Flawed from the Start

How the Wisconsin Policy Research Institute Gets the Economics of Energy Policy Wrong

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Introduction

As Wisconsin considers sweeping changes in public policy to reduce the state's dependence on fossil fuels and transition to a clean energy economy, it is imperative that those decisions be made based on a sound understanding of their ramifications on the state's economy and the environment.

The Wisconsin Policy Research Institute's November 2009 paper, "The Economics of Climate Change Proposals in Wisconsin," attempts to contribute to this debate by warning of the impact that increased state expenditures and energy prices could have on the state's economy. Unfortunately, WPRI's analysis makes no contribution at all to the better understanding of these issues. WPRI's analysis fails due to its:

- Flawed understanding of energy economics.
- Blithe and apparently wholesale dismissal of the economic benefits resulting from many of the modeled policies.
- Errors of both fact and interpretation.
- Reliance on poor-quality or biased sources of information, and
- Numerous unsupported assertions.

As a result, the WPRI analysis does not represent a credible contribution to the discussion over the economic impacts of climate change policy in Wisconsin. On the contrary, it has the potential to confuse – rather than enlighten – decision-makers at this key moment for the development of the state's energy policy.

In this paper, we review both the general flaws in the WPRI analysis and specific errors that undercut the legitimacy of the paper's conclusions.

Flawed Assumptions

WPRI's analysis relies on a general equilibrium model to produce estimates of the economic impacts of various policies to address global warming proposed by the Wisconsin Governor's Task Force on Global Warming (GTF). The institute's research – carried out by analysts at the Boston-based Beacon Hill Institute (BHI) – uses the WI-STAMP model.

The STAMP model, variations of which have been designed by BHI for a variety of states, is an unusual choice for this type of analysis. BHI describes STAMP as "a computer program designed to provide the user with the ability to perform tax policy 'simulations'– analyses of how hypothetical tax changes will affect the state economy."[1] It is an odd choice in that the majority of the policy options being evaluated are not straightforward tax policy changes, but rather a mix of regulatory programs, subsidies and fees.

The WI-STAMP model assumes that economic actors act rationally – that is that consumers "maximize their utility" and producers "maximize their profits." In other words, the model assumes that Wisconsin individuals and businesses already make optimal decisions with regards to the use of energy – and that if new opportunities to maximize profits or utility arise, consumers and producers will adopt them immediately. From the perspective of evaluating state tax proposals – the purpose for which STAMP was designed – this approach has some utility, providing an "all other things being equal" view of the impact of various tax policy changes on the economy. As applied to the evaluation of proposed changes in energy policy in Wisconsin, however, the approach is deeply flawed.

The foundational error of WPRI's approach is laid bare on page 4 of the institute's report. There, the authors write:

> Since the GTF assumes these recommendations will change economic behavior, we assume that current economic agents are not making these choices in their absence. Moreover, since agents are not making these choices today, the proposals impose a higher cost than those currently employed. If the implementation of these proposals imposed no cost, or produced a cost savings, **in the absence of market failure, economic actors would have already adopted them.** Therefore, we can assume the implementation of these proposals would involve increased costs, at least in the short to medium term. (emphasis added)

In other words, under WPRI's approach, ***any*** government intervention to encourage energy efficiency or promote clean energy is likely to increase costs in the aggregate since, by definition, any change that would have saved money or increased profits would have already been adopted.

This assumption brings to mind an old joke. In the joke, two economists are walking down the street when one spots a $20 bill on the sidewalk. The first economist tells the second, "Look, there's a $20 bill

[1] The Beacon Hill Institute, *The Economics of STAMP*, downloaded from www.beaconhill.org/STAMP_Web_Brochure/STAMP_EconofSTAMP.html, 18 December 2009.

on the sidewalk." The second economist replies, "No there's not. If there were a $20 bill on the sidewalk, someone would have already picked it up."

The above excerpt from WPRI's report does suggest an explanation for why "$20 bills on the sidewalk" – in this case unrealized economic benefits from the adoption of clean energy strategies – might not have already been picked up. The concept of "market failure" explains why economic actors – in this case, businesses and consumers – don't always act in what appears to be their own economic self-interest. For decades, economists have suspected that energy markets are far from perfectly rational and are, in fact, rife with market failures. This explains why consumers and businesses do not take energy-saving steps that would clearly be in their economic self-interest and that produce the maximum benefits for all of society.

