



State of Wisconsin
Jim Doyle, Governor

Office of Energy Independence
Judy Ziewacz, Director

MEMORANDUM

January 5, 2010

To: Energy Independence Cabinet Team

From: Economic and Policy Staff
Department of Commerce
Department of Natural Resources
Department of Transportation
Department of Workforce Development
Public Service Commission

Re: Economic Assessment of Clean Energy Jobs Act

Executive Summary

In response to a request from the Energy Independence Cabinet, economic and policy staff have completed a preliminary economic impact modeling of the proposed Clean Energy Jobs Act, focusing on those policies included in the legislation that are likely to have a significant direct impact on jobs in Wisconsin. Staff used a model developed by Regional Economic Models, Inc. (REMI) as the principal tool to forecast job growth in each of 70 different sectors of Wisconsin's economy.

The modeling shows that thousands of new jobs will be created as a result of the Clean Energy Jobs Act. Specifically, the results indicate that the legislation will create a minimum of 15,000 new jobs for Wisconsin by 2025, and more than 1,800 of those jobs will be realized in the first year of enactment. The greatest number of new jobs will initially appear in the construction sector, as a result of substantial new investments to update the state's buildings, install wind turbines and solar panels, and make businesses and homes more energy efficient. The model also predicts an immediate increase in total manufacturing jobs as a result of the legislation, with a minimum of over 2,000 manufacturing jobs added by the time the policies are fully implemented. Additionally, electricity bills will actually decrease over time because consumers will be able to meet their energy needs more efficiently. As a result, consumer spending on other goods and services will increase as consumers spend a smaller proportion of their income on electricity. Lower bills in the manufacturing sector will make manufacturers more competitive with their counterparts in other states and countries.

Among the primary beneficiaries of the legislation are the construction and manufacturing sectors of Wisconsin's economy. The legislation is expected to create, at a minimum, between 800 and 1,800 construction jobs each year of the projection period from 2011 through 2025, and over 2,000 manufacturing jobs once the policies are fully implemented. These are comparatively stable and higher wage jobs. Construction and manufacturing jobs pay on average about 25 percent more than the average Wisconsin all-industry wage. For the year 2025 alone, the additional construction and manufacturing jobs would net \$155 million in additional wages and salaries for Wisconsin workers.

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This modeling effort was a limited one and is by no means meant to reflect all of the economic benefits that are likely to result from the policies proposed in the Clean Energy Jobs Act, if enacted. With more time and additional modeling tools, staff would be able to capture some very significant additional economic benefits that Wisconsin's manufacturing sector, in particular, is likely to experience as a result of this legislation and which are not reflected in the results. For example, because of the constraints of the modeling tools used, the results do not account for any local manufacturing job gains that might result from increases in demand for energy efficient appliances and control systems or renewable energy systems and components manufactured by Wisconsin companies. Accordingly, the job numbers projected in this analysis can be viewed as a "floor" or characterization of *minimum* job creation potential for Wisconsin.

Finally, the assessment of the Clean Energy Jobs Act by state economic and policy staff in Wisconsin is consistent with the results of numerous studies of similar policies proposed by other states or at the national level. The consistent conclusion of those studies is that energy efficiency and renewable energy policies result in economic growth and job creation substantially beyond what would occur in the absence of those policies.

I. Introduction/Background

On April 5, 2007, Governor Doyle created a Task Force on Global Warming through Executive Order 191. The Task Force consisted of a diverse membership representing a cross-section of Wisconsin's economy and its communities.¹ The assignments of the Task Force were to: (1) present viable, actionable policy recommendations to the Governor to reduce greenhouse gas (GHG) emissions in Wisconsin and make Wisconsin a leader in implementation of global warming solutions; (2) advise the Governor on the ongoing opportunities to address global warming locally, while growing our state's economy, creating new jobs, and utilizing an appropriate mix of fuels and technologies in Wisconsin's energy and transportation portfolios; and, (3) identify specific short- and long-term goals for reductions in GHG emissions in Wisconsin that are, at a minimum, consistent with Wisconsin's proportionate share of reductions that are needed to occur worldwide to minimize the impacts of global warming.

