Public Service Commission of Wisconsin

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DATE: April 14, 2010

TO: Senator Mark Miller, Co-Chair, Senate Select Committee on Clean Energy
Senator Jeff Plale, Co-Chair, Senate Select Committee on Clean Energy
Representative Spencer Black, Co-Chair, Assembly Special Committee on Clean Energy Jobs
Representative Jim Soletski, Co-Chair, Assembly Special Committee on Clean Energy Jobs

FROM: Eric Callisto, Chairperson

RE: Impact of Clean Energy Jobs Act Substitute Amendment

At your request, the Public Service Commission (PSC) has conducted an analysis of the major components of the substitute amendment (CEJA Sub) to the Clean Energy Jobs Act (CEJA).

Removed from the original CEJA are: vehicle emissions standards (the "California cars" provisions); the low carbon fuel standard; appliance efficiency standards including industrial boiler inspection requirements; and advanced renewable (or "feed-in") tariff requirements. What remains in the CEJA Sub are: an enhanced, but modified, renewable portfolio standard; energy efficiency program enhancements; a clarified modification of the restrictions governing new nuclear power facilities; increased support for small-scale, distributed renewable generation facilities; and a few other policies that do not directly impact the electric utility sector.

The proposed changes to the legislation are significant, but the remaining components continue to represent sound energy and economic policy for Wisconsin. Our analysis continues to confirm that. The attached document includes a brief executive summary highlighting the PSC's findings, followed by a more detailed treatment of how the analysis was conducted and the conclusions reached.

Public Service Commission of Wisconsin

Impact of Clean Energy Jobs Act Substitute Amendment

April 14, 2010

EGEAS Modeling and Commission Staff Analysis of Assembly Bill 649/Senate Bill 450 (as amended):

Present Value of Cumulative Electricity Sector Costs through 2025 and Projected Bill Impacts

I. Executive Summary

The cost to energy consumers is less under the CEJA Sub than either the status quo (doing nothing) or the originally introduced CEJA. Specifically:

- The CEJA Sub shaves at least $1 billion (and as much as $3.7 billion) off the projected total cumulative cost of electricity from now until 2025, compared to the original CEJA.
- The CEJA Sub is at least $1.4 billion less expensive than the status quo for Wisconsin ratepayers over the next 15 years, even if greenhouse gas emissions (GHGs) are completely unregulated.
- If GHGs are regulated, the ratepayer savings under the CEJA Sub are as much as $6.4 billion, compared to the status quo, over the next 15 years.
- Average utility bills will be lower under the CEJA Sub than under the status quo, regardless of whether GHGs are regulated.
- The energy efficiency provisions in the CEJA Sub are virtually certain to save Wisconsin ratepayers billions of energy dollars over the next several years.
- The enhanced renewable portfolio standard, particularly when coupled with increased energy efficiency efforts, acts as a potential cost mitigation tool as Wisconsin's coal and fossil fuel-heavy generation fleet confronts federal GHG regulation.

II. Scope of This Analysis

In a February 19, 2010, letter to the Assembly Special Committee on Clean Energy Jobs, Chairperson Callisto outlined the PSC's cost projections for the originally introduced CEJA (Assembly Bill 649, Senate Bill 450). That analysis concluded that assuming some compliance cost associated with emitting GHGs, the cost of the CEJA was less than the cost of the status quo over the long run. PSC has conducted additional cost modeling of the electric utility sector policies included in the CEJA Sub.

With respect to the electricity sector policies, the CEJA Sub differs from the originally introduced CEJA primarily by:

- Allowing electric providers to demonstrate compliance with the renewable portfolio standard (RPS) through a combination of renewable energy and energy efficiency savings in the commercial and industrial sectors;
- Capping the maximum RPS obligation of individual utilities;
- Removing the advanced renewable tariff (ART) provisions, while instead counting each kilowatt-hour of certain, specified, small-scale, distributed renewable generation as 1.25 kilowatt-hours for the purposes of calculating a utility's renewable energy percentage;
- Preserving the "floor" on energy efficiency spending at 1.2% of utilities' annual operating revenues and preserving legislative Joint Finance Committee review of increased energy efficiency spending above 1.2%;

- Adding provisions that ensure the availability of incentives for small-scale, distributed renewable generation;
- Allowing the PSC to waive the in-state portion of RPS requirements; and
- Eliminating as a pre-condition for siting new nuclear power plants that the entire output of the new facility would have to be used to meet Wisconsin energy demand.

