



POLICY
MATTERS
OHIO

THE IMPACT OF IMPACT:* CREATING JOBS IN OHIO

*INVESTMENT FOR MANUFACTURING PROGRESS AND CLEAN TECHNOLOGY

WENDY PATTON
POLICY MATTERS OHIO

WITH ANALYSIS BY
HEIDI GARRETT-PELTIER,
POLITICAL ECONOMY RESEARCH INSTITUTE,
UNIVERSITY OF MASSACHUSETTS

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AUTHOR

Wendy Patton is a Senior Associate with Policy Matters Ohio. She served as Executive Assistant for Economic Development for the Strickland Administration, Vice President for Industrial Development at the Columbus Urban Growth Corporation and Deputy Director for Business Development in the Ohio Department of Development. She has a master's of city planning from the University of California at Berkeley and an undergraduate degree from Kent State University.

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The Impact of IMPACT: Investments for Manufacturing Progress and Clean Technology

Potential for Creating Jobs in Ohio

Executive Summary

Climate legislation to stem global warming could direct substantial investment into domestic manufacturing plants and create new markets, laying the groundwork for growth in manufacturing jobs. In this report, Policy Matters Ohio looks at an investment proposal: “Investments for Manufacturing Progress and Clean Technology Act of 2009” (IMPACT). This program, which would establish state-level revolving loan funds to support new investment in industry, could create over 52,000 new jobs in Ohio over ten years.

IMPACT would provide capital for manufacturing firms with 500 employees or fewer. The capital could be used to invest in energy efficiency or to retool to produce for clean energy markets. A revolving loan fund, the program would lend out the money again as loans are repaid. This study, which relies on an economic assessment tool called input-output analysis, finds that this investment in the base of Ohio’s industrial infrastructure could create up to 52,214 new manufacturing jobs in Ohio over the first ten years of the program. The University of Massachusetts’s Political Economy Research Institute (PERI) conducted the analysis.

We do not, in this paper, look at the complex issues around job gain and job loss due to the pricing of carbon over time. We look at what a sustained investment targeted to Ohio’s small- and medium-sized manufacturers could do for employment in Ohio. IMPACT would boost funding for the nation’s Manufacturing Extension Partnerships (MEPs) as well, allowing them to expand services by almost 20 percent to help client firms invest in energy efficiency and expand into production for advanced energy markets. It is anticipated this will allow the MEPs to serve an additional 10,000 companies, strengthening the job base in Ohio and across the nation.

The manufacturing sector remains critical to the American economy. It accounts for the bulk of U.S. exports, is key for innovation, and provides many high-wage jobs, especially for less educated workers. It is the economic lifeblood of much of the Great Lakes region. Average weekly wages were 21.1 percent higher than in other private sector industries in 2009. Yet the U.S. has lost manufacturing jobs for the last three decades, and its manufacturing output has grown more slowly than GDP. This has had a great effect on Ohio’s economy, where the decline of manufacturing employment has contributed to stagnation of wages for middle-income workers.

IMPACT is designed specifically to reverse declines in manufacturing. It would prioritize awards to states impacted by the collapse of the domestic automotive industry. Moreover, it is targeted to small- and medium-sized manufacturing firms, which comprise a larger share of Ohio’s industrial base than is typical for the nation. The job creation estimates in this report are based on an

assumption that Ohio would qualify for the maximum award amount of \$500 million in 2010 and again in 2011, with a 20% match from non-federal sources.

The jobs IMPACT would support would not fully replace the manufacturing job loss we have seen in the past 12 months. Nor would it prevent change in the economic base: some sectors will grow and others will shrink as the markets for energy change. But change is upon us, whether climate legislation moves forward or not. For example, the average American household pays \$1,100 more, annually, for oil, gas and electricity than a decade ago. Whether we do something, or do nothing, change is upon us.

This paper explores how one specific measure to help firms prepare for climate legislation, IMPACT, may affect the labor market in Ohio. The report examines the Ohio economy, describes the IMPACT program, and walks the reader through the analysis of our job projections. We conclude that for a state like Ohio, with dense supply chains of small- and medium-sized manufacturers, IMPACT presents an excellent economic opportunity. When was the last time Ohio saw a sustained, structural effort to revitalize our ravaged industrial landscape? This type of investment program provides a good start to rebuilding our manufacturing base.

The Impact of IMPACT: Investments for Manufacturing Progress and Clean Technology

Potential for Creating Jobs in Ohio

Because of concerns about energy consumption, climate change, and the environmental impact of carbon emissions, the United States House of Representatives passed a carbon cap bill in June 2009, and the U.S. Senate is developing corresponding legislative proposals. The legislation would reduce energy consumption, put a price on carbon, and generate investments in renewable energy and energy conservation. One element of the bill that passed the House of Representatives is drawn entirely from a senate bill (SB 1617), the “Investments for Manufacturing Progress and Clean Technology Act of 2009” (IMPACT) which would provide capital and technical assistance for small and medium manufacturers. In the model of Recovery Act programs that have stimulated new energy markets, like the Clean Energy Tax Credit and the Energy Efficiency Grants, IMPACT is intended to prepare domestic firms to participate in growth markets of all kinds of clean and advanced energy production.¹

We are seeing jobs proposals like IMPACT because economic anxiety is at the heart of the climate debate. Can clean energy be affordable or will the cost drive jobs overseas? Can American companies pay for their pollution or will they shutter more plants? Should other countries serve the growing markets for new energy products? Or can America reopen factories with production for the clean energy economy?

The economic implications related to climate issues are threefold. First, there are costs of doing nothing, and allowing continued increases in energy use, pollution and global warming. For example, it is estimated that the cost of oil, gas and electricity for the average American family increased \$1,100 over the past decade.² The approach of doing nothing (“business as usual”) would lead to drought, food scarcity, disease, conflict and damage to property and persons.³ Poor communities, coastal communities, places where water supply is dwindling, agricultural areas and taxpayers would be among the groups bearing these costs.

Second, pricing carbon will reduce energy use and slow climate change. It will also change the cost structure or raise costs for some companies – this is why the policy must be structured carefully. Some manufacturing firms that use a lot of

¹ According to the Center for American Progress, the number of clean-energy jobs in Ohio grew by 7.3 percent between 1998 and 2007, while jobs overall shrank by 2.2 percent. (The Economics of Clean Energy in Ohio, October 6, 2009) at http://images2.americanprogress.org/CAP/2009/10/hub/EconomicsCleanEnergy_OH.pdf

² Ibid.

³ A report by the economist Sir Nicholas Stern of Great Britain, which underpinned the European Union’s adoption of a cap and trade system to control carbon pollution, estimated that the social cost of carbon pollution would reach at \$95 per ton by mid century if we continue to conduct business as usual; this is the same range of cost as predicted if carbon is capped and priced. (Sir Nicholas Stern, “The Economics of Climate Change,” *The Stern Review* (2006) p.304)

energy could see their overall costs increase, and companies making inefficient products may find their markets constrained. It is critical to negotiate for legislation that mitigates negative impacts and finds opportunity for the state.

This brings us to the third point: Opportunity. There are opportunities in a shift to a clean and advanced energy economy. Markets for renewable energy and energy efficiency equipment, materials and supplies are growing in the United States and globally, providing opportunity for makers of insulation, gears, solar panels and other products. Firms will also find opportunity in energy cost savings as they shift to more efficient ways of operating.

There is no sector more important to protect and build than manufacturing. Manufacturing jobs are important because they make up a large share of our economy and because they play an outsized role in generating other jobs, both nationally and at the state level. The manufacturing sector remains critical to the economy. Manufacturing accounts for roughly two-thirds of U.S. research and development expenditures and employs more engineers and scientists than any other private sector industry. Manufactured goods represent two-thirds of our exports and drive more net wealth creation than any other sector.⁴ Average weekly wages in manufacturing were 21.1 percent higher in 2009 than in other private sector occupations.⁵

As new economies with new factories and equipment have emerged around the world, America's networks of manufacturing production have hollowed out. Production of key supplies has moved offshore and U.S. plants and equipment have not all been maintained. Old factories are sold for shopping malls or demolished as brown fields. With the bankruptcy of the domestic auto industry, it seems as though American ability to make things is fading. The opportunity to develop and manufacture technology for clean energy markets has been heralded as the way to rebuild America's production networks. The green jobs we hear much about may be a small share of total employment in the vast American economy, but they could nonetheless be the heart of a new generation of wealth creation, like the auto and textile industries once were.

In this report, we look at an example of an investment program associated with climate legislation that is intended to stimulate American production for the clean energy economy. Known as 'IMPACT,' which stands for Investments for Manufacturing Progress and Clean Technology, this proposal is contained in Senate Bill 1617 and House Bill 2454, the American Clean Energy and Security Act of 2009. It would provide access to capital and technical assistance to American firms with fewer than 500 workers. Firms could use this assistance - spend these funds - to conduct energy efficiency retrofits and/or to retool so that they can participate in clean energy markets. The legislation also provides for consulting assistance

⁴ Manufacturing Performance Institute on behalf of the American Small Manufacturers Coalition, "Next Generation Manufacturing Study, Overview and Findings," p.5

⁵ United States Department of Labor, Bureau of Labor Statistics, Economic News Release, January 15, 2010, Table 1: Table 1. Earnings of production or nonsupervisory workers on private nonfarm payrolls in current and constant dollars by industry(not seasonally adjusted) at <http://www.bls.gov/news.release/realer.t02.htm>

through the Manufacturing Extension Partnerships (MEPs) to help firms identify and move into new markets.

Our analysis indicates that in the first ten years of such a program in Ohio, between 41,063 and 52,214 new jobs would be created. This would contribute to stabilizing Ohio's industrial base of manufacturing jobs in small and medium sized firms, which currently employ about 495,000 people.⁶ In this report, we outline how the program works and detail how jobs would be created in the clean energy economy. We emphasize, however, that this analysis is not like the larger studies that project total outcomes of climate change legislation over the next 40 years. Here we look at opportunity over 10 years associated with one economic development program included as part of proposed climate legislation.

The Manufacturing Economy in Ohio

Manufacturing plays a more prominent role in the Ohio economy than in other states. The manufacturing sector accounts for 12 percent of the U.S. gross domestic product (GDP) while Ohio's manufacturing sector accounts for 18 percent of gross state product (GSP), 50 percent higher than in the nation as a whole.⁷ Ohio ranks third among the states in contribution to the national economy from manufactured products.⁸

New England once had a regional economy based in good measure on production of textiles and leather goods. That economy is long gone, migrating to the American South, then to Asia, then to Southeast Asia and Latin America. The Midwestern economy developed around iron and steel and cars. Ohio is enmeshed in the heart of a production network that stretched from the steel mills of Pittsburgh to the assembly plants of Detroit, through the ports of Chicago and out to Rockport, St. Louis and Kansas City. Like New England, there has been a migration of production out of the Midwest to the South and then overseas. However, Ohio and the Midwest remains an important industrial region of the nation and the world.

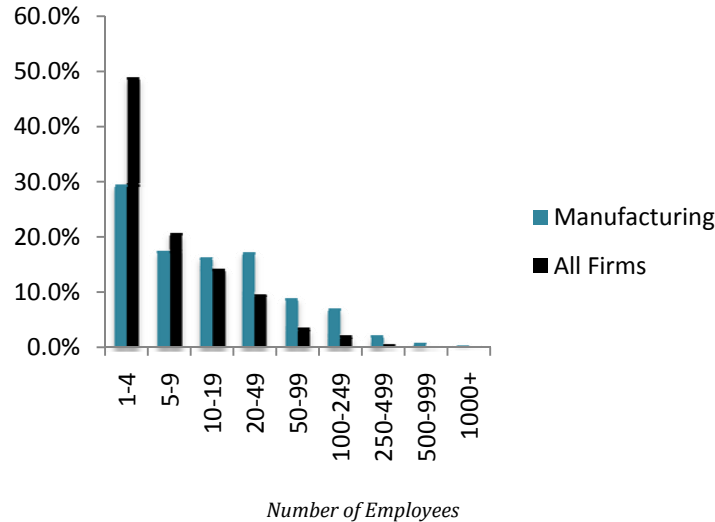
Ohio's industrial economy is the supply economy, comprised of thousands of small- and medium-sized firms that supply parts to the automotive assembly plants around the inland ports of the Midwest. Nationally and in Ohio, manufacturing jobs are concentrated in medium-sized firms rather than small firms. For example, in Ohio, as in the nation, about half of all establishments (work places) have fewer than 5 employees, but in manufacturing less than a third of all establishments are that small. This is because manufacturing is capital intensive. The cost of plant and equipment is high, so production tends to be on a greater scale than in other sectors. Figure 1, p.6, highlights the difference. For example, in Ohio, seven percent of manufacturing plants have 100 to 249 employees while in other sectors, only two percent of facilities is that large (Figure 1).

⁶ Dun and Bradstreet Selectory Database, fall 2009.

⁷ Department of Labor, Bureau of Economic Analysis, 2008.