The Task Force issued a Final Report in July 2008² that recommended dozens of policy actions to reduce greenhouse gas pollution in Wisconsin while growing the state's economy. Soon thereafter, committee leaders in the State Assembly and State Senate began work on an omnibus bill containing all of the main elements of the Task Force recommendations, excluding from the bill any recommendations that would have fiscal impacts for the state budget. The primary objective of the legislative drafting process was to craft statutory language that faithfully adhered to the recommendations of the Task Force as closely as possible.

The result of this effort is the proposed Clean Energy Jobs Act, which soon will be formally introduced in the Legislature. The proposed Clean Energy Jobs Act includes a variety of new policies designed to encourage more efficient use of energy, less dependence on imported fossil fuels, new opportunities in agriculture and forestry, and more transportation options, while also creating or maintaining Wisconsin jobs.

¹ A complete list of Task Force members is available at <http://dnr.wi.gov/environmentprotect/gtfgw/members.html>.

² The *Final Report* is available at http://dnr.wi.gov/environmentprotect/gtfgw/documents/Final_Report.pdf.

As the legislative drafting process neared completion, members of the Governor's Energy Independence Cabinet Team³ requested a staff analysis of the legislation's key pieces – specifically, how the legislation might impact Wisconsin's economy and affect jobs in the near and medium term.

Economic and policy staff from the Public Service Commission, the Department of Natural Resources, and the Department of Transportation conducted an independent assessment of the likely economic impacts of the proposed Clean Energy Jobs Act using sophisticated economic modeling software. The impacts of the legislation were assessed by comparing what is expected to happen if the Clean Energy Jobs Act becomes law to what is expected to happen if current laws go unchanged (i.e., "business as usual"). Experts from the Department of Workforce Development and the Department of Commerce added supplementary analysis of the types of jobs that would be created and the broader impacts on commerce and labor markets in Wisconsin. Finally, the results were compared to the results of other state and national studies.

II. The Economic Modeling Effort

Policies Analyzed

State agency staff completed economic impact modeling of the following policies, all included in the proposed Clean Energy Jobs Act:

- *Enhanced Energy Efficiency and Renewable Resource Programs* – increases the level of mandatory investments by energy providers in energy efficiency and customer-owned renewables;
- *Enhanced Renewable Portfolio Standards (RPS)* – requires electric providers to generate 10% of their electricity from renewable resources by 2013, 20% by 2020, and 25% by 2025;
- *Renewable ("Feed-In") Tariffs* – requires electric utilities to offer to purchase customer-generated electricity at favorable rates;
- *New Nuclear Power Plants* – modifies the standards and approval process for siting new nuclear power plants;
- *Energy Efficiency of Buildings* – updates state building codes to promote greater efficiency;
- *Energy Crop Reserve Program* – provides direct payments to landowners to help them establish and produce biomass crops; and,
- *Industrial Development Revenue Bond Allocation* – dedicates 25% of the existing private activity bond program toward financing of clean energy manufacturing facilities and renewable power generating facilities.

In the opinion of economic staff, other policies included in the proposed Clean Energy Jobs Act are less likely to have a significant direct impact on jobs in Wisconsin and thus were not modeled. For example, many of the policies call for non-binding goals, research reports, or changes to administrative processes that would not necessarily (or predictably) lead to economic impacts.

³ Created by Executive Order #192, this team consists of the Secretaries of the Departments of Administration; Agriculture, Trade and Consumer Protection; Commerce; Financial Institutions; and Natural Resources, and the Chairperson of the Public Service Commission, with substantial input from the Secretary of the Department of Workforce Development and the Director of the Office of Energy Independence.

Models Used

The assessment completed by state agency staff was based on the specific provisions contained in the legislation. State agency staff considered a variety of models, each of which has strengths and limitations, and different models were ultimately used for different aspects of the assessment.

The Electricity Generation Expansion Analysis System (EGEAS) was used to model the electricity sector in Wisconsin in each year from now until 2025. This was viewed as the best model available to forecast how much electricity will be needed in the future, how it will be generated, and what it will cost. EGEAS is a widely respected model used throughout the electricity industry and is the model that PSC relies on for Strategic Energy Assessments and construction application review. EGEAS considers all of the existing electric generation units, the costs of operating those units, and the likely cost of building and operating new power plants using different fuels and technologies (i.e., coal, gas, oil, nuclear, hydro, biomass, wind, or solar). EGEAS determines how much new generating capacity must be built and how much each unit must operate in any given year to satisfy demand, meet legal constraints such as RPS requirements, and minimize costs.

