



Green Cities
Minneapolis
Saint Paul
Green Jobs

Prepared for the Mayors' Initiative on Green Manufacturing by:

**Jay Demma
Aaron Hagar
Leigh McIlvaine
Katrina Mitchell
Kristy Swanson
Audrey Vesota Flack**

In partnership with Candace Campbell of CDC Associates

May 14, 2008

The Green Cities, Green Jobs team is grateful for the guidance of Cara Letofsky and Anne Hunt of the Cities of Minneapolis and Saint Paul, and Dave Foster of the Blue Green Alliance, and appreciate their willingness to connect us to the people and resources needed to complete this project.

The Green Cities, Green Jobs team extends their gratitude to Candace Campbell for her thoughtful insights and feedback and for giving us the opportunity to work on this exciting initiative.

In addition, the team would like to thank the following people for providing valuable feedback on various parts of this project:

Kurt Schultz, Saint Paul PED
Jim Davnie, Minnesota House of Representatives
Brendon Slotterback, Bonestroo
Joanna Hicks, Ryan Companies
Haila Maze, Minneapolis CPED
Jim Forsyth, Minneapolis CPED
Emily Stern, Minneapolis CPED

This research was prepared as a capstone course assignment and served as partial fulfillment of a Masters degree from the University of Minnesota's Humphrey Institute of Public Affairs

TABLE OF CONTENTS

Executive Summary	1
Introduction	4
Green Manufacturing Defined	5
Methodology _ _ _ _ _	6
Occupational Structure _ _ _ _ _	6
Job Density _ _ _ _ _	6
Median Firm Age _ _ _ _ _	7
Wages _ _ _ _ _	7
Employment Growth Trends _ _ _ _ _	7
The Green Building Products Industry	7
Background: Emergent Green Construction _ _ _ _ _	7
Green Building Product Opportunities _ _ _ _ _	9
Green Building Products Summary _ _ _ _ _	13
Recommended Green Building Product Opportunities _ _ _ _ _	13
The Renewable Energy Industry	14
Background: Demand for Renewable Energy Sources _ _ _ _ _	14
Renewable Energy Product Opportunities _ _ _ _ _	15
Summary _ _ _ _ _	18
Recommended Renewable Energy Product Opportunities _ _ _ _ _	19
The Transportation Industry	20
Background: Traditional Automobile Manufacturing _ _ _ _ _	20
Green Transportation Industry Background _ _ _ _ _	20
Conclusion _ _ _ _ _	25
The Green Workforce in Minneapolis and Saint Paul	25
Minneapolis and Saint Paul’s Current and Future Workforce: _ _ _ _ _	25
Conclusion and Recommendations	26
Recommendations _ _ _ _ _	27
Green Sites	30
Background _ _ _ _ _	31
Existing Criteria _ _ _ _ _	31
Criteria for Green Industrial Sites.....	33
Site Design _ _ _ _ _	37
Building Design _ _ _ _ _	39
Exterior _ _ _ _ _	39
Interior _ _ _ _ _	40
Business practices _ _ _ _ _	40
Summary and Recommendations	41
Next Steps _ _ _ _ _	43

Green Zones: Process and Policy	44
Development Incentives	44
<i>Frequently Used Financial Incentives</i>	45
<i>Frequently Used Non-Financial Incentives</i>	45
<i>Common Green Development Incentives</i>	45
<i>Economic Development Incentives: Cost vs. Benefits</i>	46
Economic Development Zones in the United States	46
<i>Best practices and Local Applications</i>	46
Variants on Enterprise Zones	47
<i>Micro-Zones» and Eco-Industrial Parks</i>	47
<i>LEED-ND</i>	48
“Green” Enterprise Zones in the United States	49
<i>Milwaukee Greenlight District</i>	49
<i>East Bay Green Corridor Partnership</i>	50
<i>New York City Industrial Business Zones (IBZ)</i>	50
<i>San Jose Environmental Business Cluster (EBC)</i>	50
Summary	51
Recommendations	52
 Conclusion	 54
Workforce Analysis	54
Green Sites	54
Green Zones	55
Towards a Sustainable Green Manufacturing Sector: How to Move Forward	56
 Appendix A: Green Jobs Analysis Data Sources & Methodology Limitations	 A
 Appendix B: Product Summary Data	 D
Green Building Products	D
Renewable Energy Products	E
Green Transportations	F
 Appendix C: Potential measures for green criteria	 G
Site Location	G
Site design	H
Building design	H
Business operations	H
 Appendix D : Green Site Location Maps.....	 I
 Appendix E: Existing Sustainability Assessment Tools	 N
 Appendix F: Federal and State Enterprise Zones - An Overview	 R
<i>Federal and State Enterprise Zones: Theoretical Debates</i>	S
<i>The Impacts of Enterprise Zones: Key Findings</i>	S

APPENDIX G: Case study of Economic Development Initiatives U

APPENDIX H: Current Development Incentives in MN V

City Programs	-----	V
State Program	-----	W
Private Funding Opportunities:	-----	X
Federal Initiatives:	-----	AA

Appendix I: Product Opportunity Production Occupations AD



EXECUTIVE SUMMARY

Green Cities, Green Jobs examines manufacturing jobs in multiple green industry subsectors, green industrial site criteria, and green economic development zones to guide Minneapolis and Saint Paul towards sustainable development. This report advises the cities on techniques available to support environmentally preferable industrial processes and products emerging from the new green economy. *Green Cities, Green Jobs* presents practical analysis, tools, and strategies that Minneapolis and Saint Paul may use to competitively position themselves by directing new and existing industrial development towards a greener, more sustainable future.

Green Jobs

This report analyses the employment characteristics of 29 existing and emerging green industries identified in *Making it Green*, Phase I of the Mayors’ Initiative on Green Manufacturing. Analysis of these industries is intended to help inform Minneapolis and Saint Paul about their most promising options for expanding manufacturing employment opportunities on their valuable industrial lands. The industries analyzed include:

Green Building Products	Renewable Energy Products	Green Transportation
Insulation	Batteries	Wind Turbine Parts
Windows & Doors	Bio-Fuels	Bio-Fuels Systems
Glass/Films	Fuel Cells	Solar/PV
HVAC Systems & Controls	Generators	Solar Hot Water
Lighting	Bio-Fuels Engine Parts	Geothermal Pumps
Wood Products	Hybrid Buses	Pelletization Systems
Alternative Materials	Neighborhood Electric Vehicles	Distributed Power Management Systems
Site and Landscape Materials	Electric Cooling/Heating of Vehicles	Sensors & Diagnostic Equipment
Adhesives		Energy Efficient Products
Paints		Energy Conservation and Green Products
Testing Kits/Remediation		

Key questions answered in this report about green manufacturing product opportunities include:

1. What proportion of the jobs in this subsector are manufacturing positions?
2. How well does the Minneapolis and Saint Paul workforce satisfy this subsector’s workforce requirements?
3. How many jobs per 1,000 square feet of facility space does this subsector house, on average?
4. What is the median age of firms in this subsector?
5. How many new jobs have been created in the last three years by this subsector?
6. How much do these manufacturing jobs pay?

Careful analysis of the 29 product opportunities results in the following product opportunity recommendations:

- HVAC Control Systems
- Wood Products
- Renewable Energy Sensors and Monitoring Systems
- Bio-fuels Systems
- Electric Vehicles

Green Cities, Green Jobs additionally recommends:

- Focusing on product opportunities in different stages of product-profit cycle in order to create competitive manufacturing jobs now while planning for growth in different markets in the future.
- Emphasizing critical workforce training in green manufacturing techniques for many of the analyzed industries.
- Conducting a supply chain analysis in order to determine local subsector suitability.
- Assisting local manufacturers in “going green” to help our existing industrial base become more competitive in future markets.
- Capitalizing on existing workforce strengths in precision manufacturing.
- Emphasizing research and development in the emerging green transportation and renewable energy sectors.

Green Sites

Green Cities, Green Jobs develops a comprehensive list of site criteria to be used for evaluation of businesses in Minneapolis and Saint Paul’s proposed Green Zones. Site criteria are described for industrial business operations, building design (interior and exterior), site design, and site location. This report recommends implementing a set of comprehensive but flexible criteria to designate manufacturers as green producers.

Green Jobs, Green Cities recommends:

- Integrating green site, building and operations criteria into existing economic development opportunities and priorities.
- Prioritizing development that mitigates the effects of location.
- Working with MetroTransit to create new transit options for workers.
- Creating an information clearing house for green industry.
- Creating a quasi-public development agency to support green industry

Green Zones

Green Cities, Green Jobs describes tools and strategies that may be used in the creation of Green Zones as an economic development tool for Minneapolis and Saint Paul. This section examines commonly-used green development incentives and other types of economic development zones used in a number of cities nationwide. *Green Cities, Green Jobs* finds that Minneapolis and Saint Paul's Green Zones initiative is unique and will position the cities as leaders in green manufacturing.

Green Cities, Green Jobs recommends that Minneapolis and Saint Paul:

- Create clear and meaningful financial and non-financial incentives.
- Streamline the paperwork process for businesses that are going green or relocating to Green Zones.
- Engage businesses early in the process of incentive development.
- Enhance industries' access to information about Green Zones and sites.
- Draw on the existing strengths of urban industrial areas such as site location near transit and workforce housing.
- Create strategies to anticipate and address disproportionate geographic impacts of designating industrial land as a Green Zone.
- Leverage the University of Minnesota's research and development capabilities.
- Create a sophisticated marketing strategy to advertise Minneapolis and Saint Paul as leaders in innovative green manufacturing and inform interested businesses about the benefits created by Green Zones.

Strategies to Move Forward

Green Cities, Green Jobs recommends that Minneapolis and Saint Paul move quickly to adopt a joint Green Zone. In order to most effectively and efficiently implement the tools and strategies identified in this report, the cities should create a shared quasi-public agency to administer the Green Zones program and promote partnership between local, regional and federal governments, nongovernmental organizations, educational institutions, and the private sector. The shared agency will act as an information clearinghouse and public advisor to businesses attracted to Green Zones and existing industries interested in greening their manufacturing processes.

INTRODUCTION

Mayors R.T. Rybak and Chris Coleman, in partnership with the Blue-Green Alliance, established the Mayors' Initiative on Green Manufacturing, a joint strategy that competitively positions the cities at the forefront of sustainable local industrial economies. The first product of this initiative is *Making it Green* in Minneapolis Saint Paul, a report that is the outcome of a series of meetings with local stakeholders and experts. *Making it Green* identifies product opportunity subsectors in which Minneapolis Saint Paul is economically competitive and recommends two unique concepts that both cities may use as tools to generate and support sustainable manufacturing: 1) green industrial zones, and 2) green site criteria for manufacturers. The report suggests additional research and analysis of green manufacturing jobs and sustainability strategies used to drive green economic growth.

Green Cities, Green Jobs furthers the work of *Making it Green* in three areas. First, *Green Cities, Green Jobs* closely analyzes the employment characteristics important to Minneapolis Saint Paul in the 29 product opportunity subsectors identified in Phase One of the Mayors' Initiative for Green Manufacturing. *Green Cities, Green Jobs* recommends five promising product opportunities for Minneapolis Saint Paul to pursue based on this analysis, and makes further recommendations to assist the cities in developing stable, competitive green manufacturing economies.

The green sites section of *Green Cities, Green Jobs* examines multiple types of sustainability criteria used in association with different types of development, and confirms that the concept of green site criteria for industrial land uses is unique in the United States. This section of the report suggests the development of green industrial site criteria on four scales: business management and operations, building design (interior and exterior), site design, and site location. *Green Cities, Green Jobs* develops a comprehensive and flexible set of criteria that may be used by Minneapolis Saint Paul to measure the overall sustainability of any industry, while supporting and rewarding manufacturers for conducting their businesses in innovative and environmentally conscientious ways through the Green Zone program.

Section three of this report examines the concept of green industrial zoning proposed in *Making it Green* and finds that it too is a unique and innovative strategy. The Green Zones portion of *Green Cities, Green Jobs* reviews existing types of economic development zones, evaluates their outcomes, and makes a series of recommendations to Minneapolis Saint Paul. This section also reviews other zoning practices utilized by municipalities such as eco-industrial parks and locally supported small business clusters, and suggests financial and non-financial incentives useful to the development of a shared Green Zone.

The synthesis of these three analyses and their recommendations connects green manufacturing processes with green products, and has the potential to help Minneapolis Saint Paul grow new manufacturing jobs in burgeoning sustainable industries. Strategic economic planning can help Minneapolis Saint Paul reduce carbon emissions, and develop healthy environments for workers and residents, creating future-forward development supportive of good jobs.

WORKING TOWARD GREEN JOBS

Recognizing that green manufacturing includes a wide variety of products, processes, and companies, *Making it Green* subcommittees narrowed the list of potential target industries to 29 product opportunities within three industry sectors: Green Building Products, Renewable Energy, and Transportation. These industry sectors were singled out as an area of focus with the understanding that changes in these industries will have the greatest potential to reduce global warming.

Not all industries are created equally. To best inform the cities of Minneapolis and Saint Paul about growth opportunities in green manufacturing subsectors, *Green Cities, Green Jobs* analyzed characteristics of firms and products based on a number of criteria. These criteria include occupational structure (the proportion of manufacturing positions in a given subsector), job density (the ratio of jobs to facility square footage), employment growth trends, median age of firms analyzed, and median wages paid to production positions in each subsector. Our results follow the below description of methodology.

Green Manufacturing Defined

Green manufacturing can be defined in two ways. Green *products* differ from regular products because they are designed for a specific market as environmentally preferable to regular goods. Green *processes* utilized in manufacturing reduce negative environmental impacts of industrial production. Growth in demand for both green products and green processes is substantial, and there is some overlap between the two. Many firms manufacturing green products have cleaned up their manufacturing processes to reduce pollution and other negative impacts of industrial production. There are also firms that produce regular products through environmentally preferable techniques. Citizens' groups, local governments and national regulatory bodies are increasing pressure on many industries to clean up their production methods, and numerous firms have taken the initiative upon themselves to produce goods in more responsible ways.

The product opportunity section of this report defines green manufacturing solely as the production of green products. *Green Cities, Green Jobs* focuses only on green products (rather than process) for a number of reasons: 1) *Making it Green* identified green manufacturing by products, not by process; 2) By targeting industries with growing consumer markets, the primary emphasis of this initiative is to create new manufacturing positions in Minneapolis and Saint Paul to replace ones that have been lost; 3) An in-depth study of firms engaged in green process manufacturing would require substantial time and funds beyond the possible scope of this report; and, 4) Many firms will naturally adopt green processes as it becomes apparent that it is to their competitive advantage to conserve energy, and communities are made more knowledgeable of industrial production impacts.

Methodology

In the following analysis, *Green Cities, Green Jobs* identifies the product opportunities, or industry subsectors, Minneapolis Saint Paul should focus on when building a green economic foundation. *Green Cities, Green Jobs* narrows down the 29 subsectors identified in *Making it Green* based on the following questions:

1. What proportion of the jobs in this subsector are manufacturing positions?
2. How well does the Minneapolis Saint Paul workforce satisfy this subsector's workforce requirements?
3. How many jobs per 1,000 square feet of facility space does this subsector house, on average?
4. What is the median age of firms in this subsector?
5. How many new jobs have been created in the last three years by this subsector?
6. How much do these manufacturing jobs pay?

Occupational Structure

Occupational structure analysis was conducted for each product opportunity category. The analysis necessitated a review of data from the Bureau of Labor Statistics (BLS). Each product category analyzed was reviewed to determine which North American Industry Classification System (NAICS) category was most representative of the companies comprising the product category, which allowed an analysis of occupation types in each industry. The resulting analysis shows the percentage of jobs in each subsector that are actual production positions.

Next, an industry-specific occupational breakdown was analyzed for each representative NAICS classification. The result is a listing of occupations representative of each those required by each subsector. The purpose of the occupational analysis is to provide insight into the potential workforce needs of the 29 product opportunities. Furthermore, the results can be compared against an occupational analysis of the workforce structure of the Minneapolis Saint Paul metropolitan area in order to reveal workforce gaps in the event that companies within the identified subsector were to consider relocation to or facility expansion in Minneapolis Saint Paul. Specific results of this workforce analysis for each of the 29 subsectors are shown in Appendix I.

Job Density

A key component to the green manufacturing criteria previously described in this study is the degree to which jobs are concentrated at a given location, such that the "density" of jobs can support public transportation and other municipal goals, such as maximizing employment opportunities for residents, promotion of job-housing balance, among others. Building upon the work completed in *Making it Green*, the research team for *Green Cities, Green Jobs* analyzed each of the identified 29 subsectors to determine which opportunities would have the highest job density rating. The job density for each product opportunity was determined through an analysis of American companies engaged in the manufacture the identified product opportunities. The analysis included a comparison of number of

employees against the size of the facility in order to determine a ratio of jobs per 1,000 square feet of manufacturing space.

Median Firm Age

Subsectors analyzed in this report represent many different stages in the product-profit cycle. Median firm age is an important descriptor of the potential product development stage for each subsector. Representative samples of companies engaged in green product manufacturing were analyzed to determine their potential stage in the research-development-mass production business cycle. Subsectors with younger median age are likely to have more employees dedicated to product development, rather than mass production for an established market.

Wages

Analysis of BLS data for typical production occupations required by each subsector was conducted to identify product opportunities for Minneapolis Saint Paul providing the highest median hourly wage. Appendix I also shows how national median wages commanded by occupations in each subsector compare to wage levels for the same occupations in the Minneapolis Saint Paul metropolitan area.

Employment Growth Trends

Finally, *Green Cities, Green Jobs* analyzes the growth in employment in each green manufacturing subsector. Unlike our analysis of wages, this data describes only companies engaged in the manufacture of green products. Analysis of employment growth is conducted by aggregating the total employment by manufacturing facilities producing green products in 2005 and 2008 for a representative sample. The results are not manufacturing position-specific, but some subsectors show staggering employment growth.

Conclusions reached in the following analysis are based on the above methodology. For a discussion on the limitations of this methodology, see Appendix A.

The Green Building Products Industry

Background: Emergent Green Construction

The green building movement, which utilizes environmentally sensitive construction techniques and products to reduce consumption and improve residential safety, is rapidly moving into the mainstream after several years of slow growth. Growth in green construction has created a shift in perception among owners and the architectural, engineering, and construction communities. Construction industry stakeholders are beginning to embrace the green movement and sustainable design for its energy cost savings and positive public perception.¹

Three major trends are pushing green building to the forefront of the construction industry's consciousness: 1) a remarkable level of government initiatives; 2) heightened residential demand for green construction; and 3) improvements in

1 FMI, FMI Presents the 2008 U.S. Construction Overview, <http://www.fminet.com/press/detail.dot?inode=9784&pageTitle=FMI+Presents+the+2008+U.S.+Construction+Overview>

and increased availability of sustainable materials.²

As the largest owner and operator of buildings, the federal, state and local governments have the ability to exert tremendous influence over the construction industry and to put in place policies, rules and regulations designed to drive private sector investment toward a more sustainable future. Many states, including Minnesota through its B3 standard, have adopted sustainability requirements for all of their new government-funded construction projects. Governments have also implemented economic incentives in the form of tax rebates and credits, density bonuses and other policies such as expedited permitting and approval for green projects.

The heightened level of interest in sustainability within the residential construction sector has contributed to green construction's movement into the mainstream. While demand for traditional residential construction is slowing down, green housing and materials markets are expanding. Homeowners are increasing their investment in sustainable housing due to improved economic paybacks resulting from high energy prices and their growing sensitivity to environmental concerns.

Green materials and building products are becoming more popular due to the upward trend in the green construction market. Consumers are becoming more knowledgeable about their health and the environment and are now questioning the volatile organic compounds (VOCs) in their carpet, paint and wood. They are making conscious efforts to identify what building materials are healthier, more energy efficient, and economically sensible. Many firms are currently engaged in the manufacture of green building products, which leads to more competition and better pricing. In addition, distribution outlets for green materials are improving.

The Harvard Business Review predicts that green construction will become a mainstream technology in the next five to ten years, as a growing market helps to drive down the cost of green building products, and building owners become increasingly aware of the economic, health, and environmental advantages of green building. The impact of green building going mainstream will be as profound on commercial real estate as the invention of central air conditioning in the 1950s and 1960s, or elevators in the 19th century.³

Over 500 U.S. companies, including a number of Fortune 500 companies, are involved in the production of green building materials and the design and construction of green buildings. This number is certain to grow rapidly as more building owners and investors are alerted to the potential of green building. Employment in "green collar jobs" represents a significant growth opportunity for Minneapolis Saint Paul's diminishing manufacturing base.

2 Building Design and Construction Construction Industry Viewpoint: Green Building is "Good", <http://www.bdcnetwork.com/article/CA6526199.html>

3 Charles Lockwood, "Building the Green Way," *Harvard Business Review* 84, no. 6 (2006): 129 – 137.

Green Building Product Opportunities

Eleven product opportunities for Minneapolis Saint Paul were identified by the Phase I Green Building Products Steering Committee in *Making it Green*. Products included in this subsector are considered environmentally preferable for a range of reasons including, but not limited to, energy efficiency, reduced emissions, recycled material content, or use of alternative materials in production.

Green building product opportunities include:

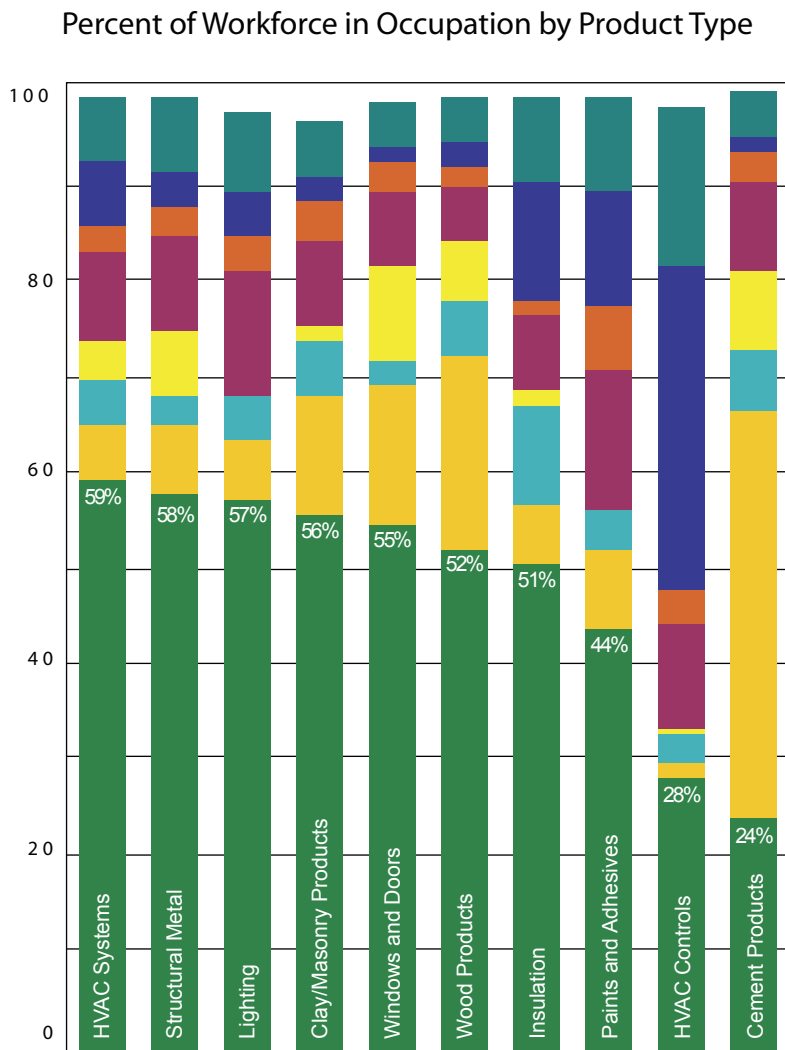
- Insulation
- Windows and Doors
- Glass and Films
- HVAC Systems and Controls
- Lighting
- Wood Products
- Alternative Materials⁴
- Site and Landscape Materials
- Adhesives
- Paints
- Testing and Remediation Kits

A total of 1,168 manufacturing facilities were analyzed for the purposes of determining subsector employment size and growth, occupational structure, and typical job densities by product type. While not all manufacturing facilities utilized in the following analysis are engaged in green building product manufacturing, each company analyzed produces green products at one or more of their facilities. Product opportunities exhibiting the greatest employment levels tend to be in industry subsectors with a great degree of diversity in the types of products manufactured, and are therefore not necessarily representative of total subsector employment. Summary statistics of the analyzed sample of green building products manufacturing locations are located in Appendix B.

Occupational Structure

To identify building product types with the highest levels of manufacturing positions, the research team for *Green Cities, Green Jobs* determined the occupational structure of the eleven building product opportunities. Most analyzed product opportunities employ a production workforce that comprises greater than fifty percent of its total workforce (Figure 1). There is a great degree of variation within product opportunity categories, however. For example, the production of structural metals, an alternative material, has an occupational structure exhibiting 58 percent production workers, while the production of cement, also an alternative material⁴, employs just 24 percent of its workforce in manufacturing occupations. Similarly, the production of HVAC systems and HVAC controls also shows a great degree of disparity in the number of manufacturing positions employed in the workforce.

Figure 1. Green Building Products Occupational Structure: Percent of Workforce in Occupation by Product Type



Source: Bureau of Labor Statistics 2006

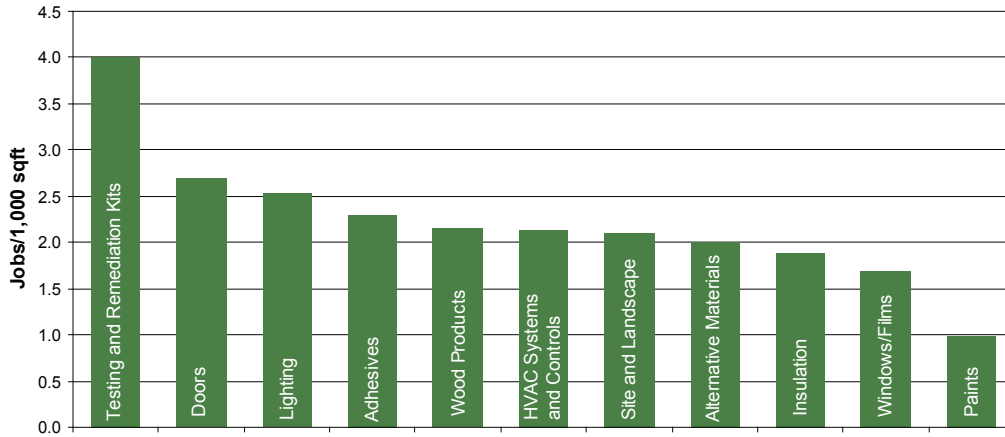
- Management, Business, Financial
- Computer, Science, Architecture, Engineering
- Sales
- Office, Administration Support
- Construction, Extraction
- Installation, Repair, Maintenance
- Transportation
- Production

4

Alternative materials examined in this analysis are defined as environmentally preferable goods produced with cement or concrete, architectural or structural metals, clay products and refractory materials, and converted paper products.

Job Density

Because the availability of industrial land in Minneapolis Saint Paul has diminished, another important evaluation criterion is the job density of each of the eleven product opportunities. Job density is defined as the number of jobs per 1,000 square feet of facility space. The production of testing and remediation kits employs the greatest number of workers per square foot of manufacturing space. Only the production of insulation, windows and films, and paint employs less than two workers per 1,000 square feet of facility space. (Figure 2)

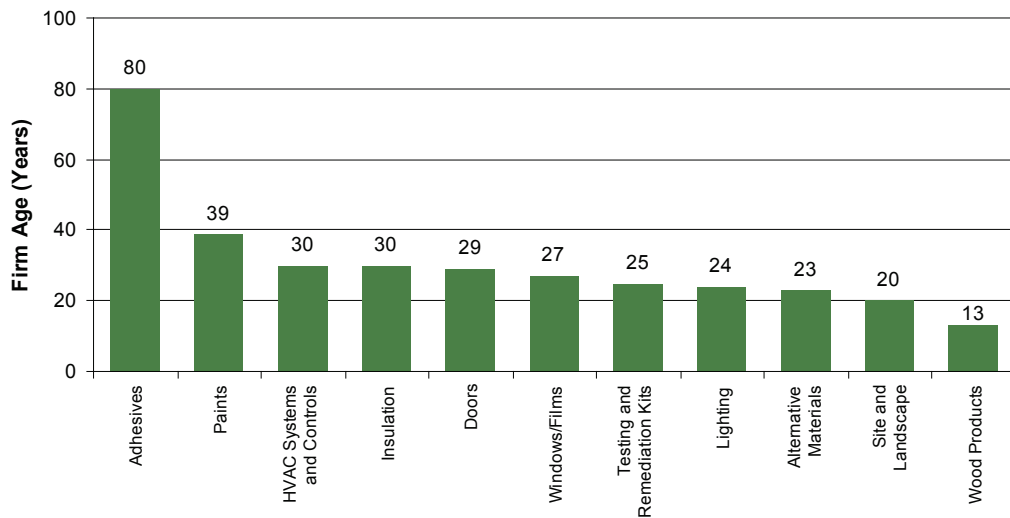


Source: Dunn & Bradstreet Million Dollar Database 2008

Figure 2. Green Building Products Job Density: Median Number of Jobs per 1,000 Square Feet by Product Type

Median Firm Age

The oldest firms in the green building products subsector are petrochemical manufacturers of adhesives and paints, at 80 and 39 years, respectively. Product opportunities exhibiting the lowest median firm ages are wood products and site and landscape materials (Figure 3).



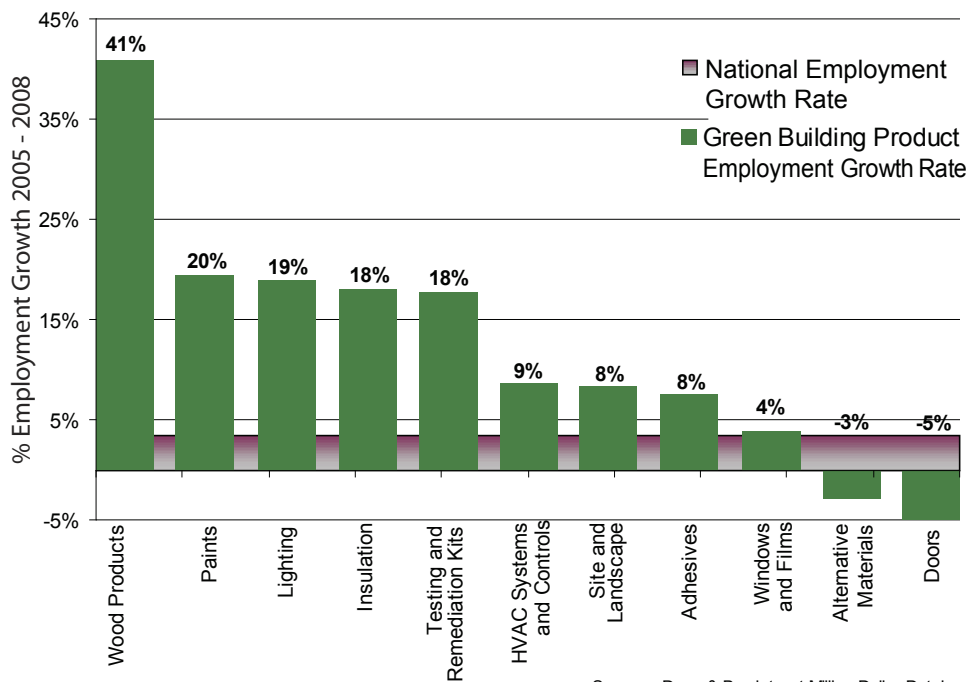
Source: Dunn & Bradstreet Million Dollar Database 2008

Figure 3. Green Building Products Firm Age: Median Age (Years)

Employment Growth

Total employment by selected manufacturing facilities increased by 6.8 percent over the past three years: 112,600 to 120,300 employees.⁵ Of the eleven product opportunities identified in *Making it Green*, wood product manufacturing experienced the most significant rate of employment growth at 40.9 percent (Figure 4). Production of paints, lighting, insulation and testing and remediation kits also reveal considerable employment growth rates. Employment by sample manufacturing locations producing alternative materials and doors decreased from 2005 to 2008.

Figure 4. Green Building Products Employment Growth: 2005 - 2008

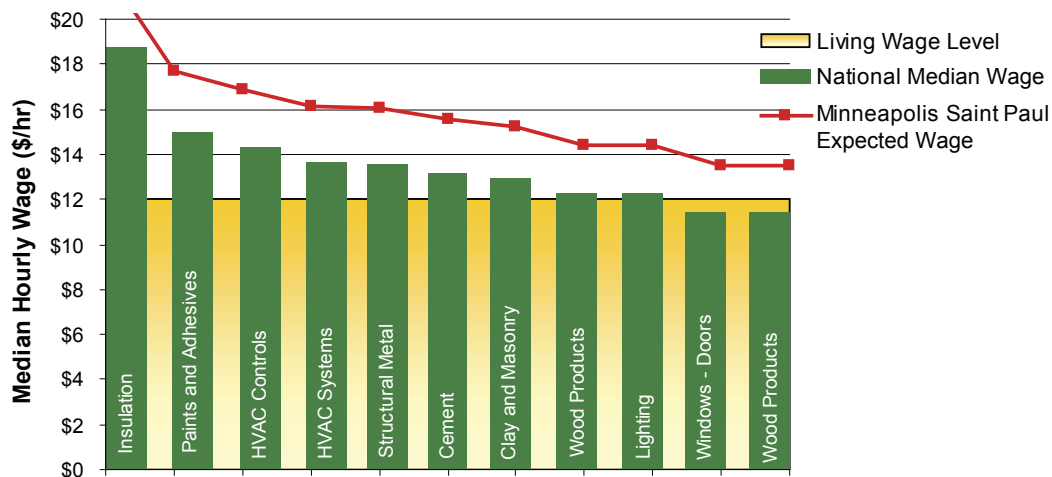


Source: Dunn & Bradstreet Million Dollar Database 2008

Wages

Green Cities, Green Jobs additionally analyzed wage levels of production occupations in the eleven green building product opportunities identified in *Making it Green*. In 2006, the highest wages were paid to manufacturers of insulation, paints and adhesives, and HVAC controls (Figure 5). Clay and masonry, wood products, and windows and doors manufacturing positions commanded the lowest median wages.

Figure 5. Green Building Products Median Production Wages 2006



Source: Bureau of Labor Statistics 2006

Green Building Products Summary

Minneapolis Saint Paul can be poised to take advantage of employment growth stemming from increased demand for green building products. The U.S. Green Building Council predicts that, by 2012, the annual market for green building products will double in size to \$60 billion. Both cities already boast a number of green building product manufacturers (identified in *Making it Green*). Because Minneapolis Saint Paul host a number of businesses that manufacture many of these products, the expansion of supply chains may prove to be a simple process provided for by existing market mechanisms.

There are limitations to Minneapolis's and Saint Paul's favorable positioning, however. The cities exhibit a proportional lack of workers trained in occupations necessary to the manufacture of green building products, with the notable exception of HVAC controls production (Appendix I). The above analysis shows that most products in this sector meet minimum job densities of one job per 1,000 square feet, and the majority of these manufacturers employ a workforce comprised of more than fifty percent production workers. Median national wages for workers employed in the production of building products range from \$11 to \$19 per hour, and would likely command higher pay in Minneapolis Saint Paul.

Recommended Green Building Product Opportunities

Wood Products

Of the eleven green building product opportunities identified in *Making it Green*, wood product manufacturing exhibited the highest employment growth rate, at 41 percent between 2005 and 2008. The manufacture of wood products has significant potential for linkages with local businesses such as construction and windows and doors manufacturers already located in Minneapolis Saint Paul. Local wood product manufacturers also have the potential to lower supply costs for local firms by reducing the cost of transportation of goods.

HVAC Control Systems

Skills required for the manufacture of HVAC control systems match the existing labor force strengths of Minneapolis Saint Paul. The production of HVAC control systems requires precision manufacturing skills already used in the manufacture of medical devices. Additionally, production workers in the HVAC control systems subsector enjoy higher median wages than many other green building product opportunities, at \$14 per hour.

The Renewable Energy Industry

Background: Demand for Renewable Energy Sources

Renewable energy has existed for a long time in the form of water power, wind power, and the like, but with technologies geared toward the exploitation of fossil fuels, such renewable sources fell to a very low relative consumption level by the late 20th Century. Due to changes in consumer demand, driven by increased sensitivity to climatic impact, and regulatory policies by local, state and federal governments, interest in renewable energy sources has increased substantially in recent years.

According to the U.S. Department of Energy's Energy Information Administration (EIA), the number of Btu's consumed from renewable energy sources (e.g., wind, bio-mass, hydro, solar, and geothermal) in the United States from 2002 to 2006 increased 17.5 percent, while all Btu's consumed during this period increased only 1.8 percent.⁶ This indicates that the interest and demand for energy from renewable sources is growing. Moreover, as of 2006, only 7 percent of all Btu's consumed in the United States is produced from renewable energy sources.⁷ This further shows that not only is demand growing, but that the potential for growth is substantial even if overall demand for energy may decrease.

Although interest in renewable energy is increasing at an accelerating rate, some product types are increasing at faster rates than others. For instance, between 2002 and 2006, bio-fuels and wind energy each experienced an increase in consumption of over 150 percent.⁸

The phenomenal growth in these two energy sectors positions Minnesota at the center of interest. According to EIA, the western and southwestern parts of the state, as well as along the Lake Superior coastline, have excellent potential to harness wind power.⁹ This is even more relevant given that most locations in the country with competitive wind potential are in isolated mountainous regions. In addition, with corn-based ethanol pushing the growth of bio-fuels, Minnesota, will prove a competitive location because of the availability of tillable soil and the infrastructure already in place to harvest and process corn.

For the cities of Minneapolis Saint Paul, there is the potential to tap into this growing industry by providing key locations for the manufacture of components and systems needed for this industry. In order to identify which product subsectors are most attractive to Minneapolis Saint Paul, a workforce analysis was conducted for a number of different products within the renewable energy industry. For companies, the benefit would be access to a large, highly-skilled labor pool and proximity to raw materials and key locations.

6, 7, 8 US Department of Energy: Energy Information Administration. Table: US Energy Consumption by Energy Source, 2002-2006. (http://www.eia.doe.gov/cneaf/solar.renewables/page/trends/table1_1.html).

9 US Department of Energy: Energy Information Administration. Wind Resource Potential (map). (<http://www.eia.doe.gov/cneaf/solar.renewables/lands/fig13.html>)

Renewable Energy Product Opportunities

Ten product opportunities for Minneapolis Saint Paul were identified by the Renewable Energy Products Steering Committee in *Making it Green*. Products included in this sector are considered environmentally preferable because they are parts of energy producing systems that take advantage of renewable energy sources.

Renewable energy product opportunities include:

- Wind Turbine OEM Suppliers
- Bio-Fuels Systems – Ethanol, Bio-Diesel, Cellulosic possibilities
- Solar/Photovoltaic Cells
- Solar Hot Water Heaters
- Geothermal Heat Pumps
- Pelletization Systems
- Distributed Power Management Systems
- Sensors and Diagnostic Equipment
- Energy Efficient Products
- Energy Conservation and Green Energy Products

Because of limitations in the data set used to analyze the sector at the company level, three of the ten product opportunities (Sensors and Diagnostic Equipment, Energy Efficient Products, and Energy Conservation and Green Energy Products) were collapsed into one category, renamed Sensors and Monitoring Systems. It was discovered during the analysis that companies who manufacture one of these product types often manufactured a product type in one of the other two opportunities as well.

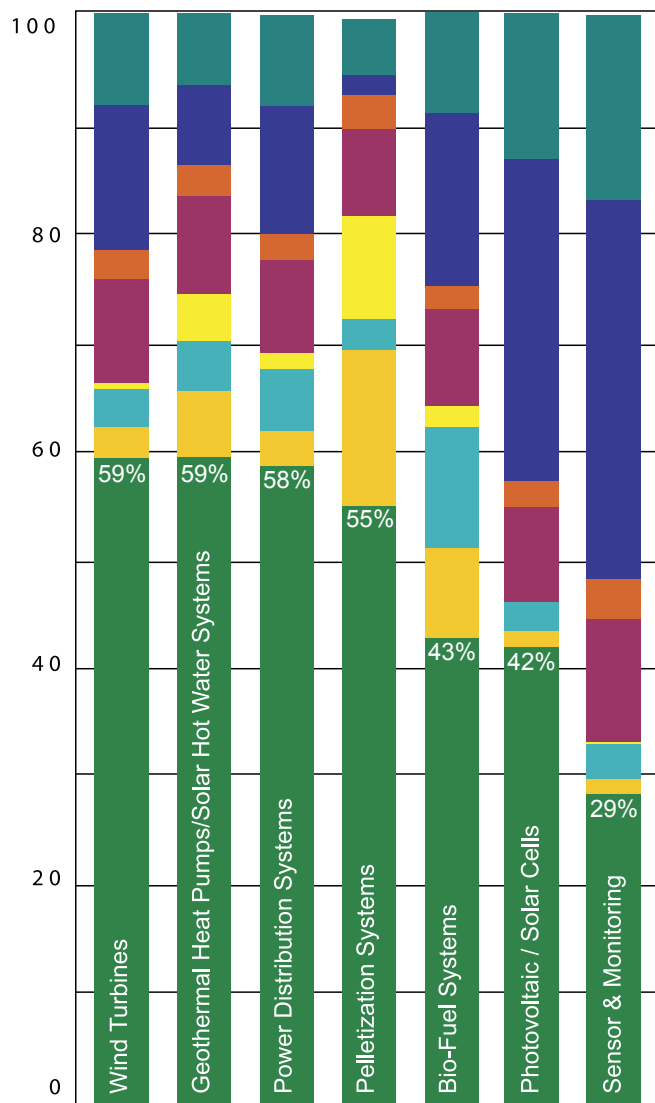
A total of 221 renewable energy manufacturing facilities were analyzed nationally in order to determine subsector employment size and growth, occupational structure, and typical job densities by product type.

