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EXECUTIVE OFFICE OF THE PRESIDENT



A FRAMEWORK FOR REVITALIZING AMERICAN MANUFACTURING

DECEMBER 2009

REVITALIZING AMERICAN MANUFACTURING

America's manufacturers are at the heart of our country's economy, providing good-paying jobs for millions of American families. The U.S. manufacturing sector is today the world's largest; indeed, by itself it would represent the 9th largest economy in the world.

Nevertheless, manufacturing today faces enormous challenges. Manufacturing workers have paradoxically often been victims of their sector's own success, as rapid productivity growth has meant that goods can be produced with fewer workers, contributing to a several decades-long trend of declining employment. This trend has been compounded by the shift of consumer spending from manufactured goods like TVs and cars to services like tourism, dining out and healthcare as well as increased consumption of manufacturing goods made elsewhere. And the recent downturn has been particularly painful for manufacturing companies, their workers and the communities that rely on them.

Despite these challenges, many sectors of American manufacturing have the potential to enjoy significant growth and success. With the right policies, America can foster successful industries like biotechnology, wind power, nanotechnology, aerospace, next generation automobiles, and perhaps more importantly the industries of the future that we do not even know about today. Although the talent and hard work of America's entrepreneurs, innovators, and workers will drive these businesses, there is a critical role for sound government policy.

Beginning with key facts and assumptions, this report analyzes the cost drivers in each step of the manufacturing process and suggests a framework for designing appropriate government support in each of these areas.

Key Facts and Assumptions

There are five key facts and assumptions that form the basis of a sound and comprehensive manufacturing policy:

1. **The manufacturing sector generates significant benefits for society.** Manufacturing creates substantial additional economic activity, is responsible for 70 percent of all research and development spending performed by industry in the United States, and with consistently improving productivity creates wealth that can be utilized elsewhere in the economy. Manufacturing jobs have higher pay and benefits than similar jobs in other sectors. Manufactured goods represent 69 percent of exports, which is particularly important as increasing exports is critical to reducing our trade deficit and supporting economic growth. Our national security requires that we maintain the ability to manufacture certain goods needed to defend ourselves militarily. Finally, production jobs in manufacturing can provide a career path to the middle class for people for whom a four-year college degree is not the best fit.
2. **Overall costs drive manufacturers' location choices.** In today's increasingly competitive global marketplace, manufacturing activities will be undertaken by private actors who will locate their factories where total all-in cost is lowest.

3. **The environmental impact of manufacturing activities creates both responsibilities and opportunities.** Clean air and water and lower greenhouse gas emissions are important to the American public, and appropriately, companies operating on our soil must do their part to mitigate or avoid adverse impacts. At the same time, companies that adopt sustainable manufacturing strategies can both benefit the environment and gain competitive advantage.
4. **Productivity growth is essential for maintaining high wages.** America's high labor standards can make an hour of labor more costly than it is in other parts of the world. In general, American society aspires to increase hourly wages and benefits, which is fundamental to allowing our citizens to enjoy a rising standard of living. An important way to keep the total cost of labor competitive is to maximize the productivity of each hour of labor. The importance of productivity growth applies equally to blue collar, white collar and managerial labor.
5. **U.S. total manufacturing costs are internationally competitive in certain sectors.** Due to dramatic increases in the productivity of manufacturing labor, combined with the very real advantages that operating in America provides, there are certain activities where U.S manufacturing is highly competitive.

A Simplified Model of the Manufacturing Process

With the above assumptions and facts in mind, it is instructive to analyze the manufacturing process. Below is a simplified model that serves to highlight each link in the chain.

The manufacturing process begins when raw materials are transported to a place – a factory – where labor, know-how, technology, equipment and energy are used to physically and/or chemically transform these materials into a product. This product is then transported either to another factory where these same inputs are again applied or to a place where those who wish to own it (consumers or other businesses that use the product for their activities) can purchase it.

Usually, a number of separate manufacturing facilities and locations are involved in creating a final product. Some of the facilities are quite large and therefore economically significant to the community in which they operate. Often a number of factories which serve a particular industry will cluster together in a geographic region, as will numerous service providers that support the factory and its suppliers.

A single product is frequently sold to end-users, who are located at distances far from the final manufacturing facility, including in other countries. Along the way, various rules and regulations govern how and in what fashion manufacturing activities can be conducted. At many steps in the process, the creation of new value and/or the activity itself is subject to taxation.

Identifying the Cost Drivers at Each Step in the Manufacturing Process

In order to understand the appropriate role for government to support manufacturing and capture its positive social impacts, it is necessary to identify each cost driver in the manufacturing

process described above. Special attention must be paid to the influence of government on each of them.

1. **Labor.** The skills of the workforce are critical to determining its productivity. Government, either directly or through subsidies, is largely responsible for providing its citizens with the opportunity to obtain those capabilities, starting in pre-school and extending beyond high school into various post-secondary education and training pathways. While individual companies are the leading source of specific training for their workforce, private firms usually do not have a way to fully capture the value of educating their workforce and will therefore tend to under-invest in this crucial area. Individuals may also under-invest in their own education due to difficulties accessing necessary credit.
2. **Technology and business practices.** Intellectual capital, such as patents from research and development as well as managerial know-how, is a vital component in determining costs, growth rates and the creation of new industries. On its own, the private sector is unlikely to invest in the optimal level of intellectual capital, particularly if that capital does not have immediate commercial application but has the potential for high social returns. And in cases where intellectual capital is privately created, the government determines what kind of protection that intellectual property is afforded.
3. **Equipment.** For a purchaser, the cost of equipment depends importantly on the cost of capital – that is the cost for the manufacturer of accessing the funds to purchase the necessary equipment. The availability and cost of capital, as we have painfully learned, is intimately related to how government chooses to regulate the flow of credit.
4. **Location.** A local market for labor, land and buildings and regulations permitting manufacturing activities are all essential for manufacturers to operate. Government incentives often impact local concentrations of skills, while government rules determine the zoning, regulatory and environmental restrictions for factories and other investments.
5. **Transportation.** The cost to move goods from one factory to another and to their final destination, the cost to move energy from where it is created to where it is used, the cost of moving people and the cost to transport information are all important costs in the manufacturing process. Our transportation infrastructure, whether moving goods, energy, people or information, is enormously influenced by government. While some infrastructure is held privately, much is publicly held and all of it is highly regulated. Here again, for the same reasons that apply to education, much of this infrastructure will not be created without an explicit government decision to do so, yet without it, private actors will face huge barriers to profitably manufacturing their goods.
6. **Access to markets.** Once a manufactured product is completed, it must be able to reach interested buyers either domestically or internationally. The government plays an important role negotiating to open foreign markets, promoting American exports, enforcing trade agreements and preventing products made elsewhere from unfairly competing in the domestic market.

7. **Regulation and Taxation.** General regulatory and tax policies, including how to tax and regulate energy, greenhouse gases, and other pollutants, impact manufacturers, and it is clear that government controls these levers.

The Obama Framework: Effectively Targeting Each Cost Driver

The proper role for government support of American manufacturing is usefully framed by working from our key assumptions and then looking at the manufacturing process and the role of government in each of the cost inputs. Fundamentally, if we want to capture the positive benefits from a vibrant and thriving manufacturing sector, the government must help to create a competitive business climate. Government support is especially critical in those areas where the market will not deliver an optimum result on its own.

The government can be helpful in multiple ways. Alone or partnering with the private sector, it can provide funds to make important investments that increase America's competitiveness and our long-run standard of living, investments that the private sector is unlikely to make on its own. These include educating all American workers and building a 21st Century infrastructure. And equally important, the government can set standards and regulations that can unleash America's greatest asset: the ingenuity of its people. This includes providing regulatory certainty in areas such as renewable energy, environmental and other permitting, intellectual property, and health information technology. Once the government clearly sets the rules of the road, the private sector can get to work doing what it does best: creating economic growth and American jobs.

We must recognize that we are unlikely to be able, nor should we aspire, to compete for all manufacturing jobs worldwide. Manufacturing activities that are likely to remain highly labor intensive, or that require proximity to raw materials not found here, are unlikely to be good candidates for being made in America. However, where productivity improvements have reduced labor content to the point where our areas of advantage allow overall costs to be competitive, we have a clear opportunity, with intelligent government support, to create and sustain good-paying manufacturing jobs.

The Obama Administration's Framework for Revitalizing American Manufacturing is designed to seize that opportunity. A high-level summary of each component is described below. As we move forward we will implement specific policy proposals in each area while also continuing to reach out to manufacturers, investors, unions, academics, policymakers, and other groups in search of new ideas in each category to help America seize the manufacturing opportunities of the future. We must:

1. **Provide workers with the opportunity to obtain the skills necessary to be highly productive.** It is crucial that these skills be relevant. Our education system must provide access to the skills that are needed for the jobs and the industries where we can compete.
2. **Invest in the creation of new technologies and business practices.** Our efforts in this area should focus on advanced research without immediate commercial application,

where private actors are likely to under-invest. We must defend the rights of those who create intellectual property from those who would use it without properly compensating them. Finally, the government has a role to play in helping to bring to scale emerging technologies as well as facilitating the diffusion of business practice innovations that can help American manufacturers compete.