The electricity cost results from the EGEAS model, along with data for policies that would affect other economic sectors, were used as inputs to a model created by Regional Economic Models, Inc. (REMI). The REMI model is an economic model of the economy of the state of Wisconsin, imbedded in the environment of the U.S. national economy (events outside the state affect the Wisconsin economy, and events within Wisconsin affect the rest of the country). It contains replications of all the supply and demand relationships between 70 industrial sectors in the state, and between those industries and the labor market and demographic trends (such as in-migration and out-migration in response to changing job opportunities). In this analysis energy expenditure changes resulting from various policies were distributed among the industrial sectors in Wisconsin according to the importance of energy consumption to their respective production processes. The REMI model estimated the direct effects of the energy expenditure changes (production cost increases or decreases depending upon the policy analyzed) on the output and hiring of each industry. The model then estimated the indirect effects on output and employment throughout the rest of the economy that would result from those direct effects. For private households the REMI model estimated the effect that changes in spending patterns would have on the economy. Increased spending on energy causes decreased spending on other household items, and decreased spending on energy increases consumption of other goods and services. The model produces estimates of how many jobs will be created or lost in each of the 70 sectors of the economy over time.

The REMI model was not used for one particular policy, *Industrial Development Revenue Bond Allocation*; a model called IMPLAN was used instead. This is because REMI could not account for the subtle differential impacts of this policy on subsectors of the industrial sectors, whereas IMPLAN could. The IMPLAN database contains input-output information for 440 Wisconsin industrial sectors, broken out by county. This is a much finer delineation than the REMI model described above. The basic data from which the database is derived comes from the same U.S. government sources as the REMI model, but does not contain demographic data. IMPLAN enables an analyst to evaluate the various commodity and employment needs of each of the industries in the model. It allows one to evaluate output of each industry and how that output is related to every other industry in the state, in a county, or in any combination of counties. It can be used to create scenarios of economic change and to estimate the output, income, and employment effects of those scenarios. IMPLAN was the appropriate tool to use to analyze the potential effect of the *Industrial Development Revenue Bond Allocation* policy because the policy reallocates spending among several related industrial sectors that aren't disaggregated in the REMI model, and the analysis does not require estimating cumulative effects over a given time horizon as do the other policies. The effect of the spending reallocation would be the same in any year for any given amount of spending.

Another limitation of the REMI model is that it does not provide a simple way to account for the fact that a wind farm built in Iowa (for example) to meet Wisconsin needs will have different economic impacts for Wisconsin than if a comparable wind farm were built in Wisconsin. EGEAS and REMI allowed full accounting for the differences in construction and operation costs that end up on utility ratepayer bills, but not the differences in jobs. To compensate for this limitation, outputs from a U.S. Department of Energy model called JEDI were used. Originally developed in 2002 for the U.S. Department of Energy's Wind Powering America project, the Job and Economic Development Impact (JEDI) model was designed to be an easy-to-use model that analyzes the economic impacts of constructing and operating wind power plants. Users enter basic information about a project, including the state, location, year of construction, and facility size. The model then estimates the project costs (i.e., specific expenditures), and the economic impacts in terms of jobs, earnings (i.e., wages and salary), and output (i.e., value of production) resulting from the project. The model also identifies specific *local* economic impacts of the project, including direct, indirect and induced job impacts. The local impacts as forecasted by the JEDI model were added to the results from REMI and IMPLAN to determine the final figures for job impacts.

Key Assumptions

In order to model the Clean Energy Jobs Act, a large number of assumptions are necessary. Most of these assumptions are built into the various models that were used, but many others had to be decided by state agency staff.

To run the EGEAS model, Public Service Commission staff had to make many assumptions about the construction and operation costs of different generating technologies, their capacity factors, etc. All of these assumptions were based on current information gleaned from recent construction cases, utility reports, and industry data. It will probably not be possible to publicly detail all of these assumptions because in some cases staff relied on sensitive or confidential business information.