Occupational Structure

The results of the occupational analysis for the renewable energy product opportunities are presented in Figure 6. Each product opportunity has a similar percentage of managerial, office support, and sales occupations. Key differences, though, are among the production and engineering class of occupations. Most traditional assembly jobs that are involved in manufacturing could be classified as production. For most product opportunities, this class of occupations account for anywhere between 50 and 60 percent of jobs. For the sensors and monitoring systems product category, the proportion of jobs classified as production is less than 30 percent. Engineering jobs make up nearly 35 percent of sensors and monitoring systems workforce, which indicates that the manufacturing that occurs in that product opportunity is likely more technical and highly paid than other manufacturing product opportunities. This is also somewhat the case for photovoltaic/solar cells, which have just under 30 percent of jobs classified as engineering jobs.

The workforce of the Minneapolis Saint Paul metropolitan area is well positioned to meet the employment needs of most manufacturers of renewable energy product opportunities. Details of the findings are displayed in Appendix I, which lists individual occupations for each NAICS code that most closely matches the production subsector. Generally, most of the occupations that represent the highest proportion of manufacturing jobs are over represented in the Minneapolis Saint Paul metropolitan area when analyzed via a location quotient. For example, in the wind turbine product opportunity, one of the most needed occupations is electronic equipment assemblers, which accounts for over 15 percent of the wind turbine workforce. The Minneapolis Saint Paul metro area exhibits a location quotient of 1.33 for electronic equipment assemblers. This indicates that Minneapolis Saint Paul possesses a ready supply of trained electronic equipment assemblers relative to other labor markets in the United States.

Figure 6. Renewable Energy Products Occupational Structure: Percent in Occupation by Product Type

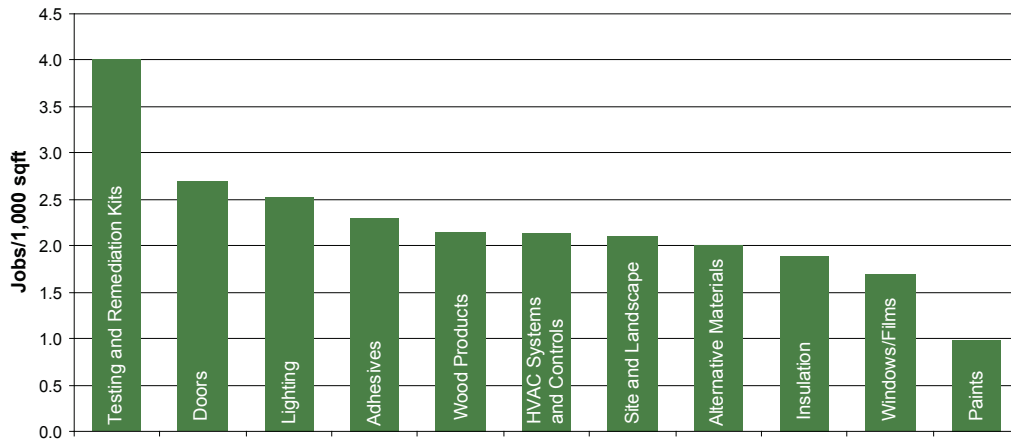


Source: Bureau of Labor Statistics 2006

- Management, Business, Financial
- Computer, Science, Architecture, Engineering
- Sales
- Office, Administration Support
- Construction, Extraction
- Installation, Repair, Maintenance
- Transportation
- Production

Job Density

Figure 7 is a summary of the job density analysis for manufacturers of renewable energy products. Six of the eight product categories have a median job density of between 1.3 and 1.9 jobs per 1,000 square feet of facility space. This is in-line with most industrial land uses, which, according to the EIA's Commercial Buildings Energy Consumption Survey, typically have between 1.2 and 1.5 employees for every 1,000 square feet of space.¹⁰ The exceptions are companies that manufacture sensors and other monitoring systems and companies, which have a high job density of 3.2, and manufacturers of pelletization systems, which have a low job density of 0.7.

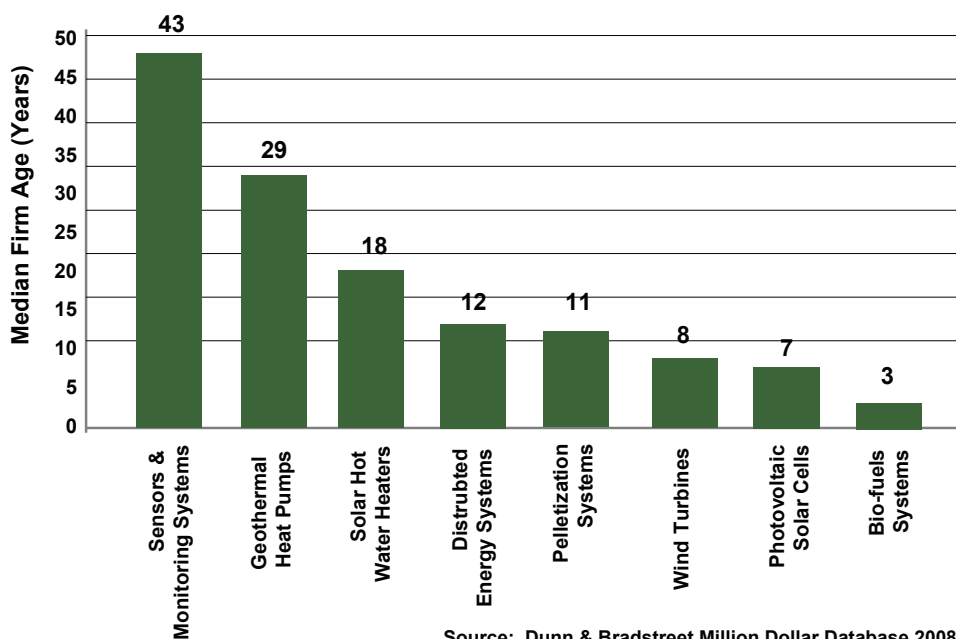


Source: Dunn & Bradstreet Million Dollar Database 2008

Figure 7. Renewable Energy Products Job Density: Median Number of Jobs per 1,000 Square Feet by Product Type

Median Firm Age

Although the job density analysis was meant to provide an understanding of which product categories should be nurtured for growth in Minneapolis Saint Paul, it also revealed several other interesting and important findings. First, the median age of companies that manufacture wind turbines is eight years, while it is only three years for companies that manufacture bio-fuels systems. This further informs the phenomenal growth of these product categories as noted previously. Figure 8 shows median firm age for manufacturers of renewable energy components.



Source: Dunn & Bradstreet Million Dollar Database 2008

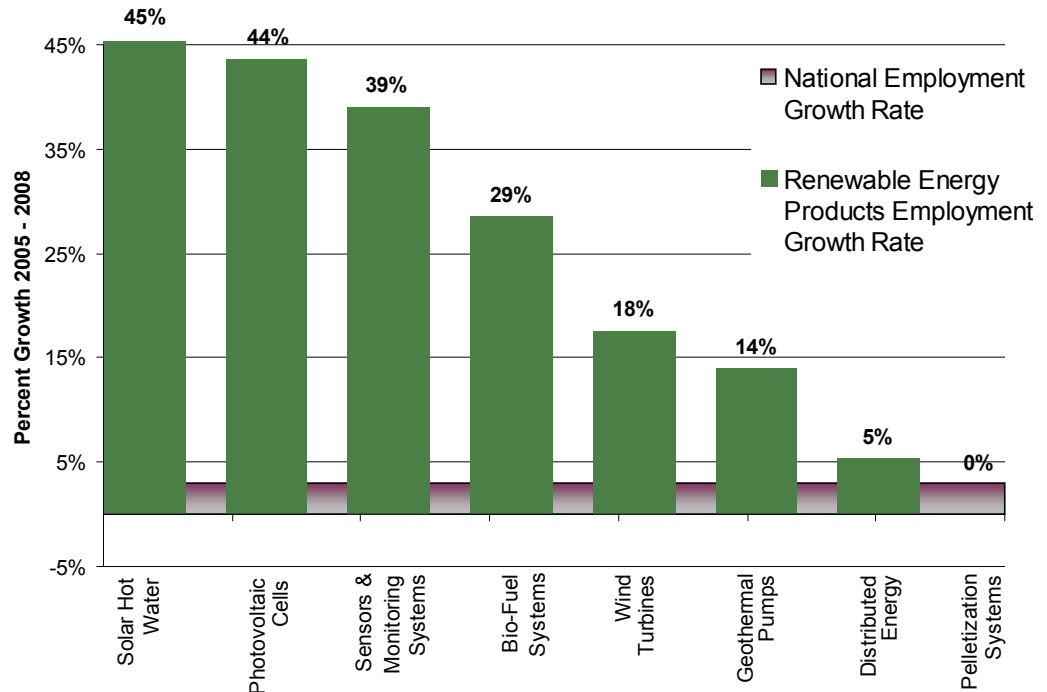
Figure 8. Renewable Energy Products Median Firm Age

¹⁰ US Department of Energy: Energy Information Administration: Commercial Buildings Energy Consumption Survey 2006. (http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003html/b1.html)

Employment Growth

Companies that manufacture renewable energy products experienced impressive employment growth from 2005 to 2008. In particular, companies that manufacture Solar Hot Water Heaters, Photovoltaic Cells, and Bio-fuels Systems grew by more than 35 percent (Figure 9). Given the relatively young age of these firms, this remarkable percentage growth is likely due to a low base of employment. Nonetheless, it is a clear indication of how green manufacturing is one of few manufacturing sectors that is growing. Moreover, seven of the eight product opportunities experienced employment growth during the last three years.

Figure 9. Renewable Energy Products Employment Growth: 2005 - 2008



Source: Dunn & Bradstreet Million Dollar Database 2008

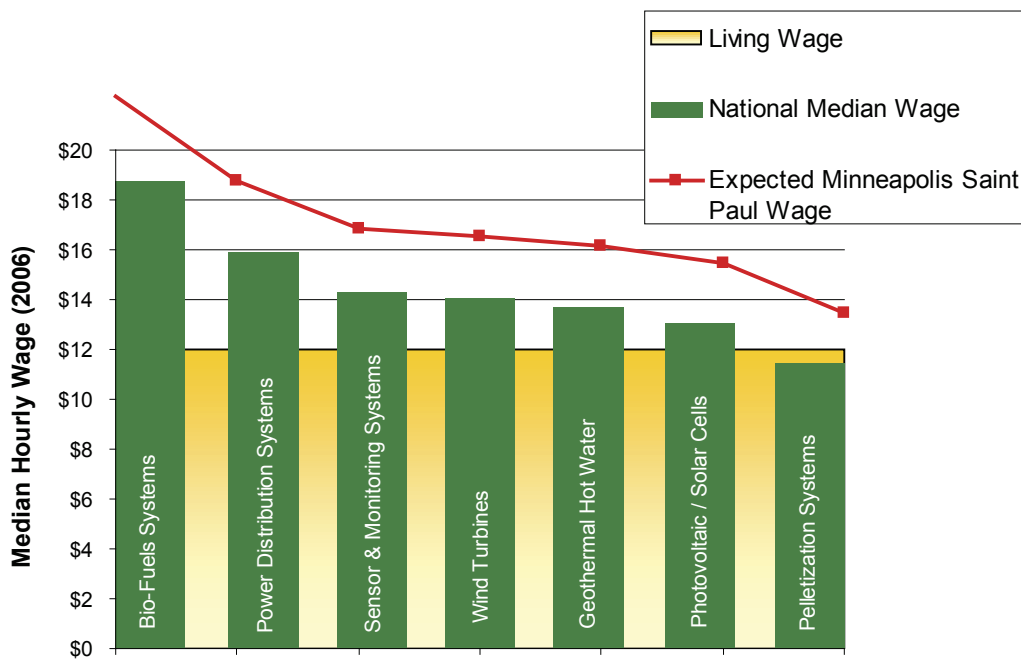
Wages

Production jobs in the bio-fuels category pay a substantially higher wage, at \$21.77, than any other renewable energy product category (Figure 10). At the other end of the spectrum, pelletization systems have the lowest median hourly wage at \$11.44. This suggests that if the cities of Minneapolis Saint Paul were to attract manufacturers of bio-fuels systems they would likely pay the highest wage for production-related jobs.

Summary

Renewable Energy product opportunities are well suited to be manufactured in Minneapolis Saint Paul. The emerging sectors of wind power and bio-fuels are centered in the Upper Midwest. Furthermore, Minneapolis Saint Paul appear to have a ready supply of skilled workers that meet the needs of renewable energy product manufacturers. However, when it comes to job density, renewable energy product opportunities tend to have a low job density. Seven of the eight product opportunities have a job density of fewer than 2 employees for every 1,000 square

Figure 10. Renewable Energy Products Employment Growth: 2005 - 2008



Source: Bureau of Labor Statistics 2006

feet of facility space. This indicates that many renewable energy product opportunities require a great deal of space to manufacture their products. This suggests that attracting manufacturers into dense urban cores with ready access to transit for employees is a lower priority than inexpensive land needed for highly automated or processes.

Recommended Renewable Energy Product Opportunities

Sensors & Monitoring Systems

Skills used in the manufacture of renewable energy sensors and monitoring systems are well represented in the Minneapolis Saint Paul metropolitan area as a result of our strength in the medical device industry. Minneapolis Saint Paul's workforce is well trained for precision manufacturing. Much of this industry is heavily invested in research and development, and thirty-five percent of jobs in sensors and monitoring systems are high-paying science, architecture, engineering, and computer science positions. Further, the sensors and monitoring subsector has good potential for linkages to other businesses through supply chains. At 3.2 workers per 1,000 square feet, manufacturers of sensors and monitoring systems exhibit the highest job density of all subsectors examined in the renewable energy products industry. Lastly, this subsector shows high employment growth.

Bio-fuels Systems

As with sensors and monitoring systems, the workforce skills required for the manufacture of bio-fuel systems match our existing labor force's skill set. Manufacturers of bio-fuel systems report high employment growth and face quickly increasing demand. There is great potential for linkages to local businesses in bio-fuel systems though Minnesota's strong agricultural presence. Finally, this subsector pays its employees extremely well, with a national median wage for production employees of nearly \$22 per hour.

The Transportation Industry

Background: Traditional Automobile Manufacturing

Motor vehicle and associated parts manufacturing are among the highest paying manufacturing industries and employees have a high degree of union membership and associated employment benefits. In contrast to past stability, the industry is undergoing extensive production and workforce changes. Overall employment in the automotive industry is expected to decline by 14 percent from 2006 – 2016¹¹. Employment is declining because of manufacturers' need to control costs and resulting in a shift to overseas production and automation. One of the most significant changes facing the industry is a shift to more adaptable and nimble production techniques in order to meet changes in consumer demand.

The shift from stable production line to outsourced production and automation requires proportionally more engineering related employees and fewer domestic production jobs. Despite declining total employment and the related occupational shift from basic production to high-tech engineering jobs, the automotive industry will continue to be a source of high paying quality jobs for many years¹².

In 2006 there were approximately 9,200 firms and 1.1 million employees in the automotive manufacturing industry¹³. Workers in the industry make everything from seatbelts to computerized engine management systems. Approximately 61 percent of industry firms manufacture automobile parts and components rather than complete vehicles¹⁴.

Because the industry is reducing employment and becoming ever more high tech, production workers are expected to have more education and skills than ever before in order to troubleshoot and operate complex production processes. Despite the fact the many production workers have specialized two-year degrees many firms provide extensive testing and training programs prior to and during employment.¹⁵

Specialized skills such as welders, machinist, electricians, millwrights, pipefitters and tool and die makers are needed to maintain robotic manufacturing equipment and do complex tasks that are not easily automated. High-tech manufacturing coupled with the intensive engineering required to design and maintain a highly efficient, automated and cost effective industry also requires a large number of engineers in many different specializations, the only occupations in the industry expected to grow over the next ten years¹⁶.

Green Transportation Industry Background

Current automobile technology is dependent on fossil fuels and contributes to greenhouse gas emissions. According to the U.S. Environmental Protection Agency, one third of CO₂ emissions from fossil fuel combustion come from auto-

11-15 U.S. Department of Labor Bureau of Labor Statistics. The 2009-09 Career Guide to Industries, Motor Vehicle and Parts Manufacturing. <http://www.bls.gov/oco/cg/cgs012.htm>

16 U.S. Department of Labor Bureau of Labor Statistics. The 2009-09 Career Guide to Industries, Motor Vehicle and Parts Manufacturing. <http://www.bls.gov/oco/cg/cgs012.htm>

mobiles¹⁷. In order to reduce greenhouse gas emissions and reduce dependence on foreign sources of fossil fuels alternative transportation products are needed. There are many new technologies available or under development that are designed to drastically increase fuel efficiency or run vehicles independently of fossil fuels.

New transportation technology that emphasizes fuel efficiency or alternative fuels not only reduces greenhouse gas emissions, it also has the potential to produce economic growth. Opportunities exist for Minneapolis Saint Paul to capitalize on future shifts in automobile production and technology development. If the new automobile production paradigm is less dependent on the agglomeration seen in Detroit in during the 20th Century, producers and suppliers may be well served by locations with strong educated workforces and an emphasis on innovation and environmental consciousness.

In order to understand how “green” transportation technology would affect the economies of Minneapolis Saint Paul *Green Cities, Green Jobs* analyzed the following product opportunities identified in *Making it Green*:

- Bio-Fuel
- Electric Vehicles
- Fuel Cells
- Hybrid Bus
- Lithium Ion Battery Technology
- Vehicle Batteries
- Vehicle Generators

Occupational Structure

In order to understand how the green transportation industry employment fits within the Minneapolis Saint Paul workforce and training framework the occupations of existing motor vehicle manufacturing industry were examined. For this analysis the three major automobile manufacturing NAICS codes were combined into a single conglomerate category. While employment in green transportation manufacturing may not have the same profile as the legacy motor vehicle industry, the occupations and skills involved provide a good basis for understanding approximate employment needs.

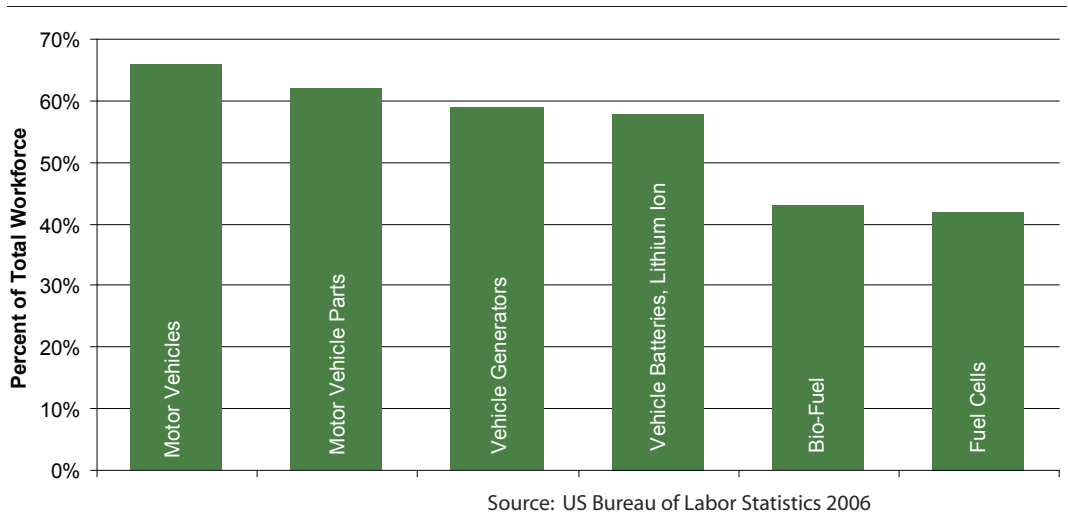
Motor vehicle production has a very high percentage of production and maintenance occupations. As a broad category, production occupations make up 64 percent of motor vehicle manufacturing workforce. Installation, maintenance and repair occupations and transportation occupations make up over six percent of the workforce each. Engineering occupations are almost five percent of the motor vehicle manufacturing workforce. Figure 11 shows the national employment structure of the conventional motor vehicle manufacturing industry.

Job Density

In order to more accurately represent facility employment in manufacturing locations, *Green Cities, Green Jobs* removed the headquarters of Cummins, Johnson Controls, AMETEK Inc, L-3 Communication Holdings, Lear Corp, and Multi-craft International LP from our analysis dataset.

17 Source: U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2006 <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>

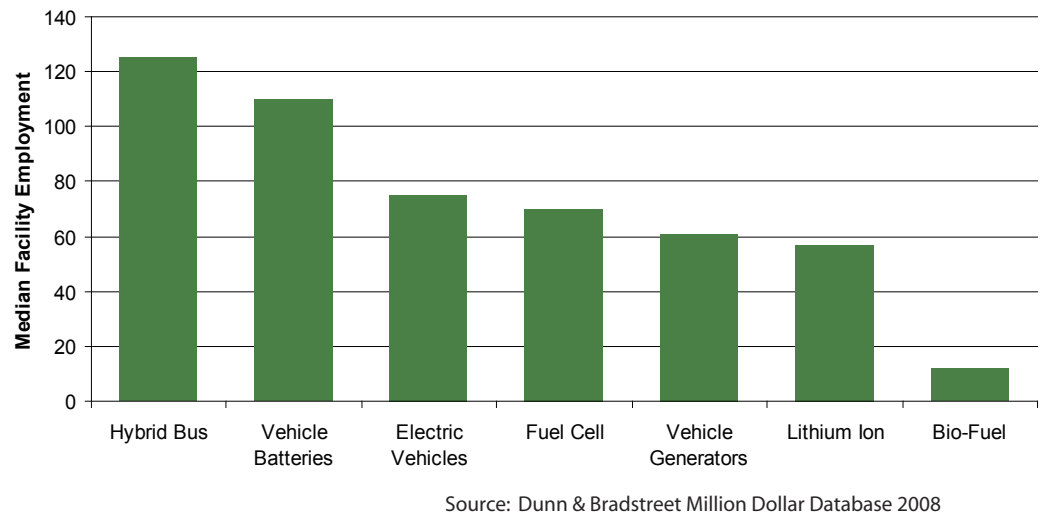
Figure 11. Green Transportation Percent Production Occupations



Facility size is similar for the vehicle generator, electric vehicle, vehicle battery and hybrid bus subsectors at around 35,000 square feet, with the rest of the subsectors being somewhat smaller. The largest facility is 959,000 square feet in size and the smallest is a 1,200 square feet. Both are electric vehicle production or related facilities.

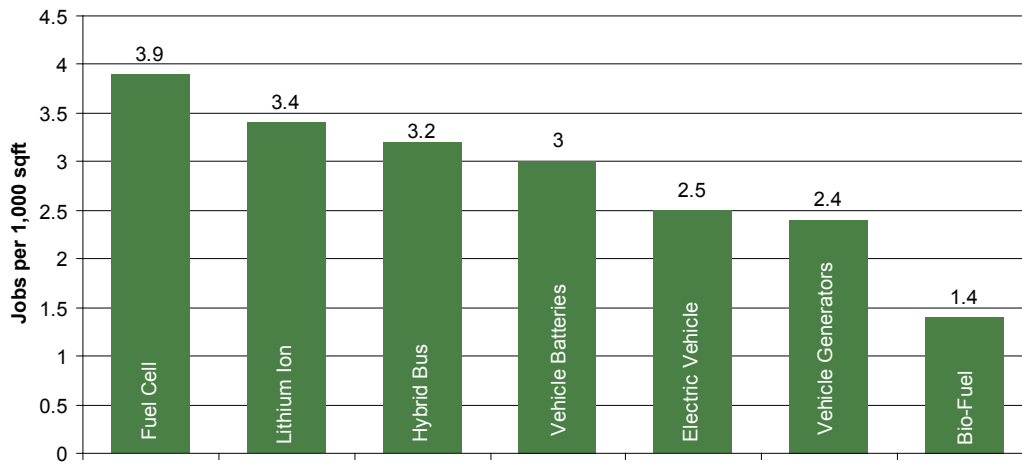
Employment on site varies broadly from firm to firm. Median employment in each of the subsectors ranges from twelve employees for bio-fuel production to 110 in vehicle batteries. The bio-fuel and hybrid bus subsectors have seen the highest increase in employment over the past three years, likely because of the relative infancy of the industries. Figure 12 shows the green transportation employment by subsector.

Figure 12. Green Transportation Median Manufacturing Facility Employment 2008



Overall, the median job density of 3.87 in the fuel cell industry is higher than other analyzed product opportunities. The bio-fuel subsector has the lowest median density with just 1.35 employees per 1,000 square feet. The vehicle generator and electric vehicle subsectors have similar job densities of approximately 2.5 employees per 1,000 square feet. The employment similarities between the vehicle generator and electric vehicle subsectors stems from the technological overlap and presence of large firms such as Cummins, Ford and Delphi in both subsectors. Figure 13 shows the median job density for green transportation subsectors.

Figure 13. Green Transportation Median Job Density

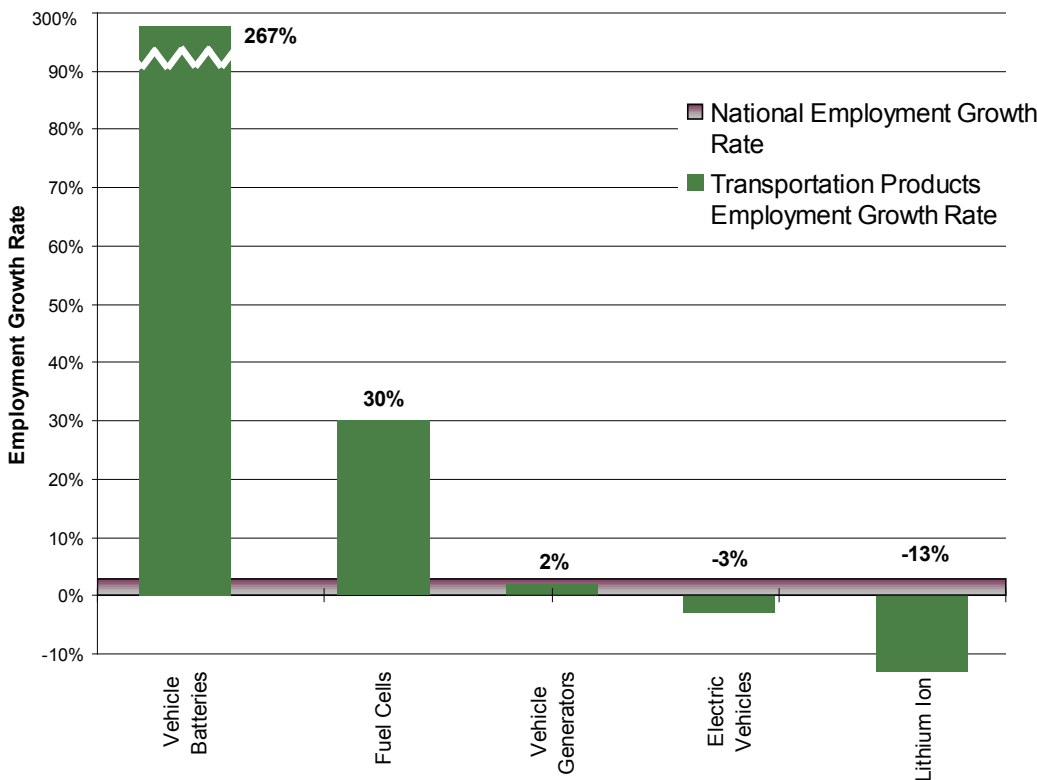


Source: Dunn & Bradstreet Million Dollar Database 2008

Employment Growth

Employment growth in the green vehicle manufacturing industry is hard to accurately quantify. Not all manufacturers identified had prior employment listed and firm numbers in certain subsectors are low so numbers may not be accurate. Vehicle battery and fuel cell industries had 267 and 30 percent employment growth on a per facility basis between 2005 and 2008 (Figure 14).

Figure 14. Green Transportation Employment Growth Rate 2005 - 2008



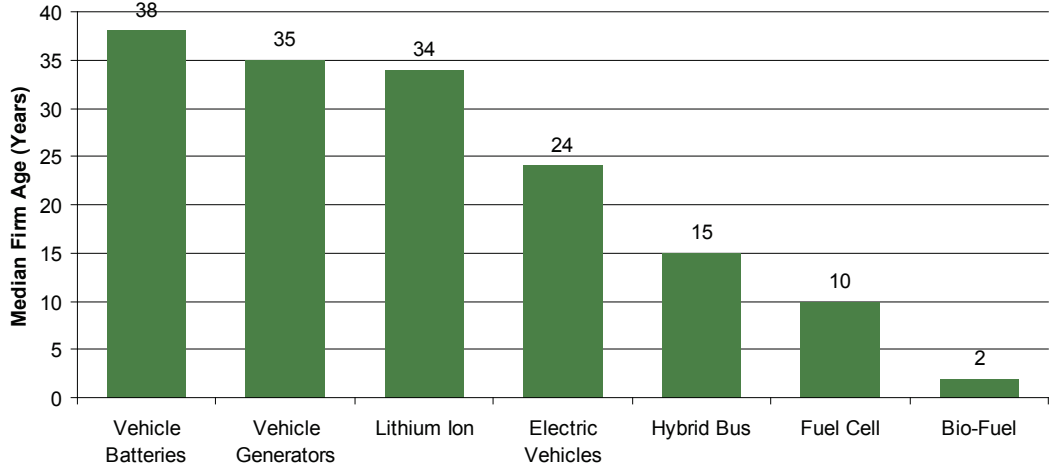
Firm Age

By examining the age of firms it may be possible to understand where industries are in a product-profit cycle and what level of growth can be expected in the future. Additionally, firm age may be helpful in understanding industry needs in terms of start-up capital and research and development. Younger industries are likely to need product development jobs from the engineering sector, while older

industries may require maintenance personnel for automated production machines.

The oldest firms tend to be in the vehicle battery, vehicle generators and lithium ion technology industries. The median age of electric vehicle firms is 24 years. Bio fuel and fuel cell firms are the youngest, reflecting their emerging nature. Figure 15 displays the median age of firms within the individual product opportunities.

Figure 15. Green Transportation Median Firm Age

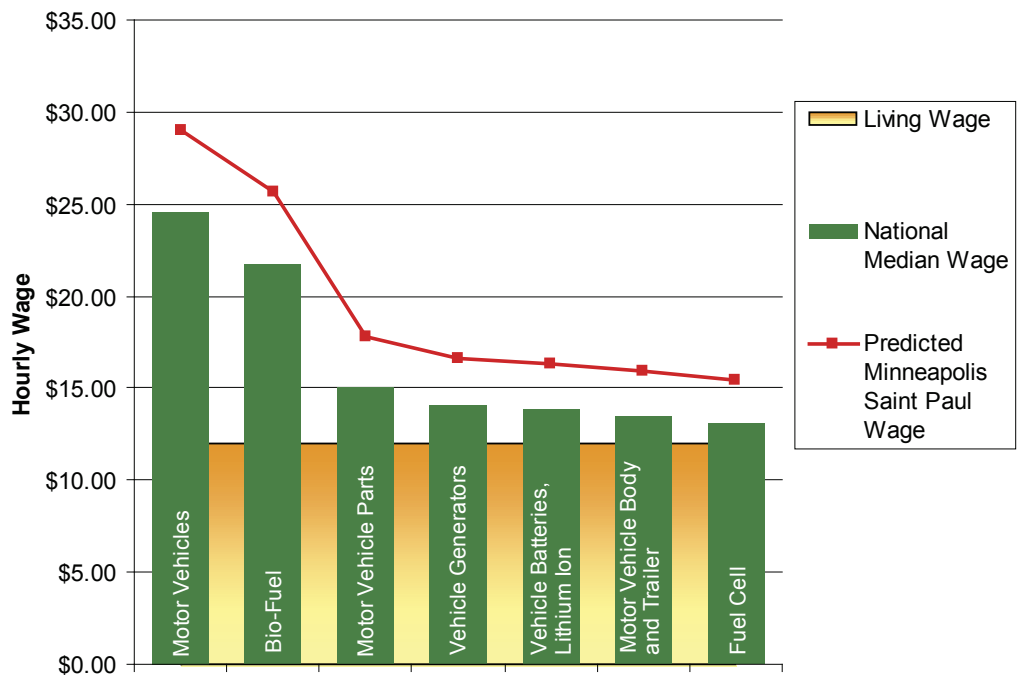


Source: Dunn & Bradstreet Million Dollar Database 2008

Wages

Assuming that wages in the green vehicle manufacturing wages are similar to traditional vehicle manufacturing, these occupations enjoy high pay. Production occupations have median wages of between \$24.55 per hour and \$13.10 per hour (Figure 16). The range in production wages may have to do with the different ages of industry subsectors and a strong history of collective bargaining in the motor vehicle manufacturing industry. For a more detailed description of wages by industry subsector and specific occupation see Appendix I.

Figure 16. Green Transportation Median Firm Age



Source: US Bureau of Labor Statistics 2006

Conclusion

It may be more effective to attract firms on an individual basis rather than attempting to cater to a broad heterogeneous industry. However, there is a clear opportunity within the electric vehicle-manufacturing subsector to capitalize on the existing automobile manufacturing industry in Minneapolis Saint Paul. Even though employment is declining on a national level, the production of new high-tech electric vehicles and their components are expected to exhibit employment growth in the coming years.

Because electric vehicle are to some degree drive the overarching need for other green transportation subsectors there may be some success in attracting a variety of firms from different industries that wish to gain from the benefits of agglomeration. If electric vehicle manufacturers choose to locate in Minneapolis Saint Paul, then *Green Cities, Green Jobs* may have increased success in attracting and growing fuel cell and battery manufacturing firms that are part of the vehicle manufacturing supply chain.

The Green Workforce in Minneapolis Saint Paul

In order to understand the potential for green product subsectors in Minneapolis Saint Paul, the occupational structure of the 29 identified green product opportunities was compared against that of the metropolitan area. Because many of these industries are emerging, and the green economy does not yet have its own classification within NAICS, industries were analyzed at a broad level. Therefore, the level of analysis is coarse, and the industries compared to local employment structure are not necessarily “green”. The analysis shows that the occupational structure of Minneapolis Saint Paul matches well to the needs of identified green industries. For a detailed list of specific industries, occupations and the relationship to Minneapolis Saint Paul metropolitan area workforce, please see Appendix I, “Product Opportunity Production Occupations”.

Minneapolis Saint Paul’s Current and Future Workforce:

Manufacturing is a key part of the Minneapolis Saint Paul workforce; the cities combined are the 4th largest manufacturing workforce in the nation. In 2006, the Minneapolis Saint Paul seven county metropolitan area was home to almost 90,000 manufacturing establishments employing over 1.6 million people in 36 industries. The average weekly wage was \$925 for a total of over \$77 billion in wages annually. Overall, the largest proportions of people are employed in the printing and machining industries, with 658 and 453 employees respectively.

Occupational analysis of the Minneapolis Saint Paul metro area reveals a wealth of manufacturing related occupations. Compared to the nation, Minneapolis Saint Paul have almost four times the national average of timing device assemblers, and high representation in adjusters and calibrators, occupations that match well with two of the identified green subsectors: HVAC Control Systems and Sensors & Monitoring Systems. While the cities have a high concentration in high skilled manufacturing occupations such as computer engineers at nearly double the national concentration, the highest number of employees is in production occupations, with over 140,000 workers area wide. Overall the Minneapolis Saint Paul metropolitan area has a well developed and diversified manufacturing workforce

and a strong representation of high tech and high skill occupations, making it a good match for innovative, research and development careers, including green jobs in the early stages of the product-profit cycle.

In 2004 the Minnesota Department of Employment and Economic Development released projections for employment growth through 2014. While *Green Cities, Green Jobs* are nearly halfway to the 2014 mark, the projections still represent a good way to understand the general direction of employment growth in the region. The Minneapolis Saint Paul area is expected to grow by 13 percent in employment and the annual median salary is estimated to increase to nearly \$39,000.

Specifically, growth in the Minneapolis Saint Paul area will be due to demand for skilled workers in high pay occupations, with projected growth rates of up to 45 percent. In terms of manufacturing, the demand for a highly skilled workforce is growing; production occupations are requiring increasing computer and engineering skills. Specifically, it is expected that there will be a high demand in occupations at the higher end of the manufacturing pay scale, between 50 and 100 thousand dollars annually, such as computer-based workers, industrial engineers, mechanical engineers, engineering technicians, sheet metal workers and mechanical engineering technicians. The number of projected openings in these occupations ranges from 700 to 7,700 for mechanical engineering technicians and software engineers, respectively. While not all computer-related openings will be in manufacturing industries, some will certainly be in high tech or precision manufacturing firms.

Green manufactured goods are environmentally preferable as a result of their thoughtful engineering and design characteristics that produce increased levels of efficiency and reduced waste and consumption. Design and production of more efficient, higher technology goods requires high skill, precision manufacturing workers. Projected national demand for high skill manufacturing workers and Minneapolis Saint Paul's existing strengths in precision and high tech manufacturing bodes well for our position in the coming green economy. Our workforce's manufacturing skill strengths are well-suited to transition into leaner, greener goods that require attention to detail and meticulous production.

Conclusion and Recommendations

Given that most product opportunities examined provide high wages the best approach for targeting firms and industries rests on a combination of job density, future employment demand, possible economies of scale, and environmental impact. By capitalizing on industry overlap, it may be possible to attract, for example, both wind turbine and electric vehicle firms by focusing on common components. The underlying goal of *Making it Green* is to capitalize on product opportunities needed to tackle climate change. The best industry candidates for the reduction of greenhouse gasses are the existing energy and transportation industries; therefore, a push for green transportation and power generation may provide the best environmental benefit.¹⁸

The green transportation sector provides a good mix of job density and future demand. By targeting firms that manufacture alternative fuel and high-efficiency vehicles it may be possible to attract firms that manufacture components for those vehicles. Because all vehicle component manufacturers supply parts that are even-

tually incorporated into vehicles, green transportation manufacturing has the most to gain from a comprehensive set of component manufacturers. Since the green transportation industry has a singular end-product focus, industry outreach may be particularly effective at reaching a wide variety of firms due to close industry ties. Furthermore, reducing fossil fuel consumption in the transportation sector can have a significant impact on carbon emissions.

The alternative energy industry has a lot of overlap with the green transportation industry. Many utilized technologies are similar. Firms that manufacture parts for automobiles may be able to manufacture components for wind turbines or fuel cell power generation as well. While the low job density of the alternative energy industry precludes it from being a prime candidate for location targeting, the industry will have high future demand and industry wages are high. Together with a strong green transportation industry, the alternative energy industry may help sustain a diversified local economy. Greening the energy industry by moving away from fossil fuels and focusing on alternative generation technology will substantially reduce the amount of carbon dioxide released into the atmosphere.

Due to a state and local presence of building products manufacturers, Minneapolis Saint Paul may benefit from local firms wishing to create “green brands” while retaining local suppliers and relationships. Green building products can produce a positive environmental impact primarily through high energy efficiency and reduced resource waste during production. Government regulations and nonprofit certification programs such as LEED will ensure continued increasing demand for green building products and subsequent job growth in these subsectors. Minneapolis Saint Paul’s best potential product opportunities utilize their existing workforce strengths in precision manufacturing and linkages with local businesses in the wood products industry.

Recommended Product Opportunities

- Building Products
 - Wood products
 - HVAC control systems
- Renewable Energy
 - Sensors and monitoring systems
 - Bio fuel manufacturing components
- Green Transportation
 - Electric vehicles

Recommendations

Focus on product opportunities in different stages of product-profit cycle

In order to ensure a diverse and stable economy Minneapolis Saint Paul need to ensure that local firms are at different stages of industry growth. Even within a single industry a healthy and vibrant economy will have firms developing new products and manufacturing processes as well as firms producing goods with established markets and processes. In terms of industry support, firms at different stages of growth will require different types of support from both the public

and private sectors. Young firms tend to need access to start-up capital while firms moving into routine production may require a large trained workforce or fewer workers with specialized skills.

