Identifying Opportunities for Wisconsin to Participate in Advanced Energy Manufacturing: An investigation into the State’s real capacity for green manufacturing

Mr. Will Krull, Ms. Megan Roehl, Ms. Caroline Palen, Mr. Ben Kaminski, Ms. Yichen Huang | Dr. Thomas Kemp | Department of Economics

Project Background

Need to Address Climate Change

In recent years, the need to address the ongoing climate change issue has prevailed in all areas, especially the need for green energy such as solar panels and wind turbines. Currently, there is large pressure towards the carbon footprint reduction for all. This neutrality by 2050. Although the US is not currently a part of the Paris Climate Agreement, there is potential for similar binding agreements in the near future. Adherence to this will require a transition into green energy production quickly and swiftly. This does not mean consumption of less products on labor, consumption in more environmentally conservative manners. Conducting business through green energy ensures environmental stability for the state for years to come.

Method and Data

Method

As we are analyzing this, we are looking at the real economic analysis which is what we are able to actually produce. Because of this, there is the possibility for a large gap for either direction in capacity based on what could be produced that is not captured in the labor employment. This is in part due to the heavier automation that is occurring in these industries. Additionally, business receipt data by state and industry has not been published since 2012. Therefore, we were required to estimate revenue based on labor. We have done this under the assumption backed by similar research that labor would be between 50% to 66% of a companies total revenues or receipts.

NAICS Code System

The NAICS system is a system of codes that identify firm type. NAICS code consists of 6-digits. As the digits increase the codes get more specific to describing the firm type. For example, NAICS code 11 is Agriculture, Forestry, Fishing and Hunting, 111 is Oiled and Grain farming, 11111 is Sorn farm ownership. We used the NAICS system in our project to match census data with proprietary data that we analyzed.

Census Industrial Data

We were able to utilize census data to identify the largest manufacturing industries in Wisconsin based on employment and payroll as identified in Figure 2. Many of these data categories would not be able to be transmitted or effected by green energy manufacturing, such as cheese manufacturing, heat process from carousels and animal slaughtering. For this reason, we have focused on industries found in figure 4.

Problems associated with receipts

When looking at the census receipts, there are several limitations within this data. The largest being that the 2017 business census data at the state level was not able to be published due to statistical errors. Therefore, we do not have any recent data by industries, prior to 2012. Additionally, this data does not utilize the standard NAICS codes, preventing us from being able to compile the same categories.

Proprietary Dataset

And limitations of dataset

Through access via the Eau Claire Public Library System, we were able to obtain access to the A-Z Database listing all registered firms within the state of Wisconsin. This includes revenue and employment data for all industries located within the state. This information is collected through marketing firms and other private business listings. However, there was no pressure for these firms to actually report their data, as there is when working within the Census. If incorporating data directly reported to the Census, it is a federal violation. Additionally, the reported information was for the entire company, regardless of its portion within Wisconsin.

Method and Data Cont.

Combining Census Data and Proprietary Data

To use the US Census data, we had to match it with proprietary data. The proprietary data doesn’t have NAICS code to match categories of firms with the NAICS used on the US census data. We had to make some assumptions when matching category of data in the US census data and proprietary data. Within each category NAICS code that we were interested in, we were able to identify the largest contributors of that NAICS code within Wisconsin utilizing A-Z companies by name of the company. Through further investigation, we were able to describe the capabilities of these manufacturers.

Solutions:

Because of the above-mentioned problems, we have determined the best solution would be to estimate receipts from the labor payroll data given by census. Utilizing industry standards, we were able to estimate that labor costs are 50% to 66% of total receipts. This allowed us to estimate receipts based from the payroll, giving us a rough estimate on total receipts within the state, which can be seen below.

Describe sorting process

Utilizing the US Census annual datasets by establishment industry, we were able to develop a rating of the largest industries in the state by both employment and payroll. With this, we included the following industries. You may note that of the top 10 industries, 5 are not related to the production of green energy supply chain components. These are included here for the following reasons: 1) Labor training in manufacturing processes are more likely to be available as these industries decline in importance and other greener industries expand, 2) Data commonly used States manufacturing capacity/field. This data is misleading because it included many industries unrelated to “high-tech”, and 3) In the State of Wisconsin there are strong tax incentives to classify a business as “manufacturing”, as such industries that might not commonly be thought of as manufacturing are categorized that way in the data. Through examination of the capabilities of these categories, we were able to reduce the list down to industries that would be able enter into the supply chain for the manufacturing of green energy materials such as solar panels, wind turbines and nuclear reactors. When doing this, we looked specifically at the ability for high precision manufacturing with high temperature variances within the needed industries. With this, we have pinpointed several industries as seen in figure 4.

Analysis Continued

Pinpointed Industries

Metal Fabrication: Contract-based manufacturing most typically specializing in CNC machining, Laser/Plasma Cutting, Stamping (Metal), Forming and Punching (Metal), Metal Forming. These are typically smaller shops with specific capacities.

Relay and Industrial Controls: These industries support the electronic and control needs for aerospace, industrial vehicles, marines and military vehicles including transmissions, circuit board manufacturing and gear boxes. They also include the capabilities of having high precision soldering and assembly, mechatronics, multi-stage electric work, pneumatic and hydraulic work and micropul bonding.

Machine Shops: Generally, do contract-based machining for a variety of customer’s (few are industry dedicated). A handful of shops are ISO 9001 certified. Specialty manufacturers, plastics, chemicals, and metal. Seems to be mostly metals and plastics. Most shops utilize CNC machines. Services commonly include: fabrication (variety of materials), casting (variety of materials), tool and die, precision milling, welding, grinding and bonding.

Engine Equipment Manufacturing: Commercial and Consumer Engine production for gasoline, diesel and alternative fuels. These have the capabilities of manufacturing liquid and air cooling, manual and electric starters in machinery capacity up to 10 horsepower. There are three International engine manufacturers with their headquarters in Wisconsin located on the eastern side of the state.

Conclusions and Remaining Questions

Climate change is shifting the need for energy to more sustainable options. Our research was to find structural opportunities and challenges for industries in Wisconsin and assess their ability to participate in manufacturing sustainable energy options. We found that there exist significant opportunities for Wisconsin manufacturing to transition to a "greener" future.

Citations


Acknowledgements

We would like to thank the following organizations for funding for this project:

Office for Research and Sponsored Programs
Tommy G. Thompson Center for Public Leadership Grant