Some of the other key assumptions made by state agency staff are summarized below:

- For the EGEAS modeling, Public Service Commission staff assumed a future cost for emitting carbon dioxide from power plants that starts at \$20/ton and rises slowly with inflation. In light of the U.S. Environmental Protection Agency (EPA) decision that greenhouse gas emissions endanger public health, there is every reason to expect regulation of carbon dioxide emissions from power plants beginning early this decade. Regardless of whether regulation comes in the form of performance standards, a cap and trade system, or a carbon tax, regulation will impose a cost, but the costs of compliance depend on the form of regulation and are hard to predict. Staff felt that the assumed \$20/ton cost was appropriate based on evidence from Europe, where carbon emission allowances traded for almost \$19/ton at the end of 2009, and based on EPA's most recent assessment of proposed cap and trade legislation in the U.S. Senate which concluded that emissions would cost between \$13 and \$24 per ton in 2015 and costs would rise over time. Finally, it should be noted that virtually all observers have concluded that compliance costs will be higher if emissions are regulated through performance standards than if they are regulated through a cap and trade system.
- To account for the effects of the *Renewable ("Feed-In") Tariffs* policy, staff forced the EGEAS model to build 250 MW of new solar photovoltaic generation and 200 MW of new biomass-fueled generation even though these technologies would not have otherwise been chosen by the model. Staff believes that this approach greatly simplifies the analysis and serves as a reasonable surrogate for estimating the costs of the tariff policy.
- In order to model the *Energy Efficiency of Buildings* policy, staff assumed that the policy would not increase overall construction costs, but rather would shift 2% of construction costs for new and modified buildings away from materials and towards labor.

- Modeling of the *Energy Crop Reserve Program* assumes that the program would initially enroll 50,000 acres of land coming out of the federal Conservation Reserve Program, plus 50,000 acres of land from marginal croplands not in any conservation program. The total amount of land enrolled each year would grow to 200,000 acres by 2020. Most importantly, staff assumed that 50% of the funding for the *Energy Crop Reserve Program* would come from federal grants such as the Biomass Crop Assistance Program, with the remaining 50% coming from a reallocation of existing state spending on other programs. In other words, the modeling assumes this policy will not have any net impact on state spending.

Results

Compared to a “business as usual” scenario, the modeling results indicate that the Clean Energy Jobs Act would create thousands of new jobs in Wisconsin. The following table summarizes the forecasted increase in net employment. Note that these figures show the net increase in total statewide employment in a given year. The results for 2025, for example, reflect the total cumulative effect of the policies over time and should not be added to the results for previous years.

	2015	2020	2025
Electric Utility Sector Policies, including: <ul style="list-style-type: none"> • Enhanced Energy Efficiency Programs for electricity • Enhanced RPS • Renewable (“Feed-In”) Tariffs • New Nuclear Power Plants 	2,165	6,256	12,379
Enhanced Energy Efficiency Programs for natural gas and propane	4	752	1,146
Energy Efficiency of Buildings ⁴	1,295	1,295	1,295
Energy Crop Reserve Program	66	92	118
Industrial Development Revenue Bond Allocation ⁵	289	289	289
Net Increase in Jobs	3,819	8,684	15,227

As the table indicates, the Electric Utility Sector Policies have the greatest job creation potential of all the modeled policies, primarily because they collectively result in far less money being spent by Wisconsin ratepayers on fossil fuels. The same is true of the efficiency programs for natural gas and propane. Because Wisconsin is without coal, oil, or natural gas reserves, every dollar spent on these fossil fuels is a dollar that leaves Wisconsin to support jobs in other states or countries. Each year, Wisconsin consumers send over \$16 billion out of state to purchase coal, natural gas, and petroleum products. Because the legislation would promote energy efficiency and increase production of renewable energy inside Wisconsin’s borders, more of those energy dollars would remain in Wisconsin to promote local economic development and local job creation.