3. **Develop stable and efficient capital markets for business investment.** We need to structure our capital markets in such a way that those who wish to invest in the equipment and facilities necessary to make labor productive can access the credit to do so.
4. **Help communities and workers transition to a better future.** We must recognize that just as manufacturing has traditionally provided a significant employment base for many communities, it is particularly painful for these communities when factories and industries can no longer employ large numbers of workers. In these situations, the government should help both the affected workers and the community transition to activities that can sustain them in the future.
5. **Invest in an advanced transportation infrastructure.** The competitiveness of American manufacturers depends critically on a modern, reliable and efficient infrastructure so that goods, energy, people and information can move cost-effectively from one place to another.
6. **Ensure market access and a level playing field.** We must be sure that those who wish to sell the goods that they make in the U.S. into other countries have the market access they need and that those who sell domestically do not face unfair competition from advantaged foreign producers.
7. **Improve the business climate, especially for manufacturing.** Consistent with our desire for clean air, water and reducing the release of greenhouse gases as well as the need for fiscal responsibility, we need legal, tax and regulatory regimes that promote American manufacturing and do not place an undue burden on those who wish to manufacture products in America.

The remainder of this document describes two key pieces of the framework in more detail. Section II outlines American manufacturing's major strengths and challenges, discussing the power of U.S. manufacturing, the evidence showing that the manufacturing sector provides good jobs and the unfortunate impacts of job losses in manufacturing on workers and communities. Section III lays out Obama Administration policies and initiatives in more detail. The Appendix provides examples of industries that could drive future manufacturing growth as our policy is implemented.

I. American Manufacturing’s Strengths and Challenges

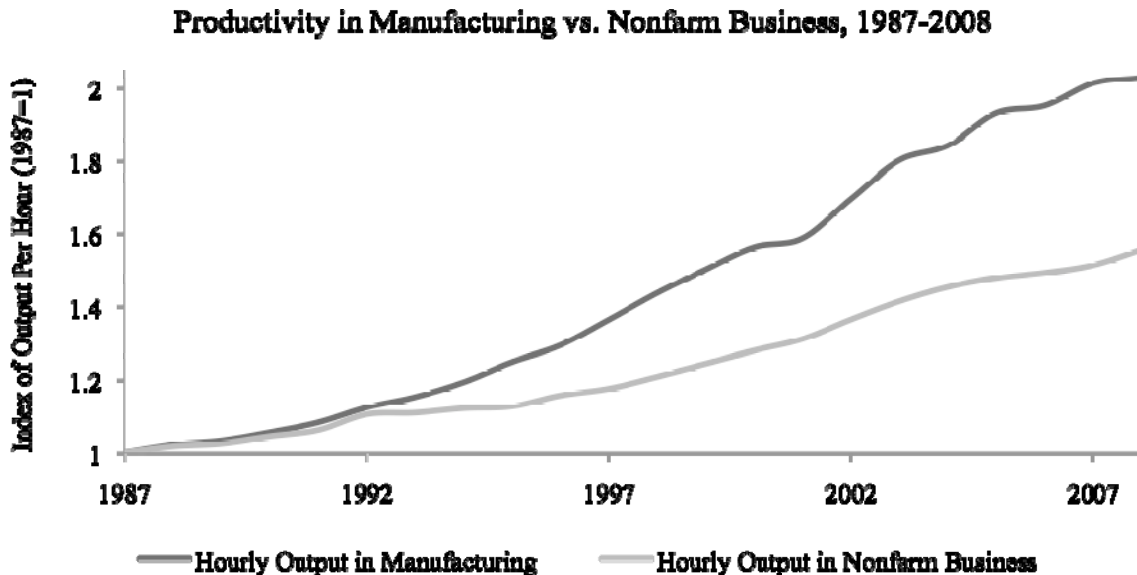
A. The U.S. is a Global Manufacturing Leader

In 1791 Alexander Hamilton—the nation’s first Secretary of the Treasury—presented to the U.S. House of Representatives a “Report on the Subject of Manufactures.” For Hamilton, manufacturing was “the next great work to be accomplished” to establish the young nation as the greatest industrial economy in the world. The report set in motion the key elements of Hamilton’s vision: a free market that allowed entrepreneurs and innovators to thrive with a limited and appropriate level of government involvement.

Though the means may be different, the goals for government support for manufacturing endures today. At the broadest level, these include an economy that is not burdened by unnecessary regulation, a stable macroeconomic environment, and critical government investments that pave the way for the industries, inventions and technologies of the future. These range from the telephone to the microwave oven, the automobile to the Internet and the jet engine to nanotechnology.

A key enduring feature of the manufacturing sector is its high productivity. Between 1987 and 2008 manufacturing productivity increased at a 3.4 percent annual rate, as compared to only 2.2 percent for nonfarm business as a whole (Figure 1). At this rate, workers can produce twice as much in manufactured goods per hour roughly every two decades, while it takes three-and-a-half decades for output-per-hour to double in the overall economy.

Figure 1.



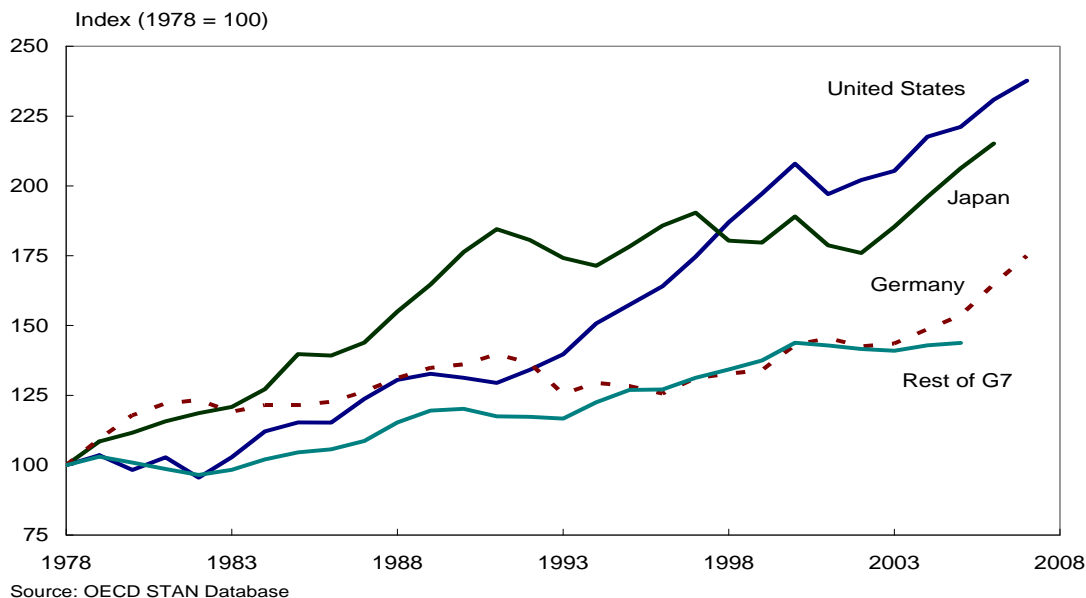
Source: Calculations from Bureau of Labor Statistics Data

Manufacturing companies are the source of 70 percent of the research and development performed by industry in the United States, accounting for a total of \$147 billion in R&D funding in 2004. Manufacturing is also responsible for 90 percent of all patents.

In 2008 manufacturing produced \$1.4 trillion in national income, making it one of the largest sectors in the American economy. If it were an economy, American manufacturing would be the 9th largest in the world – roughly the size of the entire Canadian economy. Moreover, manufacturing has critical ties to the remainder of the economy. The National Association of Manufacturers has estimated that, “every \$1.00 in manufactured goods generates an additional \$1.37 worth of additional economic activity - more than any other economic sector.” This also helps create jobs – one study found that each job in manufacturing supported three jobs in the rest of the economy.

American manufacturing has been among the most successful in the world. Over the last 30 years, the United States has had the largest increase in manufacturing output among major developed countries. Figure 2 demonstrates that U.S. manufacturing output began to increase most rapidly after 1994, propelled by rapidly increasing productivity. This improvement is unmatched by any other G7 country.

Figure 2. Real manufacturing value added, G7 countries, 1977–2007



B. The Manufacturing Sector Provides Good Jobs

Hourly total compensation in the manufacturing sector averages more than \$32.00, approximately 22 percent higher than average compensation in service industries. Forty percent of the difference is due to higher wages and salaries with 20 percent due to higher average health benefits (in total 91 percent of factory workers have employer-provided access to health insurance, as compared to 71 percent of workers across all private sector firms). Moreover, these statistics do not capture the fact that manufacturing jobs are more likely to offer training.

In part, manufacturers offer these higher wages because of the relatively long tenure and better training of their workforce. However, even controlling for these variables, workers in manufacturing still enjoy a wage premium of about nine percent compared to comparable workers in other sectors. Nonetheless, this wage premium has declined over time, most notably for less educated workers. These declines may be partly explained by the steep decline in the unionization rate within manufacturing over the past several decades and the expansion of international trade. Ensuring that workers have the opportunity to organize unions is an important part of the effort to offer good wages in a competitive manufacturing sector.