Among them:

- **Split incentives:** A landlord, for example, might find little reason to improve the energy efficiency of his or her building if tenants are responsible for paying utility bills. A tenant may have limited incentive to push the landlord to make these improvements if his or her residency in the building will be brief. As a result, cost-effective efficiency improvements are not made.

- **Liquidity issues:** Some individuals or businesses (for example, low-income individuals or small businesses) may not be able to secure capital to make cost-effective investments to lower their energy use – or, may have to finance such improvements through extremely high-cost sources of capital, such as credit card debt.

- **Lack of information:** Consumers and businesses do not have perfect awareness of all of the options for managing their energy consumption.

- **Failure to factor in societal costs/benefits:** Consumers who invest in energy efficiency, for example, often deliver benefits to other members of society – for example, reduced need to invest in new power plants (with the costs of those plants spread out to a utility's entire rate base), reduced absenteeism due to health problems caused by air pollution, lower energy prices in general due to reduced demand, etc. These benefits generally do not redound to the individual making the investment decision but to society as a whole, creating a larger version of the "split incentive" problem described above.

  Similar problems emerge with the failure to incorporate the societal costs of fossil fuel consumption into current energy decisions. For example, Sir Nicholas Stern, former chief economist of the World Bank and head of a British government review of the economics of global warming, has stated that, "(t)he problem of climate change involves a fundamental failure of markets: those who damage others by emitting greenhouse gases generally do not pay. … Climate change is a result of the greatest market failure the world has seen."[2]

[2] Alison Benjamin, "Stern: Climate Change a Market Failure," *The Guardian*, 29 November 2007.

Government clean energy initiatives – including many of the programs analyzed by WPRI and contained in the GTF report – are intended to address these market failures. Low-interest loans for energy efficiency investments and weatherization programs for low-income households address liquidity issues; home energy audits and energy efficiency consultations with businesses address information barriers; and efforts to put a price on pollution associated with fossil fuels, or to subsidize clean energy technologies, attempt to insert societal costs and benefits into the economic decision-making made by consumers and businesses.

WPRI could have acknowledged the presence of these market failures – which provide the bulk of the economic (as opposed to the environmental) rationale for government intervention in energy policy – argued against their existence, or engaged the question of whether the specific policies advocated in the GTF report are the best possible responses. Instead, WPRI simply waved the entire issue of market failure away, despite the fact that ***addressing perceived market failure is the main point*** of many of the policies considered by the GTF.

The implications of this decision for the results of WPRI's analysis are profound. They result in the deeply flawed assumption that any government intervention increases aggregate costs to consumers and producers (and, by extension, society). And that the proper valuation for the cost to society of emitting carbon dioxide and other pollutants is the current one: zero. In both of these assumptions, WPRI's analysis strains both mainstream economic thinking and simple common sense.

Ignoring Benefits

The assertion that government clean energy programs are inherently inefficient is at least subject to debate. One might argue that the benefits of clean energy policies – in reduced pollution, reduced energy expenditures for individuals and firms, etc. – are outweighed by the cost, despite ample evidence to the contrary.[3]

[3] For example, the National Academy of Sciences concluded that energy research and development sponsored by the federal Department of Energy on energy efficiency yielded net economic benefits of $30 billion – more than four times the amount of money spent on the programs. Government-sponsored research and development programs are designed to address market failures that produce lower-than-societally-optimal levels of expenditure on R&D, most notably the likelihood that a firm discovering a new technology through R&D will not reap the entire benefits due to the ability of other firms to appropriate part or all of the discovery in their own products. See National Research Council, *Energy Research at DOE: Was it Worth It? Energy Efficiency and Fossil Energy Research 1978 to 2000*, National Academies Press, 2001.

Wisconsinites have direct experience with the benefits of clean energy investment through the Focus on Energy Program. For example, the most recent report from the independent consulting firm contracted to report on the program's impacts found that energy efficiency and renewable energy investments made as a result of the Focus on Energy program deliver 2.1 times as many benefits to the economy as they cost. See PA Consulting Group, State of Wisconsin, *Public Service Commission of Wisconsin: Focus on Energy Evaluation Semiannual Report (First Half of 2009),* 19 October 2009.

What is beyond debate, however, is the fact that these efforts **do** actually deliver benefits – in reduced energy costs for homeowners and businesses, increased comfort and/or productivity, and reduced pollution. An intellectually serious analysis might argue that the cost of achieving those benefits is too high, but it cannot simply ignore them.