The Energy Efficiency of Buildings policy creates jobs because more skilled labor is required to build efficient buildings. The Energy Crop Reserve Program is expected to create jobs because it helps producers of biomass crops overcome barriers to entry into an expanding market. And the Industrial

⁴ The estimate of jobs created by the building efficiency policy do not change over time because the modelers had no reliable basis for forecasting how total spending in the building construction sector will change over the next 15 years. These results assume consistent annual spending, which causes the initially created jobs to be sustained through consistent spending in each subsequent year.

⁵ This policy is funded by a dedicated allocation from an existing, state-funded private activity bond program. The modelers assumed that funding for the private activity bond program would not change over time, thus the number of jobs created by the allocation to industrial development bonds is constant over time.

Development Revenue Bond Allocation creates jobs because it targets a portion of an existing funding source toward specific manufacturing industries that have particularly high job growth potential.

Looking more closely at the modeling results, the greatest number of new jobs initially appears in the construction sector. The model also predicts a swift increase in total manufacturing jobs as a result of the legislation, with more than 2,000 manufacturing jobs added by the time the policies are fully implemented.

The gains predicted in the state's manufacturing sector should not be surprising, and in fact, are likely understated. Wisconsin's strongest economic resource continues to be its workforce and expertise (design, engineer and build) in high-quality manufacturing. The production requirements for renewable energy (wind, solar, geothermal, biomass) component manufacturing draw heavily on the same NAICS (North American Industry Classification System) codes represented in Wisconsin's traditional manufacturing base. While these traditional manufacturing industries continue to contract and consolidate, the demand for US-based renewable energy component manufacturing will continue to grow for the foreseeable future. Wisconsin businesses are positioned to supply this demand. Of Wisconsin's 72 counties, 66 have at least one firm currently producing a product in these NAICS codes. The counties in the Milwaukee 7 region alone have 578 companies currently producing components in these NAICS codes and the 7 counties represented by New North have 262 such businesses. Decreasing Wisconsin's reliance on fossil fuels and increasing the use of renewable energy sources creates real opportunity for Wisconsin manufacturers.

Notably, the modeling also found that the amount of money that Wisconsin ratepayers will collectively spend on their electric utility bills would go down under this legislation. While the RPS policy would lead to some degree of upward pressure on electricity *rates* compared to "business as usual," electricity *bills* will actually decrease over time, since electricity bills are based on the rate times the quantity used. Lower bills in the manufacturing sector will make manufacturers more competitive with their counterparts in other states and countries. Similarly, lower bills for residential customers will allow those consumers to spend the money saved on other goods and services. That increased consumer spending also has significant positive net impacts on job creation for the state.

One other notable result of the EGEAS modeling exercise is the finding that no new nuclear units would be built in Wisconsin through 2025 under the conditions modeled (i.e., enhanced energy efficiency efforts, a 25% RPS, and no explicit economy-wide cap on emissions). However, new nuclear units might be built if a substantial amount of older coal-fired capacity were retired to meet federal emission standards or for other reasons.

Economic Impacts not Captured by the Modeling Results

All economic models have their limitations and because of their design are unable to capture various trends. While state agency staff are confident in the results of this modeling exercise, this economic modeling effort had some limitations, and staff believe that several positive economic trends that are likely to result from the proposed Clean Energy Jobs Act are not fully accounted for in the modeling results presented herein. As a result, the job projections should be considered a quantification of *minimum* potential. For example:

- Energy Efficiency:
 - Modeling of the *Energy Efficiency and Renewable Resource Programs* policy did not include new efficiency programs for heating oil due to a lack of credible data on this topic. Most of the available data for distillate oil use in Wisconsin does not distinguish between heating oil, which is covered by the policy, and transportation diesel fuels,

which are not covered by the policy. In Wisconsin, relatively few homes and businesses use heating oil but this policy nevertheless has some job creation potential which is not included in this assessment.