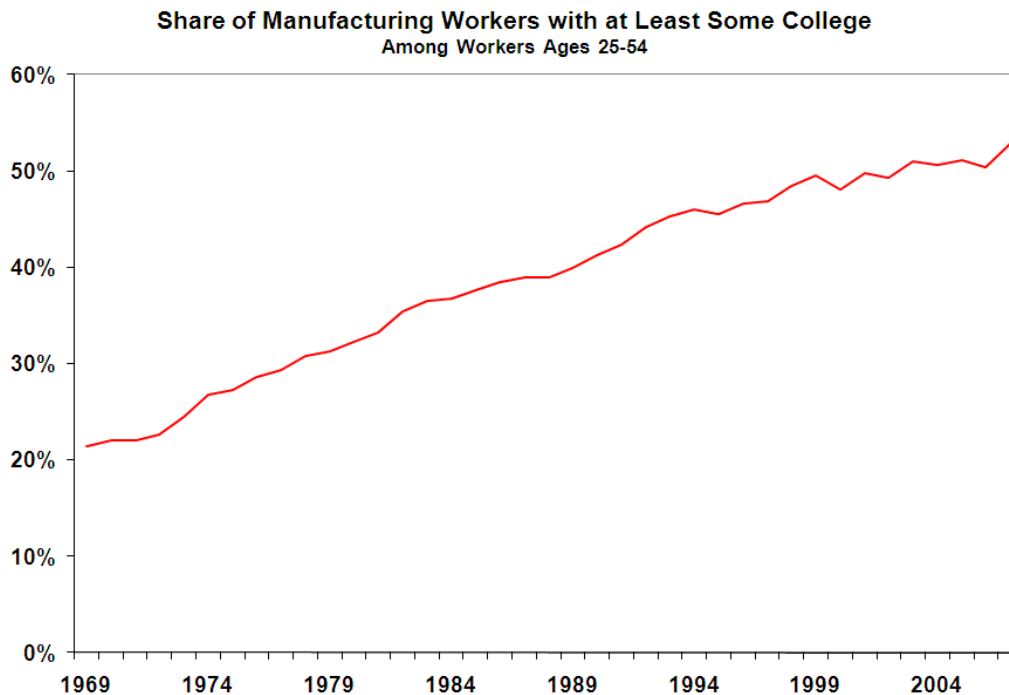
A healthy manufacturing sector helps support good jobs in other sectors as well. Manufacturers rely on efficient and sophisticated infrastructure as essential inputs into the production of goods, which can make up 25 percent of total manufacturing value added. Therefore, a competitive manufacturing base can help build a strong foundation for future job and economic growth in both manufacturing and services.

C. The Manufacturing Workforce is Diverse

Manufacturing draws on a diverse workforce. Since the 1980s, women have comprised about one-third of the manufacturing workforce, while African American workers comprise roughly 10 percent, slightly below their share of the population. The presence of Hispanics in manufacturing has increased steadily over the last four decades, along with their share of the labor force, and Hispanics now account for 15 percent of the manufacturing labor force. With the average age of manufacturing workers increasing, there will be substantial job opportunities in the coming years. The Bureau of Labor Statistics projects over 2.2 million job openings from 2008 to 2018 for production jobs due to the need to replace workers who retire or leave the labor force for other reasons. And production jobs do not represent all employment in the manufacturing industry. Jobs in management, administration, research, design, marketing, transportation and other occupations will all become available.

A frequent misconception about manufacturing is that it is largely made up of workers without any higher education. As Figure 3 demonstrates, over half of current manufacturing workers have some education beyond high school.

Figure 3



Source: IPUMS CPS data

D. Manufacturing's Impact on Local Communities

Traditional Clusters of Success

America's manufacturing sector has a long history of playing a significant role in the economic life of the communities in which it operates. Manufacturing plants tend to be large and concentrated, providing the central focus that can sustain communities over time. Economies of scale generate cost advantages as larger firms can spread the fixed costs of operating across more workers. The average establishment size in manufacturing is three times that of the overall private sector.

These large manufacturing firms often catalyze clusters of economic strength within a geographic region. They generate place-based competitive advantages that increase a region's overall productivity. Research shows that this sort of specialization and concentration allows for higher wages in the entire region.

However, for the reasons described below, manufacturing's share of total employment has been falling since 1950, and the total number of manufacturing jobs has been falling since 1979.

The long-term shift of employment away from manufacturing has three principal causes:

- **Rising productivity growth.** The upside of manufacturing productivity growth is that every twenty years the amount of output a worker can produce in an hour doubles. The

flip side of this productivity growth is that manufacturing could keep its output constant with a halving of the workforce every two decades. In reality, manufacturing output and employment growth has fallen between these two extremes. In contrast, the slow growth of productivity in the service sector has meant that more and more workers are needed to handle the ever growing demand for services.

- **Shifting consumption.** Americans have shifted their consumption away from manufactured goods and toward services. In 1950, U.S. households spent 67 percent of personal consumption expenditures on goods and 33 percent on services. By 2008, the share of expenditure on goods had fallen to 42 percent and the share of expenditure on services had risen to 58 percent. As incomes rise, consumer demand for things like tourism, dining out and healthcare tends to increase faster than demand for manufactured goods like automobiles and electronics. While declines in the price of manufactured goods can stimulate new demand, over time that new demand will not be only for such goods, but will be at least somewhat transferred to services as well.
- **Increasing international competition.** The U.S. has experienced a growing trade deficit in manufactured goods as international competition has increased substantially in the past 50 years. There are two main explanations for this trend. First, a number of factors have combined to dramatically increase the amount of goods that cross borders. These include declines in transportation costs and reductions in trade and investment barriers. Second, America's trading partners have dramatically improved their infrastructure and institutions that facilitate trade as well as their own manufacturing capabilities, bringing new high-quality competition to the global market place.

Difficulties Faced When Areas Lose Manufacturing Jobs

Just as the concentration of manufacturing activity in one location generates productivity gains that benefit firms, workers and their communities, this same concentration leaves communities vulnerable to painful dislocations when manufacturers face periods of adversity. Communities that experience substantial declines in manufacturing activity experience losses in county population, slower growth in the number of housing units and increases in the local poverty rate. The adjustment to these losses is slow and remains incomplete even decades later.

When a manufacturing plant shuts down or abolishes a shift, a large number of workers will be affected simultaneously. As establishments lay off workers or as plants close, there is a concentrated impact on the communities where manufacturing establishments are located, particularly where a large manufacturing plant was the backbone of that community. This concentration of activity in single plants and communities is an important reason that declines in manufacturing employment pose unique challenges for affected communities.

The Impact of Manufacturing Job Loss on Workers

Just as with communities, the loss of manufacturing jobs has painful consequences for the affected workers. The evidence is all around us, from the workers laid off when an auto plant closes to those affected by textile plant closures in the south.

Several studies have attempted to quantify the impact that manufacturing job loss has on workers. They find that high-tenure manufacturing workers displaced from their firms suffer long-term earnings losses 15 years or more after they lose their jobs. The wage loss is even greater for those who are not subsequently re-employed in manufacturing. This is especially disconcerting for the growing number of displaced manufacturing workers today, given the reduced employment opportunities in the sector.

These studies also find that displaced workers have higher mortality rates than their counterparts. Furthermore, there is disturbing evidence that the consequences of job losses persist across generations: the children of displaced workers have been found to have lower earnings as well.

III. The Obama Administration's Policies and Initiatives to Support Manufacturing

The manufacturing sector is undergoing transformative change. We can help foster and facilitate this change and ensure that workers and communities thrive in the midst of this change if we take certain critical actions.

Past manufacturing strategies have largely failed. Two different views have dominated these past approaches. One view was that manufacturing industries needed to be protected and insulated. Not only was this approach ineffective but it was also counterproductive. An alternative view was *laissez-faire*, cutting critical research and support programs and hoping the market will take care of problems. This approach has contributed to the steep job losses over the last decade but more importantly threatens to rob us of the potential for greater innovation over future decades.

An alternative to these two poles is a strategy that recognizes that change is inherent in the economy and necessary for productivity growth. Evidence-based policy can help foster and channel this change and ensure that workers and communities can thrive in the midst of it.

The key to success lies in American workers, businesses and entrepreneurs – but the federal government can play a supporting role in providing a new foundation for American manufacturing. The right role for government is to optimize its own interaction with each key cost driver of the manufacturing process.

The Obama Administration's policies and initiatives that support manufacturing can be broken into seven parts that draw on the lessons from analyzing the manufacturing process and government's role in each cost driver. We must:

- 1. Provide workers with the opportunity to obtain the skills necessary to be highly productive.**
- 2. Invest in the creation of new technologies and business practices.**
- 3. Develop stable and efficient capital markets for business investment.**

4. **Help communities and workers transition to a better future.**
5. **Invest in an advanced transportation infrastructure.**
6. **Ensure market access and a level playing field.**
7. **Improve the general business climate, especially for manufacturing.**

Below, we describe President Obama's policies in each area. In the future, we will work to continue implementing these substantial initiatives while also reaching out to manufacturers, investors, unions, academics, policymakers and other groups in search of new ideas in each category consistent with the framework outlined in this report.