This is, however, precisely what WPRI's analysis appears to do. In the introduction to the report, the authors write that, "Each proposal was treated as a change in state tax policy or as a change in the price of goods and services within a specific industry." Frequently, WPRI appears not to factor in the reduced energy costs to individuals or businesses of many of the policies under evaluation. In other words, if a firm pays an additional $5 in taxes to support a program that reduces its energy expenditures by $10, the WPRI analysis tallies the $5 as an increase in prices or taxes, but apparently fails to account for the $10 as a savings.

For example, WPRI analyzes the GTF's proposed industrial efficiency incentives and models their impact as a $15 million increase in the state income tax. The institute does not, however, appear to make a corresponding reduction in the costs of energy acquisition for industry, or the improved productivity resulting from the use of more efficient processes.[4]

With a few exceptions,[5] there is little evidence that WPRI considered the actual *results* of the public policies being implemented – only their costs. The most puzzling example of this comes on page 8, when WPRI evaluates a proposal to increase funding for Focus on Energy, Wisconsin's existing ratepayer-funded program to increase the energy efficiency of homes, businesses and industry. WRPI concedes that:

> It is likely that investments in energy efficiency programs, in both the private and public sectors, will provide net positive benefits.

Yet, the very next paragraph states that "BHI modeled the … program costs as an increase in fees for the utility sector, using the GTF's $380 million estimate of program costs in 2020." The energy savings or "net positive benefits" of the programs are apparently not included in the analysis or, if they are, WPRI neglects to inform the reader of how they are incorporated.

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[4] Note that, here and elsewhere in this section, there is an alternative interpretation, which is that WPRI *did* incorporate the energy cost savings delivered by energy efficiency programs, but simply neglected to make that clear to the reader. The failure to include any energy cost savings from these programs is such an absurd methodological decision that one hesitates to believe that any respectable analyst would make it. Regardless, even if the more benign explanation holds that WPRI forgot to mention its incorporation of efficiency savings in this section, it is still the job of the analyst to make his or her assumptions transparent to the reader.

[5] For example, in its analysis of California's Vehicle Emissions Standards, WPRI attempted to calculate the *net* cost to the state's economy of cars complying with the program, factoring in reduced expenditures for gasoline. And in its modeling of the renewable portfolio standard, WPRI attempted to take into account the avoided costs of reduced need for new fossil fuel generation to produce an estimate of the net cost of the RPS. Unfortunately, there are other severe flaws with WPRI's assessment of both of these programs, detailed later in this paper.

WPRI also fails to acknowledge the many other economic benefits that would result from a broad effort to repower Wisconsin with clean energy. Among the long list of benefits (apparently) not considered in the analysis are the following:

- Avoided economic impacts of global warming in Wisconsin, including predicted changes that threaten to reduce the productivity of agriculture, increase the possibility of dangerous floods, shift the composition of Wisconsin forests, affect the winter recreation industry, and more.
- Health benefits (including reductions in absenteeism, early mortality and possibly health care costs) from avoided fossil fuel-related pollution, including reductions in pollutants that form smog and soot, and mercury deposition in waterways.
- Reductions in the risk to individuals, businesses and government posed by sudden shifts in fossil fuel prices. Energy efficiency improvements and renewable energy both have hedging value as insurance against sudden spikes in fossil fuel costs.
- Avoided costs of electricity generation, transmission and distribution infrastructure resulting from reduced energy demand or the incorporation of on-site renewable generation.
- Increased income for Wisconsin farmers resulting from increased use of biofuels and the potential to lease lands for wind turbines and other forms of renewable energy development.

Quantifying the many impacts of clean energy policies is difficult and complex work, and it is rarely done to perfection, even in analyses far more sophisticated than that carried out by WPRI. However, the authors should have at least acknowledged that there are genuine public policy rationales for government action to promote clean energy – many of them with economic benefits – and acknowledged the failure of their analysis to take these indirect benefits into account.

So, in WPRI's modeling effort, industries that install more efficient boilers appear not to experience lower energy bills or higher productivity, the higher prices consumers are assumed to be paying for ethanol are not reflected in higher prices *received* for their crops by Wisconsin farmers, and so on. Whether this "glass completely empty" approach is a failing of WPRI's choice of model, an error of omission, or a deliberate misrepresentation of the economic impacts of these policies is left to the reader to decide.

Errors and Misconceptions

WPRI's report is replete with errors of fact and interpretation as well as misconceptions that, in the aggregate, delegitimize the results of the analysis. We review some of these errors and misconceptions here.