- This assessment does not account for any long-term taxpayer savings that might accrue from energy efficiency investments required or allowed under the new *State Government as Leader* and *Local Government* policies in the legislation.
- This modeling assessment does not account for any local manufacturing job gains that might result from increases in demand for energy efficient appliances and control systems manufactured by Wisconsin companies. For example, the *Energy Efficiency of Buildings* policy might create increased demand for *Energy Star* windows, doors and skylights that are currently sold by more than 20 different Wisconsin manufacturers.
- Renewable Energy:
 - The model almost certainly underestimates the job creation potential of the entire legislative proposal, because it does not account for a new RPS cost-cutting option that would be created by the legislation, wherein an electric provider can use credits based on non-electric renewable energy to comply with RPS obligations. Lower compliance costs would generally translate into net positive job impacts in the context of the economic modeling.
 - The modeling assessment assumed that only 500 megawatts of new hydroelectric power would be used for RPS compliance. Any purchases of hydroelectric power beyond that amount could reduce the cost of RPS compliance below what the modeling results indicate, and thus also result in higher than indicated net job creation overall.
 - The modeling assessment accounts for the local job creation impacts that accrue from building wind farms and installing solar photovoltaic panels in Wisconsin, but not the local job impacts from building biomass power plants in Wisconsin. As a result, the modeling fully captures the incremental costs of biomass but does not fully capture the incremental benefits.
 - As previously mentioned for energy efficiency, this modeling assessment does not account for any local manufacturing job gains that might specifically result from increased demand for renewable energy systems and components manufactured in Wisconsin. Wisconsin companies are among the market leaders, for example, in building anaerobic digesters and manufacturing glass for photovoltaic panels. This limitation of the modeling, in particular, likely means that this effort did not capture some potentially very significant and additional net gains in the manufacturing sector.

III. Quality of Jobs Being Created

The legislation is expected to create, at a minimum, between 800 and 1,800 construction jobs each year of the projection period from 2011 through 2025 and over 2,000 manufacturing jobs once the policies are fully implemented. Construction and manufacturing jobs pay on average about 25 percent more than the average Wisconsin all-industry wage. Needed skill sets in the clean energy field run the gamut, from installing weather stripping around doors to maintaining the electronic controls on a high-efficiency wind turbine.

New job creation in the construction industry is concentrated in the trades, particularly electricians, carpenters, plumbers, and laborers. These are highly paid jobs and offer training and career opportunities through Wisconsin's well-established apprenticeship training programs offered through DWD partners including WTCS and others. The following are construction apprenticeship programs in Wisconsin⁶:

⁶ http://dwd.wisconsin.gov/apprenticeship/construction_trades.htm.

- Bricklayer
- Carpenter
- Cement Mason/ Concrete Finisher
- Construction Craft Laborer
- Electrician (Construction)
- Electrician (Residential)
- Environmental Service Technician/ HVAC Installer-Technician
- Glazier
- Heat and Frost Insulator
- Ironworker
- Laborer (Construction Craft Laborer)
- Operating Engineer/ Heavy Equipment Operator
- Painter and Decorator
- Plasterer
- Plumber
- Roofer & Waterproofer
- Sheet Metal Worker
- Sprinklerfitter
- Steamfitter (Construction)
- Steamfitter (Refrigeration/Service)
- Taper & Finisher
- Teledata Communications
- Terrazzo Worker
- Tile Setter

Likewise, the modeling results indicate that a minimum of over 2,000 new manufacturing jobs would be created by the legislation. Below is a list of manufacturing industries that would be most affected:

- Nonmetallic mineral product manufacturing
- Primary metal manufacturing
- Fabricated metal product manufacturing
- Chemical manufacturing
- Apparel manufacturing
- Paper manufacturing
- Plastics and rubber product manufacturing
- Leather and allied product manufacturing
- Machinery manufacturing
- Food manufacturing
- Wood product manufacturing
- Furniture and related product manufacturing
- Computer and electronic product manufacturing
- Electrical equipment and appliance manufacturing
- Other transportation equipment manufacturing
- Miscellaneous manufacturing
- Beverage and tobacco product manufacturing
- Motor vehicles, bodies & trailers, and parts manufacturing

Manufacturing jobs also pay relatively well on average, 25% more than the average Wisconsin job. There are also training and career opportunities available for manufacturing jobs, including the industrial apprenticeship programs listed below:

- Electrical and Instrumentation Technician
- Industrial Maintenance Electrician
- Industrial Pipefitter
- Injection Molding Machine Setter
- Machinist
- Maintenance Mechanic
- Metal Fabricator
- Mold Maker
- Pattern Maker
- Tool and Die Maker

In sum, the additional construction and manufacturing jobs would add at least \$155 million in wages and salaries for Wisconsin workers in the year 2025 alone.