Some of these revisions have a greater cost mitigation impact than others. Allowing a specified amount of conservation to count toward the RPS probably has the most significant impact on the cost implications of the legislation. Capping the maximum RPS obligation of individual utilities and replacing the ART provisions with increased funding and an RPS credit multiplier do as well, but to a lesser extent. Each of these legislative revisions is reflected in the PSC's cost analysis of the CEJA Sub, and each is explained in more detail below.

Energy Efficiency as Component of RPS

The following table summarizes the RPS targets under current law (status quo), the original Clean Energy Jobs Act (CEJA), and the substitute amendment (CEJA Sub). Numbers in the "Total" columns indicate the minimum statewide percentage targets for total required renewable energy, in the case of the status quo and CEJA, and for total required renewable energy and conservation, combined, in the case of the CEJA Sub. Numbers in the "RPS" columns indicate the minimum statewide targets for renewable energy from all locations, in-state or out-of-state. Numbers in the "In-State" columns indicate the minimum statewide targets for renewable energy sited in Wisconsin. Finally, numbers in the "EE" columns indicate the maximum statewide portion of the "Total" targets that can be met through conservation, in the case of the CEJA Sub.

Table 1: Nominal Statewide RPS Targets

	2013			2015	2020				2025			
	Total	RPS	EE	RPS	Total	RPS	In-State	EE	Total	RPS	In-State	EE
Status Quo	6%	6%	---	10%	10%	10%	---	---	10%	10%	---	---
CEJA	10%	**10%**	---	10%	20%	**20%**	6%	---	25%	**25%**	10%	---
CEJA Sub	10%	**7.5%**	2.5%	10%	20%	**16%**	6%	4%	25%	**20%**	10%	5%

As Table 1 illustrates, the net effect of allowing some amount of conservation to count toward RPS compliance is that a lesser amount of actual renewable energy generation will be needed to comply with the law. In the case of the CEJA Sub, there is a maximum amount of conservation that may be used for RPS compliance purposes in each compliance year. For example, in 2025, up to one-fifth of a utility's RPS requirement may be met with conservation. That means that, under the CEJA Sub, of the 25% requirement for the year 2025, up to 5% may be met through conservation, and at least 20% will be met through renewable energy. Similarly, the CEJA Sub allows that 16% of renewable energy be required to meet the 2020 requirement, as opposed to 20% under the original CEJA.

RPS Caps in 2020 and 2025

In practice, Wisconsin's RPS law sets different overall renewable energy requirements for each electric provider, based on what the provider's "baseline" renewable generation percentage was during the period from 2001-2003. The RPS law then requires all providers to increase their renewable energy percentages by the same amount above those baselines. The result of that framework is that the original CEJA would have required certain providers to achieve renewable energy percentages in excess of 20% in 2020 and 25% in 2025.

The CEJA Substitute Amendment caps the RPS obligation of any electric provider in the year 2020 at a percentage equal to the greater of 20% or the provider's baseline percentage, and in the year 2025 at a percentage equal to the greater of 25% or the provider's baseline percentage. This has the effect of lowering the 2025 RPS obligation, compared to CEJA obligations, for six electric providers and two wholesalers who demonstrate compliance on behalf of customers.

As Table 2 illustrates, this revision also has the effect of lowering the effective statewide target in 2025 by about 0.6% or just more than 400,000 megawatt hours of renewable energy.

