Proposed Legislation to Stimulate the Growth of Carbon Free Resources to meet Electricity Demand in Wisconsin.

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Executive Summary – In this short paper I review my understanding of the "problem", outline the components of a legislative proposal, present some analysis of trends in the Wisconsin electricity market, and suggest a process to set goals to stimulate the development of nuclear, renewable and energy efficiency resources in Wisconsin. The paper ends with a series of recommended next steps.

I would appreciate feedback from committee members or interested parties.

A. Introduction: Current electricity resource planning in Wisconsin is not adequately dealing with two related problems:

1. a growing dependence on fossil fuels, coal and natural gas, to meet Wisconsin' electricity needs, despite the well documented price and environmental risks associated with these fuels.
2. lack of a market signal to take strong actions to mitigate or at least buy some insurance against the growing risks related to economic losses from global climate change.

The obvious solution to both problems: raising taxes on carbon based fuels to internalize the likely large damages associated with these fuels is likely to be politically unacceptable because most humans can not rationalize taking actions now to receive a hypothetical benefit some years in the future. The consequences of taking no action will not become clear to the majority of citizens until a series of escalating either environmental or military disasters begin to receive more attention by more than just the insurance agencies and multi nationals who have awakened to this threat already. In the interim, politics is the art of the possible and politicians have a duty to propose compromise solutions that lay out sound long term goals to the right result but at a potentially higher cost. A carbon based renewable standard for electricity generations is one such option.

Unfortunately progress in developing comprehensive renewable or carbon free portfolio standards has been slow because of a failure by government and or resource planners to set up positive incentives for the firms that could actually solve this problem to cooperate. A handful of states have passed renewable portfolio standards and California has a set of energy efficiency savings targets and solar targets fashioned by different lobbies but there is no coherent approach and failure to report on progress towards these targets at the national and regional levels.

It is time to take a more global approach to these problems because technology specific approaches are not working fast enough. Advocates of renewables, energy efficiency, and other capital intensive forms of generation all see resource planning as a zero sum game, they all want to win at the expense of others. Each sees "their" technology as at least part of, if not the whole, solution to global climate change. Other problems relate to a failure to hold all parties accountable for achieving their part of the goal and have consequences if the goal is not attained. This inability to meet the performance standards is due in part to a permissive culture of subsidies for "good central generation options" that were used in the past to support both fossil fuel and nuclear generation options.

B. Legislative Proposal

Wisconsin should support a new electricity (and energy if possible) planning framework that gives nuclear, solar and efficiency proponents a reason to work together to achieve a common goal, significantly lower carbon emissions per unit of electricity production.

The legislation should have the following elements to achieve that goal.

A. A Definition of carbon free resources to meet electricity demand and why increasing the fraction of carbon free resources is desirable.
B. Legislature defines the following resources as carbon free:
    a. Solar, nuclear, wind, fuel cells, tidal energy and hydropower and all forms of base load energy efficiency programs where savings can be verified. (might also want to give some preference for coal plants who sequester up to 90% of their baseline carbon emissions.
    b. Development of Carbon free Electricity options is desirable because of Wisconsin's desire to begin to make necessary changes to slow if not reverse growth in carbon dioxide emissions.
    c. Developers of carbon free resources will receive emission credits that can be traded on existing carbon markets in Europe.
C. A Process where consortiums of nuclear, solar, energy efficiency and renewable providers can bid to provide a specific chunk of future resource needs in WI. (say 200 MW and xx GWH).
D. Incentives for Utilities that actually achieve an increase in the level of carbon free resources used to meet electricity demand. (using higher rates of return or shared savings approaches used in CA.
E. A process to set specific carbon free resource fractions for 5, 10 and 20 years out.

Note: Others may want to set a different kind of goal related to tons of carbon produced per GWH of electricity production but I assume this may be too complicated for this first time out.

Below I produce my own high level analysis of how a carbon free resources target could be set and offer some examples