The low-hanging fruit fallacy – WPRI asserts, in its discussion of the Focus on Energy program, that, "[p]resumably, Focus on Energy has already implemented the most cost-effective programs, or harvested the low-hanging fruit" in energy efficiency – or, in other words, that future investments in energy efficiency will deliver diminishing marginal returns. Yet, WPRI dismisses without comment the

GTF's explanation of why the concept of diminishing marginal returns may not be applicable to expanded energy efficiency investment (at least at the proposed levels), specifically, the potential for greater economies of scale and increased efficiency resulting from greater experience in the design and implementation of efficiency measures. Recent research suggests that the cost per unit of energy efficiency savings delivered by programs such as Focus on Energy actually *declines* with greater investment.[6] While it is likely that the law of diminishing returns does kick in at some high level of penetration of energy efficient technologies, that point has clearly not yet arrived even in states with historically high rates of investment in energy efficiency.

In the end, WPRI's misconceptions about diminishing returns of energy efficiency investments are immaterial to the results of the analysis, as the institute appears not to credit any economic savings from averted energy consumption due to energy efficiency investments.

Mis-modeling the RPS – WPRI's modeling of the RPS includes numerous erroneous assumptions and apparent errors of fact:

1) WPRI overestimates the amount of renewable electricity required by failing to take into account the reduced growth in electricity consumption that would result from energy efficiency improvements delivered by other policies in the GTF plan. The GTF projects that the amount of renewable generation required under the RPS in 2025 is significantly lower than that projected by WPRI (36 percent lower if energy efficiency improvements delivered by other portions of the GTF plan are factored in).[7] Increasing the amount of renewable energy presumed to be required under the RPS could also be presumed to increase its cost (especially given WPRI's short-term focus), inflating WPRI's estimate of the impact on the economy.

2) WPRI falsely compares the cost of new renewable generation with the cost of conventional combustion turbines, which are generally used only to provide peak electricity or for cogeneration. The U.S. Energy Information Administration (EIA), for example, projects that there will be no new combustion turbines added beyond 2010 in either of the electricity market regions in Wisconsin.[8] This error is consequential: combustion turbines have low up-front capital costs but are very inefficient, making them more expensive to operate over the long term than baseload or intermediate power plants (including combined-cycle combustion turbines, which are more capital intensive but also vastly more efficient). Because WPRI's analysis only captures costs through 2025, the institute's choice of the generating technology with the lowest capital costs, rather than the technology most likely to be adopted, means that its estimate of the

[6] A quantitative explanation of this phenomenon can be found in Kenji Takahashi and David A. Nichols, Synapse Energy Economics, *The Sustainability and Costs of Increasing Efficiency Impacts: Evidence from Experience to Date*, presentation to the 2008 ACEEE Summer Conference, 20 August 2008.

[7] Governor's Task Force on Global Warming, *Wisconsin's Strategy for Reducing Global Warming*, July 2008.

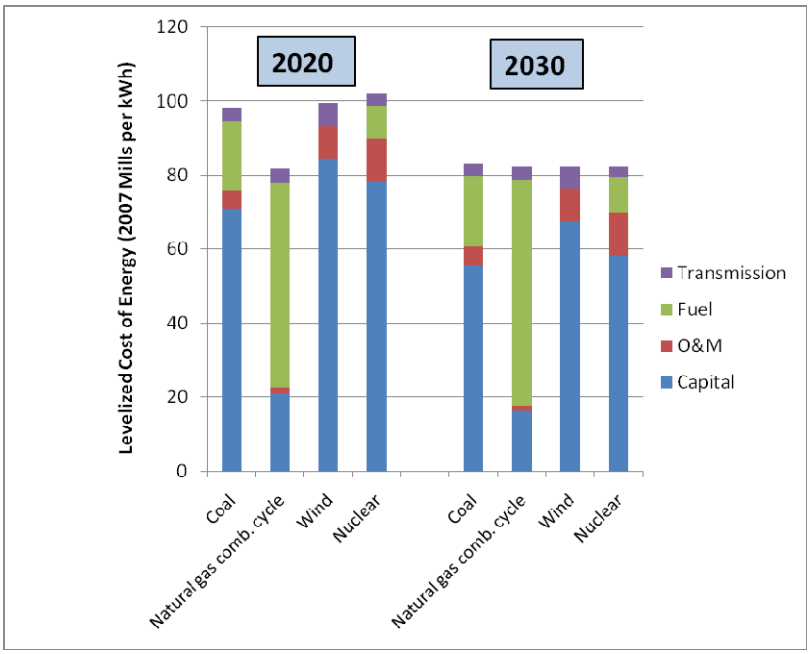
[8] U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2010 with Projections to 2035, Early Release*, 14 December 2009.