Table 2: Reduction in Effective Statewide RPS Due to Cap on Utility Obligation

2008 Sales (MWh)	Electric Provider	Baseline	CEJA 2025 Requirement	CEJA Sub Cap	Estimated Reduction in RPS due to Cap (MWh)
5,441	Centuria	12.37%	33.37%	25.00%	455
1,394,573	Consolidated	16.47%	37.47%	25.00%	173,903
31,167	North Central	33.11%	54.11%	33.11%	6,545
168,651	Northwestern	12.48%	33.48%	25.00%	14,302
106,471	Oconto Elec. Coop.	4.71%	25.71%	25.00%	756
4,974,221	WPPI wholesale cust.	4.24%	25.24%	25.00%	11,938
6,226,442	NSP	6.89%	27.89%	25.00%	179,944
523,895	NSP wholesale cust.	6.50%	27.50%	25.00%	13,097
70,117,064	**STATEWIDE**				**400,941 (0.57%)**

Removing ARTs

The original CEJA included language requiring the PSC to order utilities to offer ARTs or "feed-in" tariffs for distributed renewable energy facilities. The CEJA Sub does not include any ART requirements. Instead, the CEJA Sub ensures that for the first four years following enactment an amount equal to 0.2% of electric utilities' annual operating revenues will be devoted to grants and loans for certain, specified, small-scale, distributed generation (DG) renewable projects, with a preference for agricultural waste digester projects. PSC staff estimates that the additional investments in distributed renewable projects would likely be between $13 million and $16 million per year. In addition to increasing investments in DG renewable projects, the CEJA Sub would allow each kilowatt-hour of

generation from certain, specified small-scale renewable projects to count as 1.25 kilowatt-hours for the purposes of calculating a utility's renewable energy percentage.

III. Cost Modeling

This is the PSC's second iteration of cost forecasting for comprehensive energy legislation being considered this legislative session. As previously noted, Chairperson Callisto shared PSC modeling results for the originally introduced CEJA with the Assembly Special Committee on Clean Energy Jobs in correspondence dated February 19, 2010.

In terms of approach, PSC staff modeled the CEJA Sub much the same as was done for the original CEJA. The CEJA Sub analysis, as before, focuses primarily on the energy efficiency and RPS components of the legislation. The cost impacts of the CEJA Sub are compared against both a status quo future (doing nothing) and the original CEJA.

The PSC again used the Electricity Generation Expansion Analysis System (EGEAS) forecasting tool, which was developed by the electric utility industry's research group, the Electric Power Research Institute (EPRI). The modeling was conducted by PSC professional staff who collectively have decades of experience forecasting electricity futures for Wisconsin.

Modeling Assumptions

The EGEAS model requires that hundreds of assumptions be made about the costs of different technologies, costs of fuels, inflation rates, etc. The PSC relied on recent dockets, construction applications, rate cases, and utility industry reports to select values for each variable. It would not be practical or possible to list all of the PSC's assumptions without divulging some confidential information provided to the PSC by utilities. However, the assumptions most fundamental to the modeling include:

> *Demand*: In the status quo scenarios, total statewide demand for electricity increases at an annual average rate of 0.7%.[1] In the CEJA and CEJA Sub scenarios, total statewide demand for electricity decreases at an annual average rate of 0.2%.[2] Table 3 on the following page provides snapshots of how total statewide demand changes over time under each scenario.

[1] The U.S. Department of Energy forecasts approximately 1.2% average annual growth nationally from 2008-2025. Wisconsin's status quo energy efficiency programs have historically shaved approximately 0.5% off of the growth rate in our state. The value used for modeling of the status quo is 1.2%-0.5%=0.7%.

[2] The CEJA and CEJA Sub would require the PSC to set efficiency program goals based on studies of achievable potential, with a nonbinding goal of 2%. The most recent such study indicated that savings of 1.6% were achievable, but for modeling purposes the PSC conservatively assumed that actual results would be only 1.4%. The value used for the CEJA and CEJA Sub modeling is thus 1.2%-1.4%=-0.2%.