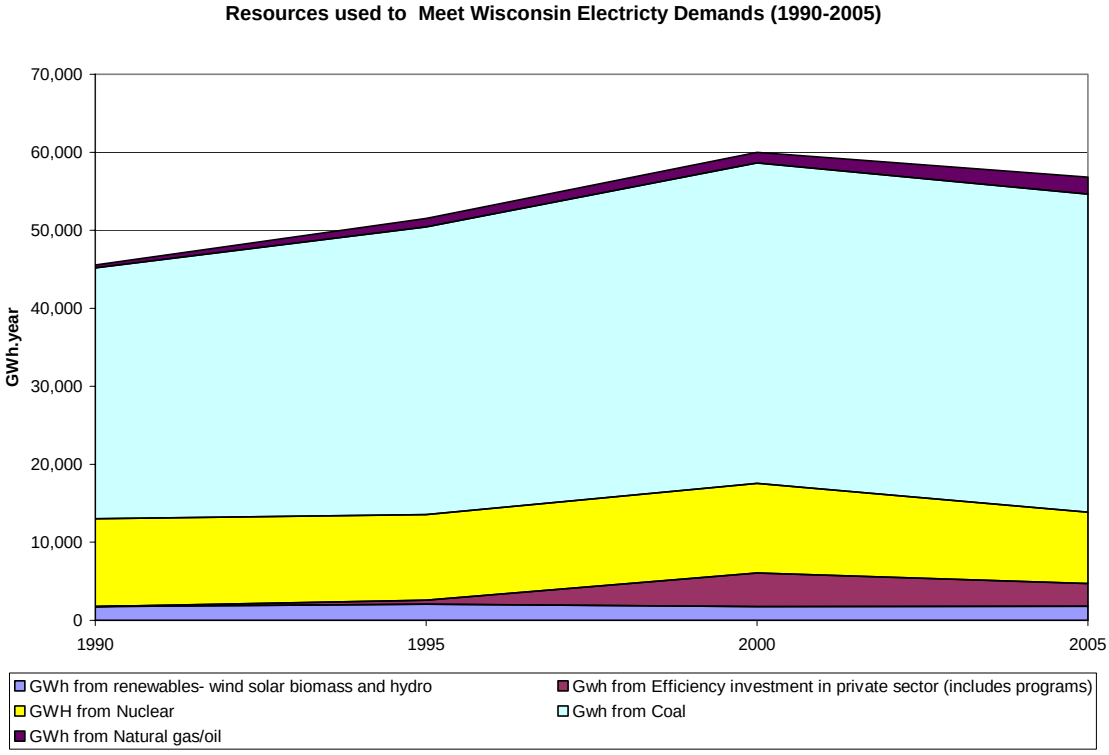
C. Talking Points

1. The Trend in Wisconsin in last ten years has been towards a higher proportion of fossil fueled resources to meet electricity demand due to lower overall prices until recently and little awareness of scope of climate change problem. Climate change effects are increasing and evidence is mounting that rate of change is accelerating. It is simply irresponsible not to hedge our risks and take actions now.
2. Time is right to encourage more capital intensive resources due to lower rates of inflation and multiplier effects of investing in high tech resources like nuclear power and energy efficiency service firms.

3. Some advocates of nuclear don't understand the importance of emphasizing both encouraging more efficiency and more nuclear power production. This legislation will change that by encouraging nuclear and or renewable power developers to bundle a series of energy efficiency investments with proposal to bring new plants on line. In particular developers of carbon free resources that bring bundles of supply and efficiency plans to the table will receive a full basis point higher rate of return. I would recommend giving nuclear developers an additional basis point if they simultaneously propose to fund energy efficiency programs that will achieve a minimum of 50% of the capacity they propose within 5 years of completing the plant.
4. Carbon free resource development goals should be set at statewide level and enforced by the Wisconsin PSC. I suggest that WPSC encourage utilities or merchant plants to use carbon free resources to meet 50% of new demand over next five years and then ramp up to 70% for period 2015 to 2020 and to 90% for period beyond 2020.
5. On site storage of nuclear wastes should be encouraged and scientists should be rewarded for proposing innovative solutions to reduce the amount of waste through better reactor design.

D. Historical Analysis

Figure 1 shows the evolution of the different types of resources used to meet electricity load in Wisconsin from 1990 to the present. This figure includes traditional source of generation, coal, natural gas and oil, hydro and nuclear as well as my estimate of the resource procured by private sector through investments in efficiency. The resources can be grouped by carbon and non carbon groups to show the share of load met by carbon intensive resources over time in Figure 2. From 1990 to 2000 the share of non carbon resources increased from 20 % to 25% as energy efficiency resources displaced need for more plants increased and nuclear generation output grew. **Unfortunately this trend toward more carbon free resources reversed itself during the period 2000-2005 to the point where the share of non carbon resources declined to 17.6% of electricity load in 2005.** Wisconsin must reverse this trend if it wants to make any serious contribution to dealing with global warming.



For a number of reasons Wisconsin should support a return to the trend experienced in the 1990's toward the use of non carbon, or at least low carbon, resources to meet total electricity demand. (These were summarized and listed in my earlier presentation). The goal of the Wisconsin legislature should be to get encourage Wisconsin's utility's to reverse this trends away from carbon intensive forms of electricity generation in the near term and increase the non resource share of 30% in next four years to continue the trend shown in the last 20 years before low oil prices and resistance to nuclear reversed trend from 200 to 2005.