Workforce training is critical

Minneapolis Saint Paul can take a proactive role in meeting the workforce requirements of green manufacturing industries. By working with training institutions such as the University of Minnesota, the MNSCU system and unions, training programs can be developed to meet projected workforce needs. Acting in an anticipatory rather than a reactive manner may reduce the lag time required to hire instructors, develop a curriculum and move students through a training program. There may be an opportunity to create a “just in time” education system similar to the processes employed in high efficiency manufacturing logistics.

There is also an opportunity within workforce training to provide outreach and employment to entry-level workers. By working with industry to understand workforce needs, programs may be developed that bring together areas of high unemployment and job specific training programs.

Conduct supply chain analysis to determine local subsector suitability

Industry is not just single firms, but also a complex network of suppliers and relationships. Understanding the relationships between firms and industries may provide an opportunity to efficiently allocate public resources and capitalize on economies of scale. Supply chain analysis is important because local suppliers are attractive to outside firms. Additionally, national manufacturers may provide demand for goods produced by local small manufacturing firms and suppliers that may benefit from economic development support.

Assist local manufacturers in “going green”

One of the best strategies to grow green manufacturing in Minneapolis Saint Paul is to provide local businesses with the tools and opportunity to create green processes, products and brands. Minnesota has a strong history of growing its own businesses. Focusing on existing businesses may be more effective at fostering growth in the green manufacturing sector compared to looking to outside firms.

Capitalize on existing workforce strengths

Minneapolis Saint Paul have skilled manufacturing workforces, much of which is related to our strength in the medical device industry. By understanding the local strengths and weaknesses it is possible to tailor workforce training and economic development efforts to fit specific industry and firm needs. Capitalizing on existing expertise can provide opportunities for firm growth, retention and attraction that may have been overlooked in a broad-based industry analysis.

Emphasize research and development in transportation and renewable energy

Due to Minneapolis Saint Paul's well-educated workforce and strong history in research and development there are opportunities for research and development in the emergent technologies of green transportation and renewable energy. Again touching on the local history of "growing our own" industries, Minneapolis Saint Paul have the workforce and leadership skills to develop new technology and bring innovative products to market. Together with the resources of the University of Minnesota there may be opportunities to develop business incubators or research parks that focus on green technology. Investing in research and development can propel Minneapolis Saint Paul to the forefront of green technology and position the cities as national leaders in environmentally conscious product development.

GREEN SITES

Defining green jobs focuses attention on manufacturing green products and establishing a green workforce. Identifying green criteria shapes the green manufacturing process; it identifies how green manufacturing can be measured, and looks to the future of the manufacturing industry. Specifying criteria by which a site, project, or business is determined to be green, or environmentally benign, promotes clean manufacturing and helps green manufacturers find sites that match their commitment to a sustainable future.

This is a critical time for Minneapolis Saint Paul to show leadership. Consumer demand and community awareness are driving manufacturers to look beyond EPA regulations for clean air and water to a more comprehensive approach to sustainability. Recent media attention on greening traditional manufacturing has been growing. Within the last six months two major chemical companies have announced a “green” line of products¹⁹ or have greened their process²⁰, signalling a growing awareness and demand for corporate environmental responsibility and green products in the marketplace.

While criteria exist to measure sustainability on a number of scales, there are no rating systems that address the specific needs of industrial lands and the manufacturing industry. There are many rating systems, each focusing on a different aspect of environmental protection, from green house gas emissions (GHGs) to waste reduction and clean water. Criteria need to be flexible enough to adapt as policy priorities shift over time, while also maintaining integrity and relevance. These criteria were developed to focus primarily on:

- Reduction of carbon emissions
- Optimizing energy usage and enhancing energy efficiency
- Protecting the quality and quantity of water
- Reducing waste
- Emphasizing use of local, environmentally preferable materials

Indoor air quality, impact on the community, pollution reduction and by-products reuse may be the emphasis in the future. An extensive list of existing rating systems can be found in Appendix E.

Green site criteria will not only allow Minneapolis Saint Paul to establish their industrial lands as Green Zones, but will also provide ways to promote industrial sites within the cities as green, affirm their commitment to the LEED²¹ standard for buildings, and prove they are leading sustainable cities. By establishing specific green site criteria for industrial land, the cities can measure and promote the extent to which they offer land and special programs to businesses in green industrial zones and attract green manufacturing. Following is a set of site specific characteristics and categories of criteria that can be used to designate an industrial site as green.

19 Clorox announces a new line of natural cleaners, GreenWorks.<http://www.cloroxgreenworks.com>

20 SC Johnson wax announces a commitment to aggressively reducing GHG emissions, and has recently launched a media campaign promoting the Racine, WI plant powered by methane produced from a landfill, http://www.scjohnsonwax.com/family/fam_pre_pre_news.asp?art_id=276

21 LEED program criteria and documentation can be found on the U.S.Green Building Council website: <http://www.usgbc.org/leed>

Background

A wide range of assessment tools already exist to measure or certify the sustainability of residential and commercial development projects. Criteria exist to rate new building construction, housing energy efficiency and performance, the sustainability of new communities and neighborhoods, landscaping, carbon footprint, existing buildings and even building operations and maintenance. For many industries, there are criteria to measure the sustainability of production, or the green-ness of the finished product, such as Green Seal for building products and Energy Star for appliances. Within business, in particular within manufacturing, there are a multitude of environmental management systems and product cycle analysis methodologies aimed at reducing waste such as Total Quality Management (TQM), Six Sigma, the Natural Step, and ISO 14001.

Each of these methodologies has limitations when applied comprehensively to industrial sites. LEED-ND, the US Green Building Council's neighborhood development standard, is the most fitting for a total site analysis, but is designed primarily for residential, transit-oriented development and some criteria do not favor industrial applications, such as residential density. Few tools exist to certify green sites, and there are no existing assessment tools for certifying green manufacturing sites or green industrial zones. The purpose of the Green Sites criteria developed here is not to replace existing assessment tools, but to establish a broad set of characteristics for assessing green industrial sites, of which building, process, product, or site certification, would be a part.

Existing Criteria

Over the last few years a number of rating systems have been developed, the US Green Building Council's LEED system is now a household brand name. Of the hundreds of systems that exist, the four systems below were the most applicable in guiding development of green criteria for industrial sites.

LEED – Leadership in Energy and Environmental Design

The US Green Building Council maintains a comprehensive set of assessment tools under the LEED, Leadership in Energy and Environmental Design, certification system. The LEED rating system is used widely by local governments across the country in green building incentive programs²². While the LEED rating system was initially geared toward new building construction, particularly commercial, over the past few years the USGBC and its partners have developed assessment tools for many types of projects, from residential and commercial building rehabilitation and reuse (LEED-EB), to neighborhood development (LEED-ND PILOT), and commercial building operations and maintenance (LEED-OM). To date there is no one LEED standard for industrial site, or green manufacturing assessment, though parts of each of the rating systems are applicable. LEED uses a criteria rating system in which there are prerequisites, the minimum criteria must be met to proceed with certification, and a point system for recommended criteria. In the LEED system a

22 Yudelson Associates for National Association of Industrial and Office Parks, "Green Building Incentives That Work: A Look at How Local Governments Are Incentivizing Green Development" (NAIOP Research Foundation, 2007)

project gains points for meeting a criteria threshold, and the sum of the points qualifies the project for a specific rating level such as gold, silver or platinum. The cities of Minneapolis and Saint Paul are early adopters of sustainable building criteria and already promote LEED certification, or its equivalent, the Minnesota Sustainable Building Guidelines²³.

Minnesota Sustainable Building Guidelines

The State of Minnesota enacted a green building standard, the Minnesota Sustainable Building Guidelines (MSBG) as part of the B3 (Buildings, Benchmarks and Beyond) initiative. The MSBG are very similar to LEED, though have higher energy efficiency standards and are considered to be at, or above, a LEED Silver rating. As of January 2004, all new state buildings funded with bond money must conform to these guidelines.

ASLA – Sustainable Sites Initiative

The American Society of Landscape Architects is currently undergoing the Sustainable Sites Initiative, which will result in a criteria-based rating system for sustainable landscape certification. Although the Sustainable Sites project is still in its initial phases, the interim report is organized into broad categories—Soils, Hydrology, Vegetation, Materials and Human Well-Being—for which specific criteria will be developed and tested over the next few years.

Green Communities

Enterprise Community Partners, a national nonprofit community development and affordable housing agency, created the Green Communities Criteria to guide residential developers toward cost-effective standards for building healthy, energy efficient homes for thriving communities. Many of these criteria are applicable to green industrial site location encouraging connection to the greater community, proximity to existing development, and guiding site construction and maintenance, to reduce the impact of development on the environment.

The following criteria are drawn primarily from these sources, adapted to meet the needs of manufacturing and industrial developments. In addition to criteria related to the site and the building, there are a number of business models that promote environmentally benign practices, in production, operations and employee relations. Building programs around these criteria would help attract businesses that have a long term commitment to sustainability, in their product, process or company. The evaluation methods of these criteria can be highly detailed, with each criteria relating to specific measures relying on the availability of data and the capacity of the city staff. Each of these systems offer specific, technical guidance on how to apply the intentions of the criteria to specific projects. A list of potential ways to measure the site location and site design criteria can be found in Appendix C.

Criteria for Green Industrial Sites

Criteria are designed to have an impact at a broad range of scales, from the macro level of public policy to the micro of private management of business and operations. Criteria are grouped into four general categories: 1) site location, 2) site design, 3) building design, and 4) business practices. At the site location level city and regional planning of major infrastructure investments and policies directing affordable housing and natural resource conservation impact the sustainability of the site. Individual companies have very little impact at this level. Cities can provide tools and incentives to encourage business to go green at the site and building design level. At this level, any deficiency in location can be overcome by optimizing the site through design. Lastly, many opportunities exist at the business operations level. The city can help businesses location information and resources on green manufacturing and operations.

The criteria presented here have been developed for application to any industrial site statewide, whether in the cities of Minneapolis and Saint Paul or elsewhere. While *Green Cities, Green Jobs* is a specific initiative at the city level, many financial incentives, particularly those related to tax incentives, are implemented on a statewide level. There are numerous benefits to locating green manufacturing facilities within the city, such as access to an available skilled workforce, proximity to a wide range of suppliers and lower costs of transportation. In addition, there are significant environmental benefits to locating industrial land within the city, including reuse of brownfield or greyfield lands, a decreased carbon footprint (due to shorter transit times for product and employees), access to public and alternative transit, and low additional impact on environmentally sensitive lands. Industrial development within the city means a lower infrastructure maintenance burden on the community than in greenfield or suburban locations, and an increased benefit where infrastructure already exists.

Site Location

Site location criteria apply at a citywide systems level. They are not about a specific development project or manufacturer, but apply to the greening of all industrial land within the cities. These criteria are about providing alternative, high efficiency energy options to manufacturers, making sure our critical habitat areas and natural resources are protected. They relate to the location of the site in relation to existing development, natural resources, environmentally sensitive land, transit, existing infrastructure, and residential areas. The intent is to optimize the potential of the site, finding sites that have a minimal impact on the environment and zero or positive impact on the community. The decreased cost of building utilities and other infrastructure must be balanced against impacts on the community due to density and congestion.

- **Proximity to existing development**
The site is adjacent to or close to a variety of existing commercial or retail development. This reduces the impact on environment due to transportation (products, materials, workers).
- **Access to District Energy or Renewable Energy options**
The site has access to district energy generation or can service a minimum of 25% of the required energy from renewable sources.

- **Proximity to natural resources/protecting the environment**
The site is not located within environmentally sensitive areas or environmentally sensitive areas are appropriately buffered, protected and enhanced.
- **Proximity to existing infrastructure**
Locating the site within an existing serviced area reduces the impact of establishing new infrastructure such as roadways and sewers, and also reduces the potential for non-sewered facilities, which typically have a negative environmental impact.
- **Proximity to high density housing that meets worker needs**
The site is located near a residential market appropriate to the workforce. This has the potential to reduce carbon emissions from automobile dependent commuting and increase the relationship to the community as more workers have the potential to live in nearby neighborhoods. Not all green manufacturing is clean manufacturing, the environmental justice implications, particularly for sensitive or vulnerable populations, should be considered before placing a potentially harmful manufacturing facility near housing.
- **Proximity to High Frequency Public Transit**
The site is located within walking distance of regular and frequent transit options. Higher ratings would be provided for access to multiple modes of transit (bus and rail).
- **Bike path access**
The site can be accessed via the designated bikeway, bike path network. This provides opportunities for workers to reduce their carbon footprint and improve their health.

Using GIS to map site location criteria: Minneapolis and Saint Paul

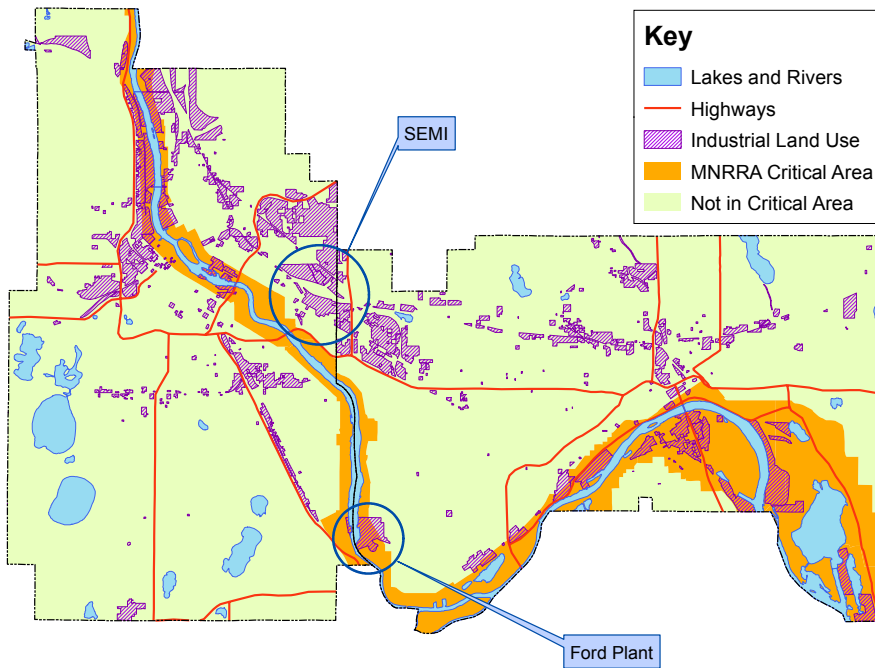
Ian McHarg in his pioneering 1969 work, *Design with Nature*²⁴, introduced the concept of overlaying multiple maps of criteria to create a priority index that clearly shows areas of interest, whether for protection or development. The concept was later extended by landscape architects and environmental planners such as David Pitt, and when used to identify the underlying environmental systems of an area, is known as “green infrastructure” analysis. Mapping an area’s green infrastructure can help planners and developers sort through complex information and identify sites with high and low priorities for development. The maps presented below are a sub-set of the site location criteria as applied to Minneapolis and Saint Paul using readily available data. Ultimately all of the site location criteria should be mapped and the layers combined to show hot spots for site remediation, and to gauge the industrial land’s inherent “greenness”.

24 Ian McHarg, *Design with Nature* (New York: Natural History Press, 1969)

25 David Pitt, Doug VanValkenburg, Dan Petrik and Wes Hell, “Socially Constructed Environmental Assessments for Smart Growth Planning.” <http://training.esri.com/campus/library/Bibliography/RecordDetail.cfm?ID=59342&LibSection=conference%20proceedings&startrow=1&hidpage=1&browseonly=1&year=2003&station=URISA>

26 Green Infrastructure, <http://www.greeninfrastructure.net/>

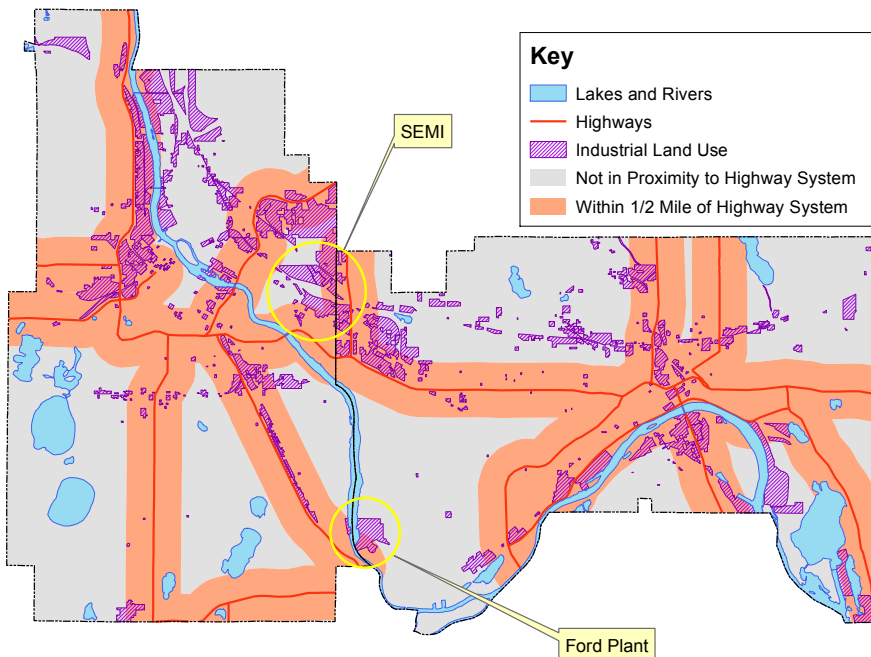
Industrial Land in Mississippi National River Recreational Area



Data Source: MetroGIS, Land Use: 2005, MNRRA: 1997

Industrial sites within the critical habitat area are great places to pilot integrated stormwater and wastewater management projects.

Industrial Land within 1/2 Mile of Highway Service



Data Source: MetroGIS, Land Use: 2005, Highways: 2002

Access to the highway and high-capacity roadways network is a huge amenity for manufacturers who need to move supplies and product to and from market²⁷.

Figure 17: Proximity to environmentally sensitive land

9.1% of Minneapolis' industrial land is within the Mississippi National River Recreational Area, in Saint Paul 25.8% of the industrial land is within this critical area.

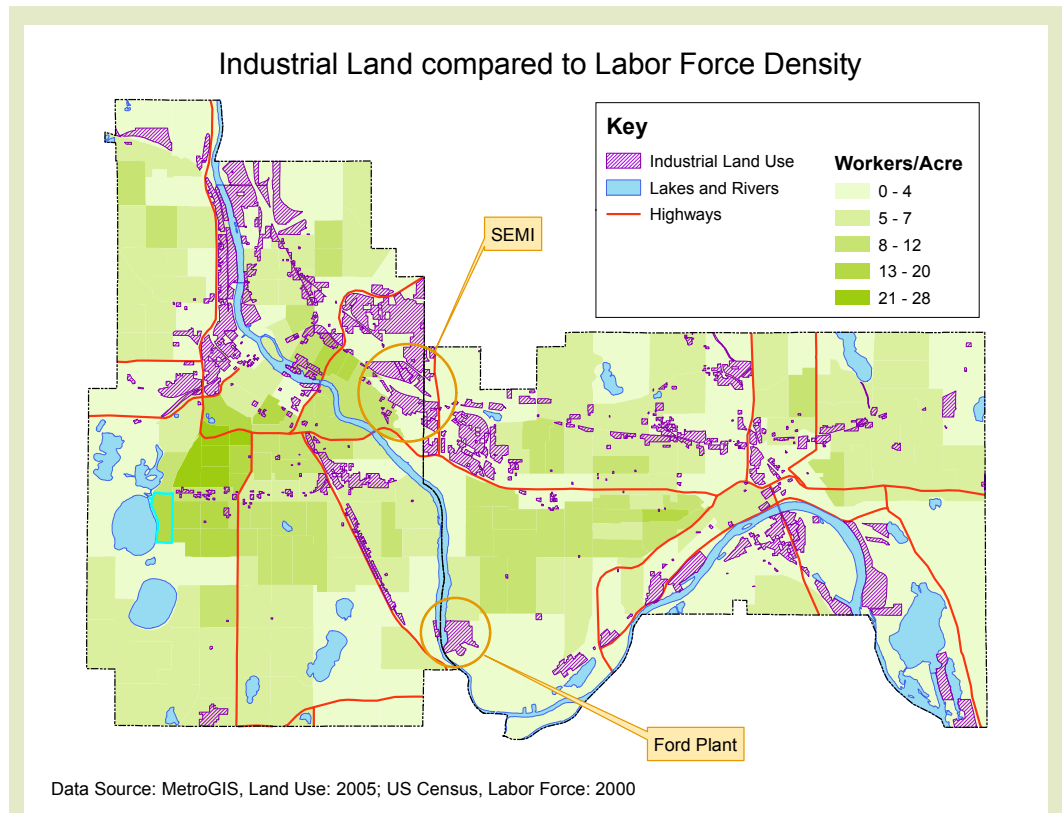
Figure 18: Proximity to existing infrastructure

Almost 50% of the industrial land in Minneapolis and Saint Paul is within 1/2 mile of highway or interstate service.

27 Note: a more applicable analysis would be to map 1/2 mile proximity to on/off ramps but that data is not currently available.

Figure 19: Proximity to workers

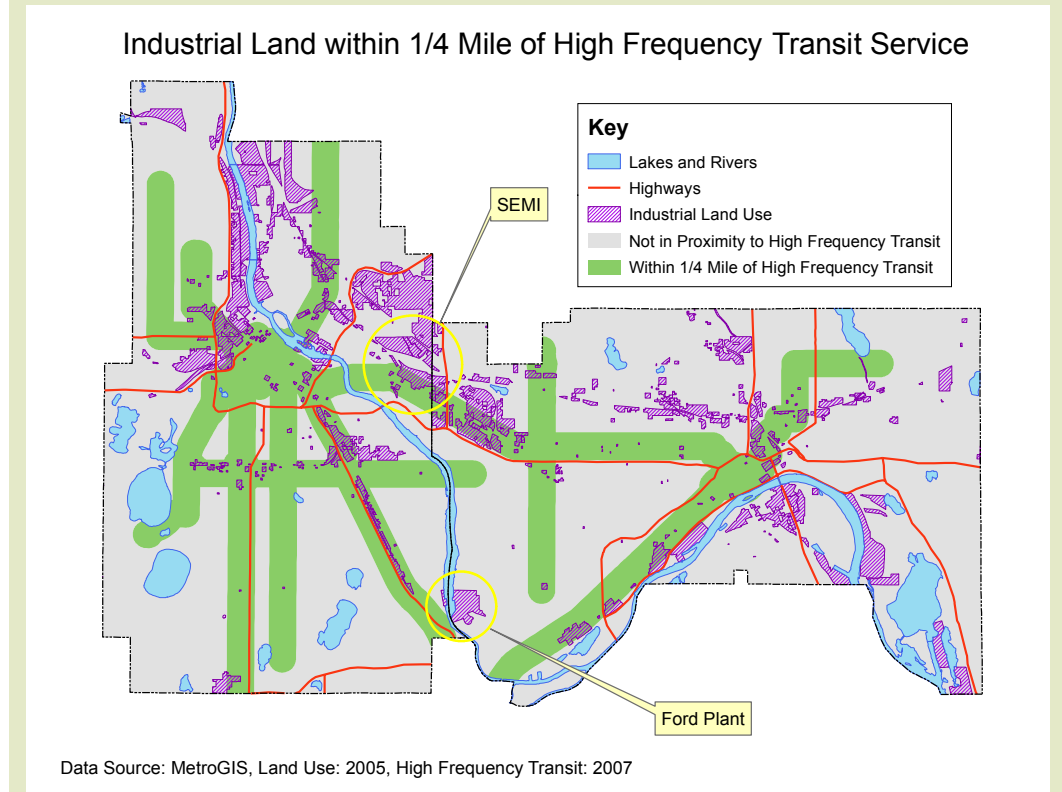
Locating industrial lands within a reasonable distance to housing that meets the needs of the target workforce minimizes commute times and reinforces connections to the community.



Low density areas are opportunities for high-density, mixed-income community development.

Figure 20: Proximity to high frequency transit service

Only 18.9% of industrial land in Saint Paul is within 1/4 mile of high frequency transit service, in Minneapolis nearly a third (32.4%) of industrial lands are close to high frequency transit lines.



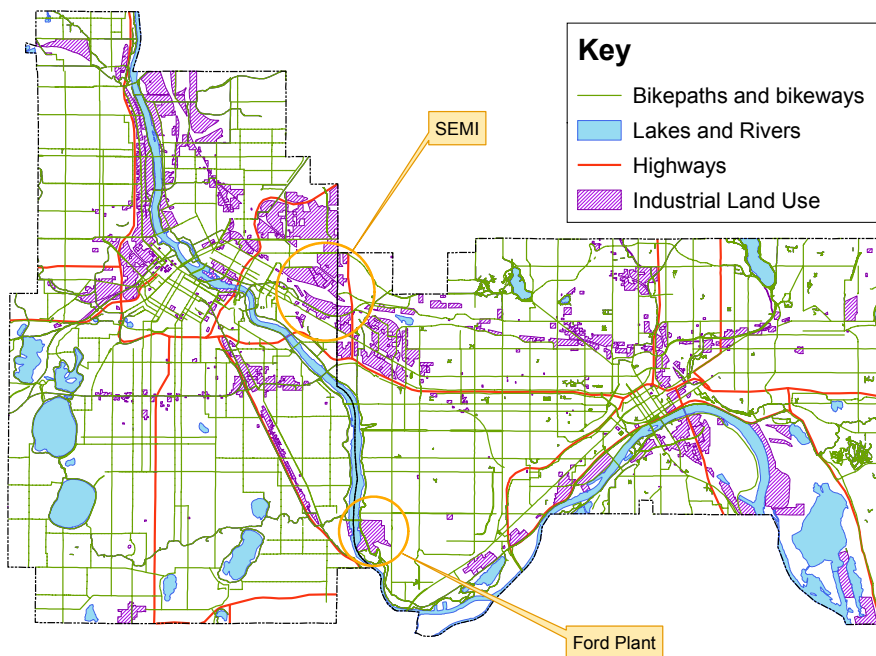
Sites that are within the High Frequency Transit Network²⁸ are not necessarily served by transit that meets the needs of shift workers. There are many ways to increase access to high frequency transit at key sites, such as creating a short shuttle/circulator route between the plant and a transit line at shift transitions.

28 The High Frequency Transit Network refers to public transportation (buses, light rail) with a frequency of 15 minutes or better operating between the hours of 6:00 a.m. to 7:00 p.m. on weekdays and on Saturdays from 9:00 a.m. to 6:00 p.m.

Figure 21: Proximity to bikeways and bikepaths

Close to 100 percent of the industrial land is in proximity to a designated bike way, bike route or bike path.

Industrial Land compared to Bikeway and Bikepath Coverage



Data Source: MetroGIS, Land Use: 2005, Bikeways: 2007

Minneapolis and Saint Paul are well served by alternative transportation options.

Site Design

Not all locations are good for industry, whether due to the constraints of manufacturing, such as access to transportation networks, or because of impact on the environment or community. Good site design can mitigate many of the negative impacts of manufacturing. This section relates to the design of the site and addresses factors such as storm water/surface water management, landscaping, passive solar gain/reduction, reduction of heat island effect (as it relates to the site, not the building), and minimizing light pollution through site design and maintenance. The intent is to reduce the impact of the building, paved surfaces and landscaping on the environment and community through site design and conservation landscaping. The cities of Minneapolis and Saint Paul already implement many of these criteria into the standard permitting process and the Minnesota Pollution Control Agency regulates stormwater and wastewater management on industrial sites, and provides guidance for best management practices at a site specific scale. The purpose of developing green criteria for site design is to reiterate and reinforce the practices already in place and reward manufacturers for good site design and innovation.

If the site already meets ASLA Sustainable Criteria for site design and maintenance (pending), or is LEED certified, these criteria may be redundant. Whether a LEED or ASLA certified site has met these criteria can easily be verified, and these criteria can be bypassed for the more stringent and measurable standards.

- **Greyfield/brownfield, adaptive re-use**
The site reuses an existing facility and environmental remediation has been done on all or part of the site.

- **Stormwater/surface water management**
The site design reduces the burden on stormwater sewer systems and complies with local surface water management plans; the site is designed in such a way as to treat stormwater on site as much as possible. Best management practices, such as bio-retention ponds, rain gardens and constructed wetlands, are in place. The quantity of stormwater leaving the site into the storm drain network is less than that entering the site and the quality of stormwater leaving the site is as good, or better, than that entering the site.
- **Waste water management**
The site is designed to reduce waste water entering the system through the use of innovative waste water management.
- **Landscaping best practices**
Landscaping reduces the environmental impact of the site and increases the aesthetic appeal. It should utilize location appropriate plants and native species where possible, and irrigation should have targeted delivery and use only non-potable water (greywater or stormwater).
- **Heat island effect reduction through site design**
Hard surface materials and landscaping minimize or reduce the heat island effect of non-building areas. Paving is light colored or is shaded by landscaping.
- **Connection to the community via walkways and sidewalks**
Provide for great connection to the community. There is clear and continuous pedestrian access to the front door of the site from the nearest public sidewalk, and reasonable access to a commuter bike path.

Site design mitigates environmental impact: Ford Rouge plant

At the turn of the 21st Century, leaders at Ford chose to rehaul their oldest and largest plant in North America — the Dearborn, Michigan facility situated on the Rouge River — creating one of the largest stand-alone sustainable industrial sites. At the time it was rebuilt, the plant boasted the largest living roof top in the world, at 450,000 sq. ft., and the largest porous parking surface. Excess stormwater is captured in large cisterns to be used for watering the landscaping, or to be released into the constructed wetlands that buffer the Rouge River from any environmental impact of polluted stormwater running off of impervious surfaces. The goal of the site design was that water leaving the site would be as clean, or cleaner, than the stormwater hitting the plant. The plant itself has many energy efficiency and quality of life features, such as an innovative layered heating system and daylighting throughout the production floor, and has extensive state of the art flexible manufacturing equipment.^{29, 30}

29 William McDonough & Michael Braungert, "Restoring the Industrial Landscape," http://www.mcdonough.com/writings/restoring_industrial.htm

30 The Henry Ford, "reinventing the rouge," <http://www.thehenryford.org/rouge/reinventing.aspx>

- **Bike racks**
Providing bike racks for workers promotes healthy alternatives to commuting by personal automobile.
- **Good neighbor design**
Loading bays and other nuisance areas are buffered from the adjacent uses by a living wall, or other natural screen to reduce noise and diesel fumes from operations at the loading docks and fleet idling.

Building Design

The building criteria presented here are broad and general and are not meant to be a replacement for more rigorous certification processes such as LEED and MSBG. LEED certification should be sought for new construction on green sites where feasible considering the limitations as applied to the manufacturing process.

Minimum criteria allow small businesses to “go green” and a path-structured assessment allowing some projects to bypass LEED certification allows for flexibility in applying these criteria. Many small businesses cannot afford to apply for certification, and some of the criteria within LEED, such as energy efficiency as applied to the whole project, may be prohibitive to manufacturers using specialized equipment with high energy demands³¹. Additionally there are many existing buildings that require significant alteration to meet the prerequisites for certification, such as the minimum threshold efficiency for their HVAC system.

Building design criteria are really about three things: 1) providing a healthy workplace for employees, 2) using locally sourced and environmentally friendly building materials to reduce carbon emissions from transport and byproducts of production and, 3) reducing the impact of the building and operations on the environment through energy efficiency and building design.

The building exterior and interior criteria may be helpful in doing an initial assessment of the sustainability of buildings on vacant sites, and for sites where certification is not feasible. If the building already meets LEED or MSBG standards this section is redundant and can be bypassed.

Exterior

- Building uses passive solar gain/reduction
- Building envelope meets or exceeds MSBG energy efficiency standards
- Exterior lighting is shielded to minimize light pollution and meets MSBG energy efficiency standards
- Green materials used in construction/redevelopment
- The building roof is high emissive or green to reduce heat island effect

Interior

- The building meets or exceeds Indoor Air quality standards
- Fixtures are water efficient and energy efficient
- Uses locally sourced materials wherever possible to reduce the impact from extraction and shipping.
- Healthy working environment
 - Low VOC surface coverings
 - Urea Formaldehyde-free Composite materials
 - Healthy, sustainable flooring materials
 - Maximum use of daylighting

Business practices

Substantial improvement in environmental performance can be made at the level of business management and operations. Many companies using environmentally benign manufacturing find savings in waste reduction and higher productivity from their workers.³² Green process is an amenity making it easier to recruit a skilled workforce in a highly competitive market. It's healthy for workers, the community and the city.

Common practices in environmentally benign manufacturing include Lean Manufacturing,³³ ISO 14001, Natural Step, Total Quality Management, Green Logistics (for greening the supply chain). LEED also provides guidance on sustainable business practices through their Operations and Maintenance certification. Each of these environmental management systems has its own rating system and set of criteria. The criteria provided below are not meant to replace any of these comprehensive approaches to reducing the environmental and health impacts of manufacturing, but can guide city staff in evaluating businesses for green industrial sites, and are a starting point for a company desiring to “go green” through their production process, business management and operations and facility maintenance.

- **Green product / green process**
Not all manufacturing produces a green product, in this case a product designed to meet the needs of the green building industry, renewable energy industry, or green transportation industry. Traditional manufacturing products made using best practices for environmentally benign manufacturing and producing low or no waste or harmful by products, should be given equal consideration.
- **Management innovation and visionary leadership**
Business is managed with a demonstrated strategic commitment to environmentally sustainable practices.
 - Green Development Plan/Strategic Plan in place
 - Environmental Management System (e.g., Total Quality Management, ISO 14001 Natural Step) is used.

32 Nicole Darnall, Deborah Rigling Gallagher, Richard N.L. Andrews and Deborah Amaral, “Environmental management systems: Opportunities for improved environmental and business strategy?” *Environmental Quality Management* 9, no. 3 (2001): 1-9

33 See the “Lean and Green” toolkit available from the Environmental Protection Agency, <http://www.epa.gov/lean/toolkit/>

- Environmental steward on the board of directors or in upper level management, or business has a well developed department of environmental affairs.
- **Operations efficiency**
Business operations including fleet maintenance, janitorial service, and procurement are green, clean and efficient. In all aspects of business there is a focus on reducing waste, improving efficiency and using products with no or low impact on human health or the environment.
 - Low or zero-emission fleet³⁴
 - Sustainable purchasing policy, using locally sourced supplies where possible
 - Solid waste reduction plan with a goal of zero solid waste where feasible
 - Green Cleaning Policy in place
- **Green workforce**
Supports green work place by providing training and recognition for sustainable practices.
 - Employee training programs for green production
 - Personal waste management & green workplace practices programs
 - Promotes alternative transit for employees
 - Provides lockup and changing facilities for bike riders
 - Provides discounted bus/transit passes
 - Good jobs³⁵
 - Job density meets minimum criteria of one employee per 1,000 square feet of facility space
 - Jobs are at, or above, a family supporting wage
- **Community connection**
Promotes and maintains a dialogue and connection with adjacent community and neighborhood groups. Engages the community early to facilitate dispute resolution.
 - Members of the management team regularly attend community meetings
 - Company sponsors community activities

Summary and Recommendations

Green site criteria are a tool to gauge the sustainability of Minneapolis Saint Paul's valuable industrial lands and manufacturing industry. The criteria presented here can act as a guide for city planning, business and economic development departments as they promote Minneapolis Saint Paul as a green manufacturing destination, and the Mayors as leaders in creating the green industrial revolution for 21st century cities.

34 For more information on green logistics see: Nikolas Geroliminis and Carlos F. Daganzo, "A Review of Green Logistics Schemes Used in Cities around the World" WORKING PAPER UCB-ITS-VWP-2005-5 (Berkeley, CA: UC Berkeley Center for Future Urban Transport, 2005)

35 These meet the economic development incentive benchmarks set by the Saint Paul Port Authority for its redevelopment projects.

In the next section the structure and potential application of green zones is discussed along with the costs and benefits of economic development incentive programs. In order to implement any incentive program there must be clear and objective measures by which to assess whether a site, or project, meets the goal of the incentive. Incentives meant to promote the green economy that are tied to industrial sites must address the environmental and social impacts of the site itself, and may also promote the benefits of good site design, buildings, and business process as ways to support the greening of manufacturing.

Integrate green site, building and operations criteria into existing economic development opportunities.

- The cities already have strong business and economic development programs. Adding green criteria prioritizes green development and strengthens the cities' sustainability message.

Prioritize development that mitigates the effects of location

- Some of the industrial lands of Minneapolis Saint Paul are in a less than ideal location from the standpoint of environmental protection and sustainability. These sites can become laboratories for site design best practices. The cities should prioritize these sites for green development.

Work with MetroTransit to create new transit options for workers

- Many of the sites are not in close proximity (1/4 mile) of the high frequency transit network. The cities should work with workers, businesses and MetroTransit on innovative strategies to meet the transit needs of these workers. This could include the creation of public/private shuttles to high frequency routes at shift turnover time, but ultimately any solutions should be driven by the needs of the users.

Create an information clearing house for green industry

- Information about sustainable building, site design and manufacturing processes can be very technical. There is an overwhelming number of websites, publications and technical documentation that a business needs to understand in order to develop a sustainability strategy. Cities across the U.S. are creating ways to promote and support green building, creating a strong web presence as cities that support sustainable building. Minneapolis Saint Paul can be leaders in bringing that support to the manufacturing industry. There are many models for providing green building information, from web-based green building information clearinghouses and green building support groups, to quasi-public agencies providing technical and financial assistance for green building³⁶. Minneapolis Saint Paul should create a quasi-public development agency for green industry, providing an information clearinghouse, support network

36 Boston's Green Roundtable: <http://www.greenroundtable.org>
Seattle's Built Green: <http://www.seattle.gov/dpd/GreenBuilding>
Santa Monica's Green Building Program: <http://www.greenbuildings.santa-monica.org>

and funding opportunities for businesses who want to go green. Some communities have established extensive programs that bring together all of the aspects of sustainable building into one place.³⁷

Provide financial assistance to businesses seeking LEED or MSBG certification

- Some cities, such as Seattle and St. Louis, provide grants to offset the cost of the certification process. The cost of certification and meeting the prerequisites for existing buildings can be a burden, particularly for small businesses. Through a quasi-public development agency, Minneapolis Saint Paul could work with foundations and larger government agencies such as the Small Business Association, or the Environmental Protection Agency, to create grant or low-interest loan programs to help small business meet the minimum requirements and pay for certification.

Strengthen public/private partnerships and programs.

- Minnesota Technology and Xcel already provide technical assistance to businesses for lean manufacturing and energy efficiency,

Partner with the USGBC to take a role in developing LEED for industry

Next Steps

The criteria presented here are a framework for thinking about green sites and the application of green criteria to business and economic development. The cities of Minneapolis and Saint Paul have different staff capacities and available data sources. Specific measurement criteria need to be developed, and weighted or prioritized, in a way that is useful and meaningful given the data and staff resources available. Some potential measures for these guidelines is provided in Appendix C.

With the development of criteria, and the application of zones and incentives, Minneapolis Saint Paul is paving the way for a reevaluation of what it means to be a sustainable city.

37 The city of Santa Monica's Green Building Program has an extensive and well designed website bringing together information, services, and ideas about green building. In the city of Boston the non-profit Green Roundtable provides information and services to green builders and consumers

Green Zones: Process and Policy

A key component of *Making it Green* is the establishment of “Green Zones” to help attract green manufacturers and publicize their presence in Minneapolis Saint Paul. Creating these zones means reprioritizing current programs, policies, and incentives to support the expansion of green industry within the city limits.³⁸ This section will first highlight current practices regarding general development incentives. It then presents findings on how traditional and environmentally-oriented economic development zones have been implemented across the country. The Green Zones section concludes with a discussion of the implications these findings for Minneapolis Saint Paul and recommends additional steps to establish successful and innovative Green Zones.

Development Incentives

The implementation of new economic development zones requires a comprehensive examination of current regulations and policies and aligning them to support the vision of Minneapolis Saint Paul. The most visible, and often controversial, tool used in economic development is financial incentives. *Green Cities, Green Jobs* first summarize current practices in general development incentives then reviews findings of traditional and green economic development zones used across the country.

Incentives are defined as any inducements state and local governments use to attract and retain companies and facilities. They are offered as a way to combat high unemployment, spur economic growth, and allow cities to compete with other cities and states for capital investments. Incentives achieve these objectives by targeting a variety of industry needs such as infrastructure, capital, site location, job training, and start-up cost reduction. They fall into three main categories :

- Tax-based incentives; typically seen as long-term operating cost assistance
- Direct financial incentives; start-up expense assistance
- Indirect financial incentives; employee training and expedited permit processing

Whether or not state and local incentives are explicitly financial, they almost always have a direct financial impact on the outcome of a proposed investment. Those that can secure public incentives have lower start-up and initial operation costs, creating competitive advantage. Because of this competitive advantage, tax incentives are increasingly targeted toward specific industries to promote economic base diversification or the expansion of a specific industry. A growing trend across the country is the creation of enterprise zones in distressed areas as a way to target tax incentives, a topic that will be addressed in subsequent sections.