⁸ Ohio Department of Development, Gross Domestic Product of Ohio, January 2009, p.3

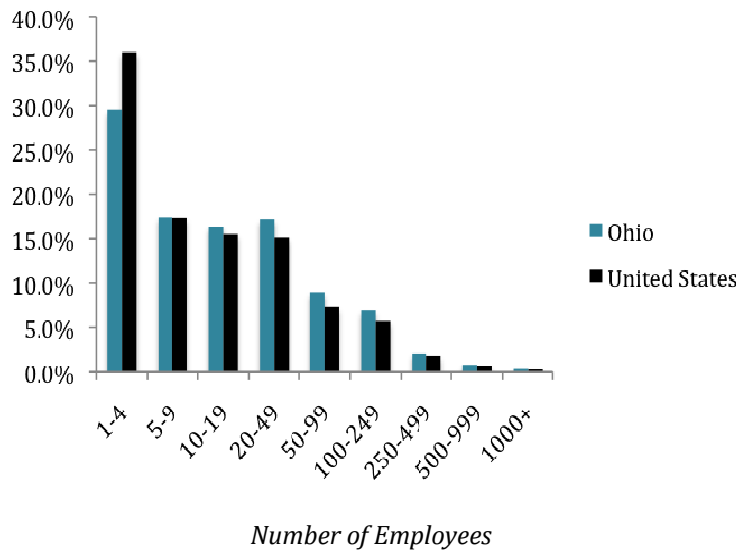
Figure 1: Comparison of all establishments and manufacturing establishments in Ohio by size



Source: Policy Matters Ohio based on County Business Patterns data for 2007 (“Number of Establishments by Employment Size Class” at <http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl>).

Figure 2, below, highlights the differences between the size of manufacturing establishments in Ohio and the U.S. Within the manufacturing sector, Ohio has fewer very small plants and more medium-sized plants than is typical for the nation.

Figure 2: Comparison of manufacturing establishments in Ohio and in the nation by size

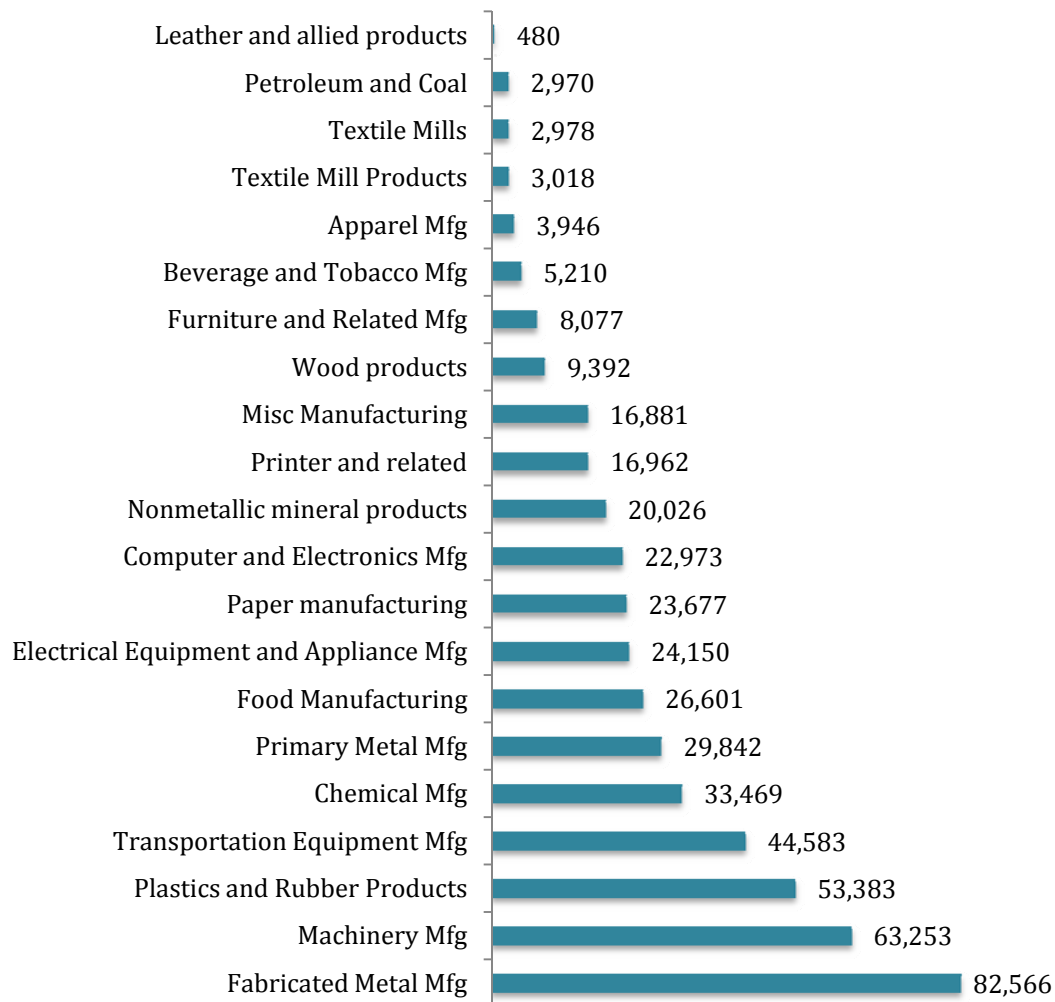


Source: Policy Matters Ohio based on County Business Patterns data for 2007 (“Number of Establishments by Employment Size Class” at <http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl>).

Figure 2 illustrates that Ohio’s share of manufacturing plants with 20 to 49 workers is 14 percent higher than that of the nation. The concentration of plants with 50 to 49 employees is about 22 percent higher than in the nation as whole; plants with 50 to 100 workers, about 23 percent higher. Ohio’s concentration of medium-sized manufacturing plants, higher than the national average, as well as the

state's overall concentration of economic output in manufacturing, highlights the importance of maintaining the competitiveness of manufacturing plants in the state. The larger the plant, the more investment and working capital that is needed to maintain and grow the facility and the more jobs that can be lost or gained with access to or lack of capital.

Figure 3: Employment by sector in Ohio manufacturing establishments with fewer than 500 employees



Source: University of Massachusetts, Amherst, Political Economy Research Institute (PERI); based on Dun & Bradstreet Data, fall 2009.

Figure 3, above, shows the distribution of employment among sectors within manufacturing plants in Ohio with fewer than 500 employees. The fabricated metal products industry, with 82,566 workers in small- and medium-sized plants, accounts for 17 percent of employment. Machinery manufacturing accounts for more than 63,253 jobs, 13 percent of employment in plants of this size in the state. The density of employment in rubber and plastics, at 53,383 jobs (11 percent) speaks to the historical legacy of the rubber industry in Ohio. Fourth largest among small- to medium-sized manufacturing in Ohio is transportation equipment

manufacture, with 44,583 jobs, 9 percent of employment in manufacturing plants of this size, reflecting the importance of the automotive supply chain in the state. The fifth largest share of employment is in chemical manufacture, which accounts for about 33,469 jobs, 7 percent of employment in small and medium-sized manufacturing plants in Ohio. The base of small and medium sized manufacturers in Ohio is extensive and diverse.

Ohio's industrial base is well suited for serving new and emerging industries like advanced energy, as well as traditional sectors. This network of industry has been weakened, however, due to many forces: globalization, trade practices, recession, and now the financial crisis. In the next section we look at how a specific, targeted investment program designed to stimulate reinvestment can support economic development activities and job creation over the next ten years.

IMPACT: Investments for Manufacturing Progress and Clean Technology Act of 2009

The IMPACT Act, introduced by Senator Sherrod Brown of Ohio in June of 2009, would help prepare small- and medium-sized manufacturers for the transition to the clean energy economy. The bill creates a \$30 billion fund for manufacturers to improve energy efficiency, retool for the clean energy industry, and expand clean energy manufacturing operations. The investment level for which Ohio would be eligible could support the growth of up to 52,214 new jobs in the state. In this section, we describe IMPACT and the way we calculated job numbers.

IMPACT, which is included as part of the American Clean Energy and Security Act of 2009 (See Appendix A), would make states eligible for grants of up to \$500 million in 2010 and again in 2011. These grants, which require a match from non-federal sources, would establish revolving loan programs administered by the states. A state would establish program guidelines within broad parameters in the legislation: For example, the term of a loan is not to exceed the useful life of the equipment or 15 years and working capital loans may not exceed 36 months; the interest rates may not be over 500 basis points above prime but may be below market rates.

The evaluation of proposals will prioritize the potential for clean energy supply chains in the region; how the program will target manufacturers located in regions characterized by high unemployment and sudden and severe economic dislocation; the availability of skilled workforce and capacity of the region's workforce and education systems to provide pathways for unemployed or low income workers into skilled manufacturing employment; and how the state will target loans to auto parts suppliers diversifying their customer base by entering clean energy markets (including parts for cars in compliance with fuel economy standards). In addition, the proposals will be evaluated on how this fund will help the state achieve earliest and maximum greenhouse gas reductions.

Access to capital is not the only barrier between small manufacturers and new clean energy markets. According to economist Sue Helper, a critical component for

domestic firms in moving to new markets and new processes is improved communication skills and mechanisms at all levels within the firm and across the supply chain. Subsidy alone is not sufficient to accomplish this. Technical assistance services need to be provided to firms directly.⁹ To address this challenge, the IMPACT Act would also bolster and modernize the Hollings Manufacturing Extension Partnership (MEP), the federal-state partnership of subsidized consultation established to assist America's firms.

At present, four centers serve Ohio through the Manufacturing Extension Partnership and, according to the Ohio Department of Development, three more are being added this year. Two well-known centers have served the state for many years: Cincinnati-based TechSolve, which serves southern and central Ohio, and Cleveland-based MAGNET, which serves northern Ohio. Through partnerships with local and regional economic development organizations such as small business development centers (SBDC's) and community colleges, TechSolve and MAGNET serve firms throughout the state. Their partners provide some services to small manufacturing companies at no cost. In addition to TechSolve and MAGNET and their partners, two of Ohio's Edison Technology Centers, BioOhio, (a statewide group headquartered in Columbus serving the bioscience and pharmaceutical industry) and EISC, Inc. (which houses the Center for Innovative Food Technology in Toledo), have joined the Manufacturing Extension Partnership in Ohio. In the current year, the Edison Welding Institute (EWI) in Columbus, the Edison Materials Technology Center in Dayton and PolymerOhio in Westerville are also merging into the Partnership.¹⁰

IMPACT would fund these organizations to assist manufacturers in transition to the new energy economy. The federal legislation suggests evaluation criteria for IMPACT loans that prioritizes loans for projects certified through the MEPs, to ensure a sound business plan as well as an effective project.

Nationally, the MEPs are underfunded for the task at hand. Over the past decade, the 59 Manufacturing Extension Partnerships across the country received an average of about \$111 million annually. State governments, which are supposed to provide one-third of MEP technical assistance funding, have had difficulty meeting this obligation during the current recession and its aftermath. The IMPACT bill would provide the program with an additional \$1.5 billion in federal funds over five years to help manufacturers diversify into clean energy markets and adopt innovative, energy efficient manufacturing technologies. The additional federal funding in this bill could enable Manufacturing Extension Partnerships to reach at least 10,000 additional U.S. manufacturers each year. While we do not include this expansion of MEPs in our estimates of job creation, this program will also support the creation and retention of jobs in manufacturing.

There is much concern that climate legislation would eliminate jobs. However investment policies like IMPACT are designed to drive job creation. Our

⁹ Dr. Sue Helper, "Renewing US Manufacturing: Promoting a high Road Strategy," Economic Policy Institute Briefing Paper, February 2008, p. 13.

¹⁰ Interview with Beth Colbert, Ohio Department of Development, February 18, 2010.

analysis of the impact of IMPACT estimates job creation potential of between 41,063 and 52,214 jobs in the first ten years of existence. The next section describes the forecasting assumptions and methodology.

Assumptions of the Analysis

In analyzing the number of jobs that IMPACT would create in Ohio, we made a number of assumptions about how the program would work.

1) We assume Ohio receives the maximum annual amount proposed in current legislation: \$500 million in 2010 and again in 2011 from the federal government. Each loan must be comprised of no more than 80 percent federal funding from IMPACT; the balance of the loan must be from non-federal sources. Therefore, we assume that all the federal funds will be used in Ohio, and that non-federal matches of at least 20 percent will be part of each loan. Private, local, state or other sources may contribute to that required match. We assume, then, a match of \$100 million in non-federal dollars. This means that a total of \$600,000 is available to support investment in Ohio plant and equipment in each of the first two years. Lending in years 3 through 10 is based on the re-lending of loan repayment streams. The repayment stream assumes terms will be generous to promote job creation (Table 1).

Table 1: Potential Distribution of IMPACT Loan Funds by Year in Ohio

	in millions
Year 1	\$600
Year 2	\$600
Year 3	\$50
Year 4	\$50
Year 5	\$100
Year 6	\$100
Year 7	\$100
Year 8	\$100
Year 9	\$100
Year 10	\$100
Total	\$1,900

Source: Policy Matters Ohio

2) We assume that the funds will be distributed across the manufacturing economy in proportion to the share of economic activity (Table 2).

Table 2: Share of Jobs in Ohio Industrial Plants of 500 or Fewer Employees

	Industry Group	Employment	Share of Manufacturing Employment
NAICS	All Manufacturing	494,437	
332	Fabricated Metal Mfg	82,566	16.70%
333	Machinery Mfg	63,253	12.79%
326	Plastics and Rubber Products	53,383	10.80%
336	Transportation Equipment Mfg	44,583	9.02%
325	Chemical Mfg	33,469	6.77%
331	Primary Metal Mfg	29,842	6.04%
311	Food Manufacturing	26,601	5.38%
335	Electrical Equipment & Appliance	24,150	4.88%
322	Paper manufacturing	23,677	4.79%
334	Computer and Electronics Mfg	22,973	4.65%
327	Nonmetallic mineral products	20,026	4.05%
323	Printer and related	16,962	3.43%
339	Misc Manufacturing	16,881	3.41%
321	Wood products	9,392	1.90%
337	Furniture and Related Mfg	8,077	1.63%
312	Beverage and Tobacco Mfg	5,210	1.05%
315	Apparel Mfg	3,946	0.80%
314	Textile Mill Products	3,018	0.61%
313	Textile Mills	2,978	0.60%
324	Petroleum and Coal	2,970	0.60%
316	Leather and allied products	480	0.10%

Source: Political Economy Research Institute, University of Massachusetts, Amherst, Dun & Bradstreet data for employers in Ohio with fewer than 500 employees, fall 2009

It may be that firms in energy intensive sectors take a greater interest in this program, and it may be that the program parameters are tweaked to favor retooling of automotive suppliers because of the importance of auto supply to our statewide employment base. However, rather than making assumptions, we assumed a proportionate share based on proportionate interest.

