemical fertilizer use and production. The environmental attributes associated with this process are key to defraying the capital and operating costs of pelletizing equipment, which is used to create the natural fertilizer, and is altogether distinct from the electricity generating process.

b. Should ARTs be established with separate prices depending on which party owns the renewable and environmental attributes?

The goal of the ART should be to transfer ARTs to the utility/state in order to achieve RPS standards, therefore project proponents should not have the opportunity to retain RECs.

15. Basis for Setting Tariff Price

a. For a given technology, should there be any differentiation in ART prices based on design characteristics (e.g., vertical versus horizontal axis wind turbines), fuel source (e.g., biomass crops versus wood waste), or location (e.g., terrestrial versus offshore wind)?

It will be very difficult to create a tariff that robust enough to handle all reasonable variations for each technology, adding complexity and cost to the process. This should only be done in the event that specific technologies, fuel sources or locations are highly prized by utilities or the state and developers need to be provided added incentives to undertake projects which match one or more of these criteria.

b. For a given technology, should ART prices decline as project size increases? If so, should size bands be created or should the price decline in linear proportion to size? How might the Commission decide on appropriate size bands?

Yes, ART prices should decline as project size increases. Ideally, prices should decline in linear proportion to size as some technologies have distinct step functions (e.g. wind turbine sizes range from 50 kW to 5 MW; biogas reciprocating engines can increase in size from one model to the next in 500 kW intervals, etc.) If logistically feasible, a linear function is more efficient from a development standpoint.

c. Should ART payment levels include any form of a capacity payment in addition to energy payments? Does your answer vary by technology? Could an auction or tender-based system for renewable capacity payments (similar to Forward Capacity Markets) help increase economic efficiency and/or reduce risk on behalf of the investor?

ART payment levels should reflect actual generation. Auction and tender-based systems for payments favor only the largest developments, which are capable of providing resources to manage this process, and are not recommended. The simpler and more transparent the program, the more traction it will gain with project financiers and project proponents.

d. Should ART prices be set at a level such that a typical participating customer will earn a positive return on their investment in renewable energy? If so, what might be an appropriate return?

Appropriate returns depend highly on circumstances such as prevailing market conditions during the period when ART contracts are to be signed, security of the program itself and its guarantors, etc. Individual companies, individual technologies, and individual projects will all have their own risk/reward criteria which will inform the required rate of return. The most effective way of determining this is to gain an understanding of all these levers from developers themselves and price the power purchase terms accordingly.

e. Should utilities offer separate prices for on-peak and off-peak generation or a single blended ART price? Should the utility or the customer be allowed to decide on their preferred approach?

Yes, utilities should offer separate prices for on-peak and off-peak generation as on-peak pricing is far more expensive to import when it is in short supply and this market reality should be reflected in the ART program to encourage more on peak production.

f. Should ART contracts include an automatic adjustment in the price based on inflation?

Yes, ART contracts should be keyed to any adjustments as inflationary pressures will affect project costs in real terms each year, particularly where the operating and maintenance costs are high as with biogas.

g. If the Commission does not require utilities to offer uniform contract duration for all ARTs, should utilities offer different prices for different contract durations?

It is not recommended that contract durations vary, but if they do, premiums should be paid on shorter term contracts to assist in financeability.

h. If any fixed premium ARTs are established (rather than fixed cost ARTs), should the premium be over and above the Locational Marginal Price, or should it be tied to some other number? Since a fixed premium would result in a variable price, should there be a price cap or other measures to prevent unacceptable profits or losses?

Fixed cost ARTs are the preferred mode for renewable energy developers because they provide known returns based on performance. However, if fixed premium ARTs are established they should be tied to the LMP and should not include a price cap, unless there is also a floor limit.

i. Should ART prices be automatically reduced annually (or periodically) to reflect the maturation of technologies and the need for renewables to become cost competitive without price supports (degression)?

ART prices should be reduced periodically for new contracts and projects to reflect the maturation of technologies, but should not be reduced for existing contracts as the technologies were at an earlier point of maturity when the capital expenditures were made.

j. Are there any benefits to customers unrelated to electricity generation that should be reflected in the tariff prices?

In the case of biogas, additional benefits include:

- *A more sustainable way to manage organic by-products, e.g. food scraps*
- *Additional greenhouse gas reduction potential due to methane destruction of manure and other organic by-products*
- *Nutrient management for farms as, in many cases, excess farm nutrients are converted into natural fertilizer*
- *Reduction of odor, weed seeds and pathogens*
- *Increased stewardship of water resources*
- *Job creation, particularly in rural areas*

16. Other

a. Are there any other ART design considerations that you feel the Commission should consider?

NOTICE IS GIVEN that the Commission considers it necessary, in order to carry out its duties, to investigate all books, accounts, practices, and activities of the utilities. The expenses incurred or to be incurred by the Commission which are reasonably attributable to such an investigation will be assessed against and collected from the utilities in accordance with the provisions of Wis. Stat. **fj** 196.85 and Wis. Admin. Code ch. PSC 5.

This is a Type I11 action under Wis. Admin. Code **fj** PSC 4.1 O(3). The Commission will review the potential environmental effects of the project. Type I11 actions normally do not require the preparation of an environmental impact statement under Wis. Stat. **fj** 1.1 1 or an environmental assessment.

The Commission requests comments on the above issues. Comments are due no later than Tuesday, February 17,2009, at noon. Comments must be filed using the Electronic Regulatory Filing system (ERF). The ERF system can be accessed through the Public Service Commission's website at http://psc.wi.gov. Members of the public may file comments using the ERF system or may file an original in person or by mail at Public Service Commission, 6 10 North Whitney Way, P .O. Box 7854., Madison, Wisconsin 53707-7854. The Commission does not discriminate on the basis of disability in the provision of programs, services, or employment. Any person with a disability who needs accommodations to participate in this docket or who needs to obtain this document in a different format should contact the docket coordinator listed below.

Questions regarding this matter may be directed to docket coordinator John Shenot at (608) 267-3798.