Table 3: Annual Statewide Electric Demand (MWh)

	2015	2020	2025
Status Quo	78,812,000	81,612,000	84,506,000
CEJA	75,147,000	74,000,000	73,075,000
CEJA Sub	75,147,000	74,000,000	73,075,000

RPS Requirements: The model assumes no transaction costs for the trading of renewable energy credits. The effect of this assumption is that the nominal statewide targets specified in Table 1 are applied without consideration of utility-specific RPS obligations. However, the cap on utility-specific obligations is modeled by reducing the statewide target by 0.6% in 2025, consistent with Table 2.

Reserve Margin: A minimum reserve margin of 15% is used. This means that available generating capacity must always exceed the forecasted peak demand by at least 15%.

Capital Costs for New Generating Units:

- Coal = $3,100/kW
- Natural Gas Combined Cycle = $1,150/kW
- Natural Gas Combustion Turbine = $765/kW
- Biomass = $4,100/kW
- Solar = $6,000/kW
- Nuclear = $6,200/kW
- Wind = $2,300/kW + $350/kW transmission adder if sited outside Wisconsin

Inflation: In general, inflation for capital costs starts at 2.7%, then increases to 3.1% in 2015 and 3.5% in 2020. Similar but slightly different inflation indices are used for operation and maintenance (O&M) costs.

CO_2 Compliance Costs: In scenarios where a CO_2 compliance cost is assumed, those costs begin in 2013 at the specified price (e.g., $10/ton). Over time, the price is assumed to increase above the specified amount at a rate that is specifically based on compliance cost forecasts.

DG Renewables: In the status quo scenarios, generation from DG renewables is treated as a reduction in demand. This is appropriate for the low levels of investment in DG renewables that occur under current law, especially considering that many DG renewables are sited at locations that consume more electricity on an annual basis than the DG renewables generate. In the CEJA scenarios, the strong effect of ARTs was modeled by adding 250 MW of solar photovoltaic capacity and 200 MW of biomass capacity over the next 15 years, despite the fact that those resources would not ordinarily be cost competitive. Finally, in the CEJA Sub scenarios, the increased budget for DG renewable incentives and the RPS credit multiplier were modeled by adding 75 MW of solar photovoltaic capacity and 125 MW of biomass capacity over the next 15 years. These more modest numbers reflect a best estimate of how much capacity might be built under the CEJA Sub policies, given the priority placed on agricultural digesters and the fact that the proposed incentive budget is limited to just the first four years following enactment.

Purchase of Hydroelectric Power: Under the CEJA or the CEJA Sub, generation from hydroelectric facilities located outside Wisconsin that have a rated capacity of 60 MW or more will be eligible for RPS compliance purposes. This provision is modeled by assuming that one or more Wisconsin electric providers enter into a 15-year contractual agreement beginning in 2018 to purchase 500 MW of capacity and approximately 2,800 GWh of annual generation from such a unit.

Summary of Modeling Results

Using the EGEAS model, the PSC forecasted electric generation production costs sufficient to meet statewide demand, reserve margin, and RPS requirements for every year through 2025.[3] This was done for the status quo, CEJA, and CEJA Sub scenarios. Under each scenario, the PSC forecasted how generation production costs might vary depending on whether the cost of compliance with GHG regulations equals $0 per ton of emissions, $10 per ton, or $20 per ton.[4] The EGEAS cost estimates include the recovery of new capital, O&M, fuel, and emission allowance costs, and are expressed in 2008 dollars. The modeling results are summarized below.

Table 4 shows the total cumulative costs to meet demand under each scenario through the year 2025, expressed as a "present value" which accounts for how inflation changes the value of one dollar over time. This Table provides the best information for assessing the direct costs or cost savings of the CEJA or the CEJA Sub.