3) We assume that in the first five years, 50 percent of the funds will be used for retooling and 50 percent for energy efficiency improvements. In the second five years, 100% of the funds are used for retooling to manufacture new products. This is based on the idea that in the first five years, firms will focus on cutting energy costs as a result of climate legislation. As plants become more energy efficient and utilities switch to renewable and advanced energy, new markets for energy efficiency equipment, renewable power generation equipment, coal sequestration and other advanced energy technologies will expand. Firms will move to take advantage of new sources of demand, which will require retooling.

4) We forecast both short-term and long-term job creation resulting from IMPACT lending. We forecast short-term jobs based on employment created due to orders and installation of machinery and equipment. Based on analysis of loan applications of firms entering clean energy or energy efficiency markets conducted by the University of Massachusetts' Political Economy Research Institute (PERI), we assume that approximately 60 percent of the value of each loan will be directed toward materials and equipment and 40 percent to installation and related construction. Long terms jobs result from expanded capacity due to the machinery and equipment purchased under the program. We use ratios of sales to fixed assets to calculate the long-term impact. The multipliers come from Dun & Bradstreet 'Industry Norms and Key Business ratios.' For example, Table 3 shows that in the fabricated metal industry, on average, \$2.20 in product sales is produced for every dollar of capital investment in fixed assets. Moving down the rows, Table 3 illustrates that smaller firms average a higher value of sales per dollar of investment when compared to larger firms.

Table 3: Examples of Dun & Bradstreet Fixed Asset/Sales Ratio

	Primary Metal	Fabricated Metal	Industrial Machinery	Misc. Manufacturing
Industry Average	1.98	2.20	1.93	1.95
\$100,001-\$250,000	n/a	3.75	3.08	3.31
\$250,001-\$500,000	2.13	2.88	2.61	2.79
\$500,001-\$1,000,000	2.35	2.34	2.05	2.32
\$1,000,001-\$5,000,000	1.96	1.95	1.75	1.75
\$5,000,0001-\$25,000,000	1.74	1.72	1.47	n/a
\$25,000,001-\$50,000,000	1.54	1.41	1.10	1.30

Source: University of Massachusetts, Amherst, Political Economy Research Institute (PERI) based on Dun & Bradstreet *"Industry Norms and Key Business Ratios"*

5) We base job creation estimates on input-output analysis, combined with employment data provided by Dun & Bradstreet. The model used for the input-output analysis is known as IMPLAN, and is used nationally to forecast job creation.

In an input-output analysis of employment, three types of jobs are considered:

- "Direct" jobs at the factory,
- "Indirect" jobs at other plants supplying materials and parts to that factory, and
- "Induced" jobs in the local economy supported when these workers spend their earnings in restaurants, movie theaters, banks, stores, and so forth.

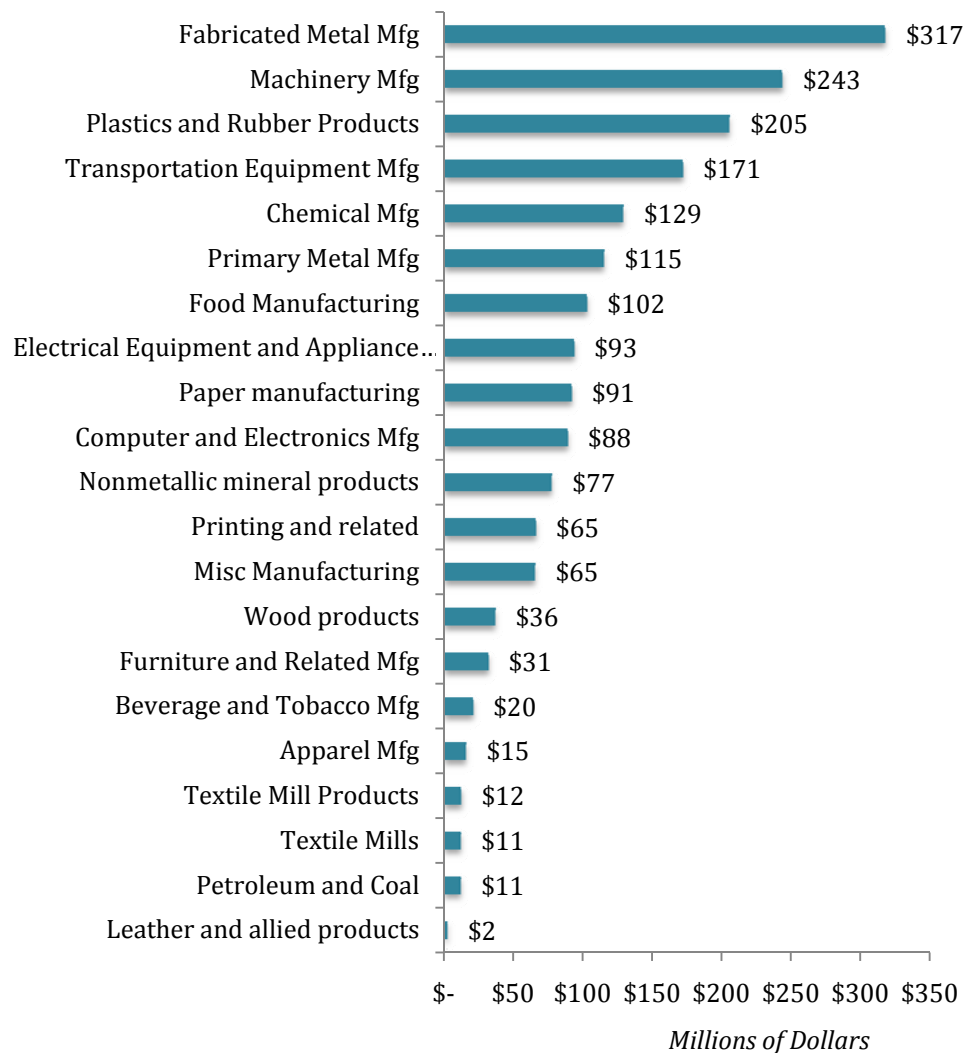
Using a model based on observed interactions within the economy, the impacts of a change – the injection of capital or the arrival of a new plant, for example - are analyzed across all sectors in the economy to see the impact on direct, indirect and induced jobs.

Distribution of funding by sector

Figure 4 shows a hypothetical distribution of IMPACT loans by sector over 10 years in Ohio. We assume that funding is proportionate to the size of the sector in the economy as measured by employment. As noted in the section on assumptions, one sector may have a high need for energy efficiency; another sector may be well into production of components for advanced energy generation (solar firms in the Toledo area, for example). At this early stage in the game, however, there is no track record for credible prediction of which sectors would have a disproportionate demand for IMPACT funds. Therefore, we used size of sector in Ohio as a basis for demand for, and distribution of, IMPACT loan funds by manufacturing sector.

In Appendix B (Table B-1), we present a complete list by detailed sector (four digit NAIC) for each of the 10 years of this analysis.

Figure 4: Hypothetical Distribution of IMPACT Loan Funds in Ohio



Source: Political Economy Research Institute at the University of Massachusetts at Amherst based on Dun & Bradstreet Data, fall 2009

How might IMPACT affect firms in a real Ohio city – say, Marion, Ohio? Table 4 presents a list of manufacturing firms in Marion County listed in February 2010 in the Dun and Bradstreet database.

Table 4: Manufacturing Firms Listed in Dunn & Bradstreet for Marion County

Company Name	Employees	Line Of Business
Marion Industries Inc	753	Manufactures motor vehicle wheels & parts
Bunge North America Foundation	63	Soybean processing
Whirlpool Corp	250	Manufactures commercial and household appliances
Pillsbury Co LLC	75	Manufactures flour & other grain products; canned fruits
Sypris Technologies Inc	200	Manufactures iron or steel & automotive forgings & power transmission
Wyandot Inc	350	Manufactures snack chip products
Arcelormittal Tubular Products	100	Manufactures steel pipe & tubes
Graphic Packaging Intl	150	Manufactures folding paperboard boxes
Tin Inc	109	Manufactures corrugated & solid fiber containers
Sika Corp	62	Manufactures concrete curing&hardening compounds;speed changers,drives,gears
Overhead Door Corp	100	Manufactures metal overhead garage doors; manufactures wooden doors
Glen-Gery Corp	90	Manufactures clay bricks; retails brick; manufactures clay refractories
Mid Ohio Packaging LLC	55	Manufactures corrugated boxes
Marion Ethanol LLC	40	Manufactures fuels
Wilson Bohannon Co	65	Manufactures padlocks; manufactures nonferrous die-cast products
Nucor Steel Marion Inc	20	Manufactures cold-rolled steel sheet or strip from own hot-rolled steel
Semco Inc	60	Copper foundry; machine shop, jobbing & repair services
Overhead Door Corp	50	Mfg Metal Doors/Sash/Trim Mfg Millwork Mfg Truck/Bus Bodies
Conagra Foods Inc	25	Manufactures canned tomato products
Steam Turbine Alternative	45	Manufactures steam turbines
General Machine & Saw Co	21	Manufactures steel pipe & tubes
Murphy Industries Inc	35	Manufactures insulated or armored steel cable
Harsco Corp	24	Manufactures industrial trucks & tractors; materials handling & construction machinery&equipment
White Mule Co Inc	21	Manufactures motor vehicle trailer hitches; structural iron work
Ohio Galvanizing Corp	50	Galvanizes iron, steel or end-formed products; manufactures rolling mill galvanizing lines
Robot Man Inc	30	Manufactures robotic conveyors
Simcote Inc	26	Painting, coating & hot dipping services; manufactures metalwork
Hercules Industries Inc	23	Manufactures hardware
Hildreth Manufacturing	25	Manufactures copper blocks
Folks Creative Printers Inc	27	Offset printing; manufactures signs & advertising; book binding; commercial printing
Water Poll Cntrl	30	Manufactures industrial water treatment equipment
Alfred Nickles Bakery Inc	20	Retail Bakery
NA-Churs Plant Food Co	25	Manufactures fertilizers; phosphatic & nitrogenous fertilizers
Mills Co	25	Manufactures floor attached partitions
J-Lenco Inc	80	Machine tools & accessories; industrial patterns
Total	3124	

Source: Dun & Bradstreet Selectory Database, February 18, 2010

A total of 16,591 employees were included in the Dun & Bradstreet database for the county. Of those employees, 3,124 (18.8 percent) are employed by manufacturing firms. All but one manufacturing firm in the Dun & Bradstreet database for Marion County have fewer than 500 workers. These are the companies IMPACT targets for assistance.

It is critically important to strengthen these firms so American has the manufacturing capacity to serve the clean energy economy. The firms shown in Table 4 range from food manufacturers through cement makers. All firms would be eligible for IMPACT loans for energy efficiency. Most firms can benefit from becoming more energy efficient and in so doing, they can reduce the costs of operations. For example, data analyzed by Policy Matters Ohio found that savings generated by energy efficiency improvements implemented with the assistance of the University of Dayton's federal energy efficiency center were greater than the initial investment and that the initial investment was recouped within a year's time, on average.¹¹

How does investment in energy efficiency create jobs? A firm that does not see opportunity in retooling for new markets may choose instead to impact the bottom line by lowering costs by upgrading to more energy efficient equipment, freeing up financial resources that could be used to increase output and employment. Such investments may have a less expansionary effect than retooling if the new energy efficiency equipment is simply taking the place of other equipment and output doesn't change the level of production. However, energy savings over time can lay the groundwork for future expansion, which is likely in the context of the growth in demand for manufactured products to serve new energy markets. It cannot be assumed that investments in energy efficiency will create more or fewer jobs than retooling built on a given level of capital investments. Further, with regard to this particular analysis, the capital assets measure used here is in fact an agglomeration of various types of capital assets. Energy efficiency improvements are not assumed to have a different effect on long-term job creation than retooling.

The real prize for a firm is in getting new customers. How will firms find new customers operating in new markets in the clean energy economy? There are some obvious connections. For example, steel plants will find growing demand in markets for pipe and tubing for coal sequestration and geothermal heat. Such linkages can be facilitated by rules that link domestic production to advanced and clean energy generation. For example, Ohio's Senate Bill 221, which addresses electricity markets in Ohio, provides that half of the renewable energy supply required under the state Renewable Energy Standard be generated in Ohio. Provisions are needed on the national level to ensure the market (utilities and other regulated emitters) seeks domestic manufacturers for the equipment they need to meet renewable energy and energy efficiency standards.

While news stories tend to highlight new clean energy companies and inventions, it is important to emphasize that the IMPACT legislation would support existing companies, allowing them to prepare for the clean energy economy by

¹¹ Amanda Woodrum, Greening Ohio Industries, Policy Matters Ohio, Fall, 2009.

becoming energy efficient and by finding and supplying new customers in the clean energy economy. Retaining and expanding jobs in manufacturing is important for several reasons. Manufacturing jobs tend to be more highly skilled and better compensated than many jobs in service industries. They also are often more productive, producing more profit per job than many service positions. In addition, manufacturing companies purchase high value materials and supplies from other factories, supporting a network of establishments and jobs. Evolution in technology and inventions in manufacturing keep an economy competitive in the world market. Manufacturing jobs create a particularly strong multiplier effect within the local economy, creating jobs throughout the supply chain and not only within the firm.