Below are some of the most commonly-used financial incentives:

38 U.S. Government Accountability Office, “Empowerment Zone and Enterprise Community Program: Improvements occurred in Communities, but the Effect of the Program is Unclear,” 2006. Retrieved from <http://www.gao.gov/new.items/d06727.pdf>

*Frequently Used Financial Incentives*³⁹

- Property Tax Rebates/Abatements
- Income/Franchise Tax Credits
- Sales Tax Exemption/Rebates
- Use Tax Exemptions
- Job Credit
- Preferred Financing
- Employment or Payroll Tax Credits
- Utility Rebates
- Industrial Development Bonds
- Community Development Block Grants

While the trend in financial incentives is targeting industries and distressed areas, the overall trend in economic development is moving towards non-tax-based incentives. Local governments are increasingly using infrastructure development and employee training to build competitive and desirable environments for industries and to quickly respond to industries' specific needs.

*Frequently Used Non-Financial Incentives*⁴⁰

- Revolving loan funds
- Linked-deposit programs
- Secondary market operations
- Job training

In the summer of 2007, Yudelson Associates, on behalf of the National Association of Office and Industrial Parks (NAIOP) Research Foundation, evaluated local government incentive programs as they pertained to green buildings⁴¹. Below are the most commonly-used incentives found in the green community as well as incentives requested most frequently from developers:

*Common Green Development Incentives*⁴²

- Priority in building permit processing and plan review or waivers of plan review fees.
- Property tax abatements for LEED Silver or better certification.
- Increased floor-to-area ratios than zoning ordinance suggests or density bonuses.
- Green investment funds; distribution of funds to development meeting criteria.
- Marketing; increasing consumer demand of green products and green processes.
- Information on green building; technical support

39,40 U.S. Department of Commerce: Economic Development Administration, "Innovative Local Economic Development Initiatives," November 1999 http://www.eda.gov/ImageCache/EDAPublic/documents/pdfdocs/1g3_5f1_5finnovldep_2epdf/v1/1g3_5f1_5finnovldep.pdf

41,42 National Association of Industrial and Office Properties, "Green Building Incentives that Work: A Look at How Local Governments Are Incentivizing Green Development," November 2007 <http://www.naiop.org/foundation/greenincentives.pdf>

As much criticism and publicity that corporate incentive (or corporate welfare) programs receive, they are only one factor businesses consider when selecting a site or contemplating expansion. Organizations conduct careful analysis of many factors before deciding to invest on a location. Examples of business location decision factors include climate, infrastructure, cost of land, quality of workforce, quality of life, transportation, and utility costs.

Economic Development Incentives: Cost vs. Benefits

There has been great debate over the impact of economic incentives and whether their benefits outweigh their costs. The majority of the literature, until recently, claimed an ambiguous impact at best. More recent econometric studies, such as those performed by Timothy Bartik, senior economist at W.E. Upjohn Institute, show that taxes impact local economic growth, and therefore lower taxes or higher economic incentives result in increased economic growth.⁴³

The Minnesota Office of the Legislative Auditor used Timothy Bartik's assessment of incentives in their evaluation of Minnesota's JOBZ program.⁴⁴ Bartik claims that state and local taxes have a statistically significant effect on business location decisions. Additionally, local economic growth positively affects local earnings.⁴⁵ The real issue therefore becomes not whether economic incentives spur economic growth, but whether the benefits of such incentives outweigh the costs. The next section examines this question in more detail by examining the implementation of economic development zones throughout the country.

Economic Development Zones in the United States

This section presents the best practices and local applications of traditional and environmentally-oriented economic development zones across the country and discusses their implications for Minneapolis Saint Paul. A detailed discussion of Federal Enterprise and Empowerment Zones, including JOBZ, is located in Appendix F.

Best practices and Local Applications

Given these mixed reviews of the impacts of empowerment zones and similar programs, it is critical that attempts to create additional zones targeted to green manufacturers avoid the oversight and implementation deficiencies that have hindered other initiatives. A recent policy brief from the Minnesota House of Representatives has made a series of recommendations, based on an extensive literature review of enterprise zone programs. Although provided here in their entirety, it should be noted that these recommendations are aimed primarily toward zones that rely on tax incentives to encourage development.⁴⁶

43 Timothy Bartik, "Solving the Problems of Economic Development Incentives" *Growth and Change*, Vol. 36 No. 2, Spring 2005 <http://www.blackwell-synergy.com/doi/pdf/10.1111/j.1468-2257.2005.00272.x>

44 Minnesota Office of the Legislative Auditor, "JOBZ Evaluation," 2008 <http://www.auditor.leg.state.mn.us/ped/2008/jobzsum.htm>

45 Timothy Bartik, "Solving the Problems of Economic Development Incentives" *Growth and Change*, Vol. 36 No. 2, Spring 2005 <http://www.blackwell-synergy.com/doi/pdf/10.1111/j.1468-2257.2005.00272.x>

46 MN House of Representatives, "Policy Brief: Enterprise Zones: A Review of the Economic Theory and Empirical Evidence," 2005, p 17-19 <http://www.house.leg.state.mn.us/hrd/pubs/entzones.pdf>

- Regularly evaluate the zone program’s effects: Develop a clear set of goals and criteria upon which the evaluation will be based prior to zone implementation.
- Reconsider the program after a specified time period, such as five years: Reauthorization should be tied to the zone’s ability to achieve its stated economic development objectives.
- Limit incentives only to firms that locate in the area because of the program: This move would prevent firms that would locate to the area regardless of program from collecting benefits, primarily tax incentives.
- Choose the right set of tax incentives, based on who directly benefits.
- Do not let the quality of local public services drop significantly: Doing so may ultimately deter businesses from relocating to or remaining in the zone, while also generating public opposition.
- Areas with more barriers may need more benefits or incentives: This recommendation should be considered in Minneapolis Saint Paul if the most “prime” industrial sites are disproportionately located in one city or certain areas.
- Additional policies may be needed if the goal is to hire local residents: Here, green workforce programs may be helpful (please see the workforce analysis section of this report).
- Keep regulations and restrictions, such as too many forms, to a minimum: This step is critical to ensuring the success of green zones in Minneapolis Saint Paul.
- Develop a decision tree of “what-if” scenarios based on the chosen tax incentives and subsidies: This recommendation may also apply to non-financial incentives used in Minneapolis Saint Paul.
- Do not create too many enterprise zones: Zones in close proximity with differing sets of incentives may compete with one another, resulting in some neighborhoods losing critical potential investments. This problem is unlikely to occur in Minneapolis Saint Paul, as all industrial lands will be designated as “green zones” and would therefore have identical incentives.

In subsequent sections, *Green Cities, Green Jobs* reviews the most relevant recommendations in more detail as they apply to establishing “green” enterprise zones within Minneapolis Saint Paul.

Variants on Enterprise Zones

Micro-Zones» and Eco-Industrial Parks

In addition to securing federal funds for Empowerment Zones and similar programs, many cities have created “micro”-enterprise zones to stimulate economic growth within a geographically-limited area, such as a particular business park.

Eco-industrial parks expand the economic development goals of enterprise zones to include principles of industrial ecology, pollution prevention, and sustainable design. Businesses in such parks operate through symbiotic exchanges of energy systems, materials flows, water flows, and construction.⁴⁷

In an evaluation of eco-industrial parks in the U.S. and the Netherlands, Heeres et al. (2004) found that heavy government influence in the U.S. tends to deter businesses from joining eco-industrial parks. A range of additional barriers — technical, economic, informational, organizational, and legal in nature — also discourage companies from participating in the symbiotic exchange relationships typical of eco-industrial parks. The most successful parks are characterized by the active participation of companies in their development, as well as a strong employers' association to promote the park to other businesses.⁴⁷ In other words, businesses must be involved not only as passive recipients of city-determined incentives, but as both active formulators of these incentives and key contributors to marketing and branding efforts.

LEED-ND

LEED-ND is a pilot program that is the first national system for neighborhood-level design.⁴⁸ Developed by the U.S. Green Building Council in partnership with the Congress for the New Urbanism and the Natural Resources Defense Council, LEED-ND presents environmental criteria that move beyond the level of the individual building to emphasize sustainable land use and transportation (Baker 2007). According to the U.S. Green Building Council, LEED-ND projects have the following characteristics:⁴⁹

- They are closer to existing town and city centers
- They have good transit access
- They are infill sites
- They are previously developed sites
- They are adjacent to existing development

Many, if not all, of the industrial sites in Minneapolis Saint Paul meet these prerequisites. Furthermore, LEED-ND criteria offer several advantages to both developers and municipalities. LEED-ND criteria may be less expensive to fulfill than LEED building criteria due to its focus on sustainable site selection, rather than green materials.⁵⁰ In addition, several counties, including Kane County, Illinois and Sarasota County, Florida, have offered developers incentives, such as expedited rezoning, discounts on impact fees, and special exceptions, to encourage LEED-ND development.⁵¹

In spite of these benefits, LEED-ND can be particularly challenging to apply to industrial land use because of its orientation toward commercial and residential uses. Density requirements, for example, are often too difficult for manufacturers

47 U.S. Environmental Protection Agency, "Eco-Industrial Parks: A Case Study and Analysis of Economic, Environmental, Technical, and Regulatory Issues," 1996, p xii <http://www.rti.org/pubs/case-study.pdf>

48,49 U.S. Green Building Council, LEED for Neighborhood Development <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148>

50 Linda Baker. 29 April 2007. There Goes the Neighborhood. Sustainable Industries. <http://www.sustainableindustries.com/greenbuilding/7239841.html>

51 Philip Langdon. September 2007. LEED Aims to Set 'First National Standard for Neighborhood Design.' New Urban News. <http://www.newurbannews.com/LEEDSep07.html>

to attain.⁵² Furthermore, an emphasis on mixed-use development is problematic for manufacturing land uses, which are rarely welcomed or permitted alongside residential uses.⁵³

Due to these concerns, it is not recommended that the Mayors' Initiative attempt to encourage all sites within the green zones to meet LEED-ND criteria. However, emphasizing that the green zone meets most key prerequisites can add critical support for the marketing of such sites as sustainable (please see the "recommendations" portion of this section for additional details).

"Green" Enterprise Zones in the United States

As enterprise zones have grown in popularity, some municipalities and regions have refined these programs' focus and goals. Recently, the concept of "green" enterprise zones, or zones providing benefits to environmentally-friendly businesses, has emerged. However, few municipalities have moved beyond the concept phase, making Minneapolis Saint Paul well-positioned to capitalize on green zoning in order to attract green manufacturing firms. Some early initiatives are highlighted below:

Milwaukee Greenlight District

In early 2007, Milwaukee Mayor Tom Barrett announced the creation of a "Greenlight District" providing tax increment financing (TIF) and other incentives to businesses who relocate along its 30th Street industrial corridor.⁵⁴ Although such incentives are not exclusive to green businesses, attracting green industry remains a central goal of the program.⁵⁵ In addition to expanding green industries as a major economic sector, program goals include attracting and growing business in general, identifying resources for site preparation and business incentives, incorporating job training incentives and workforce development, improving infrastructure, improving residential and commercial areas, addressing blight, and increasing public safety.⁵⁶

Although similar in its goal of attracting green industry, the Milwaukee Greenlight District differs from the green zones proposed by *Making it Green* in significant ways. First, it differs in scale: whereas the Greenlight District targets a specific corridor within the City of Milwaukee, green zones under the Mayors' Initiative would apply to all of the industrial lands in Minneapolis Saint Paul. Second, the programs differ in scope: the numerous objectives of the Greenlight District cumulatively give priority to economic revitalization in general, rather than to green businesses specifically.

52,53 Brendon Slotterback, personal interview; Merritt Clapp-Smith, personal communication; Joanna Hicks, personal interview

54 Small Business Times, "Milwaukee Launches 'Greenlight District' in Industrial Corridor," BizTimes Daily January 11, 2007 <http://www.biztimes.com/daily/2007/1/11/milwaukee-launches-greenlight-district-in-industrial-corridor>

55,56 City of Milwaukee: Department of City Development. 30th Street Industrial Corridor Milwaukee's Greenlight District <http://www.mkedcd.org/30thStreet/index>.

In December 2007, the mayors of Berkeley, Oakland, Richmond, and Emeryville, California, established the East Bay Green Corridor Partnership, an effort to “establish the region as one of the world’s leading centers of environmental innovation, alternative energy research, and green business and industry”.⁵⁷ The partnership is still in its infancy, lacking even a formal structure.⁵⁸ However, it is possible that the partnership will examine green enterprise zones as a potential economic development tool: the City of Oakland, for example, has considered green enterprise zones as a complement to its Green Jobs Corps, a training and workforce development program.⁵⁹

Despite its nascent stage of development, the partnership has already generated questions and some criticism from Berkeley City Council members for its limited public participation efforts and lack of criteria that constitute what is “green.” For example, some Council members have expressed concerns about the University of California, Berkeley’s recent agreement with BP to research and develop biofuels.⁶⁰ These issues emphasize the need to develop specific, transparent criteria that apply to both green zones and green sites within these zones.

New York City Industrial Business Zones (IBZ)

Another less-developed environmental economic development program is New York City’s recent designation of Industrial Business Zones (IBZ). These zones have been identified as areas with concentrations of industrial jobs that the city has committed to maintain for industrial uses.⁶¹ Although not specifically tied to green manufacturing, IBZs are viewed as a necessary step toward attracting green industry. Unlike many economic development zones, IBZs currently lack a clear legal status, thereby limiting the city’s enforcement powers.

San Jose Environmental Business Cluster (EBC)

The San Jose Environmental Business Cluster is a non-profit, unique “micro”-green incubator. The EBC provides programs and services to attract and assist start-up companies making environmental products or providing environmental services that have a positive impact on the environment. Although more specialized than the Green Zones concept, the EBC’s level of detail may provide a useful reference for Minneapolis Saint Paul as it examines program structure and potential incentives in the future:

- *Eligibility requirements:* To qualify for EBC assistance, a business must be an environmental technology or clean and renew-

57 Cathy Cockrell, “East Bay Announces Its ‘Green Corridor’ Ambitions,” UC Berkeley News, December 4, 2007, http://www.berkeley.edu/news/media/releases/2007/12/04_green.shtml

58,60 Judith Scherr, “City Council Questions, Approves Green Corridor,” Berkeley Daily Planet, 2008 <http://www.berkeleydailyplanet.com/issue/2008-01-18/article/28947>

59 Van Jones and Ben Wyskida, “Green-Collar Jobs for Urban America.” Yes! Magazine, 2007 <http://www.yesmagazine.org/article.asp?ID=1551>

61 Linda Baker. 29 April 2007. There Goes the Neighborhood. Sustainable Industries. <http://www.sustainableindustries.com/greenbuilding/7239841.html>

able energy business, product or service; in start-up, early-stage development, or restructure/re-focus phases; have a viable business plan, market identification and knowledge; produce a clear product and development plan; possess technical capability, a financial plan, the potential for creating new jobs, and the ability to pay the low participation costs.

- *Review Criteria:* Applicants are viewed based on their business potential, quality of business plan, clarity of market focus, reality of their assessment of competition, quality of management team, and their ability to utilize cluster services.
- *Incentives to businesses that locate to the EDC:* Incentives include business consultations, technology commercialization services, access to environmental and business leaders, assistance in locating financing, links to San Jose State University, and shared physical resources (such as conference rooms and office equipment). For clean and renewable energy industries, EBC hosts an annual investment forum (to link companies with investors and corporations that are potential strategic partners).

Summary

In this section, *Green Cities, Green Jobs* presents a review of existing research on development incentives and traditional and environmentally-oriented economic development zones across the country. The key findings are summarized below:

- The "Green Zones" concept is unique and has the potential to become a national model: Most economic development zones target relatively small and blighted areas, rely on tax benefits as the primary incentives, and do not focus on specific industries. Green zones in Minneapolis Saint Paul, by contrast, would apply to all industrial lands in both cities, would likely rely primarily on non-financial incentives, and would specifically target green manufacturers. The few national examples that most closely approximate this model are not fully developed and, in the case of Milwaukee, do not exclusively focus on green industries. The Green Zone concept therefore has tremendous potential to poise Minneapolis Saint Paul as national leaders in green manufacturing.
- Economic development zones have yielded mixed results: Although many zones have experienced economic benefits, some of these benefits appear to be context-specific and are not generalizable. Other programs, most notably JOBZ, have suffered from poor administration and management and have achieved only questionable results in some cases.
- Environmentally-based "micro-zones," such as eco-industrial parks and LEED-ND developments, can guide a future Green Zones initiative: The success of eco-industrial parks has frequently hinged on the active incorporation of businesses in the planning process. In addition, LEED-ND criteria can help form a backdrop for future marketing initiatives related to green zones.

Recommendations

In light of these findings, *Green Cities, Green Jobs* proposes the following recommendations to the Mayors' Initiative as it prepares to develop Green Zones in Minneapolis Saint Paul:

Create clear and meaningful incentives

Clear, meaningful incentives are critical to the success of Green Zones in Minneapolis Saint Paul. While Minneapolis Saint Paul may not currently be in the position to offer strong financial incentives to recruit new green manufacturers, the cities offer both financial and non-financial possibilities for future reference:

- Non-financial Options:
 - expedited permit processing
 - increased awareness of green initiative and green industry
 - survey industries of interest to identify specific needs
 - create a one-stop-shop for inquiring industries (information is valuable tool)

- Financial Options:

Ultimately, financial incentives should focus on maximizing labor market benefit for local residents. Investing in local residents provides the greatest financial return. In addition, upfront incentives are more cost-effective. While there may be more political and financial risk in upfront support, in the long run such support saves the government money. Incentives that go towards training and infrastructure are preferred, as these contributions are permanent investments in the region. Additional recommendations include the following:⁶²

 - Offer reduced-cost building permits.
 - Provide LEED certification cost-sharing.
 - Offer TIF loans.
 - Provide brownfield clean-up cost sharing or liability adjustments.

Furthermore, *Green Cities, Green Jobs* recommends the following steps to ensure optimum efficiency and accountability in implementing financial incentives:⁶³

- Include clawback provisions to hold companies to their promises. Provisions would require repayment of financial incentives upon failure to deliver.
- Cap incentives at \$35,000 per job.
- Tie wages to 85 percent of market average.
- Make piracy deals ineligible.
- Develop an evaluation plan for the incentive program.
- Require recipients to have clear program operation and administration plans.
- Ensure that the administering agency consistently adheres to

62,63 MN House of Representatives, "Policy Brief: Enterprise Zones: A Review of the Economic Theory and Empirical Evidence," 2005, <http://www.house.leg.state.mn.us/hrd/pubs/entzones.pdf>

objectives and criteria.

- Create subsidy agreements with meaningful and achievable goals.
- Ensure that the administering agency assesses the feasibility of the project moving ahead without financial incentives.
- Ensure that the administering agency creates reporting mechanisms and assesses the program impacts.
- Review contracts to determine compliance and hold those that are not compliant accountable.

Green Zones Recommendations

- **Keep paperwork to a minimum:** Numerous studies have found that paperwork and additional administrative burdens can serve as a strong disincentive to relocating to enterprise zones.
- **Engage businesses early in the process:** As studies of eco-industrial parks have found, the most successful endeavors are characterized by active business participation in the earliest stages of the planning process. To this end, Minneapolis Saint Paul cannot establish Green Zones in a vacuum; sustained engagement with green manufacturers is essential to developing effective incentives and emphasizing zone characteristics that meet businesses' needs.
- **Enhance industries' access to information:** A continuous theme mentioned by developers and industries when they are contemplating expansion or relocation is the need for better coordination of resources and information. Many industries noted that a single point of contact with city representatives greatly enhanced the quality and quantity of information they had to make their decisions. The best option in today's environment is a one-stop-shop website providing the following information:
 - Economic and demographic statistics
 - Tax structures and abatements
 - Business assistance programs
 - Labor market and job training resources
- **Draw on the existing strengths of urban industrial areas:** The industrial lands of Minneapolis Saint Paul already meet many of the LEED-ND prerequisites for sustainable neighborhood development, such as proximity to existing transportation routes and locations on infill sites. Emphasizing these strengths may assist in both marketing Green Zones and supporting their environmentally sustainable character.
- **Create strategies to anticipate and address disproportionate impacts:** It is possible that applying site criteria to Green Zones, as discussed in the next section, may result in disproportionate concentrations of "prime" sites in particular areas. The Mayors' Initiative should develop strategies to address the potential impacts of these criteria, including making improvements to less-prime sites or providing additional incentives in those areas.

- **Leverage the University of Minnesota's research and development capabilities:** In addition to providing training to a green workforce, the University may also be a key partner in attracting green industries to Minneapolis Saint Paul.
- **Create a sophisticated marketing strategy:** Perhaps the most important component of a successful Green Zones program in Minneapolis Saint Paul is a comprehensive marketing strategy. Marketing efforts should link the characteristics of sites within the zones with the needs of green manufacturers. Marketing will also induce greater consumer demand for green products and clean manufacturing, spurring increased industry interest in the green zone.

Conclusion

As the effects of global warming become increasingly apparent, Minneapolis Saint Paul face both critical challenges and unique opportunities. By leading the way in building a green manufacturing sector, the Mayors' Initiative will set a national example for generating economic activity that is also environmentally sustainable. This report has sought to assist the Initiative's efforts to promote green workforce development, Green Zones, and green sites by detailing each component and providing recommendations as the Initiative moves toward implementation.

Workforce Analysis

As the Mayors of Minneapolis Saint Paul and the Blue-Green Alliance work to promote green manufacturing, identifying key product and workforce development opportunities is critical. A workforce analysis of the green building products, renewable energy, and transportation sectors was conducted to identify emerging green industries and the capabilities of the existing workforce to meet these industries' needs. The analysis identified a number of recommended product opportunities in different stages of the product-profit cycle, with an emphasis on research and development in transportation and renewable energy. Additional recommendations include capitalizing on existing workforce strengths, ensuring quality workforce training to meet the needs of green manufacturers, assisting local manufactures in greening their processes, and conducting a detailed supply chain analysis.

Green Sites

This report has also presented a series of criteria against which industrial sites within Minneapolis Saint Paul can strive to meet. Proposed criteria relate to site location, site design, building design, and business operations, and can be applied to any industrial site. GIS analysis of environmentally-sensitive sites, sites near highways, and sites near transit and bicycle paths identified a number of challenges and opportunities for green manufacturers. Key recommendations include prioritizing development that mitigates the negative effects of location, creating a consortium of green business practices, tying incentives to site and building design criteria, and strengthening public/private partnerships and programs to help small businesses green their products, processes, and buildings.

Green Zones

Establishing the industrial lands of Minneapolis Saint Paul as Green Zones is a key way to link green products and processes, while also marketing the Initiative to green manufacturers. This report has reviewed the most common forms of development incentives and economic development zones across the country, noting both best practices and elements to avoid in developing Green Zones in Minneapolis Saint Paul. Research found that the Green Zone concept is nationally unique due to its environmental focus and emphasis on non-tax-based incentives. LEED-ND criteria provide a strong foundation for future promotion of the Green Zones, as urban industrial land already meets many of the program's prerequisites. And although economic development zones have yielded mixed results, many of the poor outcomes have stemmed from administrative inefficiencies or poorly-directed tax incentives.

Based on these findings, the report has outlined a number of potential non-financial and financial forms of incentives to guide the establishment of Green Zones. It also recommends that the Initiative limit paperwork to businesses, engage businesses early in the process, enhance industries' access to information, create strategies to predict the impacts of Green Zones, leverage the resources of the University of Minnesota, and create a sophisticated marketing strategy that draws on the Zones' existing strengths.

Towards a Sustainable Green Manufacturing Sector: How to Move Forward

In order to move toward the implementation phase of the Initiative, a number of key steps are recommended:

- **Focus on specific product opportunities:** Although a number of product opportunities have been identified, focusing on a limited number of strong candidates will ensure the most efficient targeting of resources toward workforce training and development.
- **Research supply chains that meet manufacturers' needs for targeted product opportunities:** In addition to workforce characteristics, existing resources in the form of supply chains are another key way to identify and prioritize product opportunities. To this end, additional research on local supply chains and their potential to serve green product opportunities should be conducted.
- **Develop a consolidated approach:** A comprehensive consortium of businesses and public agencies is essential for effective resource-sharing as the Initiative moves forward. A consolidated approach would limit duplication of efforts and resources, while ensuring creativity in green manufacturing development.
- **Establish green economic development zones:** The establishment of Green Zones is a critical first step toward developing a green manufacturing sector. Well-promoted zones signal to businesses that Minneapolis Saint Paul are committed to green manufacturing and are essential to propelling the Initiative to national prominence.
- **Adapt and prioritize site criteria:** Site criteria provide essential support for the Green Zones marketing initiative, while also serving as the foundation for implementation.

Ultimately, the ability of Minneapolis Saint Paul to attract and expand green manufacturers and maintain a green workforce will depend on the sustained commitment and active efforts of Initiative partners. The Mayors' Initiative has developed a strong, nationally unprecedented blueprint to meet the challenges of climate change and urban economic development. This report has sought to provide additional resources and recommendations necessary to begin transforming the blueprint into reality. By finalizing a set of criteria and incentives, forging new partnerships with businesses, and developing a comprehensive promotion effort, Minneapolis Saint Paul are poised to become national leaders in green manufacturing.

APPENDIX A: Green Jobs Analysis Data Sources & Methodology Limitations

For many of the product opportunities, or subsectors, analyzed in this report it is impossible to separate green product data from regular product data. For example, a data source regarding wage levels for the production of windows does not make a distinction between wages paid to manufacturing workers who produce environmentally preferable windows and manufacturing workers who produce regular windows.

Green Cities, Green Jobs have, wherever feasible, culled data for green products from multiple sources to represent workforce and employment characteristics of green subsectors as precisely as possible. Our primary data sources are the North American Industry Classification System (NAICS) and the Dunn & Bradstreet Million Dollar Database.

The first step of the analysis involved the determination of a representative sample of companies that manufacture the 29 identified green products. This was achieved through Internet searches of government reports, individual company websites, and trade organization websites, such as the American Wind Energy Association, the Geothermal Heat Pump Consortium, and BuildingGreen.com.

The primary resource for data regarding these companies is the Dunn & Bradstreet Million Dollar Database. This database was used in research of specific criteria on each green manufacturing company, such as number of employees at a particular facility location, size of facility in square feet, and annual sales figures. *Dunn & Bradstreet data used in this report represents companies that manufacture green products. Dunn & Bradstreet data was used to analyze job density, employment growth by facility, and median firm age.*

While it is a valuable source of employment data about occupations and wage levels, the Bureau of Labor Statistics' (BLS) National Industrial Classification System (NAICS) data present limitations to research about specific types of products. Because *Green Cities, Green Jobs* rely on some types of NAICS and BLS data in this report, it is important to point out its shortcomings in analyzing green manufactured products and employment. *NAICS data does not allow product identification based on manufacturing techniques, or make distinction between green and regular manufactured goods. NAICS data are used in this report to analyze wages, occupational structure, and occupation location quotients for the Minneapolis-Saint Paul metropolitan area.*

Further, NAICS data aggregates some product opportunities together and divides others into categories that do not exactly match up with the 29 product opportunities identified in *Making it Green*. For example, the manufacture of windows and doors is analyzed in two industry classifications: Wood Products (wood windows and doors) and Architectural and Structural Metals (metal windows and doors).

Despite these limitations, *Green Cities, Green Jobs* believe that the following analysis is the most accurate study conducted of the Green Building Products, Renewable Energy, and Transportation industries to date. For the purposes of identifying product opportunities best positioned for national employment growth and their potential to create manufacturing jobs in Minneapolis Saint Paul, this report represents the most current and relevant information.

Limitations of Methodology

It should be made clear that the methodology followed to determine job density has a number of limitations. First, the Dunn & Bradstreet Million Dollar Database was heavily relied upon for critical information. Although Dunn & Bradstreet has been in existence as a trusted provider of corporate information for many years, the research team did not have the time or resources to corroborate the accuracy of the data. To do so would have required, at minimum, telephone calls with thousands of companies to solicit information on their product lines, number of employees devoted to the manufacture of that product, and facility space needed to manufacture that product. Additionally, Dunn & Bradstreet data is self-reported.

Second, the data collected for individual companies may not relate exactly to the product opportunities being researched. In many cases, companies manufacture other products besides those targeted as product opportunities. This is especially true of larger corporations. In these instances, the research team was unable to determine how many employees at a given facility may be involved with the manufacture of the product opportunity being researched as opposed to other product types. Due to this limitation, the research team assumed that all jobs at a given facility would be involved in the manufacture of the product opportunity. Although this introduces error, it was determined that the error may be minimal because if the product being researched is manufactured in the same facility as other products, it would be likely that all products at that facility would have the same job density.

Third, because data was analyzed at the company level, it was difficult to differentiate between a company that manufactures a product that is considered “green” versus a company that has instituted a “green” process into the manufacturing of their product and thus enable themselves to market the product as “green.” This was particularly a problem when researching companies in the buildings products industry.

Fourth, for some products there are a very small number of companies involved in the manufacture of that product. There are two primary reasons for this. One, the product type is of a sufficient complexity that only very large corporations can profitably manufacture the product. Two, the product is new technology and only a handful companies have been able to establish a manufacturing process for that product. A small number of companies can have a significant impact on the analysis since it is difficult to determine what are realistic figures for that product.

Fifth, the data pertaining to facility size can have substantial error. There can be a number of potential explanations for this error. As noted previously, it is sometimes difficult to match up the product with the facility where the product is manufactured. Also, the information on facility size is unclear as to how much of the facility is devoted to actual manufacturing versus other business needs, such as warehousing or offices. In addition, the data does not indicate whether the facility is at partial capacity or full capacity. For job density purposes this is important because some figures may indicate a very low job density for that product, when in reality the low job density is a reflection of the fact that that facility is only using a fraction of its capacity.

Sixth, because many of the identified product opportunities are emergent technologies, a significant amount of work in these fields continues to be in research and development and not necessarily in manufacturing. This might explain why some product categories have so few manufacturers. More importantly, though, such conditions would fail to capture the true potential for job density at any one facility until research development transitions into manufacturing.

Seventh, noting the facility size does not necessarily establish a true indication of job density. For some products, the manufacturing process may require large unenclosed areas for storage or other needs that wouldn't be reflected in the facility size. This suggests that acreage and not facility size would be a better determinate of job density. Though this might true, if *Green Cities, Green Jobs* were to know acreage of a manufacturing site, this might not be a better metric since some companies hold land that isn't necessarily needed in the manufacturing process.

Finally, the researchers were obliged to make use of Bureau of Labor Statistics NAICS data in order to determine median wages, occupational structure, and employed occupations within each of the product opportunities. *Green Cities, Green Jobs* assume in this analysis that pay, occupational structure, and utilized occupations for green manufactured goods are similar to regular goods. The most substantial error introduced in this assumption will be in the renewable energy and transportation industries because both are in nascent stages of industry development.

Despite the limitations, the researchers believe the data and method of analysis yield a very good approximation of various characteristics of the identified product opportunities. To improve upon the quality of the data or methodology would require a substantial increase in time and cost.

APPENDIX B: Green Building Product Summary Data

Green Building Product Opportunities	Year Established	Facility Size (sqft)	Sales Amount (\$)	Employment 2008	Employment 2005	Job Density (jobs/1,000 sqft)	
Doors	Average	1967	48,010	54,904,519	144	180	4.21
	Median	1979	37,950	14,010,312	102	102	2.69
	Maximum	2002	260,000	1,877,500,000	1,000	1,000	83.33
	Minimum	1884	9,200	1,400,000	12	12	0.24
	Sample (N)	52					
Windows/Films	Average	1981	105,081	30,424,813	197	232	2.24
	Median	1981	64,200	24,571,450	117	137	1.69
	Maximum	2006	600,000	249,100,000	700	900	5.18
	Minimum	1935	5,800	1,100,000	9	9	0.45
	Sample (N)	38					
Insulation	Average	1976	50,040	85,101,049	112	126	2.91
	Median	1978	26,700	10,031,280	45	53	1.90
	Maximum	2006	481,000	6,461,000,000	1,100	1,000	33.33
	Minimum	1920	300	1,023,250	4	4	0.23
	Sample (N)	133					
Lighting	Average	1978	68,673	61,227,167	240	270	3.44
	Median	1984	39,000	16,576,228	100	110	2.53
	Maximum	2005	510,000	633,300,000	1,200	1,200	18.25
	Minimum	1901	1,600	1,239,322	7	7	0.50
	Sample (N)	71					
Site and Landscape	Average	1978	25,800	12,793,742	51	56	2.89
	Median	1988	19,700	5,446,500	35	43	2.10
	Maximum	2006	175,000	138,700,000	330	330	16.50
	Minimum	1887	1,500	1,000,000	0	6	0.38
	Sample (N)	45					
Paints	Average	1842	34,326	25,297,035	36	59	1.46
	Median	1969	9,100	2,530,738	12	40	0.99
	Maximum	1990	350,000	425,000,000	250	250	4.65
	Minimum	1883	2,000	100,000	3	3	0.30
	Sample (N)	49					
Adhesives	Average	1562	44,182	33,093,855	92	108	3.29
	Median	1928	21,100	15,295,690	51	52	2.30
	Maximum	1984	481,000	305,400,000	500	550	27.00
	Minimum	1920	2,700	1,111,854	3	3	0.94
	Sample (N)	24					
HVAC	Average	1925	66,501	32,531,806	160	204	2.37
	Median	1978	23,800	8,896,030	55	60	2.14
	Maximum	2005	1,500,000	343,938,600	2,000	2,500	9.17
	Minimum	1874	1,200	1,100,000	3	5	0.00
	Sample (N)	165					
Wood Products	Average	1837	38,877	26,057,679	114	94	11.33
	Median	1995	20,700	11,375,485	61	55	2.16
	Maximum	2002	139,200	87,128,800	680	680	225.00
	Minimum	1949	1,000	1,111,854	3	3	0.50
	Sample (N)	36					
Alternative Materials	Average	1951	30,094	35,738,126	66	86	2.90
	Median	1985	16,800	8,091,972	38	50	2.00
	Maximum	2006	2,000,000	479,800,000	2,000	4,253	100.00
	Minimum	1866	1,000	600,000	0	2	0.00
	Sample (N)	545					
Testing/ Remediation Kits	Average	1778	20,389	25,839,587	64	109	5.05
	Median	1983	4,800	4,250,000	33	60	4.01
	Maximum	2007	71,000	177,000,000	285	285	10.00
	Minimum	1909	2,300	1,000,000	0	6	1.97
	Sample (N)	10					

APPENDIX B: Renewable Energy Product Summary Data

Renewable Energy Product Opportunities		Year Established	Facility Size (sqft)	Sales Amount (\$)	Employment 2008	Employment 2005	Job Density (jobs/1,000 sqft)
Wind Turbines	Average	1994	36,850	8,477,244	57	81	4.2
	Median	2000	10,650	5,000,000	23	50	1.9
	Maximum	2006	200,000	40,980,000	250	350	21.2
	Minimum	1968	2,500	1,000,000	2	12	0.09
	Sample (N)	20					
Geothermal Heat Pumps	Average	1974	100,894	24,347,691	140	137	1.8
	Median	1979	56,750	17,450,000	129	129	1.6
	Maximum	2006	342,000	90,700,000	375	375	3.3
	Minimum	1930	6,500	1,400,000	14	2	0.6
	Sample (N)	16					
Solar Hot Water Heaters	Average	1989	22,004	5,362,882	29	27	3.9
	Median	1990	14,000	2,400,000	18	17	1.3
	Maximum	2006	100,000	35,000,000	125	125	70.0
	Minimum	1944	1,000	1,000,000	2	2	0.2
	Sample (N)	27					
Photovoltaic Solar Cells	Average	1993	52,126	24,446,217	114	110	2.6
	Median	2001	20,000	6,000,000	30	64	1.9
	Maximum	2007	225,100	236,510,000	878	400	8.0
	Minimum	1956	3,000	12,795	1	1	0.1
	Sample (N)	31					
Bio-Fuels Systems	Average	1990	28,785	14,544,955	51	106	1.8
	Median	2005	11,200	4,000,000	15	39.5	1.6
	Maximum	2007	323,000	229,754,000	530	530	5.9
	Minimum	1905	2,000	1,100,000	0	10	0.0
	Sample (N)	46					
Sensors & Monitoring Systems	Average	1962	31,155	84,679,341	125	138	4.5
	Median	1965	15,000	10,500,000	74	85	3.2
	Maximum	1996	420,000	3,791,617,000	1340	1340	50.0
	Minimum	1931	1,800	1,101,903	3	9	1.2
	Sample (N)	67					
Pelletization Systems	Average	1992	13,767	2,400,000	15	15	1.8
	Median	1992	17,500	2,500,000	12	12	0.7
	Maximum	1993	18,000	3,200,000	25	25	4.3
	Minimum	1992	5,800	1,500,000	8	8	0.5
	Sample (N)	3					
Distributed Energy Systems	Average	1996	68,718	20,016,564	107	123	1.7
	Median	1997	28,000	8,300,000	40	75	1.6
	Maximum	2003	340,000	45,092,792	450	400	4.1
	Minimum	1983	6,100	1,100,000	3	10	0.4
	Sample (N)	11					

APPENDIX B: Green Transportation Summary Data

Green Transportation Product Opportunities	Year Established	Facility Size (sqft)	Sales Amount (\$)	Employment 2008	Employment 2005	Job Density (jobs/1,000 sqft)	
Vehicle Generators	Average	1969	100,157	222,650,277	230	237	3.0
	Median	1973	35,500	17,349,760	65	61	2.4
	Maximum	2006	3,303,500	11,362,000,000	3400	5000	13.8
	Minimum	1895	5,000	1,000,000	3	1	0.21
	Sample (N)	79					
Electric Vehicle	Average	1972	87,186	234,207,648	204	224	2.8
	Median	1984	38,250	17,349,760	78	80	2.5
	Maximum	2006	3,303,500	17,838,900,000	3000	3300	13.8
	Minimum	1876	1,200	141,617	4	1	0.2
	Sample (N)	250					
Vehicle Batteries	Average	1956	65,869	2,690,570,958	166	171	2.5
	Median	1965	33,600	24,838,660	120	90	3.0
	Maximum	1990	369,000	34,624,000,000	550	550	4.6
	Minimum	1885	10,400	1,200,000	6	6	0.3
	Sample (N)	13					
Lithium Ion	Average	1976	32,863	439,622,421	132	136	3.1
	Median	1974	15,800	16,814,670	56.5	65	3.4
	Maximum	1984	104,500	2,504,600,000	450	450	6.4
	Minimum	1969	5,500	8,483,568	4	18	0.7
	Sample (N)	8					
Fuel Cell	Average	1989	64,530	50,811,981	270	325	4.9
	Median	1998.5	22,200	8,400,000	70	54	3.9
	Maximum	2006	351,500	706,500,000	3000	3000	30.5
	Minimum	1886	1,800	500,000	2	2	0.6
	Sample (N)	20					
Bio Fuel	Average	2006	6,667	1,466,667	9		1.3
	Median	2006	7,150	1,500,000	12		1.4
	Maximum	2007	10,000	2,100,000	14		2.2
	Minimum	2003	3,000	1,100,000	1		0.3
	Sample (N)	6					
Hybrid Bus	All Statistics	1993	38,700	11,300,000	125		3.2
	Sample (N)	1					

Appendix C: Potential measures for green criteria

Site Location

Criteria	Intent	Potential measurement
Proximity to existing development	Reduce carbon emissions	<ul style="list-style-type: none"> • Retail/commercial businesses within 1/2 mile serve the needs of workers and business • Average distance to suppliers (for example less than 10 miles)
Access to District Energy or Renewable Energy options	Reduce carbon emissions, energy efficiency	<ul style="list-style-type: none"> • Utilizes power from a clean power district energy plant • Energy provider offers renewable energy options to meet 25% of demand
Proximity to natural resources/protecting the environment	Reduce impact on local environmental systems	<ul style="list-style-type: none"> • Site is not located within a critical habitat or conservation area • Site is not located within 100 ft of a stream or river
Proximity to existing infrastructure	Reduce environmental impact	<ul style="list-style-type: none"> • There is existing and appropriate sewer, communications, and transportation infrastructure to the site
Proximity to high density housing that meets worker needs	Reduce carbon emissions, increase community connection	<ul style="list-style-type: none"> • Site is within 2 miles of housing appropriate to the size and income of the workforce • Percentage of housing units within 2 miles under the median house value. • Percentage of rental housing units within 2 miles.
Proximity to High Frequency Public Transit	Reduce carbon emissions	<ul style="list-style-type: none"> • Site is within 1/4 mile of a High Frequency Transit Network that meets the transit needs of workers
Bike path access	Reduce carbon emissions, improve worker health	<ul style="list-style-type: none"> • Site is within 1/4 mile of designated bikeways or bikepaths

Site design

Criteria	Intent	Potential measurement
Greyfield / brownfield, adaptive re-use	Reduce carbon emissions, reduce impact on local environmental systems	<ul style="list-style-type: none"> Project is on a brownfield or greyfield site and reuses at least 50% of the existing buildings
Stormwater / surface water management	Water conservation, reduce impact on local environmental systems	<ul style="list-style-type: none"> At least 50% of the hardscaping is porous or permeable Excess stormwater is captured before leaving site Stormwater is recycled on site for landscaping Site-specific best practices are in place such as bio-retention ponds, swales, and raingardens
Waste water management	Reduce impact on local environmental systems	<ul style="list-style-type: none"> Waste water is treated on site to grey water standards
Landscaping	Reduce impact on local environmental systems, reduce carbon emissions, water conservation	<ul style="list-style-type: none"> Location appropriate plants, native perennials (or self-seeding annuals) where possible Maintain or improve the biodiversity and natural habitat of the site Efficient, targeted irrigation using only non-potable (grey or rain) water
Heat island effect reduction through site design	Reduce impact on local climate	<ul style="list-style-type: none"> Paving is light colored 50% of hardscaping is shaded
Connection to the community via walkways and sidewalks	Reduce carbon emissions, increase community connection	<ul style="list-style-type: none"> Sidewalks extend to the front door of the facility

Building design

The Minnesota Sustainable Building Guidelines and LEED rating systems provide detailed guidance on ways to measure building performance and health for both the interior and exterior. The guidelines are available free online and can be accessed via these sites:

<http://www.usgbc.org/leed>
<http://www.msbg.umn.edu/>

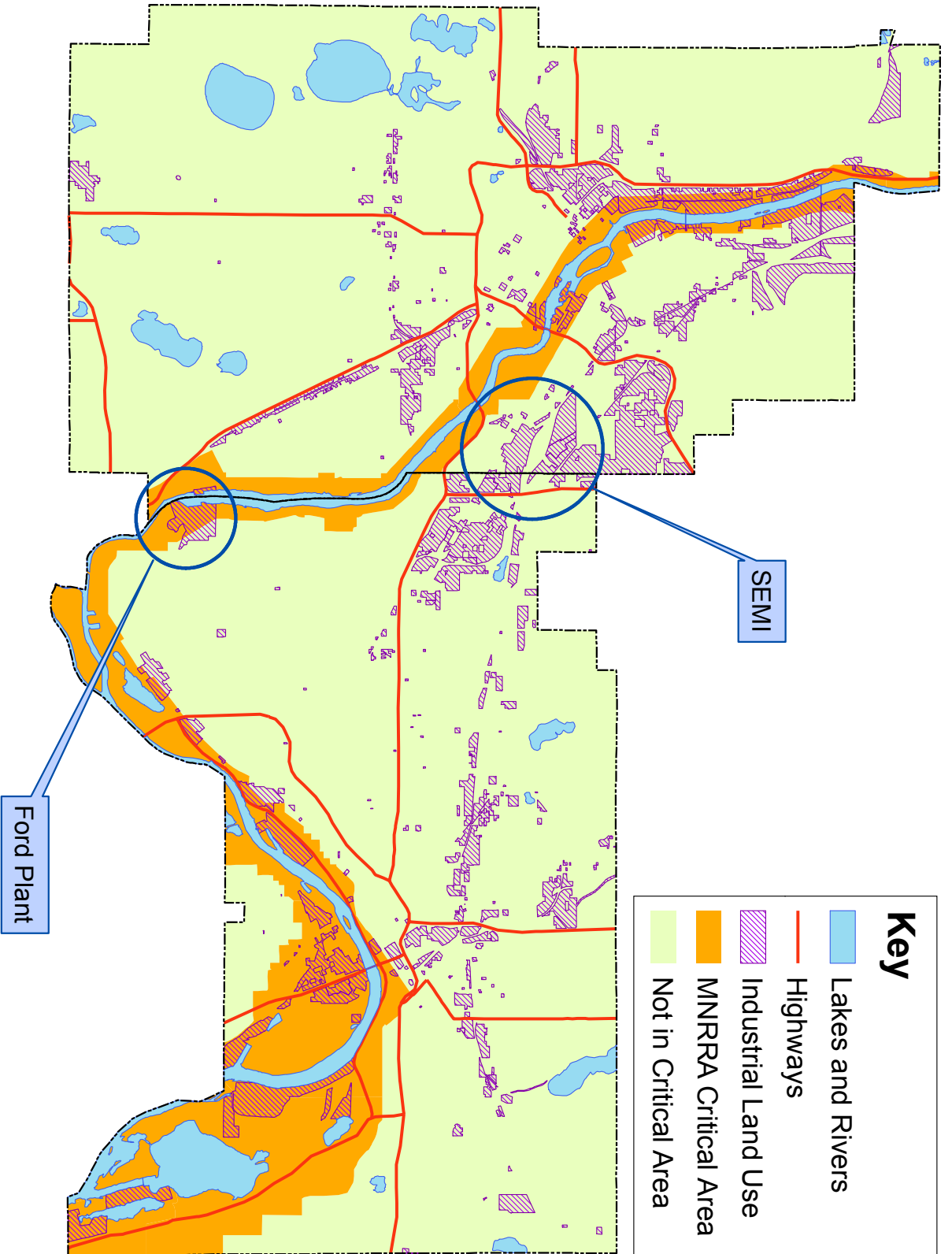
Specifying the minimum measurement for non-LEED / non-MSBG certified buildings should be a participatory process engaging stakeholders and resources from Phase 1 of the Mayors' Initiative on Green Manufacturing.