"avoided costs" of fossil generation under the RPS is unjustifiably low, increasing the assumed net cost of the RPS.

3) Similarly, WPRI's choice of a 2025 stopping point for its analysis systematically undervalues the economic benefits of renewable generation. Utilities and independent power producers make economic decisions based on the long-term cost of operating a plant over its expected lifespan. A wind turbine, for example, might be assumed to have a useful life of 20 to 30 years. Because wind and solar power plants do not incur fuel costs (as opposed to fossil fuel generators), comparing their costs with that of fossil fuel generators over, say, their first five years of operation systematically tilts the cost equation in favor of plants with low capital costs but high fuel costs (e.g., fossil fuel generators) and away from plants with low ongoing fuel costs (e.g., renewable energy.)

   When fossil generators and wind turbines are compared by metrics that account for lifetime costs, such as levelized cost of energy, they are often comparable in cost. (See Figure 1.)

Figure 1. Projected Levelized Cost of Energy for Generating Technologies[9]



In essence, WPRI's methodology books the capital costs of a wind turbine built in 2025 as part of its estimate of the cost of the RPS, but does not account at all for the avoided fuel costs that will deliver economic benefits to Wisconsinites over the 20 to 30 ensuing years of the wind turbine's lifespan.

[9] U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2009 with Projections to 2030*, March 2009.

4) WPRI erroneously based its weighted average cost for new renewable generation under the RPS on what it describes as the Energy Center of Wisconsin's "estimates of the potential renewable resources in Wisconsin."[10] In fact, the ECW report cited in the WPRI paper states in its title that it only calculates the potential for *customer-sited* renewables – in other words, it does not include the potential for generation from large-scale wind farms, solar installations, biomass plants and the like. The result is that the renewable energy mix modeled by WPRI to comply with the RPS appears to be skewed toward relatively more expensive forms of renewable energy (biogas and solar PV) and away from less expensive sources such as utility-scale wind. WPRI's description of its methodology for estimating a renewable energy mix for RPS compliance is opaque (and its explanation of the role and derivation of its "weighted average" cost of renewable energy virtually unintelligible), but relying on an analysis of potential for small-scale customer-sited renewables for information on implementation of a statewide RPS is clearly inappropriate.

5) To further skew the analysis, WPRI "adjusted the avoided cost of conventional electricity downward to reflect the unreliability of solar and wind power." WPRI does not divulge the size of this adjustment, nor does it justify why the alleged "unreliability" of solar or wind power would make conventional sources cheaper to operate than they otherwise would be. Some sources of renewable energy that could be used to comply with the RPS, such as biomass, are as reliable as existing forms of baseload generation, while analyses have shown that wind power can be integrated into the utility grid at levels similar to those contemplated under the Wisconsin RPS at minimal additional cost.[11] The inclusion of an additional, undisclosed "adjustment" to the cost figures used in the RPS analysis is therefore unjustified.

Reliance on faulty sources for cap-and-trade analysis: The cost of a global warming emission cap-and-trade program in the WPRI paper are described innocuously as being based on "a study of the effects of the Lieberman-Warner policy on energy prices by sector." The *particular* analysis of Lieberman-Warner chosen, however, is a widely discredited analysis produced by the National Association of Manufacturers (NAM) and the American Council for Capital Formation (ACCF), both industry-backed organizations.[12]

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[10] Energy Center of Wisconsin, *Energy Efficiency and Customer-Sited Renewable Resource Potential for Wisconsin for the Years 2012 and 2018*, August 2009.

[11] A detailed study of wind energy integration in Minnesota estimated that a 25 percent wind energy penetration in Minnesota would impose additional costs of $4.41 per megawatt-hour of wind electricity added to the grid. Lower penetrations of wind power (e.g. 15 percent) produce integration costs roughly half that of a 25 percent penetration. As a result, costs imposed by the supposed "unreliability" of wind power represent a small fraction of the total cost (including capital, operations and maintenance, and transmission) of wind energy. See EnerNex Corporation (for the Minnesota Public Utilities Commission), *Final Report – 2006 Minnesota Wind Integration Study, Volume 1*, 30 November 2006.

[12] For a detailed critique of the NAM/ACCF report, see Pew Charitable Trusts and Pew Environment Group, Industry Modeling Casts Warped View of Lieberman-Warner Climate Bill, downloaded from www.pewglobalwarming.org/ourwork/unitedstates/ACCF-NAMfactsheet.pdf, 18 December 2009.