1. PROVIDE WORKERS WITH THE OPPORTUNITY TO OBTAIN THE SKILLS NECESSARY TO BE HIGHLY PRODUCTIVE

A skilled, well-trained workforce is essential to improving the productivity of the manufacturing sector and raising living standards for its workers. New manufacturing process technologies, advanced materials, the demand for new and innovative products and the growing need for manufacturers to utilize sustainable and green business practices all require a manufacturing workforce with an increasingly advanced set of skills and competencies. These include both intellectual as well as physical skills. The manufacturing workers of tomorrow will work with both their head and their hands.

New investments in education and worker skills are essential to building the foundation for strong, shared economic growth. In the coming years, jobs requiring at least an associate degree are projected to grow twice as fast as those requiring no college experience. As a result, some level of higher education greatly increases the likelihood that an individual will earn a family-supportive wage. While American workers were once the best educated in the world, educational achievement has stagnated in the past generation.

The following is an overview of the components of the Obama administration's policies that will support American workers in obtaining the skills necessary to be productive in the manufacturing sector.

Higher Education and Training

- **Invest in Community Colleges.** Community colleges are an essential part of our higher education and training system, enrolling nearly 6 million students. Community colleges feature affordable tuition, open admissions policies and convenient locations and schedules. The flexible nature of community colleges allows them to work with employers and the private sector to address regional workforce shortages and create tailored training, partnerships and apprenticeship programs for those manufacturing occupations expected to have high demand. President Obama's American Graduation Initiative will provide an unprecedented increase in support for community colleges to

raise graduation rates and meet employer needs. The initiative includes resources to build partnerships with businesses and other educational institutions, improve remedial education and support services, modernize facilities, and expand high-quality online course offerings.

- **Invest in high-quality job training.** The 2010 Budget and the Recovery Act contain substantial Federal investment in job training and career pathway programs, which help individuals of varying skill levels enter and pursue rewarding careers in high-demand and emerging industries. These programs support job training for many industries and occupations, including manufacturing. They are designed to promote training along career ladders; pre-apprenticeship and registered apprenticeship programs; degrees, certificates and industry-recognized credentials; as well as access to opportunities for career advancement for individuals that have been underserved or that have faced barriers to these opportunities.
- **Provide training and mentoring to entrepreneurs.** Entrepreneurs with access to a network of trainers, mentors and counselors can improve their chances for success in building high-growth businesses. The Small Business Administration (SBA) has 68 district offices and over a thousand nonprofit “resource partners” that offer 14,000 counselors who serve about 1.5 million entrepreneurs and small business owners each year. The Administration is partnering with community colleges, universities and the philanthropic sector to deliver more training and mentoring resources to aspiring entrepreneurs, promoting the creation of new businesses, particularly among women and minorities.
- **Expand education and training support for unemployed workers.** Unemployment benefits should not only give workers the help they need to get through tough times, but should also enable them to pursue educational opportunities that will lead to good jobs and career pathways when the economy rebounds and employers begin hiring again. Currently States must waive job-search requirements in order for those in training programs to continue receiving Unemployment Insurance (UI) benefits, but States do have discretion in defining “approved training.” As a result, as many as 4 percent of UI recipients in some states are in approved training, while in other states fewer than 1 percent are in such approved training. President Obama has called on States to let unemployed workers return to school without forfeiting their benefits and to clear up red tape that disqualifies workers from student aid based upon incomes they no longer earn. The Department of Labor has already encouraged States to broaden their definition of approved training for UI during these tough economic times, and will continue working with States to strengthen these programs.
- **Make a historic investment in college affordability.** The Obama Administration is making a historic investment in scholarships to make college more affordable. The Recovery Act increased Pell grant scholarships by \$500 to \$5,350 and created a new \$2,500 tax credit for college costs. The President is now working to ensure that Pell grants grow faster than inflation every year and to make the American Opportunity Tax Credit permanent. Between the Recovery Act and the 2010 budget, the Administration is

seeking nearly \$200 billion over ten years in Pell grant scholarships and tax credits for colleges.

- **Create a New College Access and Completion Fund.** In his 2010 Budget proposal, President Obama included a five-year, \$2.5 billion fund to build federal-state-local partnerships aimed at improving college access and completion, particularly for individuals from disadvantaged backgrounds. These funds would be used to evaluate programs aimed at increasing college enrollment and graduation and to grow and bring to scale programs that are proven to be successful.

Early Childhood and K-12 Education

- **Improve America's math and science education.** To create a competitive manufacturing workforce we must improve American's math and science education. The Recovery Act provided funds to be used as a down payment toward the goal of tripling the annual number of the National Science Foundation's (NSF's) Graduate Research Fellowships. The President has also proposed more funding for NSF's Advanced Technological Education Program, which focuses on two year colleges and supports partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians.
- **Strengthen K-12 schools.** The Obama Administration has undertaken a number of initiatives to improve teacher quality, turn around failing schools and increase accountability for results. Through investing in the Innovation Fund, the Administration will support the efforts of school districts and non-profit organizations with track records of success in raising student achievement. The President has also made significant investments in improving teacher effectiveness.
- **Expand high-quality early education.** Education begins at birth, and studies show clear benefits to providing children with access to nurturing, challenging and engaging high-quality programs and environments prior to entering kindergarten. The Recovery Act invested \$5 billion in early childhood education, including Head Start, Early Head Start, child care and programs for infants and preschoolers with disabilities. Earlier this year, the President launched a new \$10 billion investment through the Early Learning Challenge fund to challenge states to raise the bar and improve outcomes in early learning programs serving children from birth through age five.

2. INVEST IN THE CREATION OF NEW TECHNOLOGIES AND BUSINESS PRACTICES

The key manufacturing growth areas in the 21st century will be driven by new technologies and new areas of consumer demand. The most successful areas will be combinations of the two, such as using new technologies to satisfy the increasing demand for clean energy. In other areas, a new innovation like nanotechnology has the promise to transform production processes and consumer products for everything from traditionally high-tech products like computers to less

obvious sources of innovation and growth like sunscreen and paint. New business practices and expertise will also be key drivers of competitiveness going forward.

There is often a debate about the right type of government support for advanced technologies. The *laissez-faire* approach is premised on the belief that private industry will simply develop the best innovations and technologies. This, however, ignores three critical facts. First, it is well established that the private sector often under-invests in the most basic research since it cannot capture all the benefits from such research. Second, spillovers exist between sub-industries. For instance, innovations in nanotechnologies are being applied to a wide range of areas. Third, coordination failures exist in which no individual makes an investment because it will not be profitable unless a number of others make similar investments. This is a problem that the United States is addressing in the electric car industry, for example, with a wide range of initiatives. Inventions from the telegraph to the jet engine, the microwave oven and the Internet did not happen simply because of private sector incentives.

On the other hand, policymakers must recognize that government has a poor track record in picking winners and losers. This is in part due to the limited ability of the government to predict the future, but it is also because such exercises are inevitably distorted by the political process.

The new approach to manufacturing policy gets around these twin problems by recognizing that the government has a vital role to play in basic research, that it can help address the coordination problems and that it can use innovative techniques to encourage economic development while avoiding picking winners and losers – for example, the relatively new policy tools of prizes and reverse auctions could be used to jump start technological advances and/or production in new manufacturing industries.

The Obama Administration is supporting new technologies in several key ways.

Basic Research and Leading Edge Technologies

Basic research is fundamental to the economic growth of any society. The United States devotes less than three percent of GDP to research and development – a ratio that is exceeded by a number of countries including Japan, Sweden, Switzerland, South Korea, Iceland and Israel. The American Recovery & Reinvestment Act already included the largest increase in research and development in our history, a total of more than \$18 billion. Increases must be sustained and linked to America's manufacturing success. The Obama Administration will:

- **Double the R&D budgets of key science agencies.** In his FY2010 Budget, President Obama proposed to double the research budgets of three key science agencies (the National Science Foundation, the Department of Energy's Office of Science and the National Institute of Standards and Technology's laboratory programs).
- **Improve coordination of manufacturing-related R&D.** The National Science and Technology Council will develop a strategy for coordinating the federal government's investments in research with the goal of establishing U.S. leadership in advanced manufacturing technologies. Some of the examples of this research include:

- Nanomanufacturing and the application of nanotechnology to traditional manufacturing industries;
 - Creating the foundation for a “bio-economy” that uses biotechnology to make “green” chemicals;
 - Developing advanced robotics technologies that allows the U.S. to retain manufacturing and respond rapidly to new products and changes in consumer demand;
 - Integrating manufactured goods and information technology to create “cyber-physical systems” that have greater adaptability, autonomy, efficiency, functionality, reliability, safety and usability.
- **Explore new options to stimulate innovations and technological breakthroughs.** The Administration will explore the possibility of using prizes and reverse auctions as a complement to grants, tax credits and other mechanisms currently used to spur innovative technologies. The advantages of using prizes and reverse auctions are that success is rewarded directly on an objective, demonstrated basis, and federal money is used to leverage private sector resources in a targeted manner. These approaches could target many key areas identified as likely manufacturing-related wealth and job creators of the future, including batteries, nanotechnology, clean energy and bioengineering. The prizes and reverse auctions could work together, with prizes incentivizing the necessary breakthroughs in basic research and reverse auctions supporting early stage of commercialization and production. For example, to promote battery technology this new strategy could:
 - Offer a prize for the development of a car battery that meets pre-specified performance standards
 - Establish a reverse auction where firms would bid for the lowest amount of support they would be willing to accept to produce a certain quantity of batteries, which would be sold on the private market.