E. Policy options and a recommendation to encourage the trend back to low carbon or non carbon electricity generation resources.

1. Set a non carbon resource share goal for Wisconsin for future years and reward utilities it they meet the goal with a small rate of return bonus?
    a. Recommendation make the non carbon share target for Wisconsin equivalent to:
        i. 25 % of total Wisconsin electricity load by 2012,
        ii. 30 % by 2015
        iii. and 50% by 2025

        This will encourage growth in renewable, nuclear and energy efficiency resources.
2. Set a carbon emissions per kwh target for instate electricity generation in Wisconsin or per total consumption (including imports). This will require estimates of the aggregate carbon emissions per kwh for the period 1990-2005 (I

am working on this) and set future targets in terms of #/kwh of production and allow utilities to manage to meet this target.

a. Recommendation- set a target 5% below the current level for 2012 and 15% below by 2020.
   Pros and cons-The Advantage of the second approach is that it is technology neutral and would allows coal to be continue to be built as long as GHG emission per unit of coal generated electricity is reduced over time. Disadvantage is that it's more difficult to set measure and enforce a carbon emissions/kwh ceiling and then make changes over time. It's easier simply to label certain electricity generation sources as non carbon and monitor their share of production. This will also require that the change in energy intensity (kwh/$ GSP) be used every year to calculate the share of total load contributed by energy efficiency.

F. Next steps-

1. Ask the WPSC to provide legislature with a report estimating the costs of complying with these carbon free standards. This report would have to make some assumptions about which carbon free resources are likely to be used to make each target and the cost of each resource type: nuclear, wind, solar and energy efficiency programs will be the largest shares.
2. Set up a brainstorming meeting with representatives from nuclear, energy efficiency and renewables organizations to get their input on this concept.
3. Work with legislative council to draft legislation

WORKSHEET FOR THE PROPOSAL

	Wisconsin	California
Population- millions in 2005	5.5	36.4
EE Program Spending- $milllions	39.7	381.5
Electricity EE Program Spending/capita	$7.22	$10.44
Statewide Reported Savings 2005 MW	37	394
Total MW Demand	15600	52522
Rate of Energy Demand Growth (MW/year)	375	1000
Fraction of growth filled by EE programs in 2005	9.9%	39.4%
Avoided Costs $/MWH over 10 years *	60	75

* middle of ranges presented in resource documents

Sources: CPUC decisions on funding, CEC forecast documents for demand growth and avoided costs
Wisconsin Statewide potential study for avoided costs
Focus on Energy Annual reports for MW achieved and spending for FY06
Wisconsin Strategic Assessment for rate of peak demand growth

Evolution of Resource Mix in Wisconsin

	1990	1995	2000	2005	2010	2015
Total Electricity demand gwh	49,198	57,967	64,689	70,339		
GWh from renewables- wind solar biomass and hydro	1,791	2,097	1,749	1,841		
GWH from Energy Efficiency programs	175	275	200	400		
Gwh from ee private sector investment**	-1,125	492	4,312	2,888		
GWH from Nuclear	11,226	10,970	11,512	9,135		
GWh from non carbon sources (1-3)	10,276	11,737	16,024	12,423		
Gwh from Coal	32,145	36,864	41,058	40,760		
GWh from Natural gas/oil	389	1,081	1,347	2,166		
Share of non carbon sources of total %	20.89%	20.25%	24.77%	17.66%	40.00%	0.5

# of Carbon per Gwh-average

Calculations of Energy Efficiency share below
** private ee derived using drop in electricity use/gdp over time period * base usage to derive ee supplied
2005 includes .25 gwh solar and 93 gwh wind

ee calls	energy efficiency c	gsp change % 1990-2000	
.10 drop in 1990-2000 * gsp change in same period	0.089285714	1.435413643	gsp growth
2005 vs 2000	0.044642857	1.314870523	elec use sam period
1995 vs 2000	0.074380165	5930.480406	conservatino inferred 90-2000
	0.991803279		

	1990	1995	2000	2005	2010
Total Electricity demand gwh	49,198	57,967	64,689	70,339	73,927
GWh from renewables- wind solar biomass and hydro	1,791	2,097	1,749	1,841	2,536
Gwh from Efficiency investment in private sector (includes programs)	0	492	4,312	2,888	6,467
GWH from Nuclear	11,226	10,970	11,512	9,135	12,663
Gwh from Coal	32,145	36,864	41,058	40,760	40,760
GWh from Natural gas/oil	389	1,081	1,347	2,166	1,949
Gwh from imports	3,647	6,463	4,711	13,549	
total in state	45,551	51,504	59,978	56,790	64,376