Business operations

The business operations criteria presented in this report are meant as a general guide. A task force should be convened to further develop specific measures using criteria from Lean Manufacturing, ISO 14001, Natural Step, and other environmental management systems.

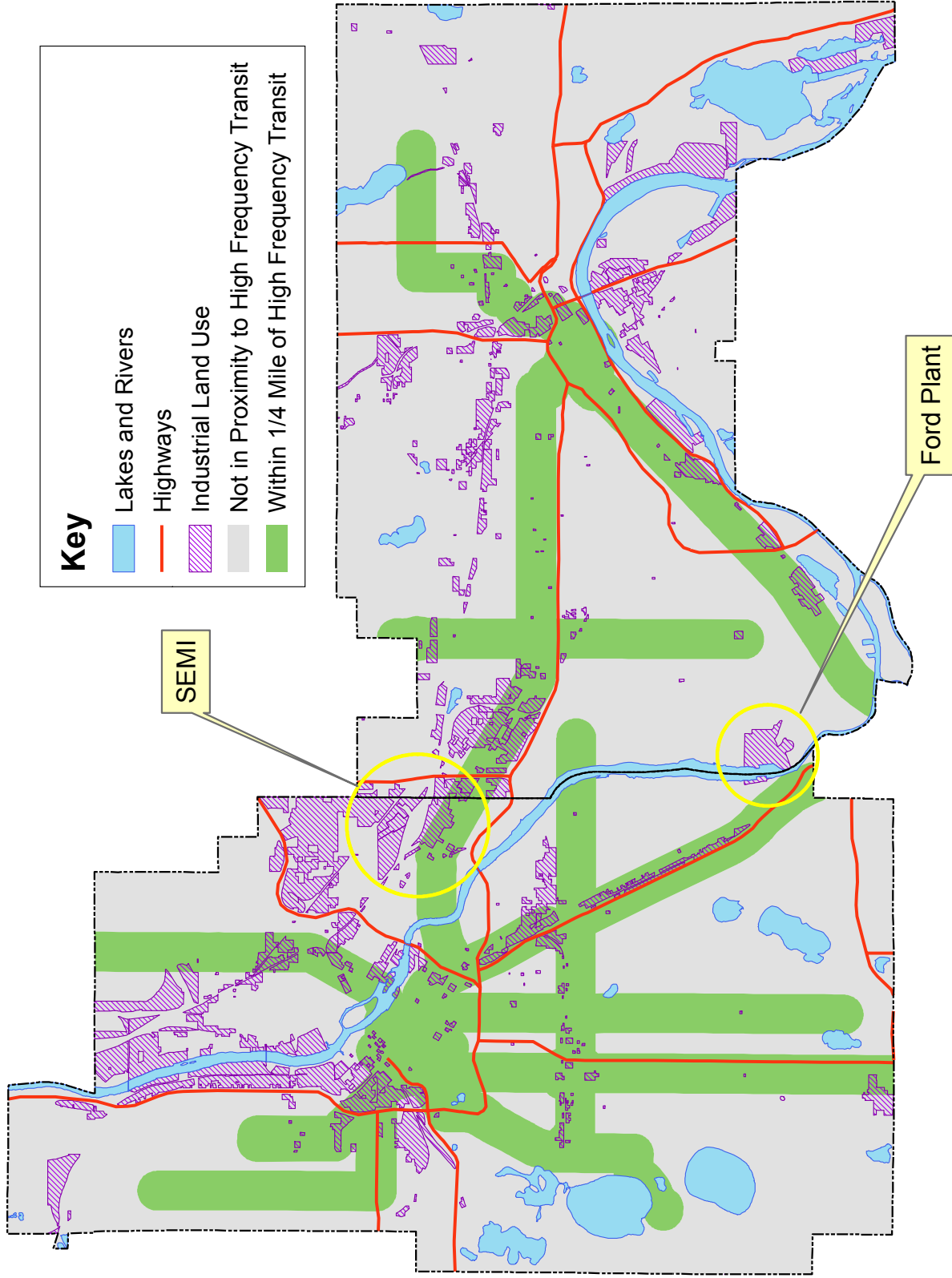
APPENDIX D : Green Site Location Maps

Industrial Land in Mississippi National River Recreational Area



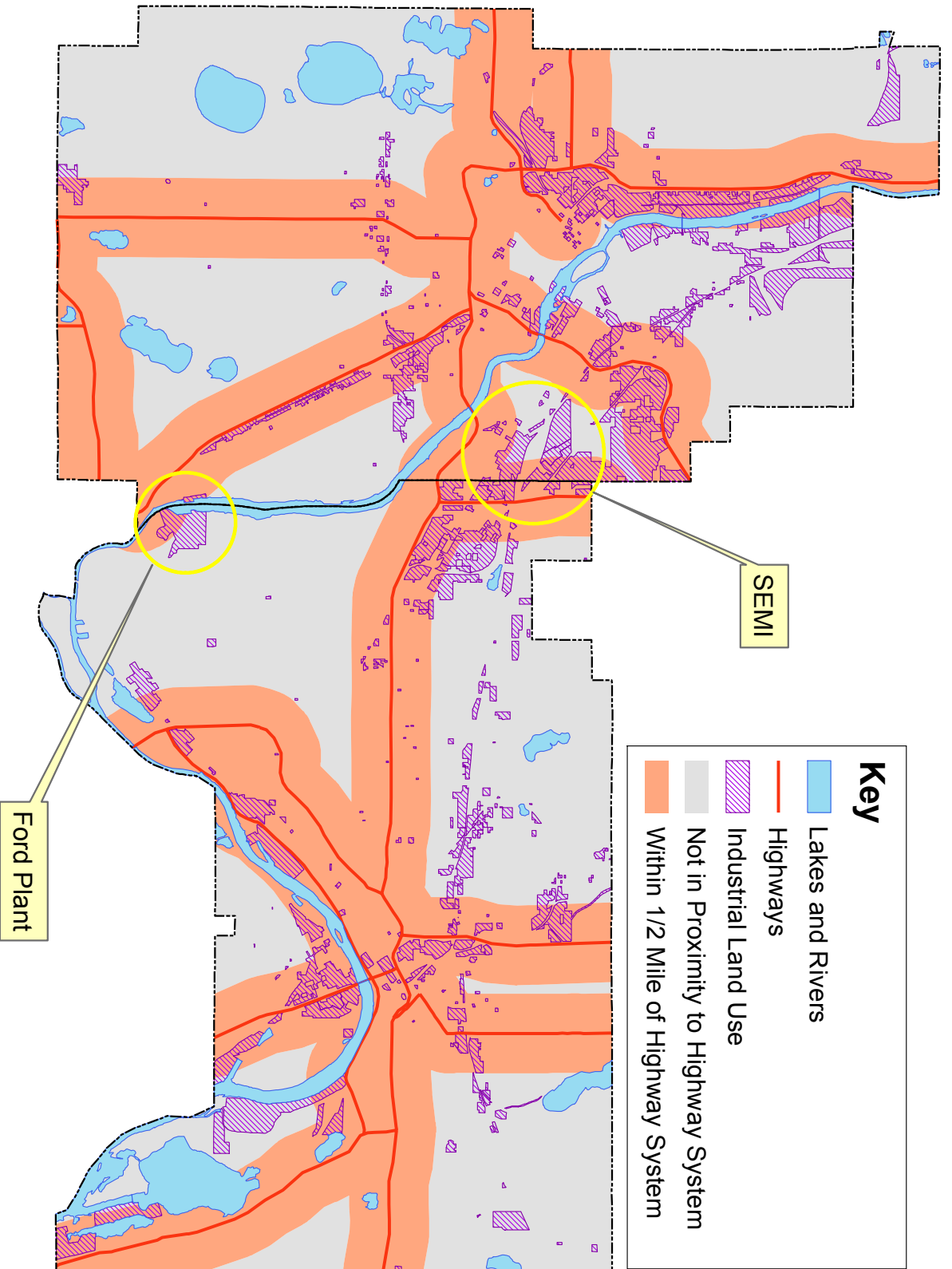
Data Source: MetroGIS, Land Use: 2005, MNRRRA: 1997

Industrial Land within 1/4 Mile of High Frequency Transit Service



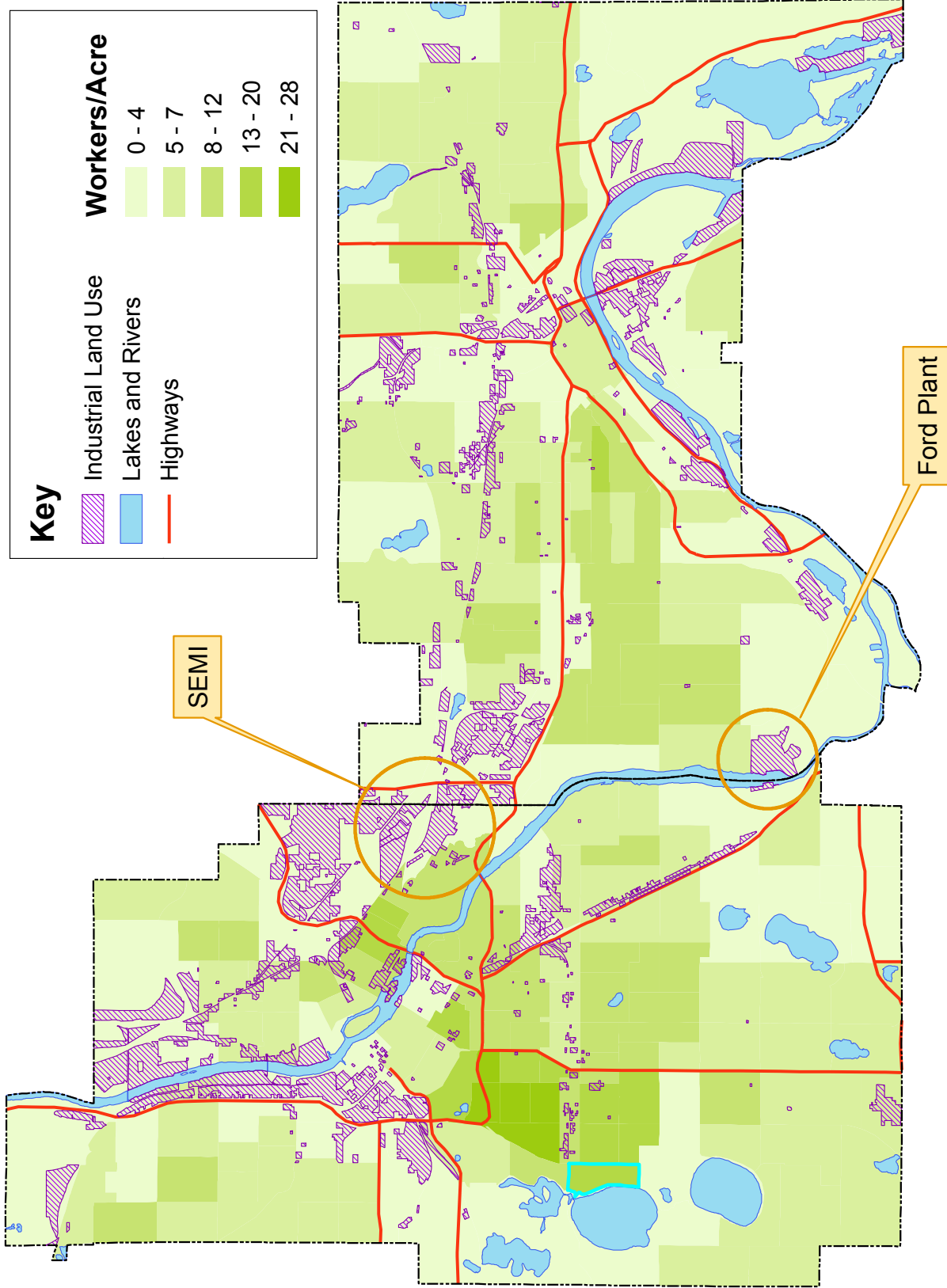
Data Source: MetroGIS, Land Use: 2005, High Frequency Transit: 2007

Industrial Land within 1/2 Mile of Highway Service



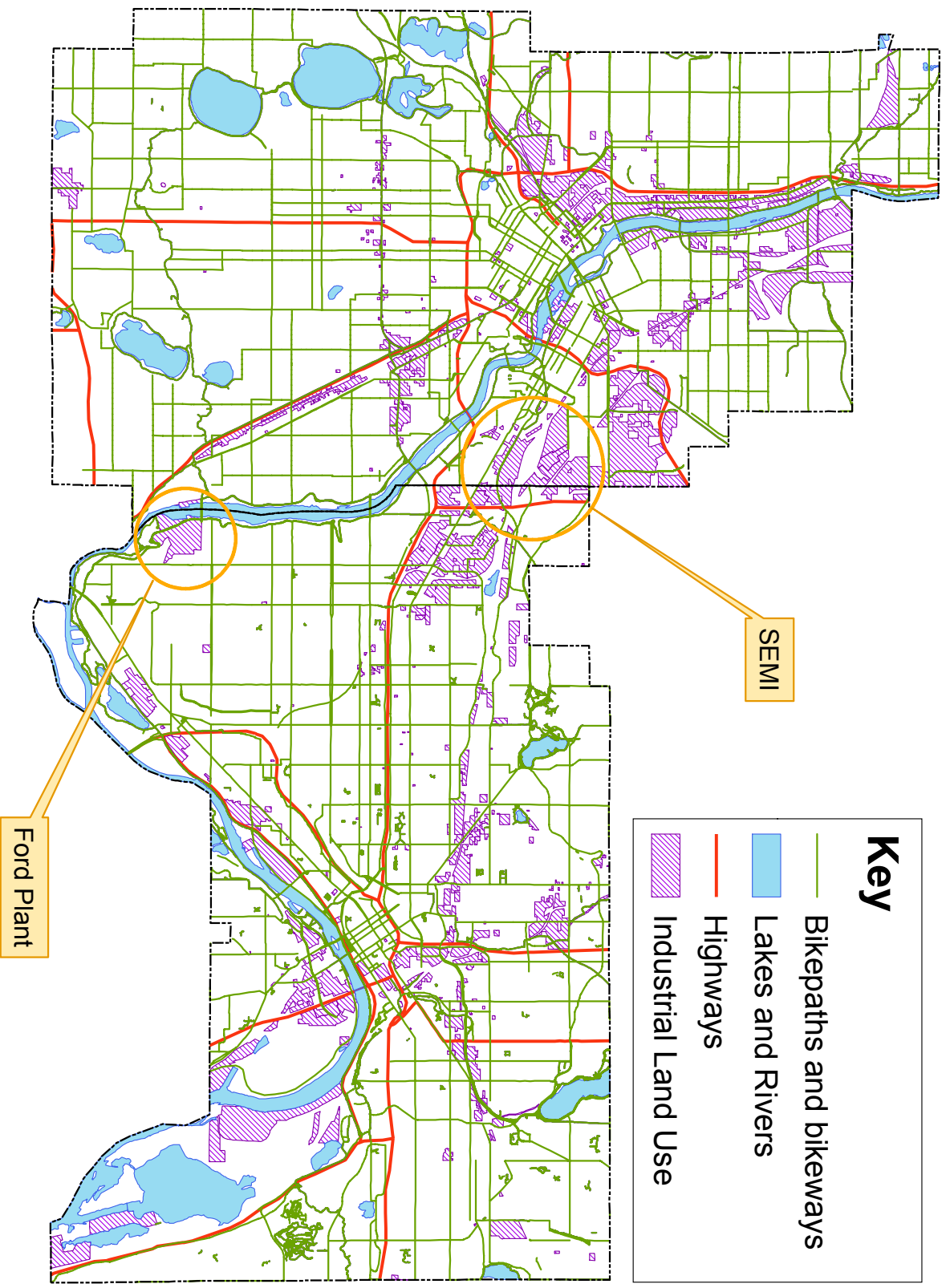
Data Source: MetroGIS, Land Use: 2005, Highways: 2002

Industrial Land compared to Labor Force Density



Data Source: MetroGIS, Land Use: 2005; US Census, Labor Force: 2000

Industrial Land compared to Bikeway and Bikepath Coverage



Data Source: MetroGIS, Land Use: 2005, Bikeways: 2007

APPENDIX E: Existing Sustainability Assessment Tools

In 2006 the Pacific Northwest National Laboratory (PNNL) produced a Sustainable Building Rating Systems Summary report for the General Services Administration^{A1}. The report intended to evaluate the best tool for assessing the performance of GSA buildings. Part of the background research was a comprehensive review of domestic and international rating systems and tools for sustainable design. These tools range from life cycle assessment used primarily in the manufacturing process to residential building evaluation. Below is a list of the tools the PNNL reviewed and screened out of their final analysis. Ultimately the authors of the report chose five systems to evaluate:

- BREEAM (Building Research Establishment’s Environmental Assessment Method)
- CASBEE (Comprehensive Assessment System for Building Environmental Efficiency)
- GBTool
- Green Globes™ U.S.
- LEED® (Leadership in Energy and Environmental Design)

A number of tools not considered in the PNNL analysis were evaluated and integrated into the criteria for the Mayor’s Green Manufacturing Initiative:

- Sustainable Sites Initiative of the American Society of Landscape Architects
- Green Communities Criteria developed by the Enterprise Foundation
- Minnesota Sustainable Building Guidelines (B3)

This list developed by the PNNL provides a view into the range and variety of sustainable building systems and guidelines that are currently available. While this list is comprehensive, it is not definitive. New criteria, tools and guidelines are continuously being developed to meet the specific needs of projects and communities.

Sustainable Design Tool	Type of tool
“Green” Hotels Association (US)	Hotels/Lodging
AccuRate (Australia)	Residential
Alameda County (CA)	Residential
Athena Model (Canada)	Life Cycle assessment tool
BASIX Building Sustainability Index (Australia)	Residential
BEAT 2000 (Denmark)	Life Cycle assessment tool
BEES (US)	Life Cycle assessment tool
BERS (Australia)	Residential
BM Bau Building Passport (Germany)	Product specification guide
BRI LCA (Japan)	Life Cycle assessment tool
BSEA 1.0 (Finland)	Energy Analysis
Build a Better Clark (Clark County Washington HBA)	Residential

A1 K.M. Fowler and E.M. Rauch, Sustainable Building Rating Systems Summary. Pacific Northwest National Laboratory (2006)

Sustainable Design Tool	Type of tool
Build A Better Kitsap Home Builder Program (Kitsap, WA HBA)	Residential
Built Green Alberta (Canada)	Residential
Built GreenTM (MBA of King and Snohomish Counties, WA)	Residential
Built GreenTM Colorado (HBA of Metro Denver)	Residential
California Green Builder Program	Residential
Chula Vista (CA) GreenStar Building Incentive Program	Residential
Cities for Climate Protection Software	GHG emissions inventories tool
City of Boulder Green Points (CO)	Residential
City of Frisco (TX) Green Building Program	Residential
City of Santa Monica Green Building & Construction Guidelines	Guideline
Coalition for Environmentally Responsible Economies (CERES) Green Hotel Initiative (US)	Hotels/Lodging
Costing Reference Model	Residential
County of Santa Barbara Innovative Building Review Program (CA)	Residential
Earth Advantage Home (US)	Residential
Earth Advantage Program (Portland General Electric)	Residential
EarthCraft House (Greater Atlanta, GA HBA)	Residential
EarthCraft House (US)	Residential
ECDG - Japan	Guideline
EcoEffect (Sweden)	Environmental Impact Software model
EcoHomes (UK)	Residential
EcoIndicator (Netherlands)	Life Cycle assessment tool
EcoInstall (Netherlands)	Life Cycle assessment tool
EcoPro (Germany)	Life Cycle assessment tool
EcoProP	Requirements management system
EcoQuantum (Netherlands)	Life Cycle assessment tool
EDIP (Denmark)	Environmental assessment of products
EnerGuide Houses Program (Canada)	Residential
Energy Certification for Buildings (Finland)	Energy analysis
Energy Rated Homes of Colorado	Residential
Energy Star	Energy analysis
Energy Star (US, Canada)	Residential
Envest	Environmental impact assessment tool
Environmental Choice Program	Materials assessment method
Environmental Classification of Properties	Environmental impact assessment
Environmental Profiles of construction materials, components and buildings (UK)	Database of LCA information
Equer (France)	Life Cycle simulation tool
Evergreen Building Guide (Issaquah, WA)	Residential
FirstRate (Australia)	Residential
G/Rated (Portland, OR)	Residential
GaBi 4	Life Cycle assessment tool

Sustainable Design Tool	Type of tool
Global Reporting Initiative	Industrial Reporting
Green Building Advisor (US)	Catalogue
Green Building Program (Austin, TX)	Guideline
Green Building Program, Austin Energy (TX)	Residential
Green Built Home (Wisconsin Environmental Initiative)	Residential
Green Built Program (HBA of Greater Grand Rapids, MI)	Residential
Green Globe 21 (US)	Hotels/Lodging
Green Home Designation (Florida Green Building Coalition)	Residential
Green Leaf Eco-Rating Program (Canada)	Hotels/Lodging
Green Points Building Program (Boulder, CO)	Residential
Green Rating Initiative (Ethiopia)	Industrial
Green Rating of Indian Industry	Industrial
Green Rating Program (Africa)	Hotels/Lodging
Green Seal Certification (US)	Hotels/Lodging
Hawaii BuiltGreen™	Residential
Health House Advantage Certification (US)	Residential
HERS (US)	Residential
Home Builders Association of Greater Kansas City (MO)	Residential
HomeRun (Canada)	Residential
Hudson Valley HBA Green Building Program (NY)	Residential
HVS International ECOTEL Certification	Hotels/Lodging
ISO 14001	Environmental Management System
KCL-ECO	Life Cycle assessment tool
LCA-House (Finland)	Life Cycle assessment tool
LCAiT (Sweden)	Life Cycle assessment tool
Legoe (Germany)	Life Cycle assessment tool
LISA (Australia)	Life Cycle assessment tool
MMG (Netherlands)	Materials assessment method
MRPI Netherlands	Environmental product declaration
Multifamily Green Building Guidelines (Alameda County, CA)	Residential
NatHERS (Australia)	Residential
National Association of Home Builders (NAHB) Green Guidelines	Residential
National Packages Sustainable Building (Netherlands)	Guideline
NEN 2916/5128, NPR 2917/5129 (Netherlands)	Energy Modeling Software
New Mexico Building America Partner Program (HBA of Central New Mexico)	Residential
Novoclimat (Quebec, Canada)	Residential
NYC High Performance Building Guidelines	Guideline
OGIP (Switzerland)	Life Cycle assessment tool
Papoose (Finland)	Environmental impact assessment
Quest	Policy choice tool
R-2000 (Canada)	Residential

Sustainable Design Tool	Type of tool
REGENERERS (Finland)	Life Cycle assessment tool
Schenectady HBA Green Building Program (NY)	Residential
SeaGreen (Seattle)	Residential
Seattle Sustainable Building Action Plan and Built Smart (Seattle, WA)	Guideline
SIA 493 (Switzerland)	Materials checklist
SIMBAD (Finland)	Energy Modeling Software
Solution Spaces (Canada)	Life cycle cost and impact of urban development forecasting tool
Southern Arizona Green Building Alliance	Residential
Super E House Program (Canada)	Residential
Super E House Program (Canada)	Residential
Super Good Cents and Natural Choice Homes	Residential
Sustainable Ecotourism Rating (Costa Rica)	Hotels/Lodging
Sustainable Project Appraisal Routine (SPEAR)	Industrial
TAKE-LCA (Finland)	Life Cycle assessment tool
TEAM (Finland)	Life Cycle assessment tool
The BREEAM Green Leaf for Multi-Residential Buildings (Canada)	Residential
The Green Builder Program (NM)	Residential
The Movement for Innovation (M4i)	Construction & Design Safety
Tokyo Metro Green Building Program	Guideline
Umberto	Life Cycle assessment tool
Vermont Built Green	Residential
Vermont Green Hotels in the Green Mountain State	Hotels/Lodging
Western North Carolina Green Building Council	Residential

APPENDIX F: Federal and State Enterprise Zones - An Overview

Enterprise zones and similar programs aim to promote economic development within a specific, often distressed, geographic area. Programs typically provide various incentives, most commonly tax benefits, to businesses that locate within the designated zone. Enterprise zones make several key assumptions:^{A2}

1. Economic barriers, such as poor transportation access, raise costs and result in the areas' lack of economic activity.
2. State officials can identify zone tax incentives that can overcome these economic barriers.
3. Conditions will allow for long-term profitability within these zones. For example, the region does not undergo a severe and sustained recession, and the zone does not simply attract risk-loving enterprises that will inevitably shut down, even with the subsidies.
4. The zones increase overall growth, rather than just speed up when growth occurs or shift it from a nearby location.

Given these assumptions, the lower taxes and less regulation provided by enterprise zones “will increase jobs and incomes...by attracting capital, labor, and economic activity” to the designated area.^{A3}

Enterprise zones have expanded in both scale and scope since their initial adoption by several states, including Minnesota, in the 1980s.^{A4} They gained traction as a standard economic development tool with the 1993 authorization of the federal Empowerment Zones/Enterprise Communities program. Managed by HUD, the program is designed to encourage businesses to open, expand, and hire local residents within a designated geographic area.^{A5} Three rounds of Empowerment Zones and two rounds of Enterprise Communities have been authorized by Congress, all of which are scheduled to end by 2009.^{A6} Zones are designated based on specific criteria, which may include thresholds for poverty and unemployment rates, as well as additional supporting indicators of distress, such as high crime, poor infrastructure, or population decline.^{A7} Federal program benefits include not only tax benefits for businesses located in the zones, but also social services block grants to assist in workforce development.^{A8}

In addition to the federal programs, states have continued to create their own enterprise zone programs. For example, Minnesota launched its JOBZ initiative in 2004 to stimulate economic development activity in Greater Minnesota.^{A9} The program provides several local and state tax exemptions to new and expanding non-retail businesses that relocate to economically distressed areas.^{A10} The program will expire in 2015. In 2003, the legislature authorized the Bio-Zone program to encourage bioscience companies to locate near major research centers in Minnesota's urban areas.^{A11}

A2,3,4 MN House of Representatives, “Policy Brief: Enterprise Zones: A Review of the Economic Theory and Empirical Evidence,” 2005, <http://www.house.leg.state.mn.us/hrd/pubs/entzones.pdf>

A5 U.S. Department of Housing and Urban Development, “HUD's Initiative for Renewal Communities and Urban Empowerment Zones,” 2008 <http://www.hud.gov/offices/cpd/economicdevelopment/programs/rc/index.cfm>

A6,7,8 U.S. Government Accountability Office, “Empowerment Zone and Enterprise Community Program: Improvements occurred in Communities, but the Effect of the Program is Unclear,” 2006 <http://www.gao.gov/new.items/d06727.pdf>

A9,10 Minnesota Department of Employment and Economic Development, “Tax-free Development (JOBZ),” <http://www.deed.state.mn.us/bizdev/jobz.htm>

A11 John Gessner, “Bio-Zone Designation Could Help City Woo Medical Firms,” Thisweek Online, November 3, 2006 <http://www.thisweek-online.com/2006/november/3b-bio.html>

Federal and State Enterprise Zones: Theoretical Debates

The underlying premises of enterprise zones continue to generate controversy. Proponents of Empowerment Zones and similar programs argue that development incentives, and tax incentives in particular, are necessary to generate investment in areas perceived by businesses as high risk.^{A12} Although frequently welcomed by advocates at both ends of the political spectrum, zones are particularly favored by conservatives as an alternative to large-scale social programs. As a recent HUD report notes, zones aim to harness the individual “entrepreneurial spirit,” as catalyst for job growth and revitalization in distressed areas.^{A13}

However, enterprise zones and related programs have generated substantial criticism over the years. Critics cite several counterarguments: (1), that zones benefit large, capital-intensive firms at the expense of small or labor-intensive firms, which have more potential for employment growth; (2), that jobs created within the zone are likely to be low-paying and provide little job security, and (3) that incentives, such as forgone tax revenue and public capital expenditures, increase the tax burdens for nonzone firms and residents; and (4), that zones may simply transfer investment from one location to another, rather than generating new business activity.^{A14} In the next section, *Green Cities, Green Jobs* examine the empirical evidence that supports or disputes these claims.

The Impacts of Enterprise Zones: Key Findings

Evaluations of enterprise zones and related programs have generated mixed and inconclusive findings. In their review of empirical studies of enterprise zone programs, Wilder and Rubin (1996) found evidence of increased job growth and investment within the zones. However, growth and investment varied considerably both between state programs and among zones within the same state. In addition, the study found that although most new jobs were generated by firms with fewer than 50 employees, enterprise zones were most attractive to larger firms, who benefited more from their tax incentives.^{A15}

More recently, a federal evaluation of Round 1 Enterprise Communities and Empowerment Zones found that although improvements in poverty, unemployment, and economic growth had occurred, an econometric analysis could not definitively tie these changes to the EZ designation.^{A16} In addition, a lack of detailed IRS and grant-related data made it impossible to determine whether the funds had been spent effectively or that the tax benefits had been used as intended, hindering detailed evaluation efforts.^{A17} The report cited the continued lack of collaboration between government agencies as the main cause of this lack of data. Political conflicts have also posed challenges for program implementation efforts. Berger (1997), for example, found that political conflicts both within city governments and between cities and states have resulted in delays.

In Minnesota, the JOBZ program has recently come under fire by the Office of the Legislative Auditor. A 2008 report found that although JOBZ helped attract some out-of-state businesses to Greater Minnesota and prevented some businesses from leaving the state, the program has largely failed to focus on these goals and has not targeted to areas that are in need of the most assistance. Instead, its tax breaks have been provided “to some businesses that would have expanded in Greater Minnesota without JOBZ” and to “businesses that compete with existing Minnesota businesses for the same Minnesota customers”.^{A18} The program also “lacks a budget constraint and meaningful policies for local governments to follow in deciding which businesses may participate in the program”.^{A19} Finally, the report found that the Minnesota Department of Employment and Economic Development (DEED) overstated the program’s impact. As a result of these findings, there is a strong likelihood that the state legislature will limit or eliminate the program in the future.

A12 Margaret G. Wilder and Barry M. Rubin, “Rhetoric Versus Reality,” *Journal of the American Planning Association* (1996) 62(4): 472-92

A13 U.S. Department of Housing and Urban Development, “HUD’s Initiative for Renewal Communities and Urban Empowerment Zones,” 2008 <http://www.hud.gov/offices/cpd/economicdevelopment/programs/rc/index.cfm>

A14,15 Margaret G. Wilder and Barry M. Rubin, “Rhetoric Versus Reality,” *Journal of the American Planning Association* (1996) 62(4): 472-92

A16-20 U.S. Government Accountability Office, “Empowerment Zone and Enterprise Community Program: Improvements occurred in Communities, but the Effect of the Program is Unclear,” 2006 <http://www.gao.gov/new.items/d06727.pdf>

The JOBZ report also provides an assessment of economic development incentives more generally. Its findings, summarized below, show that unless the incentive program meets certain criteria, the benefits are not likely to outweigh the costs:

- *The average incentive program will not be beneficial in low-unemployment areas:* If unemployment is low, residents can find jobs easily and earnings will increase. It is the earnings increase that outweighs the social benefits of the additional job development.
- *Targeting incentives to areas with high unemployment and to industries with higher paying jobs can yield significant benefits:* Increasing a metropolitan area's employment by 10 percent raises real earnings of local residents by 4 – 7 percent, with disadvantaged groups disproportionately reaping the benefits.
- *Incentives are most effective when most of the jobs go to local residents.*^{A20}

APPENDIX G: Case study of Economic Development Initiatives

Based on case studies of local economic development initiatives, the two main observations across the population were; 1) for local initiatives to be successful they must deal with the specific local conditions confronted 2) a variety of strategies will work across locales.

Initiative Type	Innovative	Not Innovative
Workforce Development	School-to-work Programs New training techniques such as distance learning Electronic Service Provision Services from non-traditional providers	Training incentives for plant relocation Job tax credits Literacy training Basic skills training Recruitment/employment centers Services from traditional workforce providers
New Economy Enterprise Initiatives	Targeting emerging growth industries New partnerships to facilitate enterprise development Electronic service provision	Industrial incentives for relocation Targeting traditional industries Government-only initiatives for partnerships Traditional industrial parks
Brownfields Redevelopment	Redevelopment programs targeted to distressed areas Use of electronic applications Initiatives with results	Recruitment tax incentives Traditional government infrastructure grants Planning initiatives alone
Sustainable Development	Initiatives that combined economic development, environmental, and social aspects Initiatives with results	Recruitment tax incentives Traditional government infrastructure grants Planning initiatives alone
Partnerships	Regional partnerships Public-Private partnerships Private-Public partnerships	Single-locality – public run
Regional Initiatives	Initiatives involving more than one jurisdiction	Single jurisdiction

APPENDIX H: Current Development Incentives in MN

City Programs

City of Minneapolis:

- **Alternative Financing Program:** profit-based financing to Minneapolis business for equipment and/or building improvements where no interest is paid or collected. The rate of return is based on an up-front profit payment.
- **Business Development Fund Loans:** market-rate loans and in some cases prepayment credits for employing Minneapolis residents.
- **Common Bond Revenue Bond Program:** a loan fund for growing manufacturing companies for land, construction and equipment.
- **Emerging Entrepreneur Capital Acquisition Loans:** loans in cooperation with private banks to help newer businesses (two years or newer) purchase and rehabilitate small commercial, multi-use or industrial properties.
- **Loan Guaranty Program:** working capital term loans or revolving lines of credit in cooperation with private banks.
- **Revenue Bonds:** bonds to finance industrial, commercial and medical facilities, multifamily rental housing, nursing homes and some nonprofit activities.

City of Saint Paul:

- **Saint Paul Strategic Investment Fund:** Applicants must have record profits, currently located outside St. Paul, constructing/purchasing/leasing commercial or industrial space in St. Paul, and participating in Metro-pass program to encourage transit use. Applicants will be evaluated and assigned points based on historical performance, current location, wages and salaries, growth potential, and market area. Loans will be based on total number of points
- **Tax Increment Financing:** The Saint Paul Housing and Redevelopment Authority (HRA) can provide tax increment financing (TIF) gap funds for rehabilitation, acquisition, demolition, site improvements, public improvements and contamination cleanup for projects that otherwise could not be redeveloped. TIF allows developers to obtain upfront financing secured by pledged future increased property tax revenues. Developers use the pledged tax increments to secure bank or investor financing. TIF must be used for projects located within a qualified TIF district. TIF financing can be structured as loan or grant financing with flexible terms.
- **Capital City Business Development Program:** PED provides gap financing to businesses that cannot secure sufficient conventional private or non-profit financing, but can demonstrate a capacity to repay loans. The program is intended to enhance the ability of private lenders to finance small businesses and emerging entrepreneurs.

Saint Paul Port Authority:

- **Redevelopment:** The State Department of Employment and Economic Development and the Metropolitan Council provide most of the Port's redevelopment money. In return for a clean site sold for \$1, manufacturers agree to build quality buildings (at least \$38 a square foot), provide new jobs (at least one job per 1,000 square feet of building space), and pay a living wage

(at least \$10.50 an hour plus benefits). Seventy percent of the business's new hires must be Saint Paul residents.