These are just examples. If implemented, specific prizes could be chosen by a blue ribbon panel of experts.

- **Make the research & experimentation tax credit permanent.** To give companies the certainty they need to make long-term research and experimentation investments in the U.S., the Administration’s FY2010 budget includes the full cost of making the R&E credit permanent in future years. Making this tax credit permanent will provide businesses with the greater confidence they need to initiate new research projects that will improve productivity, raise standards of living, and increase our competitiveness. And with over 75 percent of credit dollars attributed to wages, the credit would provide an important incentive for businesses to create new jobs.
- **Spur innovation in manufacturing by Increasing the Technology Innovation Program (TIP).** The TIP supports, promotes and accelerates innovation in the United States through high-risk, high-reward research in areas of critical national need. One

current area of focus is research on advanced manufacturing processes and materials. Awards in this area have the potential to spur new and much-needed capabilities in the manufacturing sector – whether in production techniques, material sciences or cutting-edge design options. The Obama Administration is committed to the success of the program and the catalyzing of innovation: TIP is slated to grow from \$60 million in FY09 to \$100 million in FY15.

- **Pursue structural reforms that support innovation and production.** Various structural and regulatory reforms have the potential to support innovation and increase production. The Obama Administration will explore a range of such reforms, including:
 - Public-private partnerships that can generate mutually beneficial arrangements between major businesses and localities. Infrastructure and other similar projects are good examples of such partnerships. Government can partner with private firms who agree to make critical infrastructure improvements in return for future revenues, delivering improved services without utilizing scarce public resources.
 - Provision of anti-trust waivers for certain types of private cooperation, most notably in advanced research and development. Too little research, particularly basic research, is performed by firms because its benefits can spill over to other firms and to consumers. Society would be better off if more basic research were conducted, and regulation can help by allowing companies, in certain circumstances, to cooperate on a narrow project without the threat of anti-trust litigation.
 - Use of the federal government’s coordinating abilities to overcome information problems and match innovators and markets. A manufacturer’s competitiveness is often dependent on the speed with which the company finds new markets and adopts new technologies, innovative product concepts, and improved operational and management practices. There are often information failures in the market that prevent some learning and exchange of ideas that would help manufacturers grow. The government can help overcome such information failures and help to spread new and innovative business practices.
- **Protect intellectual property rights.** Intellectual property is crucial for developing new technologies. We must ensure that intellectual property is protected in foreign markets and promote greater cooperation on international standards that allow our technologies to compete everywhere. The Administration is committed to ensuring that the United States Patent and Trademark Office has the resources, authority and flexibility to administer the patent system effectively and issue high-quality patents on innovative intellectual property, while rejecting claims that do not merit patent protection.

Diffusion of Technologies and Best Practices

In addition to supporting research, we must ensure that the development of innovations and new technologies are rapidly diffused within and across companies. Many technological innovations have their roots in the basic research spurred by R&D investments and tax credits. New products and innovative processes will continue to be introduced to the market every day by successful

entrepreneurs and companies. But these innovations are often not rapidly or completely diffused within or across companies and sectors that would benefit from them. This incomplete distribution is demonstrated by the wide variation in the adoption and diffusion of many standard business ideas and technologies – from optimal plant layouts, to marketing practices, to tailored application or bundling of existing technologies.

The competitiveness of the manufacturing sector can be enhanced by government facilitation of the rapid adoption of new technologies, innovative product concepts and operational and management practices. Moreover, a more rapid diffusion of practices can help manufacturers, particularly suppliers to original equipment manufacturers (OEMs), to retool away from contracting manufacturing sectors toward new, higher growth sectors.

To promote and facilitate the diffusion of technologies and best practices, we must:

- **Double the Manufacturing Extension Partnership (MEP).** The Manufacturing Extension Partnership works with small and medium sized manufacturers across the country to improve efficiency, implement new technology and strengthen company growth. This program has supported more than 360,000 projects across the country since its inception, and in 2006 alone helped create and retain over 50,000 jobs. The President's FY2010 Budget proposed to double funding for the MEP from \$90 million in FY08 to \$180 million in FY15 so its centers can expand their efforts to bolster the competitiveness of U.S. manufacturers.
- **Streamline and Enhance Delivery of Government Services to Businesses.** The Commerce Department is exploring ways to make its services more accessible and user-friendly for businesses. As part of this effort, on October 6 the Department launched CommerceConnect, a pilot initiative in Plymouth, Michigan, to provide manufacturers in Michigan with a single point of contact to access programs designed to foster innovation, enable commercialization and promote competitiveness. The Department is working to streamline the delivery of government services to businesses so that they can better assess their needs and access the range of government programs for which they may be eligible. This approach will provide better service to manufacturers, and promote synergies across programs.
- **Create an Office of Innovation and Entrepreneurship and a National Advisory Council on Innovation in the Department of Commerce.** In September, Secretary Locke announced the creation of a new Office of Innovation and Entrepreneurship within the Department of Commerce and the launch of a National Advisory Council on Innovation and Entrepreneurship. The new Office of Innovation and Entrepreneurship will be geared precisely towards transforming an idea from a research lab or someone's imagination into an actionable business plan. This support will help scale and diffuse new and innovative technologies and business practices throughout the economy. The National Advisory Council on Innovation and Entrepreneurship will help the Department increase their engagement with small business and entrepreneurs.

3. DEVELOP STABLE AND EFFICIENT CAPITAL MARKETS FOR BUSINESS INVESTMENT

Access to capital is essential for manufacturing businesses. Capital allows manufacturers to invest in new equipment, finance major expenditures, and expand into new markets. Yet during the recent financial crisis, access to credit was severely limited, adding to the difficulties facing America's manufacturers.

The Obama Administration has implemented an unprecedented array of support programs designed to stabilize our capital markets and nurse them back to health. Several programs were designed specifically to rehabilitate key channels of credit to businesses and households. At the same time, the Administration has committed to comprehensive reform of our financial regulatory system in order to protect businesses, investors, and American families by ensuring such a crisis never happens again.

When the Administration took office, financial markets were highly impaired. The Administration promptly implemented a Financial Stability Plan to stabilize the financial system and get credit flowing again. Although the financial system is not yet fully functioning, the outlook has greatly improved and banks have raised considerable private capital following the Supervisory Capital Assessment Program (SCAP or "stress tests"). The Administration continues to pursue policies to stabilize financial markets and get credit flowing to manufacturing and other industries.

To develop stable and efficient markets for business investment, we must:

- **Provide access to capital for new businesses.** The Recovery Act temporarily reduced fees and increased guarantee levels on the U.S. Small Business Administration (SBA) guaranteed loans, which along with the normalization of the credit markets, helped increase SBA lending by more than 61% from the depths of the recession while broadening the base of commercial SBA lenders. Growth capital is also essential. The Small Business Investment Company (SBIC) Debentures program provides debt and mezzanine financing at a time when the equity markets have pulled back from providing this kind of capital.
- **Ensure access to capital for exporters.** The Export-Import Bank of the United States (Ex-Im Bank) provided a record breaking \$21 billion of financing in support of U.S. exports in FY 2009, of which \$4.4 billion supported American small businesses. The Ex-Im Bank also increased its direct lending activities and provided additional flexibility to its working capital loan program. Further, the Ex-Im Bank introduced several new innovative financing features in FY 2009. For example, the Takeout Option allows commercial banks to improve their liquidity by selling Ex-Im Bank guaranteed loans back to Ex-Im Bank, thus increasing the amount of private financing available for exporters.

- **Create a financial regulatory system that works.** Significant reforms are needed to ensure that businesses, investors, and consumers have access to stable capital markets. The recent financial crisis highlighted the danger of managing a 21st century economy with a 20th century regulatory framework. The Obama Administration is committed to building a system where individuals and businesses can innovate and take chances without fearing that the system will pose untenable risks. Our plan:
 - Requires that all financial firms that pose a significant risk to the financial system at large are subjected to consolidated supervision and regulation.
 - Increases supervision of financial markets to help ensure that our markets are strong enough to withstand system-wide stress and the potential failure of one or more large financial institutions.
 - Rebuilds trust in our markets by creating a Consumer Financial Protection Agency to focus exclusively on protecting consumers in credit, savings, and payment markets.
 - Provides the government with the tools to cope with crises by ensuring the orderly unwinding of failing firms and avoiding the untenable choice between bailouts or damaging collapse.
 - Raises international regulatory standards and improves international coordination.