Moreover, and perhaps even more importantly, the legislation will help generate and foster a clean energy cluster in this state, positioning Wisconsin as a national and international leader in clean energy equipment manufacturing. Wisconsin is already known for its solid, established manufacturing base and corresponding skilled workforce. Passage of the Clean Energy Jobs Act will lead to substantially increased investment in the clean energy manufacturing cluster and related supply chains based here in Wisconsin.

In addition, the apprentice training programs based in Wisconsin's technical college system and other partners are well positioned to help advance the state's cutting edge tools and techniques for building and servicing clean energy equipment and operations, including not only the mechanical hardware, but the IT equipment and interfaces that will be increasingly important to run the clean energy systems at peak efficiencies.

Average Wages in Selected Industries Positively Impacted by the Clean Energy Jobs Act

Industry	Average Annual Wage
Construction	\$ 49,658
Nonmetallic mineral product manufacturing	\$ 43,468
Primary metal manufacturing	\$ 46,944
Fabricated metal product manufacturing	\$ 45,583
Chemical manufacturing	\$ 70,633
Apparel manufacturing	\$ 29,896
Paper manufacturing	\$ 56,716
Plastics and rubber product manufacturing	\$ 41,212
Leather and allied product manufacturing	\$ 33,000
Machinery manufacturing	\$ 55,029
Food manufacturing	\$ 39,354
Wood product manufacturing	\$ 32,188
Furniture and related product manufacturing	\$ 38,500
Computer and electronic product manufacturing	\$ 61,883
Electrical equipment and appliance manufacturing	\$ 55,843

Other transportation equipment manufacturing	\$ 54,842
Miscellaneous manufacturing	\$ 42,380
Beverage and tobacco product manufacturing	\$ 48,046
Motor vehicles, bodies & trailers, and parts manufacturing	\$ 34,412
All-industry average annual wage	\$ 39,200

IV. Comparison with Results of Other Assessments

Energy efficiency and renewable energy policies similar to those recommended by the Governor's Task Force have been proposed or in a few cases adopted in other states and at the national level. Many of these policies have been analyzed for their economic impacts, and these assessments almost universally validate and reinforce our conclusion that investments in energy efficiency and renewable energy as called for in the Clean Energy Jobs Act would lead to economic growth and job creation. Some of the results that are considered most relevant are summarized below:

- **Energy Center of Wisconsin:** The Energy Center published its latest "Potential Study" for Wisconsin in August 2009, concluding that an annual investment of \$350 million in energy efficiency could reduce annual electricity consumption by 1.6% and natural gas use by 1.0%, while generating \$900 million in net lifecycle energy cost savings and supporting 7,000 to 9,000 Wisconsin jobs.⁷
- **American Council for an Energy-Efficient Economy (ACEEE):** ACEEE assessed the impacts at the national level and in each state of the energy efficiency provisions in the Waxman-Markey bill that passed the U.S. House in June 2009. In addition, ACEEE analyzed the expected national and state-level impacts if the federal bill were modified to require 0.75% annual electricity savings initially, increasing to 1.5% annual savings in 2020.⁸ This latter analysis is more comparable to what is proposed in the Clean Energy Jobs Act. ACEEE concluded that the impact in Wisconsin of the 1.5% annual electricity savings scenario would be a net increase of 13,400 jobs and a net savings of \$249 per household in 2020.
- **Environmental Law and Policy Center (ELPC):** ELPC commissioned economic modeling of its own policy recommendations for the Midwest, which include a combination of energy efficiency policies and renewable energy policies that are comparable in some ways to the Clean Energy Jobs Act provisions.⁹ Compared to a reference case, ELPC found that energy efficiency policies could generate a net increase of 7,400 jobs in 2020 while increasing annual economic output by \$2.7 billion. ELPC's study also found that, compared to a reference case, renewable energy policies could generate a net increase of 6,400 jobs in 2020 while increasing annual economic output by \$600 million.
- **Union of Concerned Scientists (UCS):** UCS assessed the national and state-level impacts of a 25% by 2025 national RPS.¹⁰ UCS forecasts that such a policy would create 297,000 new jobs nationwide and lower consumer energy bills by \$64.3 billion nationwide. Wisconsin consumers would save \$1.67 billion on energy bills in 2025.