- **Tax-Exempt Industrial Development Bond:** Offers manufacturers below market rate financing for the purchase of fixed assets. Eligible users are manufacturing companies. At least 3/4ths of the bond proceeds must be spent on core manufacturing space and equipment.
- **Business Development Fund:** Assist manufacturers in purchasing or renovating real estate and equipment. The Port Authority works with a business's lender to enhance their borrowing power at the lowest rate. Their commitment provides up to \$1.25 million on a maximum loan amount of \$5 million. Most businesses can finance on real estate up to 90 percent of loan to value.
- **Working Capital:** By providing a guaranty on a loan from \$10,000 to \$250,000, the Port Authority enhances the customer's borrowing power. The guaranty for those loans is capped at \$100,000 or 75 percent of the loan whichever is less. Eligible light-industrial applicants must be in business for at least three years and demonstrate the potential for growth and increased job opportunities for the Saint Paul workforce.
- **Small Business Expansion Program:** The Saint Paul Port Authority and the City of Saint Paul have teamed up with the Community Reinvestment Fund to help businesses get the financing they need to expand and purchase new equipment. The program provides 90 percent financing for commercial and industrial acquisition and equipment purchase projects in tandem with private banks. The lender will finance at least 50 percent of the project. The Port and the city's Planning and Economic Development Department (PED) will finance up to 40 percent. The business owner would provide the remaining 10 percent as equity. The Community Reinvestment Fund (CRF) has agreed to purchase the loans once they are made.
- **Minnesota Investment Fund:** For businesses acquiring "fixed assets" (such as equipment, buildings, and land) and adding new workers as a result. The goal of this program is to create new jobs and retain the highest quality jobs possible on a statewide basis with a focus on industrial, manufacturing and technology-related industries; to increase the local and state tax base and improve the economic vitality for all Minnesota citizens. This program provides companies below-market financing. Virtually all types of businesses are eligible, excluding retail enterprises.

Metropolitan Council:

- **Tax Base Revitalization Account (TBRA):** This program is conducted in coordination with the Minnesota Department of Trade and Economic Development.
- **Livable Communities Demonstration Account (LCDA):** The Demonstration Account provides funding for development and redevelopment projects that achieve connected development patterns that link housing, jobs and services, and use regional infrastructure efficiently. Grants are available for development projects.

State Program

- The State of Minnesota offers the Solar-Electric (PV) Rebate Program, in which customers can receive rebates of \$2,000/kW (max. \$20,000) for PV installations up to 10 kW (and larger, on a case-by-case basis).

Private Funding Opportunities:

Xcel Energy

Xcel Energy offers a wide variety of rebates and incentives for high-efficiency technologies, including lighting, air-conditioning systems and components, motors, adjustable speed drives, roofing, refrigeration, compressed air systems, and natural gas-fired boilers and furnaces, as well as for custom measures and energy management systems. Also covered are energy analysis and energy design assistance.

- **Energy Design Assistance:** New construction, additions, or renovations over 15,000 eligible for free consultation, computer modeling, plan and specification review. Custom incentives for energy conservation will be produced.
- **Energy Analysis:** offers an audit that helps identify ways to save energy and qualify for rebates. More in-depth engineering assistance study assess building cooling systems, refrigeration, space/process heating or custom efficiency projects.
 - On-site energy assessment is \$200 for buildings < 25,000 sq ft and \$300 for buildings above
 - Online Energy assessment is a free online tool
 - Engineering Assistance Studies will be covered at 50% of project costs (15,000)
 - ENERGY STAR® building rating is a public acknowledgment of energy-saving achievements
- **ConservationWise Rebates:** they offer rebates for purchasing and installing eligible energy-efficient equipment and mechanical system components. They also offer free consultation, custom incentives and funding for studies.
- **Boiler Efficiency Rebates:** they offer rebates for energy-efficient natural gas boiler equipment, components, and tune-ups. Typically 25% of cost up to a maximum.
- **Compressed Air Efficiency:** they offer rebates for compressed air studies and equipment. The study helps assess current situations and recommends improvements. Rebates are based on compressor size and/or energy savings.
- **Commercial Real Estate Efficiency:** offer bundled energy services, including study funding and rebate bonuses for implementing energy saving recommendations. Will fund up to 50% of study costs (up to 20,000). Rebates available up to 50% of project cost.
- **Cooling Efficiency:** Offer rebates for replacing or updating cooling system using the latest cooling technology. Rebates vary per cooling system and components.
- **Custom Efficiency:** Offer rebates for choosing energy-efficiency measures that exceed standard options but are not covered under the energy conservation programs. Rebates are up to \$200 per kW saved and \$2 per MCF saved.
- **Efficiency Controls:** Rebates for purchasing and installing building control systems. Rebates are based on current performance to performance post control installation.
- **Efficiency Proposal:** Projects that conserve a minimum of 1GWh or 8,000 MCF can apply to Xcel's RFP. The rebate will support installation of proposed measures, up to \$300 per kW or \$2 per incf.
- **Electric Rate Savings Peak Control**

- **Furnace Efficiency:** high-efficiency furnaces are eligible for rebates; new & retrofit.
- **Lighting Efficiency & Retrofit:** rebates to customers purchasing and installing energy efficient light equipment for an existing building. Various rebates per lighting options.
- **Lighting Efficiency & New Construction:** new facilities installing energy-efficient light equipment. Various rebates offered per light options.
- **Lighting Efficiency & One-Stop Efficiency Shop:** lighting retrofit rebates and oversight of light upgrades available for small-to-medium sized business customers. Free lighting audit with up to 60% rebates of installation costs.
- **Lighting Efficiency & Redesign:** funding available for a lighting redesign study and rebates for implementation of recommended changes. Up to 50% cost of study and \$400 per kW saved due to implementation.
- **Motor Efficiency & Motors:** Various rebates available for new or updated NEMA efficient motors that can help reduce downtime, maintenance and labor costs, as well as increase the quality of output.
- **Motor Efficiency & VFD's:** Variable frequency drives can save energy and extend equipment life. Rebates are available for VFD's between 1 and 200 hp at \$30 per hp.
- **Process Efficiency:** will work with large industrial customers to identify opportunities and design a 3-5 year energy management plan. Applies to projects conserving a minimum of 2 GWh.
- **Recommissioning:** Rebates up to 50% of cost of study (\$15,000) to tune-up existing operating systems and controls. Xcel pays for custom incentives for implementation of recommended actions. Pre-approval for studies needed.
- **Saver's Switch:** Rebate to install a pager-activated device that reducing air conditioning energy loads during peak electricity demand. \$5 per ton applied to electric bill June through September.

CenterPoint Energy:

CenterPoint Energy offers rebates for efficient natural gas-fired equipment, including heating systems and components (new and retrofit), boiler tune-ups, desiccant dehumidification, food service equipment, and natural gas-fired process equipment. Custom rebates are also available.

- **Boiler System Rebates:** Rebates available for a variety of boiler, vent and steam trap equipment. Equipment must be new installation at a natural gas heated facility in MN.
- **Boiler Tune-up Rebates:** Available for retrofit boiler tune-ups made to natural gas heated facilities in MN.
- **Furnace and Unit Heater Rebates:** Various rebates available for new or retrofit efficient natural gas furnaces or unit heaters.
- **Infrared Heater Rebates:** rebates for new or retrofit infrared heaters that make large space heating much more energy efficient. Rebate is for 10% of equipment cost.
- **Carbon Monoxide Controls Rebate:** \$250 per carbon monoxide control sensor for every 5000 sq ft. New or retrofit installation in indoor heated parking garages.
- **Water Heater Rebates:** The greater the efficiency the greater the rebate for installing a 88% or

greater condensing efficiency water heater. Rebate amount up to \$280.

- Foodservice Equipment Rebates: Various rebates on various high-efficiency food service equipment such as broilers, ovens, etc.
- Custom Rebates: Made-to-order rebate on industry specific equipment needs fueled by natural gas. Up to \$5,000 in engineering assistance for energy-efficient design and planning.

Minnesota Power:

Minnesota Power (MP) offers the Power Grant Rebates program, in which incentives are available for energy-efficient equipment, including lighting, air conditioning, motors, energy management systems, refrigeration, and electric cooking equipment. Rebate amounts are either based on the kW or kWh saved over the lifetime of the equipment, up to \$50,000 per customer.

- Commercial Storage/Off-Peak Heating: This program is designed around the ability to store energy for space heating and water heating and cooling. . During off-peak hours from 11 p.m. to 7 a.m., when the cost of electricity and system demand is less, special storage equipment turns on and stores the energy needed for the balance of the day. Incentive is a reduced cost per k/Wh hour.
- PowerGrant: awards grants to commercial/industrial/agricultural customers who use innovative technologies, improve manufacturing processes, undertake renewable electric energy projects or who need project design assistance. These grant awards are available for a wide variety of projects employing diverse technologies.
- Industrial Energy Efficiency and productivity program: There are many different ways Minnesota Power can help you increase the energy efficiency and productivity of your industrial facility.

Ottertail Power Company:

- Rebates are available for a variety of energy-efficient equipment, including lighting, motors, air-source and geothermal heat pumps, refrigeration, thermal storage technologies, and electric cooking equipment.
- Grants are available through a competitive bidding process for commercial and industrial customers to undertake energy efficiency projects.
- The Facility Audit Program subsidizes up to 80% of the cost of an energy audit, up to \$10,000.

Minnesota Energy:

- The Energy-Saving Audits program provides audits for commercial customers. The audit cost is \$550 for buildings less than 25,000 square feet and \$750 for buildings greater than 25,000 square feet. However, the fee is reimbursed for customers that implement at least one recommended energy efficiency measure.
- The Minnesota Commercial Prescriptive Rebates program covers heating, HVAC systems, and water heating equipment. Custom rebates will be based on incremental cost as well as peak load and annual energy savings. Prescriptive rebates vary by equipment measure.

- Minnesota Energy offers a commercial dual fuel program. This direct load control program is designed for any electric load where a non-electric backup source of energy (e.g., natural gas as an alternative to electric heat) is available to be used during periods of peak demand. The incentive is roughly 3.5 cents per curtailable kWh.

Dakota Electric Association:

Offers rebates for motors, adjustable speed drives, various lighting and air-conditioning equipment, vending machine controls, and custom rebates. Dakota Electric Service offers the Controlled Interruptible Service Rate available to customers that have qualifying interruptible loads that can be controlled by the company. A credit is applied to the monthly bill for all energy (kWh) consumed under this rate.

Federal Initiatives:

Department of Commerce

- **Public Works and Economic Development Program:** Public Works and Economic Development investments help support the construction or rehabilitation of essential public infrastructure and facilities necessary to generate or retain private sector jobs and investments, attract private sector capital, and promote regional competitiveness, including investments that expand and upgrade infrastructure to attract new industry, support technology-led development, redevelop brownfield sites and provide eco-industrial development.
- **Economic Adjustment Assistance Program:** The Economic Adjustment Assistance Program provides a wide range of technical, planning and infrastructure assistance in regions experiencing adverse economic changes that may occur suddenly or over time. This program is designed to respond flexibly to pressing economic recovery issues and is well suited to help address challenges faced by U.S. regions and communities.
- **Planning Program:** The Planning Program helps support planning organizations, including District Organizations and Indian Tribes, in the development, implementation, revision or replacement of comprehensive economic development strategies (CEDS), and for related short-term planning investments and State plans designed to create and retain higher-skill, higher-wage jobs, particularly for the unemployed and underemployed in the nation's most economically distressed regions.
- **University Center Economic Development Program:** The University Center Economic Development Program is a partnership between the Federal government and academia that helps to make the varied and vast resources of universities available to economic development communities.
- **Local Technical Assistance:** funds are available to fund feasibility studies, market analysis and similar small projects necessary to support site redevelopment. Average grant is only \$28,000.

Department of Housing and Urban Development

- **Empowerment Zones Program:** One or more local governments and the State or States in which an urban area is located may nominate such area for designation as an Empowerment Zone and/or as an Enterprise Community if area meets eligibility requirements.

- **Brownfields Economic Development Initiative:** BEDI is designed to assist cities with the redevelopment of abandoned, idled and underused industrial and commercial facilities where expansion and redevelopment is burdened by real or potential environmental contamination.
- **Community Development Block Grant Program:** for revitalization of decaying neighborhoods. These funds have been utilized for brownfield cleanup.

Environmental Protection Agency

- **Sustainable Development Challenge Grants Program:** This competitive grant program was initiated in FY 96 to encourage community, business, and government to work cooperatively to develop flexible, locally-oriented approaches that link place-based environmental management and quality of life with sustainable development and revitalization.
- **Brownfields Assessment Grants:** Provides fund to inventory, characterize, assess, and conduct cleanup and redevelopment planning and community involvement related to brownfield sites.
- **Brownfields Revolving Loan Fund Grants:** Provides funding for a grant recipient to capitalize a revolving loan fund and to provide subgrants to carry out cleanup activities at brownfield sites.
- **Brownfields Cleanup Grants:** Provides fund to carry out cleanup activities at a specific brownfield site owned by the applicant
- **Job Training:** provide environmental job training projects that will facilitate the assessment, remediation, or preparation of brownfield sites.
- **Training, Research and Technical Assistant Grant:** provide, or fund eligible entities or nonprofit organizations to provide brownfields training, research, and technical assistance to individuals and organizations. EPA awards grants and cooperative agreements authorized by §104(k) under a statutory ranking system that includes factors relating to community need, impact on human health and the environment, stimulation or leveraging of other funds, eligibility for funding from other sources, effective use of existing infrastructure. In addition to the statutory factors, EPA also evaluates applicants based on their ability to manage grants and other policy based factors intended to promote effective stewardship of Federal funds.
- **Indoor Air Quality Grants:** These proposed projects must support demonstration, training, outreach and/or education activities that reduce exposure to indoor air pollutants and yield measurable environmental outcomes. Projects that address areas of greatest need, where the most risk reduction can be achieved, are desirable.
- **Pollution Prevention Grant Program:** The Pollution Prevention Grant Program supports State and Tribal technical assistance programs which help businesses identify better environmental strategies and solutions for reducing or eliminating waste at the source.
- **Environmental Economics Workshops:** The US Environmental Protection Agency's (EPA) National Center for Environmental Economics (NCEE) is soliciting Proposals for Federal assistance in sponsoring "Environmental Economics Workshops." NCEE is interested in supporting Environmental and Resource Economics workshops in each of the following categories: (1) Dissertation Workshops – the goal of these workshops is to attract the best and brightest graduate students/new PhDs and improve the quality of current research topics in environmental economics. (2) Methods Development and Training Workshops – these workshops should provide guidance and training on a specific analytical activity of importance in environmental economics. (3) Current Issues Workshops – these workshops should advance the field of environmental economics by exploring current and emerging issues of national or regional significance .

- Sustainable Development Challenge Grants Program: This competitive grant program was initiated in FY 96 to encourage community, business, and government to work cooperatively to develop flexible, locally-oriented approaches that link place-based environmental management and quality of life with sustainable development and revitalization.
- Brownfields Assessment Grants: Provides fund to inventory, characterize, assess, and conduct cleanup and redevelopment planning and community involvement related to brownfield sites.

Department of Energy:

- State Energy Program: The State Energy Program (SEP) provides grants to states and directs funding to state energy offices from technology programs in the Department of Energy's Office of Energy Efficiency and Renewable Energy. States use these grants to address their energy priorities and program funding to deploy emerging renewable energy and energy efficiency technologies.
- Smart Communities Network: help communities design and implement innovative strategies that enhance the local economy as well as the local environment and quality of life. Initiatives and financial opportunities, including grants and other funding, are available.

Department of Health and Human Services:

- Social Services Block Grant: Funds available for job training related to brownfield cleanup efforts in empowerment zones and enterprise communities.

Department of Transportation:

- Provides funds specifically for brownfields redevelopment under both the Federal Highway Administration and the Federal Transit Administration. The funds are available under TEA-21 and can be integrated with other support to improve transportation access and infrastructure near brownfield sites.

APPENDIX I: PRODUCT OPPORTUNITY PRODUCTION OCCUPATIONS

Green Building Products NAICS 321900

321900 Other Wood Product Manufacturing - 2006 (Millwork, Doors, Windows, Flooring)

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	9.45	0.80	71,990	13.48	1.48
47-2031	Carpenters	6.07		13,930	13.84	1.23
47-2061	Construction Laborers	1.13	0.80	6,730	11.67	1.79
47-3012	Helpers--Carpenters	0.54	0.51	930	10.37	1.12
47-2111	Electricians	0.48	0.87	6,860	15.11	1.51
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.47	0.79	7,010	21.58	1.17
47-2081	Drywall and Ceiling Tile Installers	0.16	0.67	790	13.69	1.80
47-2181	Roofers	0.11	0.76	900	13.55	1.69
47-2152	Plumbers, Pipefitters, and Steamfitters	0.1	2.31	6,390	14.49	1.47
47-2141	Painters, Construction and Maintenance	0.08	0.51	3,200	10.93	1.22
47-2121	Glaziers	0.06	0.51	300	14.09	1.26
47-2043	Floor Sanders and Finishers	0.04	0.79	300	12.66	1.55
47-2041	Carpet Installers	0.03	--	750	11.83	1.43
47-2042	Floor Layers, Except Carpet, Wood, and Hard Tiles	0.03	0.79	750	11.69	1.43
47-4099	Construction and Related Workers, All Other	0.02	0.80	540	11.61	1.17
47-2051	Cement Masons and Concrete Finishers	--	--	2,430	13.11	1.46
49-0000	Installation, Maintenance, and Repair Occupations	2.79	0.51	55,740	15.48	1.17
49-9042	Maintenance and Repair Workers, General	1.26	0.51	8,920	14.7	1.22
49-9041	Industrial Machinery Mechanics	0.52	0.51	3,540	16.84	1.10
49-9095	Manufactured Building and Mobile Home Installers	0.27	0.51	60	13.02	1.16
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.23	0.79	5,540	23.07	1.05
49-9043	Maintenance Workers, Machinery	0.17	0.51	300	13.24	1.06
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.16	0.51	2,960	15.75	1.20
49-9044	Millwrights	0.12	0.51	550	19.27	1.22
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	0.02	--	2,960	16.23	1.10
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	0.02	0.51	1,350	17.21	1.19
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.02	0.51	1,640	11.7	1.17
51-0000	Production Occupations	54.8	2.31	140,770	11.44	1.18
51-2092	Team Assemblers	14.46	0.15	22,360	11.11	1.07
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	11.28	0.15	1,470	10.94	1.17
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	5.37	0.76	430	10.73	1.27
51-7011	Cabinetmakers and Bench Carpenters	4.89	--	2,340	12.49	1.28
51-9198	Helpers--Production Workers	4.13	0.51	6,880	10.06	1.12
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.57	0.79	9,680	19.84	1.09
51-2099	Assemblers and Fabricators, All Other	1.91	--	4,860	10.99	1.03
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1.29	0.67	3,750	12.1	1.18
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.28	0.51	4,880	12.12	1.16
51-7099	Woodworkers, All Other	1.11	0.15	--	9.83	0.99
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0.91	--	1,580	12.07	1.30
51-9199	Production Workers, All Other	0.61	2.31	6,090	11.8	1.18
51-9191	Cementing and Gluing Machine Operators and Tenders	0.51	--	440	11.95	1.15
51-4121	Welders, Cutters, Solderers, and Brazers	0.49	0.15	4,550	13.49	1.25
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	0.35	0.84	580	13.01	1.24
51-7021	Furniture Finishers	0.33	0.51	170	11.56	1.23
51-9111	Packaging and Filling Machine Operators and Tenders	0.32	0.51	4,890	10.9	1.07
51-9022	Grinding and Polishing Workers, Hand	0.28	0.51	520	9.41	1.29
51-4194	Tool Grinders, Filers, and Sharpeners	0.23	0.15	150	15.22	1.19
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.18	0.67	1,310	11.71	1.25
51-9123	Painting, Coating, and Decorating Workers	0.14	0.51	420	9.74	1.00
51-8021	Stationary Engineers and Boiler Operators	0.12	0.76	1,050	13.79	1.09
51-9031	Cutters and Trimmers, Hand	0.12	0.67	360	11.92	1.27
51-7032	Patternmakers, Wood	0.09	0.51	170	10.38	1.23
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.09	0.67	260	11	1.63
51-4041	Machinists	0.05	0.51	5,890	15.9	1.18
51-4111	Tool and Die Makers	0.03	0.15	1,610	19.58	1.08
51-4199	Metal Workers and Plastic Workers, All Other	0.03	0.51	430	13.02	0.80
51-2091	Fiberglass Laminators and Fabricators	0.02	0.79	110	11.77	0.99
51-5023	Printing Machine Operators	0.02	2.31	5,170	10.78	1.29
51-4012	Numerical Tool and Process Control Programmers	0.01	0.51	380	19.15	1.15
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	0.01	0.76	220	15.41	1.02
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.01	0.51	1,150	12.17	1.23
51-2041	Structural Metal Fabricators and Fitters	--	0.76	620	17.94	1.25
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	--	0.80	3,150	11.76	1.20
51-7031	Model Makers, Wood	--	0.51	170	13.18	1.23
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	--	0.87	580	11.53	1.24

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 327200

327200 Glass and Glass Product Manufacturing - 2006

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	1.88	0.81	71,990	17.88	1.48
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.05	0.91	7,010	26.17	1.17
47-2031	Carpenters	0.09	1.06	13,930	14.57	1.23
47-2111	Electricians	0.56	0.83	6,860	21.04	1.51
47-2121	Glaziers	1.07	0.43	300	15.63	1.26
49-0000	Installation, Maintenance, and Repair Occupations	6.41	0.78	55,740	19.2	1.17
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.51	0.92	5,540	26.67	1.05
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.05	0.48	500	22.42	1.03
49-3022	Automotive Glass Installers and Repairers	0.03	1.65	410	19.29	1.41
49-9041	Industrial Machinery Mechanics	1.81	1.06	3,540	19.44	1.10
49-9042	Maintenance and Repair Workers, General	2.79	0.51	8,920	18.22	1.22
49-9043	Maintenance Workers, Machinery	0.72	0.28	300	18.49	1.06
49-9045	Refractory Materials Repairers, Except Brickmasons	0.04	0.77	550	19.04	1.22
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.34	1.70	2,960	20.4	1.20
51-0000	Production Occupations	56.37	1.03	140,770	13.72	1.18
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.77	1.07	9,680	22.65	1.09
51-2091	Fiberglass Laminators and Fabricators	0.97	0.25	110	14	0.99
51-2092	Team Assemblers	9.15	1.34	22,360	12.2	1.07
51-2099	Assemblers and Fabricators, All Other	1.39	1.26	4,860	10.91	1.03
51-4012	Numerical Tool and Process Control Programmers	0.09	1.60	380	12.7	1.15
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.71	0.80	1,000	13.63	1.06
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	0.91	1.04	3,750	12.6	1.18
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.66	1.24	1,650	13.79	1.26
51-4041	Machinists	0.95	1.14	5,890	16	1.18
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0	0.68	880	14.35	1.27
51-4121	Welders, Cutters, Solderers, and Brazers	0.18	0.91	4,550	15.46	1.25
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	0.25	0.47	170	17.44	1.05
51-5023	Printing Machine Operators	0	2.02	5,170	11.77	1.29
51-6061	Textile Bleaching and Dyeing Machine Operators and Tenders	0.04	1.20	480	18.97	1.43
51-6064	Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders	0.39	0.12	30	15.25	1.29
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	0.96	0.84	200	14.39	0.83
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	0	0.12	70	15.45	0.98
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	1.94	0.47	260	13.02	1.63
51-9022	Grinding and Polishing Workers, Hand	1.69	0.89	520	10.97	1.29
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.77	0.61	1,150	14.48	1.23
51-9031	Cutters and Trimmers, Hand	1.39	0.94	360	11.22	1.27
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	3.36	1.26	1,310	14.35	1.25
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	3.97	0.54	580.00	16.37	1.24
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	2.83	0.54	580	14.7	1.24
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	4.11	0.76	4,880	15	1.16
51-9111	Packaging and Filling Machine Operators and Tenders	3.22	0.95	4,890	13.79	1.07
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.42	1.16	1,580	11.66	1.30
51-9122	Painters, Transportation Equipment	0	0.65	450	15.16	1.39
51-9123	Painting, Coating, and Decorating Workers	0.81	1.05	420	10.72	1.00
51-9194	Etchers and Engravers	0.2	1.38	210	10.96	1.08
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	2.08	--	--	14.15	1.21
51-9198	Helpers--Production Workers	4.31	0.96	6,880	11.27	1.12
51-9199	Production Workers, All Other	2.51	1.58	6,090	15.72	1.18

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 335100

335100 Electric Lighting Equipment Manufacturing - 2006

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	--	0.81	71,990	16.13	1.48
47-2111	Electricians	--	0.83	6,860	17.44	1.51
47-2211	Sheet Metal Workers	--	1.03	2,430	16.5	1.54
47-3013	Helpers--Electricians	--	0.14	190	13.74	1.16
49-0000	Installation, Maintenance, and Repair Occupations	4.49	0.78	55,740	22	1.17
49-9042	Maintenance and Repair Workers, General	1.8	0.51	8,920	19.81	1.22
49-9043	Maintenance Workers, Machinery	0.84	0.28	300	24.68	1.06
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.3	0.48	500	21.22	1.03
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.22	0.92	5,540	29.08	1.05
49-9041	Industrial Machinery Mechanics	--	1.06	3,540	23.23	1.10
51-0000	Production Occupations	57.18	1.03	140,770	12.23	1.18
51-2092	Team Assemblers	18.62	1.34	22,360	10.7	1.07
51-2022	Electrical and Electronic Equipment Assemblers	7.82	1.33	3,740	10.94	1.13
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.37	1.07	9,680	21.31	1.09
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.48	0.76	4,880	15.48	1.16
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	2.14	1.04	3,750	12.38	1.18
51-4041	Machinists	1.5	1.14	5,890	16.23	1.18
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.48	1.16	1,580	12.31	1.30
51-9111	Packaging and Filling Machine Operators and Tenders	1.31	0.95	4,890	13.27	1.07
51-9199	Production Workers, All Other	1.28	1.58	6,090	16.25	1.18
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1.25	1.24	1,650	14.89	1.26
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.93	0.93	820	13.93	1.12
51-2023	Electromechanical Equipment Assemblers	0.74	1.52	1,210	10.52	1.10
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0.74	0.54	580	13.78	1.24
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	0.68	0.51	330	14.79	1.28
51-4111	Tool and Die Makers	0.57	1.24	1,610	19.01	1.08
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.47	0.47	260	15.07	1.63
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.39	1.53	3,170	12.32	1.13
51-2021	Coil Winders, Tapers, and Finishers	0.38	1.07	9,680	13.43	1.09
51-2093	Timing Device Assemblers, Adjusters, and Calibrators	0.36	3.96	130	12.28	1.02
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.36	0.95	540	12.91	1.25
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	0.36	--	--	14.14	1.21
51-2041	Structural Metal Fabricators and Fitters	0.25	0.47	620	14.4	1.25
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	0.2	0.63	260	10.61	1.09
51-9191	Cementing and Gluing Machine Operators and Tenders	0.11	1.40	440	--	1.15
51-2031	Engine and Other Machine Assemblers	0.08	0.37	220	16.42	1.10
51-9123	Painting, Coating, and Decorating Workers	0.08	1.05	420	11.42	1.00
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	0.06	0.48	220.00	16.65	1.02
51-4061	Model Makers, Metal and Plastic	0.06	0.99	110	18.34	1.21
51-5022	Prepress Technicians and Workers	0.05	1.63	1,540	17.35	1.33
51-2099	Assemblers and Fabricators, All Other	--	1.26	4,860	11.01	1.03
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	--	1.69	3,150	14.94	1.20
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	--	0.80	1,000	14.01	1.06
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	--	0.68	880	12.56	1.27
51-4121	Welders, Cutters, Solderers, and Brazers	--	0.91	4,550	12.67	1.25
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	--	1.70	940	10.96	1.19
51-4199	Metal Workers and Plastic Workers, All Other	--	0.67	430	10.96	0.80
51-6031	Sewing Machine Operators	--	0.32	940	6.95	1.28
51-6099	Textile, Apparel, and Furnishings Workers, All Other	--	0.13	40	10.96	0.92
51-9198	Helpers--Production Workers	--	0.96	6,880	9.51	1.12

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 325200

Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing - 2006 (Insulation)

325200

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	1.49	0.81	71,990	23.07	1.48
47-2111	Electricians	0.99	0.83	6,860	23.35	1.51
47-2152	Plumbers, Pipefitters, and Steamfitters	0.23	1.10	6,390	23.2	1.47
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.07	0.91	7,010	30.84	1.17
47-2031	Carpenters	0.06	1.06	13,930	14.58	1.23
47-2141	Painters, Construction and Maintenance	--	0.91	3,200	13.55	1.22
49-0000	Installation, Maintenance, and Repair Occupations	10.58	0.78	55,740	23.44	1.17
49-9042	Maintenance and Repair Workers, General	3.28	0.51	8,920	22.26	1.22
49-9041	Industrial Machinery Mechanics	2.7	1.06	3,540	23.05	1.10
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	1.21	0.48	500	25.19	1.03
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.96	0.92	5,540	29.39	1.05
49-9044	Millwrights	0.44	0.77	550	26.05	1.22
49-2092	Electric Motor, Power Tool, and Related Repairers	0.09	0.31	90	21.57	1.23
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	--	0.53	1,770	15.97	1.27
49-9043	Maintenance Workers, Machinery	--	0.28	300	19.98	1.06
51-0000	Production Occupations	50.72	1.03	140,770	18.8	1.18
51-8091	Chemical Plant and System Operators	10.22	--	--	24.42	0.85
51-9011	Chemical Equipment Operators and Tenders	5.35	--	--	21.78	0.79
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	4.67	1.07	9,680	27.19	1.09
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	4.64	0.61	1,150	17.23	1.23
51-2092	Team Assemblers	3.08	1.34	22,360	12.27	1.07
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	3.08	0.54	580	16.34	1.24
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	2.98	0.84	200	16	0.83
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.57	0.76	4,880	15.72	1.16
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	2.19	0.80	1,000	13.92	1.06
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	1.59	1.53	3,170	13.25	1.13
51-9198	Helpers--Production Workers	1.48	0.96	6,880	11.14	1.12
51-9199	Production Workers, All Other	1.34	1.58	6,090	17.44	1.18
51-9111	Packaging and Filling Machine Operators and Tenders	1.03	0.95	4,890	13.82	1.07
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	0.58	0.12	70	19.15	0.98
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.41	1.26	1,310	15.71	1.25
51-4041	Machinists	0.39	1.14	5,890	18.37	1.18
51-6063	Textile Knitting and Weaving Machine Setters, Operators, and Tenders	0.31	0.12	30	15.19	1.29
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0.31	1.16	1,580	14.06	1.30
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	0.18	0.54	580	18.52	1.24
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	0.17	1.04	3,750	15.44	1.18
51-8021	Stationary Engineers and Boiler Operators	0.17	1.84	1,050	23.41	1.09
51-2099	Assemblers and Fabricators, All Other	0.16	1.26	4860.00	15.78	1.03
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.15	0.47	260	14.88	1.63
51-8031	Water and Liquid Waste Treatment Plant and System Operators	0.14	0.67	950	18.07	1.26
51-8092	Gas Plant Operators	0.13	--	--	26.03	0.94
51-4121	Welders, Cutters, Solderers, and Brazers	0.12	0.91	4,550	16.34	1.25
51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	0.12	0.39	80	10.62	1.43
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	0.08	0.48	220	12.98	1.02
51-4194	Tool Grinders, Filers, and Sharpeners	0.08	0.64	150	18.96	1.19
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.05	0.68	880	15.01	1.27
51-4111	Tool and Die Makers	0.04	1.24	1,610	20.03	1.08
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.03	0.93	820	14.86	1.12
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	0.03	0.47	170	14.53	1.05
51-6031	Sewing Machine Operators	--	0.32	940	8.27	1.28
51-6062	Textile Cutting Machine Setters, Operators, and Tenders	--	0.12	30	10.51	1.29
51-6064	Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders	--	0.12	30	13.64	1.29
51-8013	Power Plant Operators	--	0.61	280	17.71	1.12

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 321200

321200 Veneer, Plywood, and Engineered Wood Product Manufacturing - 2006 (Wood Products)

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	5.22	0.81	71,990	14.18	1.48
47-2031	Carpenters	2.87	1.06	13,930	12.67	1.23
47-2111	Electricians	1.21	0.83	6,860	19.41	1.51
47-2061	Construction Laborers	0.39	0.50	6,730	10.87	1.79
47-3012	Helpers--Carpenters	0.39	0.67	930	10.26	1.12
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.24	0.91	7,010	23.46	1.17
47-2073	Operating Engineers and Other Construction Equipment Operators	0.05	1.02	5,370	13.71	1.48
49-0000	Installation, Maintenance, and Repair Occupations	5.69	0.78	55,740	17.52	1.17
49-9042	Maintenance and Repair Workers, General	1.64	0.51	8,920	16.28	1.22
49-9041	Industrial Machinery Mechanics	1.35	1.06	3,540	18.8	1.10
49-9044	Millwrights	1.34	0.77	550	17.46	1.22
49-9043	Maintenance Workers, Machinery	0.51	0.28	300	16	1.06
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.48	0.92	5,540	25.76	1.05
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	0.09	0.85	1,350	17.33	1.19
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	0.04	0.87	2,960	14.19	1.10
51-0000	Production Occupations	52.17	1.03	140,770	12.23	1.18
51-2092	Team Assemblers	11.77	1.34	22,360	10.82	1.07
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	9.8	1.13	1,470	11.87	1.17
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	6.62	0.54	430	12.22	1.27
51-9198	Helpers--Production Workers	3.96	0.96	6,880	10.5	1.12
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.73	1.07	9,680	20.63	1.09
51-2099	Assemblers and Fabricators, All Other	2.32	1.26	4,860	10.99	1.03
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.9	0.76	4,880	13.21	1.16
51-9199	Production Workers, All Other	1.47	1.58	6,090	13.93	1.18
51-9191	Cementing and Gluing Machine Operators and Tenders	1.46	1.40	440	12.45	1.15
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	1.42	0.54	580	14.5	1.24
51-7011	Cabinetmakers and Bench Carpenters	1.31	1.37	2,340	11.71	1.28
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	1.2	0.54	580	13.04	1.24
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	0.78	1.04	3,750	12.4	1.18
51-7099	Woodworkers, All Other	0.78	--	--	12.9	0.99
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.53	1.26	1,310	13.28	1.25
51-8021	Stationary Engineers and Boiler Operators	0.51	1.84	1,050	15.08	1.09
51-9111	Packaging and Filling Machine Operators and Tenders	0.33	0.95	4,890	12.5	1.07
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0.31	1.16	1,580	13.18	1.30
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	0.17	0.12	70	13.06	0.98
51-4041	Machinists	0.15	1.14	5,890	14.67	1.18
51-4194	Tool Grinders, Filers, and Sharpeners	0.15	0.64	150	14.54	1.19
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.11	0.47	260.00	12.42	1.63
51-9022	Grinding and Polishing Workers, Hand	0.1	0.89	520	10.65	1.29
51-7032	Patternmakers, Wood	0.08	0.51	170	14.19	1.23
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.08	0.61	1,150	14.69	1.23
51-4121	Welders, Cutters, Solderers, and Brazers	0.06	0.91	4,550	14.89	1.25
51-9031	Cutters and Trimmers, Hand	0.04	0.94	360	10.47	1.27
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.03	0.68	880	8.99	1.27
51-9196	Paper Goods Machine Setters, Operators, and Tenders	--	1.78	2,700	17.23	1.07

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 325500

325500 Paint, Coating, and Adhesive Manufacturing - 2006

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	0.28	0.81	71,990	18.13	1.48
47-2111	Electricians	0.15	0.83	6,860	23.56	1.51
49-0000	Installation, Maintenance, and Repair Occupations	4.09	0.78	55,740	20.65	1.17
49-9042	Maintenance and Repair Workers, General	2.22	0.51	8,920	19.21	1.22
49-9041	Industrial Machinery Mechanics	1.07	1.06	3,540	21.66	1.10
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.41	0.92	5,540	29.29	1.05
49-9043	Maintenance Workers, Machinery	0.15	0.28	300	20.12	1.06
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.1	0.48	500	22.11	1.03
51-0000	Production Occupations	43.86	1.03	140,770	14.98	1.18
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	15.68	0.61	1,150	14.29	1.23
51-9111	Packaging and Filling Machine Operators and Tenders	5.49	0.95	4,890	13.42	1.07
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	4.32	1.07	9,680	23.74	1.09
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.67	0.76	4,880	15.79	1.16
51-9011	Chemical Equipment Operators and Tenders	2.5	--	--	17.15	0.79
51-8091	Chemical Plant and System Operators	2.13	--	--	20.33	0.85
51-2092	Team Assemblers	1.75	1.34	22,360	11.58	1.07
51-9198	Helpers--Production Workers	1.64	0.96	6,880	11.13	1.12
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	1.61	0.12	70	15.39	0.98
51-9199	Production Workers, All Other	1.47	1.58	6,090	13.74	1.18
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.26	1.16	1,580	12	1.30
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0.67	0.54	580	14.89	1.24
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.4	1.53	3,170	13.78	1.13
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.39	0.80	1,000	14.68	1.06
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.31	1.26	1,310	17.68	1.25
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.27	0.47	260	12.77	1.63
51-2099	Assemblers and Fabricators, All Other	0.12	1.26	4,860	12.48	1.03
51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	0.09	0.39	80	12.08	1.43
51-5023	Printing Machine Operators	0.06	2.02	5,170	14.5	1.29
51-9191	Cementing and Gluing Machine Operators and Tenders	0.06	1.40	440	12.97	1.15
51-4041	Machinists	--	1.14	5,890	15.08	1.18

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 333400

Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment -

333400 2006

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	4.26	0.81	71,990	14	1.48
47-2211	Sheet Metal Workers	3.4	1.03	2,430	13.62	1.54
47-2111	Electricians	0.4	0.83	6,860	17.01	1.51
47-2152	Plumbers, Pipefitters, and Steamfitters	0.14	1.10	6,390	--	1.47
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.04	0.91	7,010	25.75	1.17
47-2141	Painters, Construction and Maintenance	0.03	0.91	3,200	10.75	1.22
47-3013	Helpers--Electricians	--	0.14	190	8.55	1.16
49-0000	Installation, Maintenance, and Repair Occupations	4.38	0.78	55,740	17.47	1.17
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1.43	0.53	1,770	13.61	1.27
49-9042	Maintenance and Repair Workers, General	1.34	0.51	8,920	17.7	1.22
49-9041	Industrial Machinery Mechanics	0.62	1.06	3,540	19.54	1.10
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.4	0.92	5,540	26.05	1.05
49-9043	Maintenance Workers, Machinery	0.16	0.28	300	18.15	1.06
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.14	0.48	500	17.56	1.03
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.14	0.77	1,640	12.61	1.17
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.03	1.70	2,960	--	1.20
49-2092	Electric Motor, Power Tool, and Related Repairers	--	0.31	90	13.14	1.23
51-0000	Production Occupations	59.16	1.03	140,770	13.68	1.18
51-2092	Team Assemblers	19.22	1.34	22,360	12.27	1.07
51-4121	Welders, Cutters, Solderers, and Brazers	6.11	0.91	4,550	15.12	1.25
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	4.99	1.04	3,750	13.06	1.18
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.09	1.07	9,680	22.46	1.09
51-9198	Helpers--Production Workers	2.94	0.96	6,880	11.03	1.12
51-2099	Assemblers and Fabricators, All Other	2.65	1.26	4,860	15.35	1.03
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.29	0.76	4,880	14.94	1.16
51-2041	Structural Metal Fabricators and Fitters	2.05	0.47	620	14.51	1.25
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1.87	0.68	880	14.27	1.27
51-4041	Machinists	1.63	1.14	5,890	15.95	1.18
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	1.25	0.51	330	14.08	1.28
51-2022	Electrical and Electronic Equipment Assemblers	1.21	1.33	3,740	11.14	1.13
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.11	1.16	1,580	13.7	1.30
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	0.95	1.69	3,150	15.23	1.20
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.61	0.95	540	14.26	1.25
51-4111	Tool and Die Makers	0.55	1.24	1,610	19.26	1.08
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.43	0.93	820	14.25	1.12
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.34	1.53	3,170	13.04	1.13
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	0.29	0.85	330	15.55	1.20
51-6031	Sewing Machine Operators	0.19	0.32	940.00	10.41	1.28
51-4012	Numerical Tool and Process Control Programmers	0.16	1.60	380	18.35	1.15
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.16	1.26	1,310	10.76	1.25
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.14	0.80	1,000	13.84	1.06
51-9191	Cementing and Gluing Machine Operators and Tenders	0.12	1.40	440	10.96	1.15
51-4061	Model Makers, Metal and Plastic	0.09	0.99	110	16.04	1.21
51-4192	Lay-Out Workers, Metal and Plastic	0.08	0.53	70	15.87	1.08
51-9111	Packaging and Filling Machine Operators and Tenders	0.08	0.95	4,890	13.6	1.07
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	0.07	0.63	260	16.68	1.09
51-4062	Patternmakers, Metal and Plastic	0.05	0.99	110	14.39	1.21
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.04	0.47	260	11.03	1.63
51-4194	Tool Grinders, Filers, and Sharpeners	0.03	0.64	150	11.14	1.19
51-2023	Electromechanical Equipment Assemblers	--	1.52	1,210	15.25	1.10
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	--	0.47	170	15.56	1.05
51-4199	Metal Workers and Plastic Workers, All Other	--	0.67	430	14.73	0.80
51-6062	Textile Cutting Machine Setters, Operators, and Tenders	--	0.12	30	10.98	1.29
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	--	0.12	70	12.18	0.98
51-9193	Cooling and Freezing Equipment Operators and Tenders	--	--	--	15.73	0.91
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	--	--	--	14.4	1.21
51-9196	Paper Goods Machine Setters, Operators, and Tenders	--	1.78	2,700	13.27	1.07
51-9199	Production Workers, All Other	--	1.58	6,090	12.6	1.18