In addition to stabilizing the broader financial system and providing capital assistance to small businesses and exporters, the Obama Administration is committed to expanding access to financing for manufacturers facing these tough economic conditions. Most notably, the Administration's combination of loans, grants, and tax credits for renewable energy manufacturing will help the United States regain its position as the world leader in manufacturing clean energy equipment. Programs include:

- **1603 cash grants in lieu of tax credits.** When the Recovery Act passed, many renewable energy projects had been halted as few developers had the ability to utilize the Production Tax Credit (PTC). Some forecasts expected the industry to shrink 25 to 50 percent. ARRA allows renewable energy generation projects to receive a 30 percent cash grant in lieu of the Production Tax Credit. The program has already supported over 1GW of renewable energy projects.
- **DOE 1703 and 1705 loan guarantees.** DOE loan guarantees can back financing for factories that make wind turbines, solar panels, energy efficient windows, and other clean energy equipment. The program may also support wind farms, advanced biorefineries, nuclear power plants, and advanced coal plants – that will buy turbines, steel, and other equipment from American factories. Projects employing commercial technologies can re-ignite factories, while projects employing advanced technologies can help American factories bring promising but risky new technologies to the marketplace.
- **Section 48C manufacturing tax credit.** The Section 48C Advanced Energy Manufacturing Tax Credit supports the building and equipping of new, expanded, or re-tooled factories that manufacture the products needed to power the green economy. The program covers a wide array of clean energy technologies, including renewable energy,

energy efficiency, advanced transportation, and advanced transmission. The Recovery Act included \$2.3 billion in tax credits that will support over \$7.5 billion in total capital investment. This program has generated far more interest than anticipated. DOE and Treasury received significantly more technically acceptable applications than the program had resources to fund. Instead of turning down worthy applicants who are willing to invest private resources to build and equip factories that manufacture clean energy products in America, on December 16 2009 the Administration announced its support for expanding the program by up to \$5 billion. This funding will go to shovel ready projects that will create tens of thousands of new construction and manufacturing jobs and continue America's emerging leadership in manufacturing the clean energy products of the future.

- **Advanced Vehicle Manufacturing Loan Program.** Through the \$25 billion Advanced Technology Vehicles Manufacturing Loan Program, the Administration is supporting competition to produce the most cost-effective solutions to reduce oil dependence. To date, over \$8 billion has been awarded to Ford, Nissan, Tesla, Tenneco, and Fisker. Ford's loan will allow factories in 5 Midwestern states to produce over 2 million advanced combustion vehicles every year. Loans to Nissan, Tesla, and Fisker support locating three of the world's first electric vehicle factories in Tennessee, California, and Delaware. The factories are producing cars that raise the bar for fuel efficiency, while increasing the competitiveness of the domestic industry.

4. HELP COMMUNITIES AND WORKERS TRANSITION TO A BETTER FUTURE

During the 20th century, whole cities and communities were created around plants and factories. Manufacturing provided the strong base that propelled these communities forward. But as the recent turmoil in the auto industry has shown, factory layoffs and closings can have a devastating effect on individual towns, states and even regions.

In response to these difficult realities, the Administration is pursuing policies that alleviate the community hardships caused by plant and factory closings, while also supporting community efforts that can anchor future economic development. These policies are not just grounded in a desire to help particular areas but also in the economic evidence that a community working together can better coordinate to address its economic challenges.

Specific actions include policies to:

- **End the rush to plant closures.** Currently too many businesses rush into plant closures that can have devastating consequences for their workers and local communities. The President supports extending the notification period for plant closings from 60 days to 90 days, asking companies to engage with local, state, and federal governments to explore potential alternatives to plant closing, and extending the timeframe during which communities could effectively develop plans to support dislocated workers and pursue diversification strategies. Enforcement of the Worker Adjustment and Retraining Act (WARN) provisions could also be improved. One study found that employers provided

adequate notice in only approximately one-third of cases that appeared to be subject to WARN.

- **Support the creation of competitive communities by promoting regional innovation clusters.** In various regions of the U.S., entrepreneurs are collaborating with local researchers, educators and industry leaders to foster specialized knowledge, technical expertise, and cutting-edge products. These efforts will help American businesses retain and achieve new levels of competitiveness. The President's FY2010 Budget proposed \$50 million in regional planning and matching grants within the Economic Development Administration (EDA) to support the creation of regional innovation clusters that leverage regions' existing competitive strengths to boost job creation and economic growth in both rural and metropolitan America. The Budget also proposed a \$50 million initiative in EDA that will create a national network of business incubators to encourage entrepreneurial activity in economically distressed areas.
- **Expand adjustment assistance.** Currently Trade Adjustment Assistance (TAA) provides a suite of support such as training, wage insurance, job search, health benefits and extended unemployment insurance for workers who lose their jobs due to trade. ARRA expanded eligibility for firms and workers for TAA and expanded the benefits workers could get through TAA, a temporary expansion that is proposed to be made permanent in the FY 2010 budget. The Department of Labor currently has funding for National Emergency Grants for communities/regions that have been hit by mass layoffs and severe dislocations. DOL has already made grants to a number of States for this purpose. The administration will continue to explore ways to improve adjustment assistance, particularly for the hard-hit manufacturing sector and manufacturing communities.
- **Target assistance for the auto manufacturers and workers.** The automotive industry has been especially affected by the economic crisis. In order to alleviate this situation, President Obama has created a number of targeted programs:
 - *GSA accelerated fleet purchase* – The General Services Administration has moved faster than at any time in its history to place a \$300 million order for fuel efficient vehicles for the federal fleet. The order included 17,246 vehicles, all of which were purchased from GM, Chrysler or Ford.
 - *SBA loan expansion for auto dealers* – The Small Business Administration increased the size standards for its 7(a) loan guarantee program, which more than doubled the number of auto dealers eligible for working capital loans.
 - *EPA Brownfields Awards* – The Environmental Protection Agency is continuing its national brownfields grant program for FY09 in addition to ARRA funding to assist in rebuilding communities and local economies.
 - *DOL National Emergency Grants* – Michigan – a state whose manufacturing industry and workforce has been hit disproportionately severely by the economic times – has recently received three Regional Economic Impact (REI) National Emergency Grants,

which were approved for up to \$38 million. A significant share of all non-disaster National Emergency Grants serve workers and communities affected by factory layoffs and closures. Over \$134 million in non-disaster grants have been approved to date by the Obama Administration.

5. INVEST IN AN ADVANCED TRANSPORTATION INFRASTRUCTURE

The cost to move goods from one factory to another and to their final destination, the cost to move energy from where it is created to where it is used, the cost of moving people and the cost to transport information are all significant factors in the manufacturing process. In each area, the private sector will tend to under invest because it either cannot capture the social benefits from its investment or cannot negotiate amongst the various parties with property or rights at stake. Additionally, the creation and maintenance of our nation's infrastructure system presents a significant opportunity to engage our manufacturing sector. Building bridges, transit, rail and aviation systems offers unique opportunities for American manufacturing companies to provide world-class products to a domestic market. As President Eisenhower demonstrated with the Interstate Highway System, the government can stimulate massive private activity by making fundamental investments in transportation infrastructure. To follow in these footsteps and support manufacturing, we must:

- **Invest in our nation's roads, bridges, and mass transit.** The Recovery act provides \$36 billion for infrastructure projects to improve our nation's highways and mass transit systems. The Obama Administration has also proposed "investing for performance" reforms that will improve transparency and accountability in the transportation financing system increasing the return to transportation investments and boosting long-term economic growth.
- **Continue to Advocate for a National Infrastructure Bank.** The Administration's FY10 budget proposes \$5 billion for the establishment of a National Infrastructure Bank to fund infrastructure projects with significant national or regional economic benefits. The Bank would provide federal funding through a variety of credit and grant mechanisms, and it will also serve to attract and coordinate State, local, and private co-investment. Investments will be made through a merit-based competitive process to select worthy transportation and transportation-related projects, focusing on multimodal and cross-jurisdictional projects that are underfunded by the current transportation financing system.
- **Support batteries and electric drive components for transportation electrification.** In early August, the Administration announced \$2 billion in grants to 30 factories producing advanced batteries and electric drive components. The ARRA Transport Electrification program is also providing \$400 million in cost-shared grants to 8 projects deploying over 4,000 electric vehicles and the infrastructure to support them. An additional nine grants are helping universities prepare the workforce and consumers for the new industry.