Table 4: Present Value of Cumulative Costs to Meet Demand through 2025

CO_2 @ $0/ton	**Status Quo**	$52.0 billion
	CEJA	$54.3 billion
	CEJA Sub	$50.6 billion
CO_2 @ $10/ton	**Status Quo**	$65.9 billion
	CEJA	$63.3 billion
	CEJA Sub	$62.0 billion
CO_2 @ $20/ton	**Status Quo**	$79.8 billion
	CEJA	$74.4 billion
	CEJA Sub	$73.4 billion

[3] These production cost forecasts include the estimated costs of building additional transmission lines to integrate new out-of-state wind farms into the grid.

[4] For simplicity, GHG compliance costs are expressed as a cost per ton of GHG emitted. This value represents the total costs to comply with GHG regulations, averaged over the total number of tons emitted. The $10/ton and $20/ton scenarios represent possible values for compliance costs based on available data. Specifically, GHG emission allowances currently trade in Europe for approximately $19/ton. Recent EPA estimates of proposed cap and trade legislation passed by the House of Representatives include compliance costs of between $13 and $33 per ton for the 2012 to 2030 timeframe. Also note that virtually all observers have concluded that compliance costs for electric utilities will be higher if emissions are regulated through performance standards than if they are regulated through a cap and trade system.

Conclusions drawn from Table 4:

- Total cumulative costs are significantly less under the CEJA Sub than under the status quo, even if CO_2 is completely unregulated.
- The CEJA Sub shaves between $1 billion and $3.7 billion off the projected cost of the original CEJA proposal, depending on whether GHGs are regulated.
- The CEJA Sub will save Wisconsin ratepayers at least $1.4 billion over the next 15 years, compared to the status quo, even if GHGs are unregulated.
- The CEJA Sub will save Wisconsin ratepayers as much as $6.4 billion compared to the status quo, over the next 15 years, assuming some GHG regulation.

The costs depicted in Table 4 – i.e., the costs to generate electricity and reduce demand – represent a large portion of the costs that are included on electric utility bills. However, ratepayers also have to cover the costs of the utility's distribution system, customer services, and many other things that are not directly affected by the proposed legislation. By adding all of these costs together, we are able to forecast the average difference in bills under the CEJA or CEJA Sub assumptions as compared to the status quo assumptions. Results are depicted in Table 5 below. Positive numbers in Table 5 indicate that bills in that year would be higher than under the status quo. Negative numbers indicate that bills in that year would be lower than under the status quo. For example, bills in 2020 will be 4.0% lower under the CEJA Sub than under the status quo if GHG emissions cost $20/ton.

Table 5: Percentage Change in Annual Average Ratepayer Bills (compared to Status Quo) for All Customer Classes[5]

		2015	2020	2025
CO_2 @ $0/ton	**CEJA**	1.0%	5.5%	6.2%
	CEJA Sub	-1.0%	-1.1%	0.4%
CO_2 @ $10/ton	**CEJA**	0.5%	-1.3%	-2.3%
	CEJA Sub	-1.3%	-2.7%	-3.5%
CO_2 @ $20/ton	**CEJA**	0.0%	-3.0%	-5.5%
	CEJA Sub	-1.5%	-4.0%	-6.3%

Conclusions drawn from Table 5:

- Although bills increase over time for the average ratepayer under all scenarios, they increase more under the status quo than under the CEJA or CEJA Sub scenarios if CO_2 compliance costs equal $10/ton or more.

[5] EGEAS modeling allows the PSC to estimate total utility costs, but not rates. The PSC makes decisions in every utility rate case about how to apportion the revenue requirement among customer classes. To simplify this analysis, a 1% decrease in the revenue requirement (for example) was assumed to translate into a 1% decrease in costs for each customer class. In practice, a 1% change in the revenue requirement might translate into different changes for each customer class. For example, in the 2009 rate case for Wisconsin's largest utility, the Commission approved rate increases that averaged 3.3% across all customer classes, but the increase for most residential customers was 4.9% while the increase for large industrial customers was 1.6%. In recent cases, industrial customers generally have seen lower rate increases than residential customers.

- Even if CO_2 emissions were unregulated ($0/ton), costs would increase more under the status quo than under the CEJA Sub until the year 2025.