⁷ <http://www.ecw.org/ecwresults/WI-Potential-Aug09.pdf>.

⁸ <http://aceee.org/pubs/e096.pdf>.

⁹ <http://www.elpc.org/wp-content/uploads/2008/06/jobjolt1.pdf>.

¹⁰ http://www.ucsusa.org/assets/documents/clean_energy/Clean-Power-Green-Jobs-25-RES.pdf.

- **Center for American Progress & University of Massachusetts:** This assessment considered the potential economic impacts of a nationwide \$100 billion investment program for energy efficiency, mass transit and freight rail, “smart” electrical grid transmission systems, wind power, solar power, and next-generation biofuels.¹¹ The report concludes that a \$1.8 billion investment in Wisconsin on these technologies would create 37,165 jobs in the state.
- **Center for Climate Strategies:** This nonprofit organization has supported many states in their efforts to develop climate change action plans. The Center recently announce via a press release that it has completed an economic analysis of 23 specific policy actions similar to those in the Clean Energy Jobs Act and concluded that nationwide implementation of those actions would generate more than 2 million net new jobs in 2020. The press release indicates that final published results will be made available sometime in January 2010.
- **State Level Studies:** All of the following states, and others, have commissioned economic analyses within the past three years and concluded that state-level policies similar to those in the Clean Energy Jobs Act would have positive net economic impacts for the state in question (i.e. increase in employment and total economic output):
 - Florida – Economic modeling of the 50 policy recommendations in the *Florida Energy and Climate Change Action Plan* found that the plan, which is similar in many respects to Wisconsin’s Clean Energy Jobs Act, would create more than 148,000 additional jobs in Florida in 2025.¹²
 - Illinois – REMI modeling results indicated that if all of the policies proposed by the Illinois Climate Change Advisory Group were implemented, the state would boost employment by at least 50,000 new jobs in the year 2020.¹³
 - Michigan – REMI modeling of the 54 recommended policy strategies in *Michigan’s Climate Action Plan*, which is also very similar to Wisconsin’s Clean Energy Jobs Act, found that implementation of the recommendations would add 129,000 new jobs to Michigan’s economy in 2025.¹⁴
 - New York – IMPLAN modeling of a stand-alone 25% RPS policy found that this one policy alone would create more than 1,000 short-term jobs in New York and hundreds of jobs that would last over the next two decades.¹⁵
 - Pennsylvania – The 42 work plans in Pennsylvania’s climate change action plan are expected to result in the creation of 53,000 new jobs in that state by the year 2020, according to the results of REMI modeling.¹⁶

Some may characterize the Wisconsin legislation as an expensive job killer, but all of the studies cited above offer no support for such an argument. On the contrary, the great weight of economic and policy analysis that has been conducted on these issues – here in Wisconsin, in other states, and nationally – supports the conclusion that renewable portfolio standards, energy efficiency programs, building efficiency requirements, and other such policies are extremely powerful job creation tools. Obviously, Wisconsin does not have an economy or a population as large as that of Florida, Illinois, Michigan, or Pennsylvania. But the job growth estimates in each of those states is *more than triple* what staff have estimated for similar policies if implemented in Wisconsin. There is every reason to believe the Clean Energy Jobs Act will create at least 15,000 new jobs by 2025 and very likely many thousands more.

¹¹ http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/peri_report.pdf.

¹² http://www.globalurban.org/Economic_Impact_of_Florida_Energy_and_Climate_Change_Action_Plan.pdf.

¹³ <http://www.epa.state.il.us/air/climatechange/documents/iccag-final-report.pdf>.

¹⁴ <http://www.climatestrategies.us/ewebeditpro/items/O25F22416.pdf>.

¹⁵ See *Main Tier RPS Economic Benefits Report* at <http://www.nyserda.org/rps/EconomicBenefitsResources.asp>.

¹⁶ See *Chapter 11 Macroeconomic Assessment* at <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-10677>.