- **Invest in Clean City Infrastructure.** The DOE is increasing acceptance of and access to natural gas, electric, and biofuel vehicles and infrastructure. In August, the DOE awarded nearly \$300 million in grants to 25 Clean Cities coalitions. These grants supported coalitions of some of the largest public and private fleets across the country and will support the deployment of 9,000 alternative fuel vehicles and 500 alternative fuel infrastructures.
- **Modernize the Electric Grid.** Our current electricity transmission grid must be expanded and modernized to reduce congestion, maintain reliability, and accommodate the output from new sources of renewable energy. New technologies are being developed that present significant opportunities for consumers and businesses to control their energy use and costs, reducing the strain on the electric grid and improving performance. The Recovery Act provides \$4.5 billion to support the Smart Grid, including development of technologies to enable greater energy efficiency, customer demand response, energy storage, and other components of the “Smart Grid.” In addition, the Recovery Act increased the borrowing authority of the Bonneville Power Authority by \$3.25 billion and provided new borrowing authority of \$3.25 billion for the Western Area Power Authority, enabling both Authorities to invest in transmission lines that will increase the development of renewables in their regions.
- **Fulfill a new transportation vision with high-speed rail.** As one element of a modernized transportation system, the President has proposed a long-term strategy to build an efficient, high-speed rail network of 100-600 mile intercity corridors. The President made a down payment on this strategy with an \$8 billion investment in the Recovery Act. This funding will be used to leverage other public and private funding to invest in infrastructure, equipment, and intermodal connections.

First, the strategy will advance new express high-speed corridor services (operating at speeds above 150 mph in some areas) in select corridors of 200-600 miles. Second, the strategy will develop emerging and regional high-speed corridor services (operating at speeds between 90 and 150 mph) in corridors of 100 to 500 miles. Finally, the strategy will upgrade the reliability and service on conventional intercity rail services (operating at speeds of up to 90 mph).

The President’s FY2010 budget proposed an additional \$1 billion per year to continue to develop the high-speed rail network.

- **Develop the next generation of air traffic control.** The FY2010 Budget provides \$865 million for the Next Generation Air Transportation System in the Federal Aviation Administration. The Administration supports moving from a ground-based radar surveillance system to a more accurate satellite-based surveillance system, the development of more efficient routes through the airspace, and improvements in aviation weather information.
- **Expand access to broadband.** The Recovery Act provides \$7.2 billion for broadband expansion and the 2010 budget includes \$1.3 billion in USDA loans and grants to

increase broadband capacity and telecommunication service. This support will substantially increase the number of Americans with affordable 21st century access to the Internet. Widespread high-speed Internet access is essential for economic growth, job creation, and global competitiveness, and will foster the next generation of innovators. Expanded Internet access will also enable reductions in energy consumption through telework, make online distance education tools accessible, enhance remote medical monitoring capabilities, facilitate civic engagement, and support enhanced communications networks for first responders.

- **Support research for next-generation information and communications technology.** The Administration is committed to supporting research that will foster the next wave of innovation in information and communications technologies, such as “cognitive radio” that allow for the efficient sharing of spectrum, quantum computing, efficient programming of parallel computers, cyber-physical systems, secure computers and networks, data-intensive supercomputers, and nanoelectronics that enables the continuation of information technology advances for decades to come. The President’s 2010 Budget supported this research through funding for the National Science Foundation, Defense Advanced Research Projects Agency (DARPA), and other public and private institutions.

6. ENSURE MARKET ACCESS AND A LEVEL PLAYING FIELD

In 2008 the United States exported \$1.9 trillion of goods and services – representing 13 percent of GDP. Exports have a critical role to play in the future of the American economy. As consumer spending returns to more normal and sustainable levels it will fall as a share of GDP relative to levels in the 1990s and 2000s. Net exports will have to rise to pick up the slack and drive the growth of the U.S. economy over the next decades. Our trade deficit is simply not sustainable and must be reduced.

Manufacturing will have to play a key role in the export component of America’s growth strategy. In 2008 goods exports were \$1.3 trillion, or 69 percent of all exports. According to recent estimates, closing the public and private savings gaps would push the U.S. manufacturing trade deficit into surplus.

To support exports we must:

- **Open markets abroad.** The United States has 4.5 percent of the world’s population and approximately 24 percent of the world’s GDP. American manufacturers cannot thrive without opening up markets abroad. However some foreign markets restrict American exports due to high tariffs and various non-tariff barriers. The Obama administration is committed to opening markets in key growth areas. For instance, through the Trans Pacific Partnership (TPP), the Administration hopes to negotiate a high-standard agreement in the Asia-Pacific region that provides economically significant market access opportunities for America’s exporters. The Obama administration is also working with Members of Congress and stakeholders to address outstanding concerns regarding pending trade agreements with Panama, Colombia, and South Korea. Finally, the Obama

administration is working with our trading partners to achieve a successful and balanced conclusion of the Doha Round of World Trade Organization negotiations.

- **Enforce our trade agreements.** Over the last eight years, the United States lost its focus on ensuring that other countries lived up to their promises to open their markets, not to violate America's intellectual property, and not to use dumping or subsidies to penetrate America's markets. Under President Obama's leadership, USTR and the Department of Commerce are committed to putting enforcement at the center of our trade agenda. For instance, the Obama Administration is addressing key enforcement concerns through WTO dispute settlement and other key bilateral and multilateral fora. The Administration has also launched a new enforcement initiative to address key agricultural and industrial non-tariff barriers.
- **Promote our exports.** With its network of trade specialists in over 100 cities across the United States, commercial experts in more than 75 countries around the world, and industry and trade policy analysts in the Nation's capital, the Commercial Service at the Department of Commerce is helping U.S. firms become more globally competitive, breaking down barriers to trade, and facilitating expansion of exports by U.S. firms. Services offered by the Commercial Service include market research, trade events that feature US products and services, matchmaking among producers, qualified buyers and distributors, and counseling and advocacy through every step of the export process. The Obama Administration is committed to supporting and improving these efforts.

The Small Business Administration is also undertaking several innovative programs to support manufacturing exporters:

- Training Modules (for businesses and inter-governmental support partners): The Small Business Administration, in cooperation with the Department of Commerce and Export-Import Bank, will adapt its signature *Export Training Assistance Program (E-TAP)* for small exporters with a special emphasis on manufacturers in distressed communities and industrial sectors impacted by import competition. These modules will also be distributed through SBA's partners, including its small business development centers (SBDCs), state economic development agencies, and new partners (e.g., the MEP Centers).
- Awareness Campaign: The SBA will also implement an agency-wide communication plan to stress the importance of U.S. small business manufacturing exports to our economic recovery. This campaign, directed at field office personnel and SBA resource partners, will educate and motivate those with direct contact with the small business community to become export promoters and facilitators.
- Business Outreach: The SBA's field network and resource partners (SBDCs and SCORE Chapters), will work with local MEP organizations to identify manufacturing businesses with export potential and direct them to the appropriate resources.

- **Encourage trade financing.** The financial crisis has made it more difficult for exporting companies to access commercial financing. Among U.S. agencies, the Export-Import Bank has traditionally played a leading role in supporting financing for the export of American goods and services. The Ex-Im Bank portfolio of approximately \$68 billion includes a combination of loan guarantees, insurance, direct loans, and working capital loan guarantees. The vast majority of Ex-Im Bank's portfolio supports the manufacturing sector, including more than \$33 billion in U.S. manufactured aircraft. Increasing awareness of export insurance, guarantee and loan programs among manufacturers will be an important priority of the Ex-Im Bank. These programs are useful tools for manufacturers who had not previously exported or are having difficulty acquiring loans and insurance in the private markets to support their existing exports. Efforts to increase outreach to manufacturers include interagency efforts such as Exports Live, an eight city series of half-day seminars created by six federal agencies to demonstrate how local businesses can leverage government support. The Administration is exploring ways for the Export-Import Bank to enhance its support for manufacturing exports where available private credit is insufficient.
- **Support small business investment in emerging markets and the developing world.** Helping small businesses to invest overseas is an important way to distribute the benefits of international commerce more broadly throughout the U.S. economy. As a vital source of innovation and economic growth, U.S. small businesses increasingly seek opportunities in the global marketplace. But the obstacles can be formidable: limited access to capital, perceived investment risk, and lack of knowledge about opportunities in international markets. The Overseas Private Investment Corporation (“OPIC”) places a special emphasis on helping American small businesses invest overseas by providing financing (e.g., small business loans) and political risk insurance as well as supporting investment funds. In doing so, OPIC complements private sector efforts to manage risks associated with foreign direct investment and supports U.S. foreign policy, while ensuring that there is no negative impact on the U.S. economy.
- **Review our export control regulations.** The administration will review its export control regulations, which currently pose a competitiveness challenge to many U.S. manufacturing exporters. Modernizing and reforming the U.S. export control regime in a manner that both ensures national security and creates a more level playing field for US companies will drive increased market opportunities for U.S. exports and support American jobs.