Input-Output Analysis of Job Creation resulting from IMPACT

Using the software program IMPLAN, the Political Economy Research Institute (PERI) at the University of Massachusetts, Amherst, evaluated the effect of IMPACT on the Ohio economy. As described in the section on assumptions, an input-output analysis of employment considers three types of jobs: “direct” jobs at the factory, “indirect” jobs at other plants supplying materials and parts to the first factory, and “induced” jobs in the local economy supported by the spending of the workers in restaurants, movie theaters, banks, stores, and so forth.

Short Term Jobs and Long Term Jobs

We went a step further to increase the accuracy of our projections. We looked at short-term jobs, created by the initial purchase and installation of industrial machinery, and at long-term jobs based on expansion of operations within firms that invest in energy efficiency and production equipment.

Short Term Jobs

In the first step of the analysis we calculated the number of short-term jobs IMPACT could create in Ohio. The short-term jobs will be created as a result of the purchase and installation of equipment and machinery for energy efficiency or retooling. We assume that in years one through ten of the program, 40 percent of funds will be spent on construction (installation) and 60 percent on equipment and machinery (for energy efficiency and retooling).¹² In other words, 40 percent of this funding will directly create jobs in the construction industry as people install new equipment in firms. This activity will indirectly create jobs in firms that supply the construction industry, and will support (induce) jobs where the construction workers spend their wages on food, clothing, housing, childcare and other expenses.

The analysis of the remaining 60 percent that applies to machinery works the same way. Direct jobs will be created by the producers of the machinery and indirect jobs will be created in plants that supply parts and materials to the machinery manufacturer. Induced jobs will be supported in the establishments

¹² This ratio is based on a review of bank loan applications for industrial loans undertaken by the Political Economy Research Institute (PERI) of the University of Massachusetts, Amherst.

where the machinery manufacturers' workers spend their wages. Table 5 shows the short-term employment effect of IMPACT investment in Ohio. As a result of this injection of capital into small- and medium-sized manufacturing firms, Ohio could see 21,613 direct, indirect and induced short-term jobs as companies purchase and install new equipment in plants around the state. Fabricated metals, chemical production, computers and electronics, and concrete and cement are big areas for job creation. (See Appendix B, Table B-2, for detailed numbers).

Table 5: Total Short Term Job Creation Attributable to IMPACT

Year	Direct	Indirect	Direct + Indirect	Induced	Total, Including Induced
<i>Column 1</i>	<i>Column 2</i>	<i>Column 3</i>	<i>Column 4</i>	<i>Column 5</i>	<i>Column 6</i>
Year 1	3,666	1,206	4,872	1,949	6,821
Year 2	3,666	1,206	4,872	1,949	6,821
Year 3	306	101	406	162	568
Year 4	306	101	406	162	568
Year 5	611	201	812	325	1,137
Year 6	618	196	814	326	1,140
Year 7	618	196	814	326	1,140
Year 8	618	196	814	326	1,140
Year 9	618	196	814	326	1,140
Year 10	618	196	814	326	1,140
Total	11,644	3,794	15,438	6,175	21,613

Source: University of Massachusetts, Amherst, Political Economy Research Institute (PERI)

Column 6 shows the total figures for job creation supported directly, indirectly or induced by loans to small and medium sized manufacturing establishments under the IMPACT program over the first ten years of use: they add up to 21,613 jobs during 10 years time.

Table 6 on the next page illustrates job growth by sector. While there may be good arguments as to why one sector may apply for more funds than another, such as greater need for energy efficiency or greater market demand for new orders, it is premature to estimate how that might work in Ohio. Therefore, as before, we look at a simple allocation based on size of the sector (See Appendix B, Table B-2 for greater detail).

Table 6: Short-Term Job Creation Resulting from IMPACT

Industry	Total	Direct	Indirect	Induced
Food Manufacturing	1163	626	204	332
Beverage and Tobacco Mfg	228	123	40	65
Textile Mills	130	70	23	37
Textile Mill Products	132	71	23	38
Apparel Mfg	172	93	30	49
Leather and allied products	21	11	4	6
Wood products	411	221	72	117
Paper manufacturing	1035	558	182	296
Printing and related	741	399	130	212
Petroleum and Coal	130	70	23	37
Chemical Mfg	1463	788	257	418
Plastics and Rubber Products	2334	1257	410	667
Nonmetallic mineral products	875	472	154	250
Primary Metal Mfg	1304	703	229	373
Fabricated Metal Mfg	3609	1944	634	1031
Machinery Mfg	2765	1490	485	790
Computer and Electronics Mfg	1004	541	176	287
Electrical Equipment and Appliance	1056	569	185	302
Transportation Equipment Mfg	1949	1050	342	557
Furniture and Related Mfg	353	190	62	101
Misc Manufacturing	738	398	130	211
Total	21,613	11,644	3,794	6,175

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

The automotive supply sector is of great importance to the Ohio economy. According to the Ohio Department of Development, automotive production and supply is an important economic driver throughout the state, and the value of automotive production to Ohio's gross domestic product is almost four times as great as in the nation as a whole.¹³ Up to 74 percent of the short-term employment effect of IMPACT would be in sectors that serve the automotive industry (Appendix C, Table C-1).

Long-Term Job Creation

The long-term employment that may result from capital investments supported by IMPACT funds are shown in Tables 7A and 7B. We present a lower range, based on average ratios of sales to capital investment (fixed assets) across all

¹³ Ohio Department of Development, "Automotive Industry Snapshot" at <http://www.development.ohio.gov/Research/files/B401.pdf>.

firms within an industrial sector regardless of size, and an upper range, based on average ratios for small firms, which are typically higher (See table 3, p.11).

Again, funding or loans are allocated to each industry according to its share of total manufacturing employment in firms of less than 500 employees. In this table, there is no time dimension, so the full level of capital expenditures over the 10-year period is presented in the first column. It is important to note that in this phase of the analysis, construction is not part of the equation. Firms have invested in new equipment, which they now use to produce new goods or more goods. The production and sales of these goods create ongoing employment, which is what is captured in the table below.

- Column 1 shows the investment in capital equipment that may be expected by sector.
- Column 2 contains the ratio of value of corporate sales to value of fixed asset investment within that industry.
- Column 3 gives the actual sales anticipated within each sector based on level of capital investment that IMPACT may support (Column 1 x Column 2).
- Column 4 gives the industry average for number of jobs per million dollars in sales within each sector.
- Column 5 shows total, long-term job creation. We multiplied new sales (generated from the new equipment) by the employment ratio (number of jobs created per million of dollars in sales) for each sector (Column 3 times Column 4).

Table 7A presents the calculations used to establish the lower range for direct long-term job creation. In this table, the average ratios across all firms in the industry are used. IMPACT is targeted at smaller firms so it is likely that the actual direct job creation would be higher than the final calculation of Table 7A.

We remind the reader that Tables 7A and 7B do NOT contain calculations that show indirect or induced jobs. These two tables demonstrate how we arrived at estimates for *direct job creation* in manufacturing sectors within small- and medium-sized firms. The estimates of direct jobs become the basis for the input-output analysis that provides the estimates for indirect and induced jobs, shown in Tables 8A and 8B. We also remind the reader that results of their own calculations using these numbers may vary slightly from these tables because of rounding.

Table 7A: Lower bound of long-term job creation (direct jobs only)

Annual Operating Employment from Capital Investment					
	Column 1	Column 2	Column 3	Column 4	Column 5
Sector	Total Fixed Asset Investment provided by IMPACT, in millions(\$)	Sales/Fixed Assets Ratio (industry average)	New sales: Investment x fixed asset /sales ratio	Employment ratio: Employment /\$1 million sales	Direct Operating employment (using industry average)
Food Manufacturing	61	2.11	129	1.6	207
Beverage and Tobacco	12	1.25	15	2.3	35
Textile Mills	7	2.08	14	5.1	73
Textile Mill Products	7	2.08	14	6.7	97
Apparel Manufacturing	9	2.19	20	2.4	48
Leather and allied products	1	1.61	2	2.8	5
Wood products	22	2.54	55	2	110
Paper manufacturing	55	1.86	102	0.9	91
Printing and related	39	1.92	75	1.4	105
Petroleum and Coal	7	2.30	16	2.72	43
Chemical	77	1.05	81	2.47	200
Plastics & Rubber Products	123	2.08	256	2.2	563
Nonmetallic mineral prods.	46	1.92	89	4.1	363
Primary Metal	69	1.98	136	3.6	490
Fabricated Metal	190	2.20	419	2.9	1215
Machinery	146	1.92	280	2.2	616
Computer & Electronics	53	1.49	79	5.49	433
Electrical Equip. & Appliance	56	2.98	166	7.16	1188
Transportation Equipment	103	1.94	199	3.64	726
Furniture and Related	19	2.31	43	8.3	357
Misc Manufacturing	39	1.95	76	9.61	729
Total	\$1,140				7695

Source: University of Massachusetts, Amherst, Political Economy Research Institute (PERI)

The employment to sales ratio (column 4) was derived both from the input-output model and the Dun & Bradstreet data of Ohio manufacturing firms with 500 or fewer employees. In most cases, the values derived from these two methods were quite similar. In cases where they differed, we erred on the side of being conservative and used the lower ratio.

Table 7B, below, shows the same set of calculations, but uses the ratios characteristic of smaller firms (refer to table 3, p. 11: the ratio for the smallest of firms, was used to calculate the upper bound for job creation). Since smaller firms

tend to be less capital-intensive than larger firms, they will have higher-than-average sales-to-assets ratios as well as employment-to-sales ratios, resulting in higher overall job creation per dollar invested in fixed assets. Since IMPACT is targeted to smaller firms, we calculate the higher employment/capital ratios of small firms and present them below. The results can be viewed as an upper bound of job creation possibilities.

Table 7B: Upper bound of long-term job creation (direct jobs only)

Annual Operating Employment from Capital Investment					
	Column 1	Column 2	Column 3	Column 4	Column 5
Sector	Total Fixed Asset Investment provided by IMPACT, in millions(\$)	Sales/Fixed Assets Ratio (small firms average)	New sales: Investment x fixed asset /sales ratio	Employment ratio: Employment /\$1 million sales	Direct Operating employment (using small firm average)
Food Manufacturing	61	2.65	162.53	1.6	260
Beverage and Tobacco (1)	12	1.25	15.02	2.3	35
Textile Mills(2)	7	2.67	18.33	5.1	73
Textile Mill Products(2)	7	2.67	18.58	6.7	97
Apparel Manufacturing	9	3.77	34.30	2.4	82
Leather and allied prod.(1)	1	1.61	1.78	2.8	5
Wood products	22	4.44	96.15	2	192
Paper manufacturing	55	4.15	226.55	0.9	204
Printing and related	39	4.07	159.17	1.4	223
Petroleum and Coal(1)	7	2.30	15.75	2.72	43
Chemical Manufacturing	77	2.88	222.24	2.47	549
Plastics and Rubber Products	123	2.87	353.25	2.2	777
Nonmetallic mineral prod.1)	46	1.92	88.65	4.1	363
Primary Metal	69	2.13	146.56	3.6	528
Fabricated Metal	190	3.75	713.88	2.9	2,070
Machinery	146	3.08	449.19	2.2	988
Computer & Electronics	53	4.42	234.12	5.49	1,285
Electrical Equip&Appliance	56	3.75	208.81	7.16	1,495
Transportation Equipment	103	3.14	322.77	3.64	1,175
Furniture and Related	19	2.94	54.75	8.3	454
Misc Manufacturing	39	2.79	108.59	9.61	1,044
Total	\$1,140				11,942
(1) No ratio is given to protect proprietary information, so industry average is used here.					
(2) The smallest size reported includes firms between \$500k and \$1M.					

Source: University of Massachusetts, Amherst, Political Economy research Institute (PERI)

Table 7A establishes the lower bound for direct employment at 7,695 and Table 7B establishes the upper bound for direct employment at 11,991. This range, however, represents only direct employment in these manufacturing industries. While it includes all types of occupations within these industries (e.g. manufacturing firms

employ both production workers and office staff), it does not include the indirect or induced employment that is supported by this operating employment.

Tables 8A and 8B provide the results of the input-output analysis of indirect and induced jobs resulting from the creation of the long-term jobs. Table 8A shows the lower bound for total long-term job creation due to IMPACT; it is based on overall industry averages, regardless of firm size. The direct job calculations upon which Table 8A is based are derived in Table 7A. Table 8B shows the upper bound for total long-term job creation; it is based on the estimates shown in Table 7B, using the industry averages for the smallest of firms.

Table 8A: Lower bound of long-term job creation from IMPACT (includes direct, indirect and induced jobs)

Annual Operating Employment with direct, indirect, and induced effects (industry average)				
	Column 1	Column 2	Column 3	Column 4
	Ongoing employment (direct)	Ongoing indirect employment	Ongoing induced employment	Total ongoing employment
Food Manufacturing	207	531	295	1,033
Beverage and Tobacco Mfg	35	53	35	122
Textile Mills	73	56	51	180
Textile Mill Products	97	45	57	199
Apparel Mfg	48	56	41	145
Leather and allied products	5	4	4	13
Wood products	110	105	86	300
Paper manufacturing	91	315	162	569
Printing and related	105	225	132	463
Petroleum and Coal	43	27	28	97
Chemical Mfg	200	251	181	632
Plastics and Rubber Products	563	546	501	1,610
Nonmetallic mineral product	363	222	234	819
Primary Metal Mfg	490	341	332	1,163
Fabricated Metal Mfg	1,215	1215	972	3,401
Machinery Mfg	616	672	515	1,803
Computer & Electronics Mfg	433	189	249	872
Electrical Equip & Appliance	1,188	448	654	2,291
Transportation Equipment	726	499	490	1,714
Furniture and Related Mfg	357	125	193	675
Misc Manufacturing	729	235	386	1,351
Total	7,695	6,157	5,598	19,450

Source: University of Massachusetts, Amherst, Political Economy Research Institute (PERI)

Table 8B presents the upper bound of total job creation that may result from IMPACT. Here, direct job creation is based on the higher sales to fixed asset ratios of smaller firms. These values were used in this run of input-output analysis, and yielded higher indirect and induced jobs as well.