Later in its paper, WPRI takes a "split the difference" approach to the California vehicle emission standards, using the mean of cost estimates produced by industry and government bodies. In this instance, however, WPRI makes no attempt to balance the industry perspective with that of environmentalists, let alone neutral government analysts such as the U.S. Energy Information Administration or U.S. Environmental Protection Agency, both of which have produced analyses of the economic impacts of the Lieberman-Warner proposal, as well as more recent national global warming policies.

Questionable and outdated assumptions with regard to California vehicle emission limits: As noted above, the authors attempt to estimate the increased cost of compliance with California vehicle global warming emission limits by "splitting the difference" between vehicle cost increases projected by the California Air Resources Board (CARB, a neutral government entity) and the Alliance of Automobile Manufacturers (an industry trade group). To set the lower bound for the costs of the program, WPRI asserts, based on review of a CARB fact sheet, that CARB claimed that the increased cost of vehicles would be offset by fuel savings. In fact, numerous CARB documents assert that consumers would experience net *savings* from the regulations, even at gasoline prices of $1.70 per gallon, far below today's prices or those now projected for the future.[13] As a result, WPRI's low bound estimate for the cost of the program on consumers is not low enough – it should have shown a significant net cost savings to consumers, rather than the "break even" estimate assumed by WPRI.

Moreover, attempting to "balance" the CARB findings with an analysis produced by an industry trade group that was, at the time, pursuing legislative, regulatory and litigation strategies to stop the spread of the California standards, does not represent objectivity. WPRI could have better balanced the scales by incorporating estimates of economic benefits by advocates of the standards, such as the Union of Concerned Scientists, which has concluded that a fuel economy average of 38 mpg (greater than that required by the California standards) is achievable by the light-duty fleet at an additional cost per vehicle of $1,700. At gasoline prices of $2.50 per gallon, owners would experience net savings of $3,400 over the vehicle's lifetime due to avoided fuel costs (contrasting with the $2,000 net additional *cost* implied by WPRI's assessment of the automakers' study).[14]

To be clear, we do not accept this "split the difference" approach as valid. Numerous recent studies by a variety of analysts have shown that there is great potential for cost-effective reduction in vehicle global warming emissions, even with current technology. But if WPRI were to employ the "split the difference" approach, the institute could have at least chosen analyses that represented two opposite poles in the debate.

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[13] California Air Resources Board, *Addendum Presenting and Describing Revisions to Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles*, 10 September 2004.

[14] Rachel Cleetus, Steven Clemmer and David Friedman, Union of Concerned Scientists, *Climate 2030: A National Blueprint for a Clean Energy Economy*, May 2009.

WPRI's report, dated November 2009, is also outdated, in that it neglects to note that a program based on the California emission limits will be implemented nationally, as a result of a deal reached in May 2009 between the state of California, the federal government, and the automobile industry. In other words, the question of whether Wisconsin should adopt the California standards is, for the time being anyway, moot. (Wisconsin would be eligible to adopt new standards adopted by California for application after model year 2016.)

Recent EPA analysis of the proposed national program concludes that, upon full implementation of the national standards in 2016, the average consumer can expect to save $3,000 over the lifetime of his or her vehicle due to the fuel economy improvements driven by the new standards – results very similar to those produced by the UCS analysis cited above.[15] WPRI's estimate of the cost of the program to the economy – especially in light of the recent increases in gasoline prices – is likely wildly inaccurate.

Conclusion

WPRI's "The Economics of Climate Change Proposals in Wisconsin" does not contribute to a better understanding of the economic impacts of proposed measures to address global warming in Wisconsin. Rather, it clouds the debate by inserting inaccurate and unsupported information at a key moment in the debate about the state's energy future.

There are many areas of the WPRI analysis that we did not specifically address here – notably, the presumed impact of climate change proposals on the paper industry. Presumably, these sections of the analysis also demonstrate the same ignorance of fundamental dynamics in energy economics, poor methodological choices, and narrow perspectives that plague the remainder of the analysis.

That is a pity. Wisconsin decision-makers need cogent and well-thought-out analyses of economic and environmental challenges – including from those who, like WPRI, bring a libertarian perspective to the debate – if the state is going to address those challenges in the most effective possible way. Unfortunately, WPRI's analysis does not meet even the most basic standard of accuracy, and, as such, makes no useful contribution whatsoever to the ongoing policy debate.

[15] http://www.epa.gov/oms/climate/regulations/420f09047.htm#1-1