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 334500

334500 Navigational, Measuring, Electromedical, and Control Instruments Manufacturing (HVAC Controls and Testing Kits)

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	0.2	0.81	71,990	23.97	1.48
47-2111	Electricians	0.09	0.83	6,860	24.3	1.51
47-2152	Plumbers, Pipefitters, and Steamfitters	0.05	1.10	6,390	28.2	1.47
47-2211	Sheet Metal Workers	0.04	1.03	2,430	19.78	1.54
47-2031	Carpenters	0.01	1.06	13,930	26.21	1.23
47-2141	Painters, Construction and Maintenance	0.01	0.91	3,200	17.83	1.22
49-0000	Installation, Maintenance, and Repair Occupations	3.22	0.78	55,740	21	1.17
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.87	0.48	500	20.44	1.03
49-9042	Maintenance and Repair Workers, General	0.69	0.51	8,920	19.19	1.22
49-9041	Industrial Machinery Mechanics	0.28	1.06	3,540	19.9	1.10
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.27	0.92	5,540	30.55	1.05
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.26	1.70	2,960	22.78	1.20
49-2091	Avionics Technicians	0.25	0.24	50	22.96	1.10
49-9062	Medical Equipment Repairers	0.11	1.47	630	20.44	1.23
49-3011	Aircraft Mechanics and Service Technicians	0.09	1.45	1,000	24.64	1.23
49-9069	Precision Instrument and Equipment Repairers, All Other	0.07	0.69	120	18.33	0.97
49-9043	Maintenance Workers, Machinery	0.06	0.28	300	18.75	1.06
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	0.04	0.53	1,770	25.39	1.27
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	0.03	0.89	500	21.31	1.04
49-9044	Millwrights	0.03	0.77	550	16.8	1.22
49-2011	Computer, Automated Teller, and Office Machine Repairers	0.02	1.14	2,130	18.37	1.08
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.02	0.77	1,640	13.92	1.17
51-0000	Production Occupations	28.49	1.03	140,770	14.29	1.18
51-2022	Electrical and Electronic Equipment Assemblers	7.05	1.33	3,740	13.42	1.13
51-2092	Team Assemblers	5.35	1.34	22,360	12.75	1.07
51-2023	Electromechanical Equipment Assemblers	3.63	1.52	1,210	13.28	1.10
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2.44	0.76	4,880	16.35	1.16
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	2.12	1.07	9,680	25.85	1.09
51-4041	Machinists	1.79	1.14	5,890	17.12	1.18
51-2099	Assemblers and Fabricators, All Other	0.78	1.26	4,860	13.62	1.03
51-9198	Helpers--Production Workers	0.62	0.96	6,880	10.62	1.12
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	0.55	1.69	3,150	15.18	1.20
51-9199	Production Workers, All Other	0.5	1.58	6,090	--	1.18
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	0.47	1.04	3,750	13.39	1.18
51-4121	Welders, Cutters, Solderers, and Brazers	0.45	0.91	4,550	15.32	1.25
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.41	1.53	3,170	13.16	1.13
51-2021	Coil Winders, Tapers, and Finishers	0.24	1.07	9,680	11.78	1.09
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.23	0.68	880.00	19.18	1.27
51-2093	Timing Device Assemblers, Adjusters, and Calibrators	0.21	3.96	130	12.87	1.02
51-4111	Tool and Die Makers	0.19	1.24	1,610	22.47	1.08
51-9141	Semiconductor Processors	0.13	--	--	15.5	1.01
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0.1	1.16	1,580	14.26	1.30
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	0.09	1.07	9,680	22.9	1.09
51-4199	Metal Workers and Plastic Workers, All Other	0.09	0.67	430	17.12	0.80
51-9082	Medical Appliance Technicians	0.08	0.42	60	17.65	1.25
51-9111	Packaging and Filling Machine Operators and Tenders	0.08	0.95	4,890	13.79	1.07
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plas	0.07	1.24	1,650	14.23	1.26
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	0.07	1.70	940	12.61	1.19
51-4012	Numerical Tool and Process Control Programmers	0.06	1.60	380	19.31	1.15
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	0.06	0.85	330	16.1	1.20
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.05	0.93	820	16.29	1.12
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	0.05	0.51	330	14.17	1.28
51-2041	Structural Metal Fabricators and Fitters	0.04	0.47	620	15.99	1.25
51-5023	Printing Machine Operators	0.04	2.02	5,170	15.09	1.29
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.03	0.95	540	13.76	1.25
51-4061	Model Makers, Metal and Plastic	0.03	0.99	110	25.09	1.21
51-9022	Grinding and Polishing Workers, Hand	0.03	0.89	520	12.28	1.29
51-9083	Ophthalmic Laboratory Technicians	0.03	1.54	600	18.26	1.08
51-9011	Chemical Equipment Operators and Tenders	0.02	--	--	17.31	0.79
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	0.01	0.47	170	12.84	1.05
51-5022	Prepress Technicians and Workers	0.01	1.63	1,540	13.63	1.33
51-6031	Sewing Machine Operators	0.01	0.32	940	10.63	1.28
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0.01	0.54	580	15.24	1.24
51-9123	Painting, Coating, and Decorating Workers	0.01	1.05	420	13.74	1.00
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	0.01	--	--	16.69	1.21
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	--	0.80	1,000	16.6	1.06
51-4192	Lay-Out Workers, Metal and Plastic	--	0.53	70	11.56	1.08
51-9194	Etchers and Engravers	--	1.38	210	11.22	1.08

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 327300

327300 Cement and Concrete Product Manufacturing - 2006

Occ. Code	Occupation Title	Percent of				Salary Ratio (MSP/NAT)
		Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	
47-0000	Construction and Extraction Occupations	8.58	0.81	71,990	13.92	1.48
47-2051	Cement Masons and Concrete Finishers	2.54	0.83	2,430	12.05	1.46
47-2061	Construction Laborers	2.23	0.50	6,730	12.3	1.79
47-2073	Operating Engineers and Other Construction Equipment Operators	1.78	1.02	5,370	16.11	1.48
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.65	0.91	7,010	23.71	1.17
47-2031	Carpenters	0.58	1.06	13,930	14.18	1.23
47-2111	Electricians	0.32	0.83	6,860	21.21	1.51
47-5099	Extraction Workers, All Other	0.07	0.67	170	18.88	1.04
47-2053	Terrazzo Workers and Finishers	0.04	1.49	130	12.61	1.71
47-2171	Reinforcing Iron and Rebar Workers	0.04	0.20	80	11.57	1.53
47-4099	Construction and Related Workers, All Other	0.04	0.72	540	13.44	1.17
47-2071	Paving, Surfacing, and Tamping Equipment Operators	0.03	1.24	1,040	13.29	1.43
47-3019	Helpers, Construction Trades, All Other	0.03	0.92	440	10.3	0.81
47-2022	Stonemasons	0.02	0.25	60	13.79	1.42
47-5051	Rock Splitters, Quarry	0.02	0.67	170	23.57	1.04
47-2021	Brickmasons and Blockmasons	--	1.09	1,710	26.81	1.30
47-2151	Pipelayers	--	0.81	630	15.49	1.68
47-3012	Helpers--Carpenters	--	0.67	930	11.09	1.12
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners	--	1.09	320	14.13	1.19
49-0000	Installation, Maintenance, and Repair Occupations	5.94	0.78	55,740	17.82	1.17
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	2.09	0.87	2,960	17.21	1.10
49-9042	Maintenance and Repair Workers, General	1.84	0.51	8,920	17.44	1.22
49-9041	Industrial Machinery Mechanics	0.62	1.06	3,540	18.57	1.10
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.48	0.92	5,540	26.4	1.05
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	0.47	0.85	1,350	18	1.19
49-9043	Maintenance Workers, Machinery	0.28	0.28	300	15.3	1.06
49-9044	Millwrights	0.03	0.77	550	20.43	1.22
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.03	0.77	1,640	9.41	1.17
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.03	1.70	2,960	15.6	1.20
49-3023	Automotive Service Technicians and Mechanics	0.02	0.80	6,840	18.23	1.09
49-9096	Riggers	0.02	0.56	90	17.22	1.11
51-0000	Production Occupations	24.01	1.03	140,770	13.16	1.18
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	5.25	--	--	11.58	1.21
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	3.77	0.54	580	12.18	1.24
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	3.17	0.61	1,150	13.42	1.23
51-9198	Helpers--Production Workers	2.55	0.96	6,880	10.86	1.12
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	2.27	1.07	9,680	22.48	1.09
51-2092	Team Assemblers	1.24	1.34	22,360.00	12.24	1.07
51-4121	Welders, Cutters, Solderers, and Brazers	1.14	0.91	4,550	14.88	1.25
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.88	0.47	260	13.96	1.63
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	0.73	0.76	4,880	14.93	1.16
51-9111	Packaging and Filling Machine Operators and Tenders	0.49	0.95	4,890	11.94	1.07
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	0.42	0.54	580	18.78	1.24
51-9199	Production Workers, All Other	0.39	1.58	6,090	12.58	1.18
51-8099	Plant and System Operators, All Other	0.23	1.25	230	22.89	0.94
51-9022	Grinding and Polishing Workers, Hand	0.23	0.89	520	14.21	1.29
51-4041	Machinists	0.21	1.14	5,890	17.16	1.18
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0.15	1.16	1,580	14.08	1.30
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.11	1.26	1,310	12.96	1.25
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.05	0.80	1,000	14.44	1.06
51-9123	Painting, Coating, and Decorating Workers	0.05	1.05	420	10.63	1.00
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.04	1.24	1,650	15.39	1.26
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.04	1.53	3,170	10.99	1.13
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	0.04	0.84	200	11.99	0.83
51-2041	Structural Metal Fabricators and Fitters	0.02	0.47	620	14.14	1.25
51-4052	Pourers and Casters, Metal	0.02	0.81	160	12.79	1.19
51-4071	Foundry Mold and Coremakers	0.02	0.98	190	14.62	1.21
51-4199	Metal Workers and Plastic Workers, All Other	0.02	0.67	430	11.94	0.80
51-8021	Stationary Engineers and Boiler Operators	0.02	1.84	1,050	20.74	1.09
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	0.02	0.12	70	17.08	0.98
51-2091	Fiberglass Laminators and Fabricators	--	0.25	110	9.95	0.99
51-2099	Assemblers and Fabricators, All Other	--	1.26	4,860	10.38	1.03
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	--	1.04	3,750	11.82	1.18
51-9031	Cutters and Trimmers, Hand	--	0.94	360	12.1	1.27

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 332300

332300 Architectural and Structural Metals Manufacturing - 2006 (Alternative Materials, Metal Windows and Doors)

Occ. Code	Occupation Title	% of Total Industry Employment	Local Location Quotient	Total Local Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	6.62	0.81	71,990	16.94	1.48
47-2211	Sheet Metal Workers	4.18	1.03	2,430	16.6	1.54
47-2221	Structural Iron and Steel Workers	0.46	0.51	460	18.15	1.65
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.4	0.91	7,010	24.5	1.17
47-2121	Glaziers	0.28	0.43	300	23.64	1.26
47-2031	Carpenters	0.26	1.06	13,930	13.01	1.23
47-2111	Electricians	0.22	0.83	6,860	18.78	1.51
47-2061	Construction Laborers	0.15	0.50	6,730	11.11	1.79
47-2171	Reinforcing Iron and Rebar Workers	0.1	0.20	80	16.54	1.53
47-3019	Helpers, Construction Trades, All Other	0.1	0.92	440	10.87	0.81
47-2141	Painters, Construction and Maintenance	0.07	0.91	3,200	12.81	1.22
47-2152	Plumbers, Pipefitters, and Steamfitters	0.07	1.10	6,390	20.39	1.47
47-4099	Construction and Related Workers, All Other	0.06	0.72	540	10.21	1.17
47-4031	Fence Erectors	0.03	--	--	13.25	1.22
47-2011	Boilermakers	--	0.78	180	19.53	1.11
47-3012	Helpers--Carpenters	--	0.67	930	11.38	1.12
47-3014	Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons	--	0.51	160	10.24	1.36
49-0000	Installation, Maintenance, and Repair Occupations	2.86	0.78	55,740	17.09	1.17
49-9042	Maintenance and Repair Workers, General	1.2	0.51	8,920	17.05	1.22
49-9041	Industrial Machinery Mechanics	0.58	1.06	3,540	18.42	1.10
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.29	0.92	5,540	24.53	1.05
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.26	0.77	1,640	12	1.17
49-9043	Maintenance Workers, Machinery	0.18	0.28	300	15.08	1.06
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.14	1.70	2,960	15.22	1.20
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	0.04	0.53	1,770	21.57	1.27
49-9096	Riggers	0.03	0.56	90	13.77	1.11
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	0.02	0.87	2,960	17.43	1.10
49-3023	Automotive Service Technicians and Mechanics	0.01	0.80	6,840	16.04	1.09
49-9045	Refractory Materials Repairers, Except Brickmasons	0.01	0.77	550	15.28	1.22
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	--	0.85	1,350	16.68	1.19
49-9011	Mechanical Door Repairers	--	1.09	220	13.36	1.24
49-9044	Millwrights	--	0.77	550	18.1	1.22
49-9095	Manufactured Building and Mobile Home Installers	--	0.47	60	10.29	1.16
51-0000	Production Occupations	57.66	1.03	140,770	13.59	1.18
51-4121	Welders, Cutters, Solderers, and Brazers	11.18	0.91	4,550	14.39	1.25
51-2092	Team Assemblers	8.59	1.34	22,360	11.46	1.07
51-2041	Structural Metal Fabricators and Fitters	8.01	0.47	620	14.2	1.25
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	5.77	1.04	3750.00	12.62	1.18
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	4.25	1.07	9,680	21.94	1.09
51-9198	Helpers--Production Workers	3.26	0.96	6,880	10.11	1.12
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.56	1.16	1,580	12.16	1.30
51-4041	Machinists	1.49	1.14	5,890	15.96	1.18
51-2099	Assemblers and Fabricators, All Other	1.24	1.26	4,860	11.98	1.03
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	1.21	0.48	220	13.4	1.02
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	1.12	1.69	3,150	14.93	1.20
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.07	0.76	4,880	15.27	1.16
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plas	1.05	1.24	1,650	11.95	1.26
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1	0.68	880	14.02	1.27
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	0.98	0.51	330	14.71	1.28
51-4192	Lay-Out Workers, Metal and Plastic	0.79	0.53	70	16.04	1.08
51-9022	Grinding and Polishing Workers, Hand	0.51	0.89	520	11.33	1.29
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.48	0.95	540	13.45	1.25
51-9199	Production Workers, All Other	0.43	1.58	6,090	13.73	1.18
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.4	0.80	1,000	12.9	1.06
51-4199	Metal Workers and Plastic Workers, All Other	0.4	0.67	430	13.34	0.80
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	0.38	0.63	260	13.16	1.09
51-4111	Tool and Die Makers	0.28	1.24	1,610	19.37	1.08
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.26	0.93	820	14.12	1.12
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	0.26	0.85	330	13.59	1.20
51-9111	Packaging and Filling Machine Operators and Tenders	0.23	0.95	4,890	12.21	1.07
51-4012	Numerical Tool and Process Control Programmers	0.21	1.60	380	19.2	1.15
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	0.16	1.70	940	12.99	1.19
51-4194	Tool Grinders, Filers, and Sharpeners	0.13	0.64	150	12.1	1.19
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	0.11	0.47	170	14.07	1.05
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0.11	0.54	580	12.73	1.24
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.08	1.26	1,310	10.77	1.25
51-9123	Painting, Coating, and Decorating Workers	0.05	1.05	420	11.98	1.00
51-4062	Patternmakers, Metal and Plastic	0.04	0.99	110	14.08	1.21
51-2022	Electrical and Electronic Equipment Assemblers	0.03	1.33	3,740	13.35	1.13
51-2023	Electromechanical Equipment Assemblers	0.03	1.52	1,210	11.66	1.10
51-4061	Model Makers, Metal and Plastic	0.03	0.99	110	18.84	1.21
51-7011	Cabinetmakers and Bench Carpenters	0.02	1.37	2,340	15.14	1.28
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	0.02	0.54	580	15.63	1.24
51-5023	Printing Machine Operators	0.01	2.02	5,170	13.34	1.29
51-9011	Chemical Equipment Operators and Tenders	0.01	--	--	18.38	0.79
51-2091	Fiberglass Laminators and Fabricators	--	0.25	110	12.36	0.99
51-2093	Timing Device Assemblers, Adjusters, and Calibrators	--	3.96	130	15.24	1.02
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	--	1.53	3,170	10.8	1.13
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	--	0.54	430	10.24	1.27
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	--	1.13	1,470	13.14	1.17
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	--	0.47	260	13.56	1.63

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 321900

321900 Other Wood Product Manufacturing - 2006 (Millwork, Doors, Windows, Flooring)

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	9.45	0.80	71,990	13.48	1.48
47-2031	Carpenters	6.07		13,930	13.84	1.23
47-2061	Construction Laborers	1.13	0.80	6,730	11.67	1.79
47-3012	Helpers--Carpenters	0.54	0.51	930	10.37	1.12
47-2111	Electricians	0.48	0.87	6,860	15.11	1.51
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	0.47	0.79	7,010	21.58	1.17
47-2081	Drywall and Ceiling Tile Installers	0.16	0.67	790	13.69	1.80
47-2181	Roofers	0.11	0.76	900	13.55	1.69
47-2152	Plumbers, Pipefitters, and Steamfitters	0.1	2.31	6,390	14.49	1.47
47-2141	Painters, Construction and Maintenance	0.08	0.51	3,200	10.93	1.22
47-2121	Glaziers	0.06	0.51	300	14.09	1.26
47-2043	Floor Sanders and Finishers	0.04	0.79	300	12.66	1.55
47-2041	Carpet Installers	0.03	--	750	11.83	1.43
47-2042	Floor Layers, Except Carpet, Wood, and Hard Tiles	0.03	0.79	750	11.69	1.43
47-4099	Construction and Related Workers, All Other	0.02	0.80	540	11.61	1.17
47-2051	Cement Masons and Concrete Finishers	--	--	2,430	13.11	1.46
49-0000	Installation, Maintenance, and Repair Occupations	2.79	0.51	55,740	15.48	1.17
49-9042	Maintenance and Repair Workers, General	1.26	0.51	8,920	14.7	1.22
49-9041	Industrial Machinery Mechanics	0.52	0.51	3,540	16.84	1.10
49-9095	Manufactured Building and Mobile Home Installers	0.27	0.51	60	13.02	1.16
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.23	0.79	5,540	23.07	1.05
49-9043	Maintenance Workers, Machinery	0.17	0.51	300	13.24	1.06
49-9099	Installation, Maintenance, and Repair Workers, All Other	0.16	0.51	2,960	15.75	1.20
49-9044	Millwrights	0.12	0.51	550	19.27	1.22
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	0.02	--	2,960	16.23	1.10
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	0.02	0.51	1,350	17.21	1.19
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.02	0.51	1,640	11.7	1.17
51-0000	Production Occupations	54.8	2.31	140,770	11.44	1.18
51-2092	Team Assemblers	14.46	0.15	22,360	11.11	1.07
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	11.28	0.15	1,470	10.94	1.17
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	5.37	0.76	430	10.73	1.27
51-7011	Cabinetmakers and Bench Carpenters	4.89	--	2,340	12.49	1.28
51-9198	Helpers--Production Workers	4.13	0.51	6,880	10.06	1.12
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.57	0.79	9,680	19.84	1.09
51-2099	Assemblers and Fabricators, All Other	1.91	--	4,860	10.99	1.03
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1.29	0.67	3,750	12.1	1.18
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.28	0.51	4,880	12.12	1.16
51-7099	Woodworkers, All Other	1.11	0.15	--	9.83	0.99
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0.91	--	1,580	12.07	1.30
51-9199	Production Workers, All Other	0.61	2.31	6,090	11.8	1.18
51-9191	Cementing and Gluing Machine Operators and Tenders	0.51	--	440	11.95	1.15
51-4121	Welders, Cutters, Solderers, and Brazers	0.49	0.15	4,550	13.49	1.25
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	0.35	0.84	580	13.01	1.24
51-7021	Furniture Finishers	0.33	0.51	170	11.56	1.23
51-9111	Packaging and Filling Machine Operators and Tenders	0.32	0.51	4,890	10.9	1.07
51-9022	Grinding and Polishing Workers, Hand	0.28	0.51	520	9.41	1.29
51-4194	Tool Grinders, Filers, and Sharpeners	0.23	0.15	150	15.22	1.19
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	0.18	0.67	1,310	11.71	1.25
51-9123	Painting, Coating, and Decorating Workers	0.14	0.51	420	9.74	1.00
51-8021	Stationary Engineers and Boiler Operators	0.12	0.76	1,050	13.79	1.09
51-9031	Cutters and Trimmers, Hand	0.12	0.67	360	11.92	1.27
51-7032	Patternmakers, Wood	0.09	0.51	170	10.38	1.23
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.09	0.67	260	11	1.63
51-4041	Machinists	0.05	0.51	5,890	15.9	1.18
51-4111	Tool and Die Makers	0.03	0.15	1,610	19.58	1.08
51-4199	Metal Workers and Plastic Workers, All Other	0.03	0.51	430	13.02	0.80
51-2091	Fiberglass Laminators and Fabricators	0.02	0.79	110	11.77	0.99
51-5023	Printing Machine Operators	0.02	2.31	5,170	10.78	1.29
51-4012	Numerical Tool and Process Control Programmers	0.01	0.51	380	19.15	1.15
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	0.01	0.76	220	15.41	1.02
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.01	0.51	1,150	12.17	1.23
51-2041	Structural Metal Fabricators and Fitters	--	0.76	620	17.94	1.25
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	--	0.80	3,150	11.76	1.20
51-7031	Model Makers, Wood	--	0.51	170	13.18	1.23
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	--	0.87	580	11.53	1.24

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Building Products NAICS 322200

322200 Converted Paper Product Manufacturing - 2006 (Alternative Materials, Fiber Can and Drum)

Occ. Code	Occupation Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and Extraction Occupations	0.41	0.81	71,990	22.75	1.48
47-2111	Electricians	0.33	0.83	6,860	22.92	1.51
47-2152	Plumbers, Pipefitters, and Steamfitters	0.03	1.10	6,390	24.66	1.47
49-0000	Installation, Maintenance, and Repair Occupations	5.67	0.78	55,740	19.9	1.17
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	0.49	0.92	5,540	29.11	1.05
49-2092	Electric Motor, Power Tool, and Related Repairers	0.11	0.31	90	19.22	1.23
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.2	0.48	500	22.28	1.03
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	0.01	0.87	2,960	18.56	1.10
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	0.01	0.53	1,770	26.63	1.27
49-9041	Industrial Machinery Mechanics	1.8	1.06	3,540	19.54	1.10
49-9042	Maintenance and Repair Workers, General	2.5	0.51	8,920	19.11	1.22
49-9043	Maintenance Workers, Machinery	0.35	0.28	300	18.45	1.06
49-9044	Millwrights	0.11	0.77	550	21.92	1.22
49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.01	0.77	1,640	13.81	1.17
49-9099	Installation, Maintenance, and Repair Workers, All Other	--	1.70	2,960	20.16	1.20
51-0000	Production Occupations	55.69	1.03	140,770	14.55	1.18
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	3.96	1.07	9,680	24.59	1.09
51-2091	Fiberglass Laminators and Fabricators	0.01	0.25	110	20.49	0.99
51-2092	Team Assemblers	3.13	1.34	22,360	12.59	1.07
51-2099	Assemblers and Fabricators, All Other	0.3	1.26	4,860	11.06	1.03
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	0.02	0.80	1,000	14.28	1.06
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	--	0.48	220	12.44	1.02
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1.02	1.04	3,750	13.82	1.18
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.02	1.24	1,650	13.95	1.26
51-4041	Machinists	0.52	1.14	5,890	17.06	1.18
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	0.06	1.53	3,170	15.65	1.13
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0.11	0.68	880	16.15	1.27
51-4111	Tool and Die Makers	0.52	1.24	1,610	17.55	1.08
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	0.04	1.70	940	17.48	1.19
51-4199	Metal Workers and Plastic Workers, All Other	--	0.67	430	12.18	0.80
51-5011	Bindery Workers	0.45	2.24	1,900	11.07	1.16
51-5021	Job Printers	0.06	1.09	670	13.35	1.36
51-5022	Prepress Technicians and Workers	0.9	1.63	1,540	16.52	1.33
51-5023	Printing Machine Operators	3.9	2.02	5,170	16.37	1.29
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	0.04	0.84	200	13.97	0.83
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	0.05	1.13	1,470	16.53	1.17
51-8021	Stationary Engineers and Boiler Operators	0.11	1.84	1,050	20.67	1.09
51-8031	Water and Liquid Waste Treatment Plant and System Operators	0.02	0.67	950.00	18.76	1.26
51-8091	Chemical Plant and System Operators	0.04	--	--	22.28	0.85
51-9011	Chemical Equipment Operators and Tenders	0.06	--	--	17.75	0.79
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	0.11	0.12	70	16.77	0.98
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	0.05	0.47	260	16.86	1.63
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	0.4	0.61	1,150	15.37	1.23
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	3.72	1.26	1,310	14.39	1.25
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	0.89	0.54	580	14.99	1.24
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	0.05	0.54	580	15.73	1.24
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1.7	0.76	4,880	13.79	1.16
51-9111	Packaging and Filling Machine Operators and Tenders	--	0.95	4,890	12.82	1.07
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1.65	1.16	1,580	15.52	1.30
51-9123	Painting, Coating, and Decorating Workers	0.02	1.05	420	14.16	1.00
51-9191	Cementing and Gluing Machine Operators and Tenders	1.87	1.40	440	14.06	1.15
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	0.01	--	--	15.7	1.21
51-9196	Paper Goods Machine Setters, Operators, and Tenders	20.53	1.78	2,700	14.4	1.07
51-9198	Helpers--Production Workers	6.11	0.96	6,880	11.76	1.12
51-9199	Production Workers, All Other	1.14	1.58	6,090	14.88	1.18

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products NAICS 335300

335300 Electrical Equipment Manufacturing - 2006 (Wind Turbines)

Occ. Code	Occupational Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and extraction occupations	0.5%	0.81	71,990	19.25	1.31
47-2111	Electricians	0.4%	0.83	6,860	20.23	1.57
47-2211	Sheet metal workers	--	1.03	2,430	16.69	1.66
49-0000	Installation, maintenance, and repair occupations	3.4%	0.78	55,740	18.99	1.09
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.3%	0.92	5,540	27.19	1.00
49-2092	Electric motor, power tool, and related repairers	0.3%	0.31	90	16.67	1.16
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.7%	0.48	500	19.91	1.12
49-2095	Electrical and electronics repairers, powerhouse, substation, and relay	--	0.48	500	20.42	1.09
49-9041	Industrial machinery mechanics	0.2%	1.06	3,540	20.2	1.08
49-9042	Maintenance and repair workers, general	1.3%	0.51	8,920	18.11	1.04
49-9043	Maintenance workers, machinery	0.2%	0.28	300	17.5	1.01
49-9098	Helpers--installation, maintenance, and repair workers	0.1%	0.77	1,640	11.54	1.08
49-9099	Installation, maintenance, and repair workers, all other	0.0%	1.70	2,960	18.24	1.04
51-0000	Production occupations	59.2%	1.03	140,770	14.04	1.11
51-1011	First-line supervisors/managers of production and operating workers	3.3%	1.07	9,680	22.86	1.09
51-2021	Coil winders, tapers, and finishers	4.9%	1.07	9,680	13.62	1.83
51-2022	Electrical and electronic equipment assemblers	15.2%	1.33	3,740	13.05	1.07
51-2023	Electromechanical equipment assemblers	2.7%	1.52	1,210	13.78	1.05
51-2031	Engine and other machine assemblers	0.7%	0.37	220	13.14	1.34
51-2041	Structural metal fabricators and fitters	0.7%	0.47	620	16.27	1.12
51-2092	Team assemblers	10.7%	1.34	22,360	12.73	0.98
51-2093	Timing device assemblers, adjusters, and calibrators	0.2%	3.96	130	14.46	0.98
51-2099	Assemblers and fabricators, all other	1.3%	1.26	4,860	16.11	0.83
51-4011	Computer-controlled machine tool operators, metal and plastic	1.7%	1.69	3,150	15.21	1.20
51-4012	Numerical tool and process control programmers	0.0%	1.60	380	21.23	1.10
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.4%	0.80	1,000	16.22	0.89
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	0.1%	0.48	220	13.36	1.14
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	2.5%	1.04	3,750	14.34	1.04
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.6%	0.95	540	14.21	1.26
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.5%	1.24	1,650	13.89	1.22
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.7%	0.93	820	15.62	1.11
51-4041	Machinists	2.2%	1.14	5,890	15.28	1.29
51-4061	Model makers, metal and plastic	0.1%	0.99	110	20.22	1.21
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.9%	1.53	3,170	13.13	1.05
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	0.7%	0.68	880	15.5	1.21
51-4111	Tool and die makers	0.6%	1.24	1,610	21.2	1.09
51-4121	Welders, cutters, solderers, and brazers	2.1%	0.91	4,550	14.6	1.29
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	0.6%	0.51	330	16.19	1.18
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.0%	0.47	170	18.46	0.85
51-4192	Lay-out workers, metal and plastic	0.0%	0.53	70	14.22	1.23
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	0.1%	1.70	940	15.05	1.04
51-4199	Metal workers and plastic workers, all other	0.2%	0.67	430	12.98	1.03
51-5023	Printing machine operators	0.0%	2.02	5,170	10.46	1.83
51-9023	Mixing and blending machine setters, operators, and tenders	0.0%	0.61	1,150	13.1	1.32
51-9061	Inspectors, testers, sorters, samplers, and weighers	2.9%	0.76	4,880	15.31	1.07
51-9111	Packaging and filling machine operators and tenders	0.1%	0.95	4,890	12.75	0.93
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.7%	1.16	1,580	13.98	1.20
51-9123	Painting, coating, and decorating workers	0.0%	1.05	420	11.65	0.95
51-9194	Etchers and engravers	0.0%	1.38	210	15.35	0.87
51-9198	Helpers--production workers	0.8%	0.96	6,880	11.85	0.94
51-9199	Production workers, all other	0.4%	1.58	6,090	15.86	0.89

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products NAICS 333400

333400 Ventilation, Heating, Air-Cond., and Commercial Refrigeration Equipment Mfg (Geothermal Heat Pumps & Solar Hot Water Heaters)

Occ. Code	Occupational Title	Percent of				Salary Ratio (MSP/NAT)
		Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	
47-0000	Construction and extraction occupations	4.3%	0.81	71,990	14	1.80
47-1011	First-line supervisors/managers of construction trades and extraction workers	0.0%	0.91	7,010	25.75	1.18
47-2111	Electricians	0.4%	0.83	6,860	17.01	1.87
47-2141	Painters, construction and maintenance	0.0%	0.91	3,200	10.75	1.70
47-2152	Plumbers, pipefitters, and steamfitters	0.1%	1.10	6,390	*	--
47-2211	Sheet metal workers	3.4%	1.03	2,430	13.62	2.03
47-3013	Helpers--electricians	--	0.14	190	8.55	1.54
49-0000	Installation, maintenance, and repair occupations	4.4%	0.78	55,740	17.47	1.19
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.4%	0.92	5,540	26.05	1.04
49-2092	Electric motor, power tool, and related repairers	--	0.31	90	13.14	1.48
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.1%	0.48	500	17.56	1.27
49-9021	Heating, air conditioning, and refrigeration mechanics and installers	1.4%	0.53	1,770	13.61	1.69
49-9041	Industrial machinery mechanics	0.6%	1.06	3,540	19.54	1.12
49-9042	Maintenance and repair workers, general	1.3%	0.51	8,920	17.7	1.06
49-9043	Maintenance workers, machinery	0.2%	0.28	300	18.15	0.97
49-9098	Helpers--installation, maintenance, and repair workers	0.1%	0.77	1,640	12.61	0.99
49-9099	Installation, maintenance, and repair workers, all other	0.0%	1.70	2,960	*	--
51-0000	Production occupations	59.2%	1.03	140,770	13.68	1.14
51-1011	First-line supervisors/managers of production and operating workers	3.1%	1.07	9,680	22.46	1.11
51-2022	Electrical and electronic equipment assemblers	1.2%	1.33	3,740	11.14	1.25
51-2023	Electromechanical equipment assemblers	--	1.52	1,210	15.25	0.95
51-2041	Structural metal fabricators and fitters	2.1%	0.47	620	14.51	1.25
51-2092	Team assemblers	19.2%	1.34	22,360	12.27	1.01
51-2099	Assemblers and fabricators, all other	2.6%	1.26	4,860	15.35	0.87
51-4011	Computer-controlled machine tool operators, metal and plastic	0.9%	1.69	3,150	15.23	1.19
51-4012	Numerical tool and process control programmers	0.2%	1.60	380	18.35	1.28
51-4021	Drilling and boring machine setters, operators, and tenders, metal and plastic	0.1%	0.80	1,000	13.84	1.04
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.1%	0.63	260	16.68	0.91
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	5.0%	1.04	3,750	13.06	1.14
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.6%	0.95	540	14.26	1.26
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.4%	0.93	820	14.25	1.22
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.3%	0.85	330	15.55	1.17
51-4041	Machinists	1.6%	1.14	5,890	15.95	1.24
51-4061	Model makers, metal and plastic	0.1%	0.99	110	16.04	1.53
51-4062	Patternmakers, metal and plastic	0.1%	0.99	110	14.39	1.71
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.3%	1.53	3,170	13.04	1.06
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	1.9%	0.68	880	14.27	1.31
51-4111	Tool and die makers	0.6%	1.24	1,610	19.26	1.20
51-4121	Welders, cutters, solderers, and brazers	6.1%	0.91	4,550	15.12	1.24
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	1.3%	0.51	330	14.08	1.35
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	--	0.47	170	15.56	1.00
51-4192	Lay-out workers, metal and plastic	0.1%	0.53	70	15.87	1.10
51-4194	Tool grinders, filers, and sharpeners	0.0%	0.64	150	11.14	1.58
51-4199	Metal workers and plastic workers, all other	--	0.67	430	14.73	0.91
51-6031	Sewing machine operators	0.2%	0.32	940	10.41	1.11
51-6062	Textile cutting machine setters, operators, and tenders	--	0.12	30	10.98	1.22
51-9012	Separating, filtering, clarifying, precipitating, and still machine setters, operators, and tenders	--	0.12	70	12.18	1.36
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.0%	0.47	260	11.03	1.99
51-9032	Cutting and slicing machine setters, operators, and tenders	0.2%	1.26	1,310	10.76	1.57
51-9061	Inspectors, testers, sorters, samplers, and weighers	2.3%	0.76	4,880	14.94	1.09
51-9111	Packaging and filling machine operators and tenders	0.1%	0.95	4,890	13.6	0.87
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	1.1%	1.16	1,580	13.7	1.22
51-9191	Cementing and gluing machine operators and tenders	0.1%	1.40	440	10.96	1.27
51-9193	Cooling and freezing equipment operators and tenders	--	--	**	15.73	0.67
51-9195	Molders, shapers, and casters, except metal and plastic	--	--	**	14.4	1.01
51-9196	Paper goods machine setters, operators, and tenders	--	1.78	2,700	13.27	1.22
51-9198	Helpers--production workers	2.9%	0.96	6,880	11.03	1.01
51-9199	Production workers, all other	--	1.58	6,090	12.6	1.12

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products NAICS 334400

334400 Semiconductor and Other Electronic Component Manufacturing (Solar/Photovoltaic Cells)

Occ. Code	Occupational Title	Percent of				Salary Ratio (MSP/NAT)
		Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	
47-0000	Construction and extraction occupations	0.1%	0.81	71,990	24.96	1.01
47-2111	Electricians	0.0%	0.83	6,860	21.93	1.45
47-4041	Hazardous materials removal workers	0.0%	0.93	480	16.44	1.59
49-0000	Installation, maintenance, and repair occupations	2.6%	0.78	55,740	21.15	0.98
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.2%	0.92	5,540	31.67	0.86
49-2011	Computer, automated teller, and office machine repairers	0.0%	1.14	2,130	21.23	0.89
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.4%	0.48	500	22.12	1.01
49-9021	Heating, air conditioning, and refrigeration mechanics and installers	0.0%	0.53	1,770	26.62	0.86
49-9041	Industrial machinery mechanics	0.8%	1.06	3,540	21.43	1.02
49-9042	Maintenance and repair workers, general	1.0%	0.51	8,920	19.13	0.98
49-9043	Maintenance workers, machinery	0.0%	0.28	300	17.73	1.00
49-9069	Precision instrument and equipment repairers, all other	0.0%	0.69	120	18.93	1.14
49-9099	Installation, maintenance, and repair workers, all other	0.1%	1.70	2,960	21.37	0.89
51-0000	Production occupations	42.0%	1.03	140,770	13.1	1.19
51-1011	First-line supervisors/managers of production and operating workers	2.8%	1.07	9,680	25.06	0.99
51-2011	Aircraft structure, surfaces, rigging, and systems assemblers	--	1.07	9,680	27.08	0.92
51-2021	Coil winders, tapers, and finishers	1.1%	1.07	9,680	10.55	2.36
51-2022	Electrical and electronic equipment assemblers	10.9%	1.33	3,740	11.45	1.22
51-2023	Electromechanical equipment assemblers	1.7%	1.52	1,210	11.61	1.25
51-2041	Structural metal fabricators and fitters	0.0%	0.47	620	12.2	1.49
51-2092	Team assemblers	4.5%	1.34	22,360	10.94	1.14
51-2093	Timing device assemblers, adjusters, and calibrators	0.0%	3.96	130	15.01	0.94
51-2099	Assemblers and fabricators, all other	0.7%	1.26	4,860	12	1.11
51-4011	Computer-controlled machine tool operators, metal and plastic	0.7%	1.69	3,150	13.35	1.36
51-4012	Numerical tool and process control programmers	0.0%	1.60	380	16.88	1.39
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.1%	0.80	1,000	11.3	1.27
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.0%	0.63	260	15.13	1.00
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	--	0.48	220	9.39	1.62
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	0.7%	1.04	3,750	11.8	1.26
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.1%	0.95	540	12.41	1.44
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.0%	1.24	1,650	10.66	1.60
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.1%	0.93	820	14.96	1.16
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.0%	0.85	330	16.54	1.10
51-4041	Machinists	1.1%	1.14	5,890	16.51	1.20
51-4061	Model makers, metal and plastic	0.0%	0.99	110	23.89	1.03
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.4%	1.53	3,170	12.32	1.12
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	0.2%	0.68	880	14.35	1.30
51-4111	Tool and die makers	0.1%	1.24	1,610	21.28	1.08
51-4121	Welders, cutters, solderers, and brazers	0.8%	0.91	4,550	12.22	1.54
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	0.1%	0.51	330	11.73	1.62
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	--	0.47	170	10.38	1.50
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	0.9%	1.70	940	12.72	1.23
51-4199	Metal workers and plastic workers, all other	0.1%	0.67	430	13.8	0.97
51-5022	Prepress technicians and workers	0.1%	1.63	1,540	13.03	1.63
51-5023	Printing machine operators	0.1%	2.02	5,170	13.25	1.45
51-8021	Stationary engineers and boiler operators	0.0%	1.84	1,050	28.75	0.84
51-8031	Water and liquid waste treatment plant and system operators	0.0%	0.67	950	17.27	1.27
51-9011	Chemical equipment operators and tenders	0.0%	--	**	14.71	1.04
51-9023	Mixing and blending machine setters, operators, and tenders	0.0%	0.61	1,150	14.48	1.19
51-9032	Cutting and slicing machine setters, operators, and tenders	0.0%	1.26	1,310	12.09	1.39
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.0%	0.54	580	13.05	1.26
51-9051	Furnace, kiln, oven, drier, and kettle operators and tenders	0.0%	0.54	580	13.43	1.23
51-9061	Inspectors, testers, sorters, samplers, and weighers	3.9%	0.76	4,880	13.32	1.23
51-9111	Packaging and filling machine operators and tenders	0.0%	0.95	4,890	12.34	0.96
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.1%	1.16	1,580	12.92	1.30
51-9131	Photographic process workers	0.0%	2.08	670	12.64	1.20
51-9132	Photographic processing machine operators	0.0%	1.20	800	9.15	1.17
51-9141	Semiconductor processors	8.2%	--	**	15.72	1.01
51-9194	Etchers and engravers	0.1%	1.38	210	11.74	1.13
51-9195	Molders, shapers, and casters, except metal and plastic	0.0%	--	**	14.23	1.02
51-9198	Helpers--production workers	0.4%	0.96	6,880	10.41	1.07
51-9199	Production workers, all other	1.3%	1.58	6,090	12.69	1.12