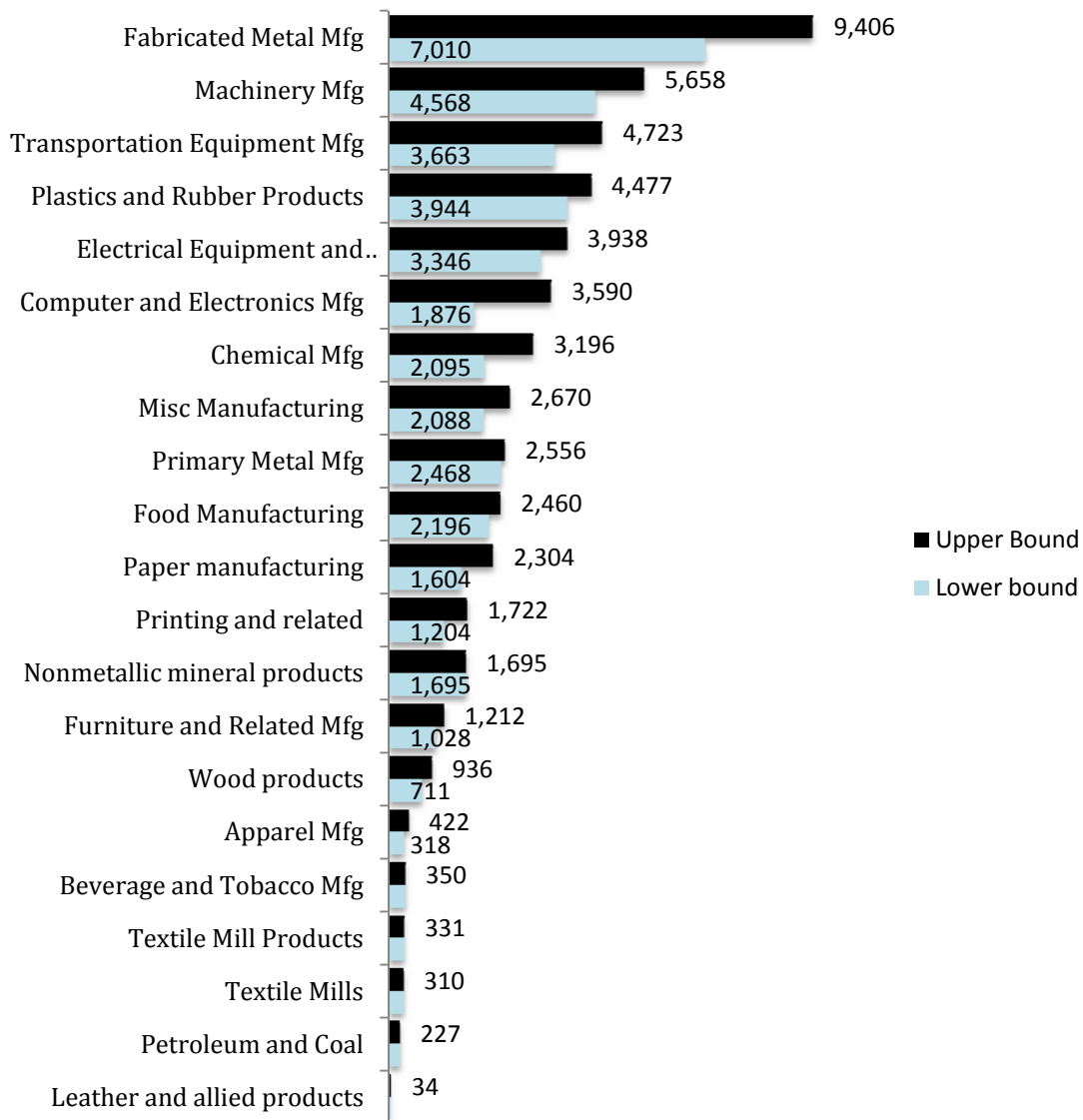
Table 8B: Upper bound of total long-term job creation from IMPACT (includes direct, indirect and induced jobs)

Annual Operating Employment with direct, indirect, and induced effects - Using small firm sales/asset ratio				
	Column 1	Column 2	Column 3	Column 4
	Ongoing employment (direct)	Ongoing indirect employment	Ongoing induced employment	Total ongoing employment
Food Manufacturing	260	666	371	1,297
Beverage and Tobacco Mfg	35	53	35	122
Textile Mills	73	56	51	180
Textile Mill Products	97	45	57	199
Apparel Mfg	82	96	71	250
Leather and allied products	5	4	4	13
Wood products	192	183	150	525
Paper manufacturing	204	702	362	1,269
Printing and related	223	478	280	980
Petroleum and Coal	43	27	28	97
Chemical Mfg	549	689	495	1,733
Plastics and Rubber Products	777	754	612	2,143
Nonmetallic mineral products	363	222	234	819
Primary Metal Mfg	528	366	358	1,252
Fabricated Metal Mfg	2,070	2070	1656	5,797
Machinery Mfg	988	1078	827	2,893
Computer and Electronics Mfg	1,285	562	739	2,586
Electrical Equipment & Appliance	1,495	564	824	2,882
Transportation Equipment Mfg	1,175	807	793	2,775
Furniture and Related Mfg	454	159	245	858
Misc Manufacturing	1,044	337	552	1,932
Total	11,942	9,916	8,743	30,601

Source: University of Massachusetts at Amherst Political economy Research Institute (PERI)

Figure 5 presents a graph illustrating the range of job creation possibilities by sector and incorporating both long term and short-term jobs. These totals are the sum of short-term jobs presented in Table 6 (p.17) and the long-term jobs presented in Tables 7A and 7B. The two estimates given represent the alternative assumptions of sales/assets ratios for smaller and larger firms. There is clearly variation between sectors in the range of possibility: this is attributable to the differing sales/asset ratios by sector and by size of firm. We emphasize that the upper bound of job creation uses the ratio for smaller firms while the lower bound represents the industry average, which includes large firms with employment over 500. IMPACT is focused on smaller firms; therefore, it is likely that job creation numbers would be on the higher end. .

Figure 5: IMPACT’s projected total job creation by sector: upper and lower bounds



Source: University of Massachusetts, Amherst, Political Economy Research Institute (PERI)

Table 9 summarizes both short-term and long-term employment resulting from the IMPACT program. The first line shows short-term job creation (direct, indirect, and induced) resulting from expenditures on construction and equipment for retooling and equipping Ohio’s manufacturing sector with more efficient technology. Short-term job creation is estimated at 21,613 jobs over the course of ten years. These equipment and machinery purchases will enable these manufacturers to create or maintain ongoing (long-term) employment, which is presented in the second row. The direct effects are the jobs created in the manufacturing firms themselves. The indirect and induced effects are created as a result of the direct manufacturing employment, and occur both in manufacturing as well as in other sectors. In sum, over the ten years analyzed here, direct long-term job creation could range from 19,450 to 30,601. Including indirect and induced

jobs, IMPACT is expected to create between 41,063 and 52,214 jobs in Ohio over the course of ten years.

Table 9: Cumulative Employment Effects of IMPACT

Total Employment Impacts				
	Direct	Indirect	Induced	Total
Short-term	11,644	3,794	6,175	21,613
Ongoing	7,695 to 11,942	6,157 to 9,916	5,598 to 8,743	19,450 to 30,601
Total	19,339 to 23,586	9,951 to 13,710	11,773 to 14,918	41,063 to 52,214
*Reminder to the reader: range of "ongoing" jobs depends on size of sales/asset ratio from tables 7A & 7B				

Source: University of Massachusetts, Amherst Political Economy Research Institute (PERI)

Almost three quarters of the total employment creation in Ohio would fall in sectors that serve the automotive industry (Appendix C). This reflects the fact that Ohio's manufacturing base is dependent upon automotive manufacture and highlights the importance of investment programs like IMPACT that can facilitate investment in energy efficiency and transition from declining markets to new markets of the future.

Conclusion and Recommendations

The IMPACT legislation would create between 41,063 and 52,214 new jobs across Ohio. This funding stream would represent an enormous investment of federal funds into the industrial base of Ohio. This new wave of reinvestment in Ohio's plant and equipment would stabilize the current economy, retaining jobs in cities like Marion, Findlay, Lancaster, Hamilton, Lorain and Cambridge – places that have been ravaged by the current recession.

IMPACT would also leave a lasting legacy for economic development for the state: a sizable revolving loan fund to allow bankers and businesses to redevelop banking relationships shattered by the collapse of the financial system. One of the largest barriers to recovery of the American economy is banks' fear of lending. By providing additional capital, IMPACT would create a cushion that will allow formation of stronger manufacturing plants and better access to capital. This investment could start an upward spiral based on production of things people need and will buy – a real basis for the economy of the future, instead of the speculative ventures that have sputtered and failed to replace a once robust production-based economy during the last 30 years.

Investment strategies like the IMPACT program can make climate change legislation work to America's advantage. If we ensure that clean energy markets create jobs in the United States, and if we prepare our manufacturers to respond to this new demand, we strengthen Ohio's competitive advantage. We have not seen a deliberate effort to grow basic economic assets for a generation. IMPACT, as part of climate change legislation, represents an opportunity to turn that around.

There is a long way to go in the move toward comprehensive federal climate legislation. What the Midwestern economy needs is both the markets that federal legislation would create, and the ability to access those markets. IMPACT would provide the funding to allow Ohio's firms to become efficient and to access new markets for clean energy technologies. We recommend that Ohio lawmakers support this bold initiative.

Appendix A: IMPACT language From the American Clean Energy and Security Act of 2009

SEC. 246. CLEAN ENERGY MANUFACTURING REVOLVING LOAN FUND PROGRAM.

The National Institute of Standards and Technology Act (15 U.S.C. 271 et seq.) is amended by inserting after section 26 the following:

SEC. 27. CLEAN ENERGY MANUFACTURING REVOLVING LOAN FUND PROGRAM.

(a) Purposes- The purposes of this section are as follows:

(1) To develop the long-term manufacturing capacity of the United States.

(2) To create jobs through the retooling and expansion of manufacturing facilities to produce clean energy technology products and energy efficient products.

(3) To improve the long-term competitiveness of domestic manufacturing by increasing the energy efficiency of manufacturing facilities.

(4) To assist small- and medium-sized manufacturers diversify operations to respond to emerging clean energy technology product markets.

(b) Definitions- In this section:

(1) CLEAN ENERGY TECHNOLOGY PRODUCT- The term 'clean energy technology product' means technology products relating to the following:

(A) Wind turbines.

(B) Solar energy.

(C) Fuel cells.

(D) Advanced batteries, battery systems, or storage devices.

(E) Biomass equipment.

(F) Geothermal equipment.

(G) Advanced biofuels.

(H) Ocean energy equipment.

(I) Carbon capture and storage.

`(J) Such other products as the Secretary determines--

`(i) relate to the production, use, transmission, storage, control, or conservation of energy;

`(ii) reduce greenhouse gas concentrations;

`(iii) achieve the earliest and maximum emission reductions within a reasonable period per dollar invested;

`(iv) result in the fewest non-greenhouse gas environmental impacts; and

`(v) either--

`(I) reduce the need for additional energy supplies by--

`(aa) using existing energy supplies with greater efficiency; or

`(bb) by transmitting, distributing, or transporting energy with greater effectiveness through the infrastructure of the United States; or

`(II) diversity the sources of energy supply of the United States--

`(aa) to strengthen energy security; and

`(bb) to increase supplies with a favorable balance of environmental effects if the entire technology system is considered.

`(2) ENERGY EFFICIENT PRODUCT- The term 'energy efficient product' means a product that, as determined by the Secretary in consultation with the Secretary of Energy--

`(A) consumes significantly less energy than the average amount that all similar products consumed on the day before the date of the enactment of this Act; or

`(B) is a component, system, or group of subsystems that is designed, developed, and validated to optimize the energy efficiency of a product.

`(3) HOLLINGS MANUFACTURING EXTENSION CENTER- The term 'Hollings Manufacturing Extension Center' means a center established under section 25.¹⁴

`(4) HOLLINGS MANUFACTURING PARTNERSHIP PROGRAM- The term 'Hollings Manufacturing Partnership Program' means the program established under sections 25 and 26.¹⁵

`(5) PROGRAM- The term 'Program' means the grant program established pursuant to subsection (c)(1).

`(6) REVOLVING LOAN FUND- The term 'revolving loan fund' means a revolving loan fund described in subsection (d).

¹⁴ Of the National Institute of Standards and Technology Act (15 U.S.C. 278K)

¹⁵ Of the same Act (15 .S.C. 278 and 2781).

`(7) SECRETARY- Except as otherwise provided, the term `Secretary' means the Secretary of Commerce.

`(8) SMALL OR MEDIUM-SIZED MANUFACTURER- The term `small or medium-sized manufacturer' means a manufacturer that employs fewer than 500 full-time equivalent employees at a manufacturing facility that is not owned or controlled by an automobile manufacturer.

`(c) Grant Program-

`(1) ESTABLISHMENT- Not later than 120 days after the date of the enactment of this section, the Secretary shall establish a program under which the Secretary shall award grants to States to establish revolving loan funds to provide loans to small- and medium-sized manufacturers to finance the cost of--

`(A) reequipping, expanding, or establishing (including applicable engineering costs) a manufacturing facility in the United States to produce--

`(i) clean energy technology products;

`(ii) energy efficient products; or

`(iii) integral component parts of clean energy technology products or energy efficient products; or

`(B) reducing the energy intensity or greenhouse gas production of a manufacturing facility in the United States, including using energy intensive feedstocks.