7. IMPROVE THE GENERAL BUSINESS CLIMATE, ESPECIALLY FOR MANUFACTURING

Manufacturing is a critical part of the overall economy and benefits from sound overall economic policies. In many cases, manufacturing is disproportionately hurt by bad economic policies because it is a more cyclical industry and thus more vulnerable to downturns, as evidenced by the current recession. But the flip side is that manufacturing disproportionately benefits from sound economic policies. Particularly important actions include:

- **Get the economy going again.** Manufacturing has borne nearly one-third of the job loss in the current recession even though it represents only one-tenth of the jobs. Getting the economy going again will disproportionately benefit manufacturing. That is why the Recovery Act is so critical to expanding aggregate demand and creating jobs. And that is why the financial stability plan is essential for restoring the flow of credit, a critical input to American manufacturing and manufacturing job creation.
- **Slow cost growth through health reform.** The National Association of Manufacturers has stated that “the rising cost of health care coverage is one of the biggest impediments to sustained recovery in the manufacturing sector.” The typical manufacturing worker receives \$2.92 per hour in health insurance benefits – as compared to \$1.77 per hour for workers in service-providing industries. As a result the industry will disproportionately benefit from the Obama Administration’s efforts to slow cost growth and improve quality, efforts that began with ARRA’s investments in health IT, comparative effectiveness research and prevention, and are continuing with healthcare reform.
- **Replace tax breaks for overseas investment with tax cuts for businesses creating jobs in America.** The President is committed to curbing tax incentives that give a company a lower tax rate for creating jobs overseas than it receives for creating jobs in America. The President’s plan will use the savings from curbing these tax breaks to make the research and experimentation tax credit permanent, disproportionately benefiting manufacturing companies because they are the source of over two-thirds of all American R&D performed by industry.
- **Cut the deficit in half to free up capital and reduce the trade deficit.** America’s swelling budget deficit has reduced the national savings rate to the lowest level since the 1930s, cutting the capital available for American businesses, increasing foreign borrowing and swelling the trade deficit. The President’s plan will more than cut the deficit he inherited in half, boosting national savings, investment in manufacturing, and exports.
- **Pass comprehensive energy and climate legislation that will jump start the American clean energy sector.** Comprehensive market-based legislation will send a clear signal that will help business plan for the future. Done properly, this legislation could unleash a wave of transformative investments in clean energy alternatives and energy efficiency that could spur new manufacturing industries. Indeed, the President has made a substantial down payment on seizing this opportunity through ARRA’s \$80 billion in clean energy investments. A central part of this strategy is to ensure that domestic manufacturers aren’t unduly disadvantaged relative to their global competitors and that domestic reductions in carbon pollution aren’t simply offset by increased emissions abroad. The Administration is also committed to helping industry cut energy costs by increasing energy efficiency and promoting sustainable manufacturing strategies.

VII. Conclusion

Today e-mail, GPS, and microwave ovens are taken for granted, but just a generation ago they were unimaginable or prohibitively expensive. This rapid shift did not happen spontaneously. The Internet grew out of security research at DARPA and thrives on the backbone of a public-private partnership. The United States Navy piloted GPS technology. And the microwave came out of physics research sponsored by the U.S. military.

So too the next generation's economy will be profoundly different than the one we have today. If history is any guide, the differences will be due in part to the steps we take in our lifetimes. The most important steps will be taken by private entrepreneurs and workers. But history reminds us that these steps will have much to do with support for innovation from the public sector.

One of the most important responsibilities the government has is to help foster the conditions for sustainable growth and the creation of good jobs. The Obama Administration's approach to manufacturing will do just this, unleashing innovation, helping workers prosper, and fostering some of the most important industries of the future.

APPENDIX

The Opportunity: Examples of Manufacturing Industries of the Future

While it is impossible to predict exactly what a revamped American manufacturing sector will look like, a glimpse of the future can be found by looking at a combination of young and mature industries that have the potential for significant growth. What follows is anything but an exhaustive or predictive list. Rather, it is meant as a sample of industries that have at least some of the characteristics for a promising future.

1. Responding to Growing Demand: High-tech Clean Energy Industries of the Future

The Obama Administration has made a substantial down payment and commitment to clean industries of the future. Examples include:

Wind

In 2008, U.S. installed wind capacity increased by 50 percent, and capacity has been growing almost 40 percent a year for the last decade. American manufacturers are increasingly positioned to take advantage of this rapid growth. Between 2005 and 2008, the share of domestically manufactured wind turbine components grew from 30 percent to 50 percent. The wind industry is growing rapidly and is projected to continue growing in the decade ahead. By 2012, one industry analysis expects installed capacity to triple, employing several hundred thousand workers.

Solar

Technology innovation in solar power has been thriving in the United States. The US investment almost single handedly equaled the \$1.3 billion in investment by the rest of the world in 2008. According to Department of Energy estimates, the overall solar industry currently employs about 20,000 individuals in the U.S. in a broad range of jobs, approximately half in manufacturing. The worldwide hardware (e.g., solar panels, towers) market is expected to grow rapidly, with some analysts estimating growth from \$33 billion in 2008 to over \$100 billion in 2013.

2. Reinvigorating the Backbone of Manufacturing: Steel and Autos

The steel and auto industries have traditionally been the backbone of the American manufacturing sector. While both industries are in difficult and sometimes painful transition periods, new advances provide hope for a strong and vibrant future.

Steel

Today's American steel industry has emerged from two decades of consolidation and restructuring as modern, hi-tech, green and globally competitive. According to the American Iron and Steel Institute, the steel industry contributes over \$350 billion annually to the economy,

directly employing over 165,000 people and supporting 1.2 million jobs. American steelmakers are using innovative techniques and new technology to increase efficiency, closing the comparative advantage that low labor costs provide developing countries. A major source of productivity improvements has been the development of minimills (electric arc furnace, or EAF, mills). Traditional blast furnace steel making has made dramatic strides as well. For example, new computer models have improved production efficiency and product quality.

Batteries and Electric cars

While traditional domestic automobile production is undergoing a historic transition, new technological developments in batteries and design are paving the way for the future of U.S. auto manufacturing. The first stage, already well underway, is the introduction of hybrid electric vehicles (HEVs), which combine traditional internal combustion engines with batteries capable of propelling the car as well. The projected growth in this area suggests there is a tremendous opportunity for American HEV manufacturers to enter the market and participate in a substantial way. The second stage is plug-in hybrid electric vehicles (PHEVs). As costs fall and availability increases, PHEVs are expected to become a viable option for a larger segment of the car buying population. The last stage is fully electric vehicles (EVs). A small but visible group of U.S. startups, such as Tesla Motors, Fisker Automotive, Coda Automotives, and Phoenix Motorcars, are beginning to produce fully electric cars. While the EV market will likely develop slowly in the next five to seven years, projections reach as high as 100,000 cars per year by 2015.

3. Capital-Intensive, High-Productivity Industries: Bioengineering

American manufacturing will naturally involve new industries focused on capital intensive, high productivity processes. One example of an industry which is already showing promising results is bioengineering. Drug and chemical design and manufacturing have been revolutionized over the past two decades through the development of biological engineering technology. Companies can take advantage of novel biomaterials, high-throughput biochemical processes, and genomic technologies for smarter design of medical drugs and other chemicals with applications in agriculture and industry.

4. Major American Leaders: The Aerospace Industry

In the 20th century, the U.S. aerospace industry was a bedrock of innovation that created jobs and touched the pride and imagination of the country through endeavors like the Space Race. Today, the industry remains a strong and vital part of the U.S. economy. In 2007, aerospace contributed \$97 billion in export sales, with aerospace alone accounting for 1.5 percent of GDP. According to Inforum, in 2008, the industry directly employed over 550,000 workers. According to one recent estimate, the aerospace manufacturing industry is expected to grow 24 percent between 2011 and 2020, adding over 100,000 good-paying new American jobs.

5. Nascent Industries: Nanotechnology

Some industries likely to play a key role in job and wealth creation over the next several decades are just beginning to find their footing. One such example is nanotechnology, a field defined by

its focus on the design, manipulation, and manufacture of things on the molecular and atomic level. Nanotechnology can be applied to almost anything, from the manufacture of chemicals and computer chips to the creation of medical devices and technologies to foods. In August 2008, The Project on Emerging Nanotechnologies catalogued 803 products involving some form of nanotechnology, up from 212 in March 2006. Of these, 426 originated in the United States, which is currently the leader in nanotechnology by a wide margin.

6. Beyond Manufacturing: Building the Smart Grid and Weatherizing Homes

While the focus of this report is on the manufacturing sector, there are several other industries that have similar characteristics, offering the prospect of creating good-paying jobs for American workers. Two important examples are building the smart grid and weatherizing homes.

Building a Smart Grid

The Recovery Act includes \$11 billion for new technologies, transmission system expansion and upgrades, and other investments to modernize and enhance the electric transmission infrastructure and improve energy efficiency and reliability. This unprecedented investment will create hundreds of thousands of new jobs.

Weatherizing Homes

U.S. weatherization efforts have been growing quickly in response to energy price volatility and the push toward energy efficiency. As the President took office, over 28 million low-income homes remained eligible for government provided weatherization assistance. Recognizing the importance and job creation potential of efficiency improvements, the Recovery Act allocated \$5 billion to the Weatherization Assistance Program (WAP) to weatherize and/or increase energy efficiency of low-income housing and assist local governments in implementing energy efficiency programs. The stimulus represents a more than tenfold increase in weatherization spending.

Although absorbing new resources will take some time, WAP estimates the funding will help weatherize approximately 525,000 homes over the next several years. This expansion in weatherization efforts will require hiring and training of workers throughout the country, creating tens of thousands of new jobs.