



WISCONSIN CLEAN ENERGY JOBS ACT MACROECONOMIC IMPACT STUDY

FREQUENTLY ASKED QUESTIONS

by

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1. What are macroeconomic impacts?

Macroeconomic impacts refer to the outcomes of public and private sector decisions that influence the entire economy of a nation or region. They result from a positive or negative stimulus and various interaction effects among consumption, investment, cross-border trade, and government activity.

2. What do macroeconomic impacts tell us?

The results of the analysis provide projections of the most likely impacts on employment, income, and gross state product for Wisconsin. It also provides information on these impact indicators for individual sectors.

3. What kinds of models are usually used in macroeconomic impact study?

There are ranges of model types that can be used in macroeconomic analysis. One approach is input-output (I-O) analysis. This is a practical methodology but is considered very restrictive because it is a linear model that does not allow for any substitution and other adjustments in the economy. Yet another approach is computable general equilibrium (CGE) analysis, which incorporates most of the good features of I-O but overcomes many of the limitations. CGE models are non-linear, allow for substitution and other adjustments, and reflect the workings of prices and markets. However, they are expensive and time-consuming to construct. A third approach is macro econometric models (ME), which use statistical techniques applied to economic data and are based on a macroeconomic framework. ME models have the advantage of sounder statistical properties than the other two modeling types and a forecasting ability. However, they are often more aggregated than I-O or CGE models.

4. What is the REMI Policy Insight Plus (PI+) Model?

REMI stands for Regional Economic Models, Inc. The REMI model is a ME model template that can be applied to any region, including an entire state in the U.S. The template consists of an analytical framework that is estimated using econometric techniques applied to data for the region in question. The REMI model also

incorporates the features of the other three major modeling approaches: I-O, CGE, and Economic Geography. The REMI PI⁺ model is the new generation of the REMI Policy Insight Model.

5. How many economic sectors are included in the REMI model?

In this study, we chose the 169-sector Wisconsin REMI model (which is the most disaggregated REMI model in terms of sectoral resolution) to undertake the macroeconomic analysis.

6. How can we be sure that the REMI is a good choice for Wisconsin?

The REMI model in general has been used in every state in the U.S and is the most widely used modeling approach by state governments. The Wisconsin Department of Transportation has used REMI models of Wisconsin successfully for several years, and has applied it to non-transportation analyses on behalf of other departments. Moreover, the research team has applied the REMI model to analyze the macroeconomic impacts of climate action plans previously in Michigan, Florida and Pennsylvania.

7. What data inputs go into the REMI model?

The database used for indirect or secondary impact analysis consists of data obtained from reliable sources such as the U.S. Department of Commerce, U.S. Bureau of Labor Statistics, and U.S. Census Bureau. However, some data is scaled down from the national level, and where parameters are missing, national parameters or adaptations of national parameters are often used. Direct effects of policy options are input from other sources as a first step. In the Wisconsin Climate Action Plan study, cost-effectiveness (microeconomic) estimates of nine climate policy options were used as inputs for the macroeconomic analysis.

8. Which is the latest historical year of data incorporated in the Wisconsin REMI model?

The Wisconsin REMI PI⁺ model is based on the state historical data through Year 2007.

9. Is the REMI model just another black box?

The REMI model is reasonably transparent in its structure and data. Its equations in general are well documented, and we have the ability to focus on specific components of the model. Model documents are available to the public at the REMI website: www.remi.com.

10. How can we be sure that the REMI model is accurate?

The REMI analysis is based on sound data, sound macroeconomic theory and realistic assumptions. It has been subject to peer-scientist review spanning 30 years and generates reasonable and tested impact estimates.

11. What basic assumptions go into the REMI analysis?

All models include many assumptions. In fact, this is the essence of modeling-- abstracting from many extraneous considerations to be able to focus on the core

aspects of a topic. In the REMI model, the standard economic modeling assumptions are used. For example, individuals and businesses behave rationally, i.e., they utilize their incomes and resources prudently, and they respond to price signals. Also, import demand and demand for Wisconsin-produced exports respond to econometrically estimated price differentials.

Several other important assumptions are unique to the problem at hand. Examples include the extent to which investment in equipment that mitigates greenhouse gases adds to or displaces investment in ordinary plant and equipment, the extent to which any price changes are passed on to customers, the value of the discount rate that enables us to compare dollar gains in different years, etc. Assumptions are used because it is impossible to gauge each of these factors precisely in any study done within a time span of only a few months.

12. How do the Wisconsin study results compare with previous results for the state or those of other states?

Many aspects of the impacts of state climate action plans are state-specific. For example, in a REMI analysis of a renewable portfolio standard (RPS) in Florida, the impacts were significantly positive. This is due to the fact that renewable energy (e.g., solar, wind, and biomass) is especially attractive in that state from an economic standpoint. Also, the displacement of electricity produced by conventional fossil fuels does not negatively affect that state very much, since only a very small portion of these energy fuel inputs are produced within Florida's boundaries. Moreover, it is reasonable to assume that if a state gets out in front on climate action planning, it will attract investment from other states.

These factors are not anywhere near as positive for the U.S. as a whole, for example. In that case, one needs to use national averages of the relative attractiveness of renewables. Fuel inputs for electricity generation are produced almost entirely within the country, and there is limited opportunity to attract foreign investment.

A recent study of Michigan's Climate Action Plan (2009) using similar modeling approaches showed their proposed policies would likely generate positive and significant macroeconomic impacts as well. Like the current study, that study found that demand side policies tend to generate the largest potential economic impacts, while supply-side policies tend to generate relatively lower impacts. When comparing policy-by-policy impacts in terms of percent change from the baseline GSP products, the two studies are comparable.

Looking at the studies as a whole, three primary differences arise. Michigan is a relatively larger economy than is Wisconsin. GHG mitigation impacts are spread across 10 million Michigan residents compared to 5.6 million in Wisconsin. Michigan's 2008 GSP was \$382.5 billion in current dollars while Wisconsin's was \$240.4. The differences in the sizes of the two economies contribute to the differences in impacts.

A second difference between the two economic impact reports is the breadth of policy segments afforded the Michigan Study relative to the Wisconsin study. The Michigan study provided a comprehensive analysis of most all policy segments

outlined in their Climate Action Plan. Wisconsin's study focused on a subset of CEJA policy proposals. Hence, the Michigan study scanned a much larger terrain of policy segments than the Wisconsin study.

Finally, Wisconsin has been historically more pro-active in the implementation of effective GHG measures than has Michigan. This means that Wisconsin's economy is already experiencing the positive macroeconomic benefits of a number of climate policy actions, which for Michigan appear as yet-unrealized future opportunities.

13. Are the analysts who performed the Wisconsin REMI analysis qualified?

Dr. Steve Miller is the Director of the Center for Economic Analysis at Michigan State University. Dr. Miller specializes in modeling regional economies and his dissertation topic of research was the development of a dynamic economic impact model for Oklahoma. Dr. Dan Wei is a post-doctoral associate in the School of Policy, Planning, and Development at USC. She wrote her Ph.D. dissertation (from the Department of Energy and Environmental Economics at Penn State) on energy conservation policy, and has used the REMI Model successfully in several applications. Dr. Adam Rose is a research professor in the School of Policy, Planning, and Development at USC. Prior to coming to USC he served as Professor and Head of the Department of Energy and Environmental Economics at Penn State for fifteen years. He is a leading authority on energy and environmental economics, with special application to climate change. He was the research team leader on REMI applications to estimate the impacts of climate action plans on the Florida, Pennsylvania and the U.S. economies.