`(2) MAXIMUM AMOUNT- The Secretary may not award a grant under the Program in an amount that exceeds \$500,000,000 in any fiscal year.

`(d) Criteria for Awarding Grants-

`(1) MATCHING FUNDS- The Secretary may make a grant to a State under the Program only if the State agrees to ensure that for each loan provided by the State under the Program, not less than 20 percent of the amount of each loan will come from a non-Federal source.

`(2) ADMINISTRATIVE COSTS- A State receiving a grant under the Program may only use such amount of the grant for the costs of administering the revolving loan fund as the Secretary shall provide in regulations.

`(3) APPLICATION- Each State seeking a grant under the Program shall submit to the Secretary an application therefore in such form and in such manner as the Secretary considers appropriate.

`(4) EVALUATION- The Secretary shall evaluate and prioritize an application submitted by a State for a grant under the Program on the basis of--

`(A) the description of the revolving loan fund to be established with the grant and how such revolving loan fund will achieve the purposes described in subsection (a);

`(B) whether the State will be able to provide loans from the revolving loan fund to small or medium-sized manufacturers before the date that is 120 days after the date on which the State receives the grant;

`(C) a description of how the State will administer the revolving loan fund in coordination with other State and Federal programs, including programs administered by the Assistant Secretary for Economic Development;

`(D) a description of the actual or potential clean energy manufacturing supply chains, including significant component parts, in the region served by the revolving loan fund;

`(E) how the State will target the provision of loans under the Program to manufacturers located in regions characterized by high unemployment and sudden and severe economic dislocation, in particular where mass layoffs have resulted in a precipitous increase in unemployment;

`(F) the availability of a skilled manufacturing workforce in the region served by the revolving loan fund and the capacity of the region's workforce and education systems to provide pathways for unemployed or low-income workers into skilled manufacturing employment;

`(G) a description of how the State will target loans to small or medium-sized manufacturers who are--

`(i) manufacturers of automobile components; and

`(ii) either--

`(I) increasing the energy efficiency of their manufacturing facilities; or

`(II) retooling to manufacture clean energy products or energy efficient products, including manufacturing components to improve the compliance of an automobile with fuel economy standards prescribed under section 32902 of title 49, United States Code;

`(H) a description of how the State will use the loan fund to achieve the earliest and maximum greenhouse gas emission reductions within a reasonable period of time per dollar invested and with the fewest non-greenhouse gas environmental impacts; and

`(I) such other factors as the Secretary considers appropriate to ensure that grants awarded under the Program effectively and efficiently achieve the purposes described in subsection (a).

`(e) Revolving Loan Funds-

`(1) IN GENERAL- A State receiving a grant under the Program shall establish, maintain, and administer a revolving loan fund in accordance with this subsection.

`(2) DEPOSITS- A revolving loan fund shall consist of the following:

`(A) Amounts from grants awarded under this section.

`(B) All amounts held or received by the State incident to the provision of loans described in subsection (f), including all collections of principal and interest.

`(3) EXPENDITURES- Amounts in the revolving loan fund shall be available for the provision and administration of loans in accordance with subsection (f).

`(4) LIMITATION- No funds provided pursuant to this section may be leveraged through use of tax-exempt bonding authority by a State or a political subdivision of a State.

`(f) Loans-

`(1) IN GENERAL- A State receiving a grant under this section shall use the amount in the revolving loan fund to provide loans to small- and medium-sized manufacturers as described in subsection (c)(1).

`(2) LOAN TERMS AND CONDITIONS- The following shall apply with respect to loans provided under paragraph (1):

`(A) TERMS- Loans shall have a term determined by the State receiving the grant as follows:

`(i) For fixed assets, the term of the loan shall not exceed the useful life of the asset and shall be less than 15 years.

`(ii) For working capital, the term of the loan shall not exceed 36 months.

`(B) INTEREST RATES- Loans shall bear an interest rate determined by the State receiving the grant as follows:

`(i) The interest rate shall enable the loan recipient to accomplish the activities described in subparagraphs (A) and (B) of subsection (c)(1).

`(ii) The interest rate may be set below-market interest rates.

`(iii) The interest rate may not be less than zero percent.

`(iv) The interest rate may not exceed the current prime rate plus 500 basis points.

`(C) DESCRIPTION AND BUDGET FOR USE OF LOAN FUNDS- Each recipient of a loan from a State under the Program shall develop and submit to the State and the Secretary a description and budget for the use of loan amounts, including a description of the following:

`(i) Any new business expected to be developed with the loan.

`(ii) Any improvements to manufacturing operations to be developed with the loan.

`(iii) Any technology expected to be commercialized with the loan.

`(D) PRIORITY IN REVIEW AND PREFERENCE IN SELECTION FOR CERTAIN LOAN APPLICANTS-

`(i) REVIEW- In reviewing applications submitted by small or medium-sized manufacturers for a loan, a recipient of a grant under the Program shall give priority to small or medium-sized manufacturers described in clause (iii).

`(ii) SELECTION- In selecting small or medium-sized manufacturers to receive a loan, a recipient of a grant under the Program shall give preference to small or medium-sized manufacturers described in clause (iii).

`(iii) PRIORITY AND PREFERRED SMALL OR MEDIUM-SIZED MANUFACTURERS- A small or medium-sized manufacturer described in this clause is a manufacturer that--

`(I) is certified by a Hollings Manufacturing Extension Center or a manufacturing-related local intermediary designated by the Secretary for purposes of providing such certification; or

`(II) provides individuals employed at the manufacturing facilities of the manufacturer--

`(aa) pay in amounts that are, on average, equal to or more than the average wage of an individual working in a manufacturing facility in the State; and

`(bb) health benefits.

`(iv) CERTIFICATION BY HOLLINGS MANUFACTURING EXTENSION CENTER- A Hollings Manufacturing Extension Center or other entity designated by the Secretary for purposes of providing certification under clause (iii)(I) shall only certify applications for a loan after carrying out a qualitative and quantitative review of the applicant's business strategy, manufacturing operations, and technological ability to contribute to the purposes described in subsection (a).

`(E) REPAYMENT UPON RELOCATION OUTSIDE UNITED STATES-

`(i) IN GENERAL- If a person receives a loan under paragraph (1) to finance the cost of reequipping, expanding, or establishing a manufacturing facility as described in subsection (c)(1)(A) or to reduce the energy intensity of a manufacturing facility and such person relocates the production activities of such manufacturing facility outside the United States during the term of the loan, the recipient shall repay such loan in full with interest as described in clause (ii) and for a duration described in clause (iii).

`(ii) PAYMENT OF INTEREST- Any amount owed by the recipient of a loan under paragraph (1) who is required to repay the loan under clause (i) shall bear interest at a penalty rate determined by the Secretary to deter recipients of loans under paragraph (1) from relocating production activities as described in clause (i).

`(iii) PERIOD OF REPAYMENT- Repayment of a loan under clause (i) shall be for a duration determined by the Secretary.

`(F) COMPLIANCE WITH WAGE RATE REQUIREMENTS- Each recipient of a loan shall undertake and agree to incorporate or cause to be incorporated into all contracts for construction, alteration or repair, which are paid for in whole or in part with funds obtained pursuant to such loan, a requirement that all laborers and mechanics employed by contractors and subcontractors performing construction, alteration or repair shall be paid wages at rates not less than those determined by the Secretary of Labor, in accordance with subchapter IV of chapter 31 of title 40, United States Code (known as the 'Davis-Bacon Act'), to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the same locality in which the work is to be performed. The Secretary of Labor shall have, with respect to the labor standards specified in this subparagraph, the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (15 Fed. Reg. 3176; 64 Stat. 1267) and section 3145 of title 40, United States Code.

`(G) ANNUAL REPORTS BY LOAN RECIPIENTS- Each recipient of a loan issued by a State under paragraph (1) shall, not less frequently than once each year during the term of the loan, submit to such State a report containing such information as the Secretary may specify for purposes of the Program, including information that the Secretary can use to determine whether a recipient of a loan is required to repay the loan under subparagraph (E).

`(3) ANNUAL REPORTS BY GRANT RECIPIENTS- Each recipient of a grant under the Program shall, not less frequently than once each year, submit to the Secretary a report on the impact of each loan issued by the State under the Program and the aggregate impact of all loans so issued, including the following:

- `(A) The sales increased or retained.
- `(B) Cost savings or costs avoided.
- `(C) Additional investment encouraged.

`(D) Jobs created or retained.

`(g) Authorization of Appropriations- There is authorized to be appropriated to carry out this section \$15,000,000,000 for each of fiscal years 2010 and 2011.'

SEC. 247. CLEAN ENERGY AND EFFICIENCY MANUFACTURING PARTNERSHIPS.

(a) Hollings Manufacturing Partnership Program- Section 25(b) of the National Institute of Standards and Technology Act (15 U.S.C. 278k(b)) is amended--

(1) in paragraph (2), by striking `and' at the end;

(2) in paragraph (3), by striking the period at the end and inserting `; and'; and

(3) by adding at the end the following:

`(4) the establishment of a clean energy manufacturing supply chain initiative--

`(A) to support manufacturers in their identification of and diversification to new markets, including support for manufacturers transitioning to the use of clean energy supply chains;

`(B) to assist manufacturers improve their competitiveness by reducing energy intensity and greenhouse gas production, including the use of energy intensive feedstocks;

`(C) to increase adoption and implementation of innovative manufacturing technologies;

`(D) to coordinate and leverage the expertise of the National Laboratories and Technology Centers and the Industrial Assessment Centers of the Department of Energy to meet the needs of manufacturers; and

`(E) to identify, assist, and certify manufacturers seeking loans under section 27(e)(1).'¹⁶

(b) Reduction in Cost Share Requirements- Section 25(c) of such Act (15 U.S.C. 278k(c)) is amended--

(1) in paragraph (1), by inserting `or as provided in paragraph (5)' after `not to exceed six years';

(2) in paragraph (3)(B), by striking `not less than 50 percent of the costs incurred for the first 3 years and an increasing share for each of the last 3 years' and inserting `50 percent of the costs incurred or such lesser percentage of the costs incurred as determined appropriate by the Secretary by rule'; and

¹⁶ Section 137(e)(1) of the Emergency Economic Stabilization Act of 2008

(3) in paragraph (5)--

(A) by striking `at declining levels';

(B) by striking `one third' and inserting `50 percent'; and

(C) by inserting `, or such lesser percentage as determined appropriate by the Secretary by rule,' after `maintenance costs'.

(c) Authorization of Appropriations- There are authorized to be appropriated to the Secretary of Commerce for the Hollings Manufacturing Partnership Program authorized under sections 25 of the National Institute of Standards and Technology Act (15 U.S.C. 278k) and for the provision of assistance under section 26 of such Act (15 U.S.C. 278l)--

(1) \$200,000,000 for fiscal year 2010;

(2) \$250,000,000 for fiscal year 2011;

(3) \$300,000,000 for fiscal year 2012;

(4) \$350,000,000 for fiscal year 2013; and

(5) \$400,000,000 for fiscal year 2014.

SEC. 248. TECHNICAL AMENDMENTS.

(a) Amendment to National Institute of Standards and Technology Act- Section 25 of the National Institute of Standards and Technology Act (15 U.S.C. 278k(b)) is amended--

(1) in subsection (a), by striking `(hereafter in this Act referred to as the `Centers')'; and

(2) by adding at the end the following:

`(g) Designation-

`(1) HOLLINGS MANUFACTURING PARTNERSHIP PROGRAM- The program under this section shall be known as the `Hollings Manufacturing Partnership Program'.

`(2) HOLLINGS MANUFACTURING EXTENSION CENTERS- The Regional Centers for the Transfer of Manufacturing Technology created and supported under subsection (a) shall be known as the `Hollings Manufacturing Extension Centers' (in this Act referred to as the `Centers').'

(b) Amendment to Consolidated Appropriations Act, 2005- Division B of title II of the Consolidated Appropriations Act, 2005 (Law 108-447; 118 Stat. 2879; 15 U.S.C. 278k note) is amended under the heading `INDUSTRIAL TECHNOLOGY SERVICES' by striking `2007: *Provided further, That*' and all that follows through `Extension Centers.' and inserting `2007.'.