Table 6 shows the forecasted impact of the proposed legislation on monthly electricity bills for an average residential customer. As a point of reference, the average monthly bill for an average customer in 2010 is about $90. Monthly bill impacts were not calculated for commercial and industrial customers because bills in those customer classes vary much more widely than residential bills. In Table 6, a negative value indicates that the monthly bill would be lower under the proposed legislation than under the status quo.

Table 6: Monthly Bill Impacts for an Average Residential Customer

		2015	2020	2025
CO_2 @ $0/ton	**CEJA**	$1.15	$7.25	$9.63
	CEJA Sub	-$1.16	-$1.40	$0.62
CO_2 @ $10/ton	**CEJA**	$0.58	-$2.00	-$4.33
	CEJA Sub	-$1.54	-$4.06	-$6.51
CO_2 @ $20/ton	**CEJA**	-$0.01	-$5.04	-$12.06
	CEJA Sub	-$1.94	-$6.73	-$13.65

Conclusions drawn from Table 6:

- Average monthly residential bills increase more under the status quo than under the CEJA scenario if CO_2 compliance costs equal $10/ton or more.
- Even if CO_2 emissions were unregulated ($0/ton), average monthly residential bills would increase more under the status quo than under the CEJA Substitute Amendment until the year 2025, when the status quo is $0.62 per month less.

Why the CEJA and CEJA Sub Mitigate Cost Impacts Over Time

Opponents of clean energy legislation take it as self-evident that policies promoting renewable energy and energy efficiency will raise energy costs for consumers. They argue that because increased renewable portfolio standards will require new investments in renewable energy and the cost of those investments will be passed on to ratepayers, clean energy policies will mean higher utility bills. That argument ignores the costs that clean energy policies will help to offset – i.e., the avoided costs associated with continuing to use energy inefficiently and relying so heavily on aging power plants and imported fossil fuels. In other words, there is a hefty *cost of inaction*, and the modeling results bear that out.

There are several components that make up Wisconsin's high cost of inaction. First, the state could be using energy more efficiently, and if it were, Wisconsin ratepayers would be saving money. As indicated in Table 3, PSC forecasts that the CEJA and the CEJA Sub could make Wisconsin far more efficient, reducing statewide demand for electricity in 2025 by 13.5%, or more than 11 million MWh, compared to the status quo. The cost of reducing demand by 11 million MWh is far cheaper than the cost of generating that much electricity using *any* available technology. In fact, the most recent potential study published by the Energy Center of Wisconsin documents that the state could generate $900 million per year in energy savings on a $350 million per year investment in energy efficiency. That is, by investing

more in energy efficiency, Wisconsin consumers will be using less energy, offsetting the need for additional generation and transmission investments, and ultimately returning energy dollars to Wisconsin ratepayers.

The second major component of Wisconsin's high cost of inaction is the state's coal and fossil fuel-heavy generation fleet. Vast amounts of imported coal and natural gas are required to fuel Wisconsin's power plants. Fossil fuels are unregulated (and recently volatile) commodities. Continued and heavy reliance on those fuels means that electricity costs will continue to be linked to fluctuating fuel prices – over which Wisconsin has no control. And the total impact is staggering: ratepayers are spending more than a billion dollars per year on imported fossil fuels just to meet our electricity needs.

Finally, half of Wisconsin's state's coal-fired generating units are 50 years old, or older. These units cannot run forever, and even in the near-term keeping them running has a significant cost. In some cases, these units need to be upgraded to comply with environmental regulations, and those upgrades can cost hundreds of millions of dollars. Moreover, as GHG regulations take effect, there will be substantial additional compliance costs for some, if not all, fossil fuel power plants. Those compliance costs almost certainly will be passed through to ratepayers. The more reliant Wisconsin is on fossil fuels, the higher all of these compliance costs will be. Steadily increasing the proportion of our energy mix that comes from renewable resources, by enhancing the RPS law, helps to act as a cost mitigation tool as environmental regulations, and especially GHG regulations, ratchet up in the coming years and compliance becomes more expensive.