Appendix B: Detailed data:

Table B-1: Distribution of IMPACT funding by detailed sector, 2010 - 2020

Table B-2: Employment Impacts from Retooling and Installing EE Equipment (Full-time Equivalent Jobs)

Table B-1: Distribution of IMPACT funding by detailed sector, 2010 - 2020

4-digit NAICS	Industry	Total and Annual Spending by Industry (in millions of dollars)										
		Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
3111	Animal Food Mfg	7.37	2.33	2.33	0.19	0.19	0.39	0.39	0.39	0.39	0.39	0.39
3112	Grain and Oilseed Milling	7.42	2.34	2.34	0.20	0.20	0.39	0.39	0.39	0.39	0.39	0.39
3113	Sugar and Confectionary Products	3.20	1.01	1.01	0.08	0.08	0.17	0.17	0.17	0.17	0.17	0.17
3114	Fruit and Vegetable Preserving and Specialty	9.71	3.07	3.07	0.26	0.26	0.51	0.51	0.51	0.51	0.51	0.51
3115	Dairy Products	15.01	4.74	4.74	0.40	0.40	0.79	0.79	0.79	0.79	0.79	0.79
3116	Animal Slaughtering and Processing	14.25	4.50	4.50	0.38	0.38	0.75	0.75	0.75	0.75	0.75	0.75
3118	Bakeries and Tortilla Mfg	25.72	8.12	8.12	0.68	0.68	1.35	1.35	1.35	1.35	1.35	1.35
3119	Other Food Mfg	19.54	6.17	6.17	0.51	0.51	1.03	1.03	1.03	1.03	1.03	1.03
3121	Beverage Mfg	20.02	6.32	6.32	0.53	0.53	1.05	1.05	1.05	1.05	1.05	1.05
3131	Fiber, Yarn, and Thread Mills	0.31	0.10	0.10	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
3132	Fabric Mills	9.13	2.88	2.88	0.24	0.24	0.48	0.48	0.48	0.48	0.48	0.48
3133	Textile and Fabric Finishing Mills	2.01	0.63	0.63	0.05	0.05	0.11	0.11	0.11	0.11	0.11	0.11
3141	Textile Furnishings Mills	5.60	1.77	1.77	0.15	0.15	0.29	0.29	0.29	0.29	0.29	0.29
3149	Other Textile Mill Products	5.99	1.89	1.89	0.16	0.16	0.32	0.32	0.32	0.32	0.32	0.32
3152	Cut and Sew Apparel Mfg	12.80	4.04	4.04	0.34	0.34	0.67	0.67	0.67	0.67	0.67	0.67
3159	Accessories and Other Apparel Mfg	2.36	0.75	0.75	0.06	0.06	0.12	0.12	0.12	0.12	0.12	0.12
3162	Footwear Mfg	1.25	0.39	0.39	0.03	0.03	0.07	0.07	0.07	0.07	0.07	0.07
3169	Other Leather Product Mfg	0.60	0.19	0.19	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
3211	Sawmills and Wood Preservation	5.93	1.87	1.87	0.16	0.16	0.31	0.31	0.31	0.31	0.31	0.31
3212	Plywood and Engineered Wood Product	4.33	1.37	1.37	0.11	0.11	0.23	0.23	0.23	0.23	0.23	0.23
3219	Other Wood Product Mfg	25.84	8.16	8.16	0.68	0.68	1.36	1.36	1.36	1.36	1.36	1.36
3221	Pulp, Paper, Paperboard Mills	24.20	7.64	7.64	0.64	0.64	1.27	1.27	1.27	1.27	1.27	1.27
3222	Converted Paper Products	66.79	21.09	21.09	1.76	1.76	3.52	3.52	3.52	3.52	3.52	3.52
3231	Printing and Related Activities	65.18	20.58	20.58	1.72	1.72	3.43	3.43	3.43	3.43	3.43	3.43
3241	Petroleum and Coal Products	11.41	3.60	3.60	0.30	0.30	0.60	0.60	0.60	0.60	0.60	0.60
3251	Basic Chemical Mfg	37.12	11.72	11.72	0.98	0.98	1.95	1.95	1.95	1.95	1.95	1.95
3252	Resin, Rubber, Artificial Fibers	18.51	5.84	5.84	0.49	0.49	0.97	0.97	0.97	0.97	0.97	0.97
3253	Agricultural Chemicals	3.78	1.19	1.19	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.20
3254	Pharmaceutical and Medicine Mfg	12.27	3.88	3.88	0.32	0.32	0.65	0.65	0.65	0.65	0.65	0.65
3255	Paint, Coating, Adhesives	21.76	6.87	6.87	0.57	0.57	1.15	1.15	1.15	1.15	1.15	1.15
3256	Soap, Clean Compounds, Toiletry Mfg	18.40	5.81	5.81	0.48	0.48	0.97	0.97	0.97	0.97	0.97	0.97
3259	Other Chemical Mfg	16.77	5.30	5.30	0.44	0.44	0.88	0.88	0.88	0.88	0.88	0.88
3261	Plastics Product Mfg	159.39	50.33	50.33	4.19	4.19	8.39	8.39	8.39	8.39	8.39	8.39
3262	Rubber Product Mfg	45.75	14.45	14.45	1.20	1.20	2.41	2.41	2.41	2.41	2.41	2.41
3271	Clay Product and Refractory Mfg	14.05	4.44	4.44	0.37	0.37	0.74	0.74	0.74	0.74	0.74	0.74
3272	Glass and Glass Products	19.46	6.14	6.14	0.51	0.51	1.02	1.02	1.02	1.02	1.02	1.02
3273	Cement and Concrete	25.47	8.04	8.04	0.67	0.67	1.34	1.34	1.34	1.34	1.34	1.34
3274	Lime and Gypsum Products	2.77	0.88	0.88	0.07	0.07	0.15	0.15	0.15	0.15	0.15	0.15
3279	Other Non-Metallic Products	15.21	4.80	4.80	0.40	0.40	0.80	0.80	0.80	0.80	0.80	0.80
3311	Iron and Steel Mills	26.02	8.22	8.22	0.68	0.68	1.37	1.37	1.37	1.37	1.37	1.37
3312	Steel Products from Purchased Steel	19.20	6.06	6.06	0.51	0.51	1.01	1.01	1.01	1.01	1.01	1.01
3313	Alumina and Aluminum Products	13.17	4.16	4.16	0.35	0.35	0.69	0.69	0.69	0.69	0.69	0.69
3314	Other Non-Ferrous Metal Production	11.28	3.56	3.56	0.30	0.30	0.59	0.59	0.59	0.59	0.59	0.59

3315	Foundries	45.01	14.21	14.21	1.18	1.18	2.37	2.37	2.37	2.37	2.37	2.37
3321	Forging and Stamping	55.25	17.45	17.45	1.45	1.45	2.91	2.91	2.91	2.91	2.91	2.91
3322	Cutlery and Hand tool Mfg	10.34	3.26	3.26	0.27	0.27	0.54	0.54	0.54	0.54	0.54	0.54
3323	Architectural and Structural Metal	58.06	18.33	18.33	1.53	1.53	3.06	3.06	3.06	3.06	3.06	3.06
3324	Boiler, tank, and shipping container	14.95	4.72	4.72	0.39	0.39	0.79	0.79	0.79	0.79	0.79	0.79
3325	Hardware Mfg	8.22	2.60	2.60	0.22	0.22	0.43	0.43	0.43	0.43	0.43	0.43
3326	Spring and Wire Products	14.75	4.66	4.66	0.39	0.39	0.78	0.78	0.78	0.78	0.78	0.78
3327	Machine Shops	68.74	21.71	21.71	1.81	1.81	3.62	3.62	3.62	3.62	3.62	3.62
3328	Coating, Engraving, Heat-Treating Metals	36.63	11.57	11.57	0.96	0.96	1.93	1.93	1.93	1.93	1.93	1.93
3329	Other Fabricated Metal Products	50.34	15.90	15.90	1.32	1.32	2.65	2.65	2.65	2.65	2.65	2.65
3331	Ag, Construction, Mining Machinery	21.23	6.70	6.70	0.56	0.56	1.12	1.12	1.12	1.12	1.12	1.12
3332	Industrial Machinery	24.06	7.60	7.60	0.63	0.63	1.27	1.27	1.27	1.27	1.27	1.27
3333	Commercial and Service Industry Machinery	17.48	5.52	5.52	0.46	0.46	0.92	0.92	0.92	0.92	0.92	0.92
3334	HVAC and Commercial Refrigeration	26.89	8.49	8.49	0.71	0.71	1.42	1.42	1.42	1.42	1.42	1.42
3335	Metalworking Machinery	58.82	18.57	18.57	1.55	1.55	3.10	3.10	3.10	3.10	3.10	3.10
3336	Turbine and Power Transmission Equip	15.26	4.82	4.82	0.40	0.40	0.80	0.80	0.80	0.80	0.80	0.80
3339	Other Machinery	79.32	25.05	25.05	2.09	2.09	4.17	4.17	4.17	4.17	4.17	4.17
3341	Computer and Peripherals	6.39	2.02	2.02	0.17	0.17	0.34	0.34	0.34	0.34	0.34	0.34
3342	Communications Equipment	12.51	3.95	3.95	0.33	0.33	0.66	0.66	0.66	0.66	0.66	0.66
3343	Audio and Video Equipment	2.41	0.76	0.76	0.06	0.06	0.13	0.13	0.13	0.13	0.13	0.13
3344	Semiconductor and Electronic Components	17.44	5.51	5.51	0.46	0.46	0.92	0.92	0.92	0.92	0.92	0.92
3345	Electronic Instruments	45.97	14.52	14.52	1.21	1.21	2.42	2.42	2.42	2.42	2.42	2.42
3346	Magnetic Media Mfg	3.56	1.12	1.12	0.09	0.09	0.19	0.19	0.19	0.19	0.19	0.19
3351	Electric Lighting Equip	14.52	4.59	4.59	0.38	0.38	0.76	0.76	0.76	0.76	0.76	0.76
3352	Household Appliances	19.17	6.05	6.05	0.50	0.50	1.01	1.01	1.01	1.01	1.01	1.01
3353	Electrical Equipment	29.59	9.34	9.34	0.78	0.78	1.56	1.56	1.56	1.56	1.56	1.56
3359	Other Electrical Equip	29.52	9.32	9.32	0.78	0.78	1.55	1.55	1.55	1.55	1.55	1.55
3361	Motor Vehicle Mfg	10.68	3.37	3.37	0.28	0.28	0.56	0.56	0.56	0.56	0.56	0.56
3362	Motor Vehicle Body and Trailer	19.27	6.09	6.09	0.51	0.51	1.01	1.01	1.01	1.01	1.01	1.01
3363	Motor Vehicle Parts Mfg	116.93	36.93	36.93	3.08	3.08	6.15	6.15	6.15	6.15	6.15	6.15
3364	Aerospace Products and Parts	17.88	5.65	5.65	0.47	0.47	0.94	0.94	0.94	0.94	0.94	0.94
3365	Railroad Rolling Stock	1.88	0.59	0.59	0.05	0.05	0.10	0.10	0.10	0.10	0.10	0.10
3366	Ship and Boat Building	1.55	0.49	0.49	0.04	0.04	0.08	0.08	0.08	0.08	0.08	0.08
3369	Other Transportation Equipment	3.13	0.99	0.99	0.08	0.08	0.16	0.16	0.16	0.16	0.16	0.16
3371	Household and Institutional Furniture	18.16	5.74	5.74	0.48	0.48	0.96	0.96	0.96	0.96	0.96	0.96
3372	Office Furniture and Fixtures	10.42	3.29	3.29	0.27	0.27	0.55	0.55	0.55	0.55	0.55	0.55
3379	Other Furniture and Related	2.45	0.77	0.77	0.06	0.06	0.13	0.13	0.13	0.13	0.13	0.13
3391	Medical Equipment and Supplies	19.46	6.14	6.14	0.51	0.51	1.02	1.02	1.02	1.02	1.02	1.02
3399	Other Misc Mfg	45.41	14.34	14.34	1.20	1.20	2.39	2.39	2.39	2.39	2.39	2.39
Total		\$ 1,900	\$ 600	\$ 600	\$ 50	\$ 50	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100
Sub-Total Auto industry-related		1,415	447	447	37	37	74	74	74	74	74	74

Source: Political Economy Research Institute, University of Massachusetts at Amherst

**TABLE B-2: Employment Impacts from Retooling and Installing EE Equipment
(Full-time Equivalent Jobs)**

4-digit NAICS	Industry	Total	Construction - Direct	Construction - Indirect	Construction - Induced	Machinery Manufacturing - Direct	Machinery Manufacturing - Indirect	Machinery Manufacturing - Induced
3111	Animal Food Mfg	84	28	6	13	17	9	10
3112	Grain and Oilseed Milling	84	28	6	14	17	9	11
3113	Sugar and Confectionary Products	36	12	3	6	7	4	5
3114	Fruit and Vegetable Preserving and Specialty	110	37	8	18	23	12	14
3115	Dairy Products	171	57	12	27	35	18	21
3116	Animal Slaughtering and Processing	162	54	11	26	33	17	20
3118	Bakeries and Tortilla Mfg	293	98	20	47	60	31	36
3119	Other Food Mfg	222	74	15	36	46	24	28
3121	Beverage Mfg	228	76	16	37	47	24	28
3131	Fiber, Yarn, and Thread Mills	4	1	0	1	1	0	0
3132	Fabric Mills	104	35	7	17	21	11	13
3133	Textile and Fabric Finishing Mills	23	8	2	4	5	2	3
3141	Textile Furnishings Mills	64	21	4	10	13	7	8
3149	Other Textile Mill Products	68	23	5	11	14	7	9
3152	Cut and Sew Apparel Mfg	146	49	10	23	30	15	18
3159	Accessories and Other Apparel Mfg	27	9	2	4	6	3	3
3162	Footwear Mfg	14	5	1	2	3	2	2
3169	Other Leather Product Mfg	7	2	0	1	1	1	1
3211	Sawmills and Wood Preservation	67	22	5	11	14	7	8
3212	Plywood and Engineered Wood Product	49	16	3	8	10	5	6
3219	Other Wood Product Mfg	294	98	20	47	60	31	37
3221	Pulp, Paper, Paperboard Mills	275	92	19	44	57	29	34
3222	Converted Paper Products	760	253	53	122	156	81	95
3231	Printing and Related Activities	741	247	51	119	152	79	92
3241	Petroleum and Coal Products	130	43	9	21	27	14	16
3251	Basic Chemical Mfg	422	141	29	68	87	45	53
3252	Resin, Rubber, Artificial Fibers	211	70	15	34	43	22	26
3253	Agricultural Chemicals	43	14	3	7	9	5	5
3254	Pharmaceutical and Medicine Mfg	140	47	10	22	29	15	17
3255	Paint, Coating, Adhesives	248	83	17	40	51	26	31
3256	Soap, Clean Compounds, Toiletry Mfg	209	70	14	34	43	22	26
3259	Other Chemical Mfg	191	64	13	31	39	20	24
3261	Plastics Product Mfg	1813	604	125	292	372	193	226
3262	Rubber Product Mfg	520	173	36	84	107	55	65
3271	Clay Product and Refractory Mfg	160	53	11	26	33	17	20
3272	Glass and Glass Products	221	74	15	36	45	24	28
3273	Cement and Concrete	290	97	20	47	60	31	36
3274	Lime and Gypsum Products	32	11	2	5	6	3	4
3279	Other Non-Metallic Products	173	58	12	28	36	18	22
3311	Iron and Steel Mills	296	99	20	48	61	31	37

3312	Steel Products from Purchased Steel	218	73	15	35	45	23	27
3313	Alumina and Aluminum Products	150	50	10	24	31	16	19
3314	Other Non-Ferrous Metal Production	128	43	9	21	26	14	16
3315	Foundries	512	171	35	82	105	54	64
3321	Forging and Stamping	629	209	44	101	129	67	78
3322	Cutlery and Handtool Mfg	118	39	8	19	24	13	15
3323	Architectural and Structural Metal	660	220	46	106	136	70	82
3324	Boiler, tank, and shipping container	170	57	12	27	35	18	21
3325	Hardware Mfg	94	31	6	15	19	10	12
3326	Spring and Wire Products	168	56	12	27	34	18	21
3327	Machine Shops	782	261	54	126	161	83	98
3328	Coating, Engraving, Heat-Treating Metals	417	139	29	67	86	44	52
3329	Other Fabricated Metal Products	573	191	40	92	118	61	71
3331	Ag, Construction, Mining Machinery	242	80	17	39	50	26	30
3332	Industrial Machinery	274	91	19	44	56	29	34
3333	Commercial and Service Industry Machinery	199	66	14	32	41	21	25
3334	HVAC and Commercial Refrigeration	306	102	21	49	63	33	38
3335	Metalworking Machinery	669	223	46	108	137	71	83
3336	Turbine and Power Transmission Equip	174	58	12	28	36	18	22
3339	Other Machinery	902	301	62	145	185	96	113
3341	Computer and Peripherals	73	24	5	12	15	8	9
3342	Communications Equipment	142	47	10	23	29	15	18
3343	Audio and Video Equipment	27	9	2	4	6	3	3
3344	Semiconductor and Electronic Components	198	66	14	32	41	21	25
3345	Electronic Instruments	523	174	36	84	107	56	65
3346	Magnetic Media Mfg	40	13	3	7	8	4	5
3351	Electric Lighting Equip	165	55	11	27	34	18	21
3352	Household Appliances	218	73	15	35	45	23	27
3353	Electrical Equipment	337	112	23	54	69	36	42
3359	Other Electrical Equip	336	112	23	54	69	36	42
3361	Motor Vehicle Mfg	121	40	8	20	25	13	15
3362	Motor Vehicle Body and Trailer	219	73	15	35	45	23	27
3363	Motor Vehicle Parts Mfg	1330	443	92	214	273	141	166
3364	Aerospace Products and Parts	203	68	14	33	42	22	25
3365	Railroad Rolling Stock	21	7	1	3	4	2	3
3366	Ship and Boat Building	18	6	1	3	4	2	2
3369	Other Transportation Equipment	36	12	2	6	7	4	4
3371	Household and Institutional Furniture	207	69	14	33	42	22	26
3372	Office Furniture and Fixtures	119	40	8	19	24	13	15
3379	Other Furniture and Related	28	9	2	4	6	3	3
3391	Medical Equipment and Supplies	221	74	15	36	45	24	28

3399	Other Misc Mfg	517	172	36	83	106	55	64
	Total	21,613	7,204	1496	3480	4,440	2298	2695
	sub-total auto-related	16,096	5,365	1,114	2,592	3,307	1,711	2,007

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

Appendix C: Employment effect of IMPACT on Automotive Sectors

Table C-1: Short-term job creation induced by IMPACT loans in sectors that serve the automotive industry

Table C-2: Mapping auto-related industries from 4-digit NAICS to 3-digit NAICS

Table C-3: Ongoing Auto-related Employment: Direct, Indirect, and Induced Jobs in Industries that Supply the Automobile Manufacturing Sector (using industry-average sales/assets ratios from D&B)

Table C-4: Ongoing Auto-related Employment: Direct, Indirect, and Induced Jobs in Industries that Supply the Automobile Manufacturing Sector (using small firm sales/assets ratios from D&B)

Table C-5: Total Auto-Related Employment in Ohio from IMPACT Legislation

Table C-6: Auto related employment as a percent of total employment effects of IMPACT

Calculating the employment effect of IMPACT on automotive sectors

In order to isolate auto-industry employment from the general long-term employment effects of IMPACT legislation in Ohio, we first identified the supply chain for automobile production using input-output analysis. We simulated increased demand for the production of cars and light trucks, and traced backward linkages to industries that supply manufactured goods for car and truck manufacturing.

Tables B-1 and B-2, above, highlight sectors by 4-digit NAICs that serve the automotive industry. Table C-1 is derived from those highlighted sectors in Table B-2. It identifies short-term job creation in sectors that serve the automotive industry as a result of access to capital through IMPACT loans.

Table C-1: Short-term job creation induced by IMPACT loans in sectors that serve the automotive industry

4-digit NAICS	Industry	Total	Direct	Indirect and Induced
3221	Pulp, Paper, Paperboard Mills	275	148	127
3222	Converted Paper Products	760	409	350
3231	Printing and Related Activities	741	399	342
3251	Basic Chemical Mfg	422	227	195
3252	Resin, Rubber, Artificial Fibers	211	113	97
3255	Paint, Coating, Adhesives	248	133	114
3259	Other Chemical Mfg	191	103	88
3261	Plastics Product Mfg	1813	977	836
3262	Rubber Product Mfg	520	280	240
3272	Glass and Glass Products	221	119	102
3311	Iron and Steel Mills	296	159	137
3312	Steel Products from Purchased Steel	218	118	101
3313	Alumina and Aluminum Products	150	81	69
3314	Other Non-Ferrous Metal Production	128	69	59
3315	Foundries	512	276	236
3321	Forging and Stamping	629	339	290
3323	Architectural and Structural Metal	660	356	305
3324	Boiler, tank, and shipping container	170	92	78
3325	Hardware Mfg	94	50	43
3326	Spring and Wire Products	168	90	77
3327	Machine Shops	782	421	361
3328	Coating, Engraving, Heat-Treating Metals	417	224	192
3329	Other Fabricated Metal Products	573	308	264
3334	HVAC and Commercial Refrigeration	306	165	141
3335	Metalworking Machinery	669	360	309
3336	Turbine and Power Transmission Equip	174	94	80
3339	Other Machinery	902	486	416
3341	Computer and Peripherals	73	39	34

3343	Audio and Video Equipment	27	15	13
3344	Semiconductor and Electronic Components	198	107	92
3345	Electronic Instruments	523	282	241
3351	Electric Lighting Equip	165	89	76
3353	Electrical Equipment	337	181	155
3359	Other Electrical Equip	336	181	155
3361	Motor Vehicle Mfg	121	65	56
3362	Motor Vehicle Body and Trailer	219	118	101
3363	Motor Vehicle Parts Mfg	1330	717	614
3399	Other Misc Mfg	517	278	238
	TOTAL	16096	8671	7424

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

The analysis of short-term employment was done at the 4-digit level of NAICS. However, in order to estimate long-term employment using sales/assets ratios (to calculate the sales and employment that will result from capital investments), the 4-digit results were grouped into 3-digit categories, since sales/assets ratios are available at the 3-digit level.

Table C-2 shows the mapping of auto-related sectors from the 4-digit level into 3-digit level, giving the percentage of the 3-digit category results that are attributable to the auto industry. If, for example, all of the 4-digit industries that start with 326 are identified as auto-related (using I-O analysis), then all of NAIC 326 is used in the analysis of long-term employment effects. An industry such as 325, however, has some 4-digit industries which are in the auto supply chain and others which are not: For example, 3251, 3252, 3255, and 3259 relate to automobile production, while 3253, 3254, and 3256 do not. In these cases, only the share of the 3-digit industry that relates to automobile production is included. So in the case of industry 325, that share is 73%. The shares were calculated based on total short-term employment created by IMPACT in each of the 4-digit industries.

Table C-2: Mapping auto-related industries from 4-digit NAICS to 3-digit NAICS

3-digit NAICS category	Auto Industry Mapping from 4-digit to 3-digit	4-digit included categories
322	100%	3221,3222
323	100%	3231
325	73%	3251, 3252, 3255,3259
326	100%	3261,3262
327	25%	3272
331	100%	3311,3312,3313,3314,3315
332	97%	3321,3323,3324,3325,3326,3327,3328,3329
333	74%	3334,3335,3336,3339
334	82%	3341,3343,3344,3345
335	79%	3351,3353,3359
336	86%	3361,3362,3363
339	70%	3399

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

Table C-3: Ongoing Auto-related Employment: Direct, Indirect, and Induced Jobs in Industries that Supply the Automobile Manufacturing Sector (using industry-average sales/assets ratios from Table 7A)

NAICS 3-digit code		Operating employment (direct)	Ongoing Indirect	Ongoing Induced	Total Ongoing	Auto-related Direct	Auto-Related Indirect	Auto-related Induced	Auto-related Total
311	Food Manufacturing	207	531	295	1,033	-	-	-	-
312	Beverage and Tobacco Mfg	35	53	35	122	-	-	-	-
313	Textile Mills	73	56	51	180	-	-	-	-
314	Textile Mill Products	97	45	57	199	-	-	-	-
315	Apparel Mfg	48	56	41	145	-	-	-	-
316	Leather and allied products	5	4	4	13	-	-	-	-
321	Wood products	110	105	86	300	-	-	-	-
322	Paper manufacturing	91	315	162	569	91	315	162	569
323	Printing and related	105	225	132	463	105	225	132	463
324	Petroleum and Coal	43	27	28	97	-	-	-	-
325	Chemical Mfg	200	251	181	632	147	184	132	463
326	Plastics and Rubber Products	563	546	501	1,610	563	546	501	1,610
327	Nonmetallic mineral products	363	222	234	819	92	56	59	207
331	Primary Metal Mfg	490	341	332	1,163	490	341	332	1,163
332	Fabricated Metal Mfg	1,215	1215	972	3,401	1,175	1,175	940	3,290
333	Machinery Mfg	616	672	515	1,803	457	498	382	1,338
334	Computer and Electronics Mfg	433	189	249	872	354	155	204	713
335	Electrical Equipment and Appliance Mfg	1,188	448	654	2,291	943	355	519	1,817
336	Transportation Equipment Mfg	726	499	490	1,714	622	427	420	1,470
337	Furniture and Related Mfg	357	125	193	675	-	-	-	-
339	Misc Manufacturing	729	235	386	1,351	511	165	270	945
	Total	7,695	6,157	5,598	19,450	5,550	4,443	4,055	14,048

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

Table C-4: Ongoing Auto-related Employment: Direct, Indirect, and Induced Jobs in Industries that Supply the Automobile Manufacturing Sector (using small firm sales/assets ratios from Table 7B)

NAICS 3-digit code		Operating employment (direct)	Ongoing Indirect	Ongoing Induced	Total Ongoing	Auto-related Direct	Auto-Related Indirect	Auto-related Induced	Auto-related Total
311	Food Manufacturing	260	666	371	1,297	-	-	-	-
312	Beverage and Tobacco Mfg	35	53	35	122	-	-	-	-
313	Textile Mills	73	56	51	180	-	-	-	-
314	Textile Mill Products	97	45	57	199	-	-	-	-
315	Apparel Mfg	82	96	71	250	-	-	-	-
316	Leather and allied products	5	4	4	13	-	-	-	-
321	Wood products	192	183	150	525	-	-	-	-
322	Paper manufacturing	204	702	362	1,269	204	702	362	1,269
323	Printing and related	223	478	280	980	223	478	280	980
324	Petroleum and Coal	43	27	28	97	-	-	-	-
325	Chemical Mfg	549	689	495	1,733	402	504	362	1,269
326	Plastics and Rubber Products	777	754	612	2,143	777	754	612	2,143
327	Nonmetallic mineral products	363	222	234	819	92	56	59	207
331	Primary Metal Mfg	528	366	358	1,252	528	366	358	1,252
332	Fabricated Metal Mfg	2,070	2070	1656	5,797	2,003	2,003	1,602	5,608
333	Machinery Mfg	988	1078	827	2,893	733	800	613	2,146
334	Computer and Electronics Mfg	1,285	562	739	2,586	1,051	460	604	2,115
335	Electrical Equipment and Appliance Mfg	1,495	564	824	2,882	1,186	447	653	2,287
336	Transportation Equipment Mfg	1,175	807	793	2,775	1,007	692	680	2,379
337	Furniture and Related Mfg	454	159	245	858	-	-	-	-
339	Misc Manufacturing	1,044	337	552	1,932	731	236	386	1,353
	Total	11,942	9,916	8,743	30,601	8,936	7,497	6,573	23,007

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

Table C-5: Total Auto-Related Employment in Ohio from IMPACT Legislation

	Direct	Indirect	Induced	Total
Short-term auto-related	8,671	2,825	4,599	16,096
Ongoing (using industry average sales/assets)	5,550	4,443	4,055	14,048
Ongoing (using small firm sales/assets)	8,936	7,497	6,573	23,007
	14,221-			
TOTAL	17,607	7,268-10,322	8,654-11,172	30,144-39,103

Source: University of Massachusetts at Amherst, Political Economy Research Institute (PERI)

Table C-6: Auto related employment as a percent of total employment effects of IMPACT

	Direct	Indirect	Induced	Total
Short-term auto-related	74.5%	74.5%	74.5%	74.5%
Ongoing (using industry average sales/assets)	72.1%	72.2%	72.4%	72.2%
Ongoing (using small firm sales/assets)	74.8%	75.6%	75.2%	75.2%

Source: Policy Matters Ohio, based on Tables 9, C-5, herein.

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