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products NAICS 326100

325100 Basic Chemical Manufacturing (Bio-Fuels)

Occ. Code	Occupational Title	Percent of Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
00-0000	Industry Total					
47-0000	Construction and extraction occupations	2.0%	0.81	71,990	23.51	1.07
47-1011	First-line supervisors/managers of construction trades and extraction workers	0.0%	0.91	7,010	31.17	0.97
47-2011	Boilermakers	0.0%	0.78	180	28.35	0.88
47-2031	Carpenters	0.1%	1.06	13,930	19.78	1.09
47-2073	Operating engineers and other construction equipment operators	--	1.02	5,370	22.45	1.17
47-2111	Electricians	0.9%	0.83	6,860	24.43	1.30
47-2131	Insulation workers, floor, ceiling, and wall	0.1%	0.88	370	14.36	1.39
47-2141	Painters, construction and maintenance	0.0%	0.91	3,200	17.14	1.07
47-2152	Plumbers, pipefitters, and steamfitters	0.5%	1.10	6,390	23.65	1.28
47-5042	Mine cutting and channeling machine operators	--	0.67	170	21.12	0.82
49-0000	Installation, maintenance, and repair occupations	11.0%	0.78	55,740	23.41	0.89
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	1.2%	0.92	5,540	33.55	0.81
49-2092	Electric motor, power tool, and related repairers	0.1%	0.31	90	20.47	0.95
49-2094	Electrical and electronics repairers, commercial and industrial equipment	1.2%	0.48	500	26.02	0.86
49-3023	Automotive service technicians and mechanics	0.1%	0.80	6,840	21.19	0.84
49-3031	Bus and truck mechanics and diesel engine specialists	0.1%	0.87	2,960	18.43	1.08
49-3042	Mobile heavy equipment mechanics, except engines	--	0.85	1,350	17.7	1.31
49-9012	Control and valve installers and repairers, except mechanical door	0.0%	0.89	500	22.31	1.01
49-9041	Industrial machinery mechanics	3.3%	1.06	3,540	22.82	0.96
49-9042	Maintenance and repair workers, general	3.6%	0.51	8,920	21.14	0.89
49-9043	Maintenance workers, machinery	0.5%	0.28	300	23.51	0.75
49-9044	Millwrights	0.2%	0.77	550	24.2	1.10
49-9098	Helpers--installation, maintenance, and repair workers	0.1%	0.77	1,640	11.15	1.12
49-9099	Installation, maintenance, and repair workers, all other	0.1%	1.70	2,960	21.5	0.88
51-0000	Production occupations	42.8%	1.03	140,770	21.77	0.71
51-1011	First-line supervisors/managers of production and operating workers	4.7%	1.07	9,680	30.84	0.81
51-2092	Team assemblers	0.6%	1.34	22,360	13.3	0.93
51-2099	Assemblers and fabricators, all other	0.0%	1.26	4,860	15.2	0.87
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.1%	0.80	1,000	13.8	1.04
51-4041	Machinists	0.7%	1.14	5,890	18.56	1.06
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	--	1.53	3,170	9.7	1.43
51-4111	Tool and die makers	0.1%	1.24	1,610	24.08	0.96
51-4121	Welders, cutters, solderers, and brazers	0.3%	0.91	4,550	19.85	0.95
51-8021	Stationary engineers and boiler operators	0.1%	1.84	1,050	22.61	1.07
51-8031	Water and liquid waste treatment plant and system operators	0.0%	0.67	950	20.45	1.07
51-8091	Chemical plant and system operators	16.3%	--	**	24.72	0.81
51-8092	Gas plant operators	0.2%	--	**	23.34	1.04
51-8099	Plant and system operators, all other	0.3%	1.25	230	23.51	0.89
51-9011	Chemical equipment operators and tenders	7.7%	--	**	20.74	0.74
51-9012	Separating, filtering, clarifying, precipitating, and still machine setters, operators, and tenders	1.8%	0.12	70	18.43	0.90
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.1%	0.47	260	15.05	1.46
51-9023	Mixing and blending machine setters, operators, and tenders	3.8%	0.61	1,150	15	1.15
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.2%	0.54	580	15.43	1.07
51-9051	Furnace, kiln, oven, drier, and kettle operators and tenders	0.2%	0.54	580	11.17	1.48
51-9061	Inspectors, testers, sorters, samplers, and weighers	1.4%	0.76	4,880	17.77	0.92
51-9111	Packaging and filling machine operators and tenders	2.1%	0.95	4,890	14.02	0.84
51-9192	Cleaning, washing, and metal pickling equipment operators and tenders	0.0%	0.39	80	11.64	1.35
51-9198	Helpers--production workers	0.8%	0.96	6,880	12.53	0.89
51-9199	Production workers, all other	0.4%	1.58	6,090	17.9	0.79

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products 334500

334500 Navigational, Measuring, Electromedical, and Control Instruments Manufacturing (Sensors & Diagnostic Systems)

Occ. Code	Occupational Title	Percent of				
		Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
47-0000	Construction and extraction occupations	0.2%	0.81	71,990	23.97	1.05
47-2031	Carpenters	0.0%	1.06	13,930	26.21	0.82
47-2111	Electricians	0.1%	0.83	6,860	24.3	1.31
47-2141	Painters, construction and maintenance	0.0%	0.91	3,200	17.83	1.03
47-2152	Plumbers, pipefitters, and steamfitters	0.0%	1.10	6,390	28.2	1.07
47-2211	Sheet metal workers	0.0%	1.03	2,430	19.78	1.40
49-0000	Installation, maintenance, and repair occupations	3.2%	0.78	55,740	21	0.99
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.3%	0.92	5,540	30.55	0.89
49-2011	Computer, automated teller, and office machine repairers	0.0%	1.14	2,130	18.37	1.03
49-2091	Avionics technicians	0.2%	0.24	50	22.96	1.08
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.9%	0.48	500	20.44	1.09
49-3011	Aircraft mechanics and service technicians	0.1%	1.45	1,000	24.64	0.84
49-9012	Control and valve installers and repairers, except mechanical door	0.0%	0.89	500	21.31	1.06
49-9021	Heating, air conditioning, and refrigeration mechanics and installers	0.0%	0.53	1,770	25.39	0.91
49-9041	Industrial machinery mechanics	0.3%	1.06	3,540	19.9	1.10
49-9042	Maintenance and repair workers, general	0.7%	0.51	8,920	19.19	0.98
49-9043	Maintenance workers, machinery	0.1%	0.28	300	18.75	0.94
49-9044	Millwrights	0.0%	0.77	550	16.8	1.59
49-9062	Medical equipment repairers	0.1%	1.47	630	20.44	1.17
49-9069	Precision instrument and equipment repairers, all other	0.1%	0.69	120	18.33	1.18
49-9098	Helpers--installation, maintenance, and repair workers	0.0%	0.77	1,640	13.92	0.90
49-9099	Installation, maintenance, and repair workers, all other	0.3%	1.70	2,960	22.78	0.83
51-0000	Production occupations	28.5%	1.03	140,770	14.29	1.09
51-1011	First-line supervisors/managers of production and operating workers	2.1%	1.07	9,680	25.85	0.96
51-2011	Aircraft structure, surfaces, rigging, and systems assemblers	0.1%	1.07	9,680	22.9	1.09
51-2021	Coil winders, tapers, and finishers	0.2%	1.07	9,680	11.78	2.11
51-2022	Electrical and electronic equipment assemblers	7.1%	1.33	3,740	13.42	1.04
51-2023	Electromechanical equipment assemblers	3.6%	1.52	1,210	13.28	1.09
51-2041	Structural metal fabricators and fitters	0.0%	0.47	620	15.99	1.14
51-2092	Team assemblers	5.4%	1.34	22,360	12.75	0.98
51-2093	Timing device assemblers, adjusters, and calibrators	0.2%	3.96	130	12.87	1.10
51-2099	Assemblers and fabricators, all other	0.8%	1.26	4,860	13.62	0.98
51-4011	Computer-controlled machine tool operators, metal and plastic	0.5%	1.69	3,150	15.18	1.20
51-4012	Numerical tool and process control programmers	0.1%	1.60	380	19.31	1.21
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	--	0.80	1,000	16.6	0.86
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	0.5%	1.04	3,750	13.39	1.11
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.0%	0.95	540	13.76	1.30
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.1%	1.24	1,650	14.23	1.20
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.0%	0.93	820	16.29	1.07
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.1%	0.85	330	16.1	1.13
51-4041	Machinists	1.8%	1.14	5,890	17.12	1.15
51-4061	Model makers, metal and plastic	0.0%	0.99	110	25.09	0.98
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.4%	1.53	3,170	13.16	1.05
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	0.2%	0.68	880	19.18	0.97
51-4111	Tool and die makers	0.2%	1.24	1,610	22.47	1.03
51-4121	Welders, cutters, solderers, and brazers	0.4%	0.91	4,550	15.32	1.23
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	0.0%	0.51	330	14.17	1.34
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.0%	0.47	170	12.84	1.22
51-4192	Lay-out workers, metal and plastic	--	0.53	70	11.56	1.51
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	0.1%	1.70	940	12.61	1.24
51-4199	Metal workers and plastic workers, all other	0.1%	0.67	430	17.12	0.78
51-5022	Prepress technicians and workers	0.0%	1.63	1,540	13.63	1.56
51-5023	Printing machine operators	0.0%	2.02	5,170	15.09	1.27
51-6031	Sewing machine operators	0.0%	0.32	940	10.63	1.09
51-9011	Chemical equipment operators and tenders	0.0%	--	**	17.31	0.88
51-9022	Grinding and polishing workers, hand	0.0%	0.89	520	12.28	1.21
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.0%	0.54	580	15.24	1.08
51-9061	Inspectors, testers, sorters, samplers, and weighers	2.4%	0.76	4,880	16.35	1.00
51-9082	Medical appliance technicians	0.1%	0.42	60	17.65	1.06
51-9083	Ophthalmic laboratory technicians	0.0%	1.54	600	18.26	0.72
51-9111	Packaging and filling machine operators and tenders	0.1%	0.95	4,890	13.79	0.86
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.1%	1.16	1,580	14.26	1.18
51-9123	Painting, coating, and decorating workers	0.0%	1.05	420	13.74	0.81
51-9141	Semiconductor processors	0.1%	--	**	15.5	1.03
51-9194	Etchers and engravers	--	1.38	210	11.22	1.19
51-9195	Molders, shapers, and casters, except metal and plastic	0.0%	--	**	16.69	0.87
51-9198	Helpers--production workers	0.6%	0.96	6,880	10.62	1.05
51-9199	Production workers, all other	0.5%	1.58	6,090	*	--

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products NAICS 321900

321900 Other Wood Product Manufacturing (Pelletization Systems)

Occ. Code	Occupational Title	Percent of				Salary Ratio (MSP/NAT)
		Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	
47-0000	Construction and extraction occupations	9.4%	0.81	71,990	13.48	1.87
47-1011	First-line supervisors/managers of construction trades and extraction workers	0.5%	0.91	7,010	21.58	1.41
47-2031	Carpenters	6.1%	1.06	13,930	13.84	1.56
47-2041	Carpet installers	0.0%	1.53	750	11.83	2.00
47-2042	Floor layers, except carpet, wood, and hard tiles	0.0%	1.53	750	11.69	2.03
47-2043	Floor sanders and finishers	0.0%	3.01	300	12.66	1.70
47-2051	Cement masons and concrete finishers	--	0.83	2,430	13.11	1.75
47-2061	Construction laborers	1.1%	0.50	6,730	11.67	1.94
47-2081	Drywall and ceiling tile installers	0.2%	0.42	790	13.69	2.28
47-2111	Electricians	0.5%	0.83	6,860	15.11	2.10
47-2121	Glaziers	0.1%	0.43	300	14.09	1.49
47-2141	Painters, construction and maintenance	0.1%	0.91	3,200	10.93	1.67
47-2152	Plumbers, pipefitters, and steamfitters	0.1%	1.10	6,390	14.49	2.09
47-2181	Roofers	0.1%	0.54	900	13.55	1.94
47-3012	Helpers--carpenters	0.5%	0.67	930	10.37	1.20
47-4099	Construction and related workers, all other	0.0%	0.72	540	11.61	1.47
49-0000	Installation, maintenance, and repair occupations	2.8%	0.78	55,740	15.48	1.34
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.2%	0.92	5,540	23.07	1.18
49-3031	Bus and truck mechanics and diesel engine specialists	0.0%	0.87	2,960	16.23	1.23
49-3042	Mobile heavy equipment mechanics, except engines	0.0%	0.85	1,350	17.21	1.35
49-9041	Industrial machinery mechanics	0.5%	1.06	3,540	16.84	1.29
49-9042	Maintenance and repair workers, general	1.3%	0.51	8,920	14.7	1.28
49-9043	Maintenance workers, machinery	0.2%	0.28	300	13.24	1.33
49-9044	Millwrights	0.1%	0.77	550	19.27	1.39
49-9095	Manufactured building and mobile home installers	0.3%	0.47	60	13.02	1.08
49-9098	Helpers--installation, maintenance, and repair workers	0.0%	0.77	1,640	11.7	1.07
49-9099	Installation, maintenance, and repair workers, all other	0.2%	1.70	2,960	15.75	1.20
51-0000	Production occupations	54.8%	1.03	140,770	11.44	1.36
51-1011	First-line supervisors/managers of production and operating workers	3.6%	1.07	9,680	19.84	1.25
51-2041	Structural metal fabricators and fitters	--	0.47	620	17.94	1.01
51-2091	Fiberglass laminators and fabricators	0.0%	0.25	110	11.77	1.05
51-2092	Team assemblers	14.5%	1.34	22,360	11.11	1.12
51-2099	Assemblers and fabricators, all other	1.9%	1.26	4,860	10.99	1.21
51-4011	Computer-controlled machine tool operators, metal and plastic	--	1.69	3,150	11.76	1.55
51-4012	Numerical tool and process control programmers	0.0%	1.60	380	19.15	1.22
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	0.0%	0.48	220	15.41	0.99
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	1.3%	1.04	3,750	12.1	1.23
51-4041	Machinists	0.0%	1.14	5,890	15.9	1.24
51-4111	Tool and die makers	0.0%	1.24	1,610	19.58	1.18
51-4121	Welders, cutters, solderers, and brazers	0.5%	0.91	4,550	13.49	1.39
51-4194	Tool grinders, filers, and sharpeners	0.2%	0.64	150	15.22	1.15
51-4199	Metal workers and plastic workers, all other	0.0%	0.67	430	13.02	1.03
51-5023	Printing machine operators	0.0%	2.02	5,170	10.78	1.78
51-7011	Cabinetmakers and bench carpenters	4.9%	1.37	2,340	12.49	1.33
51-7021	Furniture finishers	0.3%	0.51	170	11.56	1.28
51-7031	Model makers, wood	--	0.51	170	13.18	1.12
51-7032	Patternmakers, wood	0.1%	0.51	170	10.38	1.42
51-7041	Sawing machine setters, operators, and tenders, wood	5.4%	0.54	430	10.73	1.38
51-7042	Woodworking machine setters, operators, and tenders, except sawing	11.3%	1.13	1,470	10.94	1.23
51-7099	Woodworkers, all other	1.1%	--	--	9.83	1.10
51-8021	Stationary engineers and boiler operators	0.1%	1.84	1,050	13.79	1.75
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.1%	0.47	260	11	2.00
51-9022	Grinding and polishing workers, hand	0.3%	0.89	520	9.41	1.58
51-9023	Mixing and blending machine setters, operators, and tenders	0.0%	0.61	1,150	12.17	1.42
51-9031	Cutters and trimmers, hand	0.1%	0.94	360	11.92	1.14
51-9032	Cutting and slicing machine setters, operators, and tenders	0.2%	1.26	1,310	11.71	1.44
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	--	0.54	580	11.53	1.43
51-9051	Furnace, kiln, oven, drier, and kettle operators and tenders	0.3%	0.54	580	13.01	1.27
51-9061	Inspectors, testers, sorters, samplers, and weighers	1.3%	0.76	4,880	12.12	1.35
51-9111	Packaging and filling machine operators and tenders	0.3%	0.95	4,890	10.9	1.08
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.9%	1.16	1,580	12.07	1.39
51-9123	Painting, coating, and decorating workers	0.1%	1.05	420	9.74	1.14
51-9191	Cementing and gluing machine operators and tenders	0.5%	1.40	440	11.95	1.16
51-9198	Helpers--production workers	4.1%	0.96	6,880	10.06	1.11
51-9199	Production workers, all other	0.6%	1.58	6,090	11.8	1.20

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Renewable Energy Products NAICS 333800

333600 Engine, Turbine, and Power Transmission Equipment Manufacturing (Distributed Energy Systems)

Occ. Code	Occupational Title	Percent of				Salary Ratio (MSP/NAT)
		Total Industry Employment (%)	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	
47-0000	Construction and extraction occupations	1.5%	0.81	71,990	24.3	1.04
47-1011	First-line supervisors/managers of construction trades and extraction workers	--	0.91	7,010	32.37	0.94
47-2111	Electricians	1.1%	0.83	6,860	23.87	1.33
47-2211	Sheet metal workers	0.1%	1.03	2,430	23.78	1.16
49-0000	Installation, maintenance, and repair occupations	5.6%	0.78	55,740	20.37	1.02
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.5%	0.92	5,540	29.16	0.93
49-2093	Electrical and electronics installers and repairers, transportation equipment	0.3%	0.31	90	20.22	0.96
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.1%	0.48	500	19.73	1.13
49-3031	Bus and truck mechanics and diesel engine specialists	0.1%	0.87	2,960	17.73	1.12
49-3042	Mobile heavy equipment mechanics, except engines	--	0.85	1,350	16.79	1.38
49-9012	Control and valve installers and repairers, except mechanical door	0.0%	0.89	500	24.98	0.91
49-9041	Industrial machinery mechanics	1.5%	1.06	3,540	20.17	1.08
49-9042	Maintenance and repair workers, general	2.6%	0.51	8,920	19.39	0.97
49-9043	Maintenance workers, machinery	0.1%	0.28	300	21.25	0.83
49-9099	Installation, maintenance, and repair workers, all other	0.1%	1.70	2,960	24.6	0.77
51-0000	Production occupations	58.4%	1.03	140,770	15.89	0.98
51-1011	First-line supervisors/managers of production and operating workers	3.7%	1.07	9,680	25.84	0.96
51-2021	Coil winders, tapers, and finishers	0.1%	1.07	9,680	*	--
51-2022	Electrical and electronic equipment assemblers	--	1.33	3,740	15.11	0.92
51-2023	Electromechanical equipment assemblers	0.6%	1.52	1,210	14.8	0.98
51-2031	Engine and other machine assemblers	7.0%	0.37	220	13.87	1.27
51-2041	Structural metal fabricators and fitters	--	0.47	620	17.03	1.07
51-2092	Team assemblers	10.8%	1.34	22,360	12.81	0.97
51-2099	Assemblers and fabricators, all other	3.2%	1.26	4,860	15.02	0.89
51-4011	Computer-controlled machine tool operators, metal and plastic	3.2%	1.69	3,150	15.54	1.17
51-4012	Numerical tool and process control programmers	0.5%	1.60	380	19.57	1.20
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.0%	0.63	260	17.94	0.85
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	0.1%	0.48	220	12.23	1.24
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	1.2%	1.04	3,750	14.34	1.04
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	1.4%	0.95	540	17.45	1.03
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	1.9%	1.24	1,650	13.83	1.23
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	2.8%	0.93	820	16.73	1.04
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.9%	0.85	330	17.67	1.03
51-4041	Machinists	6.7%	1.14	5,890	17.72	1.11
51-4051	Metal-refining furnace operators and tenders	0.1%	0.61	150	16.47	1.05
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.5%	1.53	3,170	14.55	0.95
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	2.4%	0.68	880	16.71	1.12
51-4111	Tool and die makers	0.9%	1.24	1,610	20.91	1.10
51-4121	Welders, cutters, solderers, and brazers	1.5%	0.91	4,550	17.35	1.08
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	--	0.51	330	17.22	1.11
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.6%	0.47	170	16.07	0.97
51-4194	Tool grinders, filers, and sharpeners	0.5%	0.64	150	17.92	0.98
51-4199	Metal workers and plastic workers, all other	0.1%	0.67	430	15.62	0.86
51-8021	Stationary engineers and boiler operators	0.1%	1.84	1,050	25.21	0.96
51-9022	Grinding and polishing workers, hand	0.1%	0.89	520	13.24	1.12
51-9061	Inspectors, testers, sorters, samplers, and weighers	3.3%	0.76	4,880	16.76	0.98
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.4%	1.16	1,580	15.2	1.10
51-9198	Helpers--production workers	0.9%	0.96	6,880	12.65	0.88
51-9199	Production workers, all other	0.3%	1.58	6,090	16.3	0.87

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation NAICS 336100

336100 Motor Vehicle Manufacturing

Occ. Code	Occupation	Percent of Industry Employment	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
00-0000	Industry Total				25.84	
49-0000	Installation, maintenance, and repair occupations	7.34	0.78	55740	28.28	1.17
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.71	0.92	5540	37.22	1.05
49-2093	Electrical and electronics installers and repairers, transportation equipment	0.02	--	--	15.67	--
49-3031	Bus and truck mechanics and diesel engine specialists	0.21	0.87	2960	29.04	1.10
49-9041	Industrial machinery mechanics	1.19	1.06	3540	29.46	1.10
49-9042	Maintenance and repair workers, general	2.12	0.51	8920	24.94	1.22
49-9043	Maintenance workers, machinery	0.12	0.28	300	25.7	1.06
51-0000	Production occupations	65.62	1.03	140770	24.55	1.18
51-1011	First-line supervisors/managers of production and operating workers	2.81	1.07	9680	30.98	1.09
51-2022	Electrical and electronic equipment assemblers	0.11	1.33	3740	--	--
51-2031	Engine and other machine assemblers	--	0.37	220	25.5	1.10
51-2041	Structural metal fabricators and fitters	0.08	0.47	620	--	--
51-2091	Fiberglass laminators and fabricators	0.05	0.25	110	12.19	0.99
51-2092	Team assemblers	24.31	1.34	22360	21.6	1.07
51-2099	Assemblers and fabricators, all other	18.67	1.26	4860	25.23	1.03
51-4011	Computer-controlled machine tool operators, metal and plastic	0.18	1.69	3150	13.66	1.20
51-4012	Numerical tool and process control programmers	0.02	1.60	380	18.73	1.15
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.03	0.63	260	11.68	1.09
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	--	1.04	3750	17.36	1.18
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.28	1.24	1650	25.23	1.26
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.03	0.93	820	--	--
51-4121	Welders, cutters, solderers, and brazers	1.25	0.91	4550	20.62	1.25
51-6031	Sewing machine operators	0.02	0.32	940	11.47	1.28
51-6093	Upholsterers	0.02	0.20	110	10.49	1.15
51-8099	Plant and system operators, all other	0.02	1.25	230	28.24	0.94
51-9022	Grinding and polishing workers, hand	0.08	0.89	520	--	--
51-9061	Inspectors, testers, sorters, samplers, and weighers	2.74	0.76	4880	25.45	1.16
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.31	1.16	1580	21.9	1.30
51-9122	Painters, transportation equipment	2.21	0.65	450	23.98	1.39
51-9198	Helpers--production workers	--	0.96	6880	12.28	1.12
53-0000	Transportation and material moving occupations	5.21	0.85	109190	24.92	1.18
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	0.28	1.08	2580	31.33	1.12
53-3032	Truck drivers, heavy and tractor-trailer	0.3	0.79	17690	25.06	1.15
53-7021	Crane and tower operators	0.05	0.62	380	19.12	1.25
53-7051	Industrial truck and tractor operators	1.46	0.81	6780	24.92	1.25
53-7062	Laborers and freight, stock, and material movers, hand	1.76	0.73	23000	24.39	1.19
53-7199	Material moving workers, all other	0.33	--	--	19.13	--

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation NAICS 336200

336200 Motor Vehicle Body and Trailer Manufacturing

Occ. Code	Occupation	Percent of Industry Employment	Minneapolis / Saint Paul Location Quotient	Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
00-0000	Industry Total				14.19	
17-0000	Architecture and engineering occupations	2.67	1.19	38670	26.06	0.97
17-2071	Electrical engineers	0.07	1.26	2480	30.79	1.00
17-2072	Electronics engineers, except computer	0.03	1.02	1790	30.47	0.93
17-2112	Industrial engineers	0.79	1.88	4980	28.15	1.07
17-2141	Mechanical engineers	0.75	1.33	3850	31.46	0.95
17-2199	Engineers, all other	0.11	--	--	--	--
17-3013	Mechanical drafters	0.41	1.72	1670	19.46	1.12
17-3019	Drafters, all other	0.05	0.69	210	15.54	1.08
17-3023	Electrical and electronic engineering technicians	0.03	1.19	2630	20.23	0.94
17-3026	Industrial engineering technicians	0.27	2.49	2450	19.25	1.00
17-3027	Mechanical engineering technicians	0.05	2.47	1540	21.1	1.08
17-3029	Engineering technicians, except drafters, all other	0.03	1.72	1800	28.4	1.01
49-0000	Installation, maintenance, and repair occupations	4.34	0.78	55740	17.16	1.17
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.38	0.92	5540	23.29	1.05
49-2093	Electrical and electronics installers and repairers, transportation equipment	0.15	--	--	16.12	--
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.02	0.48	500	21.4	1.03
49-2096	Electronic equipment installers and repairers, motor vehicles	0.1	0.85	220	15.65	1.06
49-3011	Aircraft mechanics and service technicians	0.07	--	--	21.06	--
49-3021	Automotive body and related repairers	0.23	0.75	1560	13.66	1.29
49-3023	Automotive service technicians and mechanics	0.11	0.80	6840	15.14	1.09
49-3031	Bus and truck mechanics and diesel engine specialists	0.42	0.87	2960	17.28	1.10
49-3042	Mobile heavy equipment mechanics, except engines	0.04	0.85	1350	14.73	1.19
49-3092	Recreational vehicle service technicians	0.22	0.61	110	16.8	1.37
49-9041	Industrial machinery mechanics	--	1.06	3540	18.58	1.10
49-9042	Maintenance and repair workers, general	1.28	0.51	8920	16.72	1.22
49-9043	Maintenance workers, machinery	0.23	0.28	300	15.94	1.06
49-9044	Millwrights	0.11	0.77	550	26.64	1.22
49-9098	Helpers--installation, maintenance, and repair workers	0.03	0.77	1640	11.87	1.17
49-9099	Installation, maintenance, and repair workers, all other	0.19	1.70	2960	16.14	1.20
51-0000	Production occupations	69.7	1.03	140770	13.46	1.18
51-1011	First-line supervisors/managers of production and operating workers	4.13	1.07	9680	20.26	1.09
51-2021	Coil winders, tapers, and finishers	--	--	--	16.36	--
51-2022	Electrical and electronic equipment assemblers	0.45	1.33	3740	13.75	1.13
51-2023	Electromechanical equipment assemblers	0.13	1.52	1210	*	1.10
51-2031	Engine and other machine assemblers	--	0.37	220	12.43	1.10
51-2041	Structural metal fabricators and fitters	3.01	0.47	620	13.63	1.25
51-2091	Fiberglass laminators and fabricators	1.06	0.25	110	11.97	0.99
51-2092	Team assemblers	24.55	1.34	22360	13	1.07
51-2099	Assemblers and fabricators, all other	--	1.26	4860	12.52	1.03
51-4011	Computer-controlled machine tool operators, metal and plastic	0.69	1.69	3150	14.64	1.20
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.07	0.80	1000	14.88	1.06
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.1	0.63	260	12.35	1.09
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	1.99	1.04	3750	13.22	1.18
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.25	0.95	540	13.37	1.25
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.73	1.24	1650	12.65	1.26
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.29	0.85	330	19.06	1.20
51-4041	Machinists	1.25	1.14	5890	15.91	1.18
51-4061	Model makers, metal and plastic	0.05	0.99	110	15.55	1.21
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	--	1.53	3170	12.43	1.13
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	0.15	0.68	880	14.69	1.27
51-4111	Tool and die makers	0.29	1.24	1610	20.47	1.08
51-4121	Welders, cutters, solderers, and brazers	11.61	0.91	4550	13.68	1.25
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	1.42	0.51	330	13.28	1.28
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.04	0.47	170	11.02	1.05
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	--	1.70	940	12.41	1.19
51-4194	Tool grinders, filers, and sharpeners	0.02	0.64	150	11.27	1.19
51-4199	Metal workers and plastic workers, all other	0.08	0.67	430	14.57	0.80
51-6031	Sewing machine operators	0.32	0.32	940	12.95	1.28
51-6092	Fabric and apparel patternmakers	0.02	--	--	10.27	--
51-6093	Upholsterers	0.02	0.20	110	11.26	1.15
51-7011	Cabinetmakers and bench carpenters	0.32	1.37	2340	11.03	1.28
51-7041	Sawing machine setters, operators, and tenders, wood	0.09	0.54	430	10.23	1.27
51-7042	Woodworking machine setters, operators, and tenders, except sawing	0.06	1.13	1470	10.62	1.17
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.06	0.47	260	13.57	1.63
51-9022	Grinding and polishing workers, hand	0.67	0.89	520	11.86	1.29
51-9032	Cutting and slicing machine setters, operators, and tenders	0.02	1.26	1310	13.76	1.25
51-9061	Inspectors, testers, sorters, samplers, and weighers	1.8	0.76	4880	14.4	1.16
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.53	1.16	1580	12.64	1.30
51-9122	Painters, transportation equipment	2.53	0.65	450	14.54	1.39
51-9123	Painting, coating, and decorating workers	0.03	1.05	420	15.3	1.00
51-9191	Cementing and gluing machine operators and tenders	0.21	1.40	440	10.49	1.15
51-9198	Helpers--production workers	2.93	0.96	6880	11.1	1.12
51-9199	Production workers, all other	1.26	1.58	6090	14.75	1.18
53-0000	Transportation and material moving occupations	4.86	0.85	109190	13.07	1.18
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	0.18	1.08	2580	20.66	1.12
53-3032	Truck drivers, heavy and tractor-trailer	0.28	0.79	17690	14.93	1.15
53-3033	Truck drivers, light or delivery services	0.3	0.79	9880	10.65	1.12
53-3099	Motor vehicle operators, all other	0.12	1.02	980	14.2	0.84
53-7051	Industrial truck and tractor operators	1.74	0.81	6780	13.48	1.25
53-7061	Cleaners of vehicles and equipment	0.11	0.95	4230	10.29	1.20
53-7062	Laborers and freight, stock, and material movers, hand	1.78	0.73	23000	12.02	1.19
53-7064	Packers and packagers, hand	0.14	1.01	11170	12.34	1.22

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation NAICS 336300

336300 Motor Vehicle Parts Manufacturing

Occ. Code	Occupation	Percent of Industry Employment	Local Location Quotient	Total Local Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
00-0000	Industry Total				17.17	
17-0000	Architecture and engineering occupations	7.2	1.19	38670	30.5	0.97
17-2041	Chemical engineers	0.02	0.77	300	34.46	0.93
17-2072	Electronics engineers, except computer	0.05	1.02	1790	33.55	0.93
17-2111	Health and safety engineers, except mining safety engineers and inspectors	0.03	0.73	240	30.36	1.08
17-2112	Industrial engineers	2.07	1.88	4980	31.97	1.07
17-2131	Materials engineers	0.07	0.46	130	32.26	0.99
17-2141	Mechanical engineers	1.43	1.33	3850	33.05	0.95
17-3012	Electrical and electronics drafters	0.01	1.25	540	28.27	1.04
17-3013	Mechanical drafters	0.22	1.72	1670	22.55	1.12
17-3023	Electrical and electronic engineering technicians	0.08	1.19	2630	21.28	0.94
17-3026	Industrial engineering technicians	0.64	2.49	2450	20.6	1.00
17-3027	Mechanical engineering technicians	0.15	2.47	1540	22	1.08
49-0000	Installation, maintenance, and repair occupations	6.59	0.78	55740	22.27	1.17
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.51	0.92	5540	30.83	1.05
49-2093	Electrical and electronics installers and repairers, transportation equipment	0.09	--	--	17.68	--
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.03	0.48	500	21.76	1.03
49-3023	Automotive service technicians and mechanics	0.31	0.80	6840	13.72	1.09
49-3031	Bus and truck mechanics and diesel engine specialists	0.08	0.87	2960	28.69	1.10
49-9021	Heating, air conditioning, and refrigeration mechanics and installers	0.06	0.53	1770	29.2	1.27
49-9041	Industrial machinery mechanics	1.47	1.06	3540	24.97	1.10
49-9042	Maintenance and repair workers, general	2.04	0.51	8920	19.84	1.22
49-9043	Maintenance workers, machinery	0.5	0.28	300	18.3	1.06
49-9098	Helpers--installation, maintenance, and repair workers	0.03	0.77	1640	12.13	1.17
49-9099	Installation, maintenance, and repair workers, all other	0.21	1.70	2960	25.93	1.20
51-0000	Production occupations	62.36	1.03	140770	15.08	1.18
51-1011	First-line supervisors/managers of production and operating workers	3.29	1.07	9680	23.52	1.09
51-2021	Coil winders, tapers, and finishers	0.17	--	--	12.63	--
51-2022	Electrical and electronic equipment assemblers	1.41	1.33	3740	12.17	1.13
51-2023	Electromechanical equipment assemblers	0.74	1.52	1210	13.41	1.10
51-2031	Engine and other machine assemblers	1.13	0.37	220	15.06	1.10
51-2041	Structural metal fabricators and fitters	0.25	0.47	620	13.87	1.25
51-2091	Fiberglass laminators and fabricators	0.09	0.25	110	11.68	0.99
51-2092	Team assemblers	15.18	1.34	22360	13.06	1.07
51-2099	Assemblers and fabricators, all other	3.19	1.26	4860	18.97	1.03
51-4011	Computer-controlled machine tool operators, metal and plastic	1.92	1.69	3150	14.12	1.20
51-4012	Numerical tool and process control programmers	0.08	1.60	380	15.4	1.15
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.95	0.63	260	13.87	1.09
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	0.15	0.48	220	15.48	1.02
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	4.19	1.04	3750	13.43	1.18
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	1.11	0.95	540	16.88	1.25
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	1.24	1.24	1650	15.79	1.26
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	1.34	0.93	820	15.92	1.12
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.23	0.85	330	16.03	1.20
51-4041	Machinists	3.75	1.14	5890	18.27	1.18
51-4061	Model makers, metal and plastic	0.11	0.99	110	22.31	1.21
51-4071	Foundry mold and coremakers	0.09	0.98	190	13.67	1.21
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	1.78	1.53	3170	13.63	1.13
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	2.6	0.68	880	17.29	1.27
51-4111	Tool and die makers	2.6	1.24	1610	26.45	1.08
51-4121	Welders, cutters, solderers, and brazers	1.9	0.91	4550	15.14	1.25
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	1.57	0.51	330	17.75	1.28
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.31	0.47	170	15.03	1.05
51-4192	Lay-out workers, metal and plastic	0.02	0.53	70	22.05	1.08
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	0.19	1.70	940	23.81	1.19
51-4194	Tool grinders, filers, and sharpeners	0.06	0.64	150	20.27	1.19
51-4199	Metal workers and plastic workers, all other	0.76	0.67	430	26.01	0.80
51-5023	Printing machine operators	0.03	2.02	5170	12.71	1.29
51-6031	Sewing machine operators	0.53	0.32	940	10.29	1.28
51-6062	Textile cutting machine setters, operators, and tenders	0.03	0.12	30	10.94	1.29
51-6093	Upholsterers	0.16	0.20	110	12.95	1.15
51-7041	Sawing machine setters, operators, and tenders, wood	0.03	0.54	430	12.88	1.27
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.06	0.47	260	14.42	1.63
51-9022	Grinding and polishing workers, hand	0.14	0.89	520	12.61	1.29
51-9023	Mixing and blending machine setters, operators, and tenders	0.15	0.61	1150	14.26	1.23
51-9031	Cutters and trimmers, hand	0.03	0.94	360	10.8	1.27
51-9032	Cutting and slicing machine setters, operators, and tenders	0.03	1.26	1310	13.27	1.25
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.09	0.54	580	12.73	1.24
51-9061	Inspectors, testers, sorters, samplers, and weighers	3.5	0.76	4880	16.74	1.16
51-9111	Packaging and filling machine operators and tenders	0.05	0.95	4890	11.55	1.07
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.54	1.16	1580	12.85	1.30
51-9123	Painting, coating, and decorating workers	0.04	1.05	420	9.98	1.00
51-9191	Cementing and gluing machine operators and tenders	0.03	1.40	440	11.9	1.15
51-9192	Cleaning, washing, and metal pickling equipment operators and tenders	0.02	0.39	80	9.8	1.43
51-9198	Helpers--production workers	1.47	0.96	6880	10.84	1.12
51-9199	Production workers, all other	2.04	1.58	6090	18.55	1.18
53-0000	Transportation and material moving occupations	6.74	0.85	109190	14.23	1.18
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	0.22	1.08	2580	20.15	1.12
53-1031	First-line supervisors/managers of transportation and material-moving machine and vehicle operators	0.05	1.17	3430	20.57	1.01
53-3032	Truck drivers, heavy and tractor-trailer	0.11	0.79	17690	19.02	1.15
53-3033	Truck drivers, light or delivery services	0.17	0.79	9880	12.95	1.12
53-7011	Conveyor operators and tenders	0.04	0.66	440	*	1.04
53-7021	Crane and tower operators	0.08	0.62	380	24.93	1.25
53-7051	Industrial truck and tractor operators	2.58	0.81	6780	15.38	1.25
53-7062	Laborers and freight, stock, and material movers, hand	2.08	0.73	23000	13.46	1.19
53-7063	Machine feeders and offbearers	0.07	0.50	1000	13.56	1.26
53-7064	Packers and packagers, hand	0.87	1.01	11170	11.49	1.22

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation NAICS 335300

335300 Electrical Equipment Manufacturing

Occ. Code	Occupation	Percent of Industry Employment	Minneapolis		Total Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
			/ Saint Paul Location Quotient				
00-0000	Industry Total					16.25	
17-0000	Architecture and engineering occupations	10.92	1.19	38670	27.71	0.97	
17-2061	Computer hardware engineers	0.04	--	--	37.57	0.92	
17-2071	Electrical engineers	2.57	1.26	2480	32.52	1.00	
17-2072	Electronics engineers, except computer	1.10	1.02	1790	34.27	0.93	
17-2081	Environmental engineers	0.03	0.61	420	31.01	1.04	
17-2111	Health and safety engineers, except mining safety engineers and inspectors	0.04	0.73	240	23.37	1.08	
17-2112	Industrial engineers	1.45	1.88	4980	31.19	1.07	
17-2131	Materials engineers	0.05	0.46	130	30.51	0.99	
17-2141	Mechanical engineers	1.43	1.33	3850	30.83	0.95	
17-2199	Engineers, all other	0.25	--	--	34.76	--	
17-3012	Electrical and electronics drafters	1.07	1.25	540	20.69	1.04	
17-3013	Mechanical drafters	0.22	1.72	1670	20.38	1.12	
17-3023	Electrical and electronic engineering technicians	1.68	1.19	2630	21.26	0.94	
17-3024	Electro-mechanical technicians	0.05	0.49	100	19.50	1.05	
17-3025	Environmental engineering technicians	0.03	0.29	80	18.65	1.30	
17-3026	Industrial engineering technicians	0.44	2.49	2450	20.17	1.00	
17-3027	Mechanical engineering technicians	0.40	2.47	1540	21.51	1.08	
17-3029	Engineering technicians, except drafters, all other	0.03	1.72	1800	19.10	1.01	
49-0000	Installation, maintenance, and repair occupations	3.36	0.78	55740	18.99	1.17	
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.28	0.92	5540	27.19	1.05	
49-2092	Electric motor, power tool, and related repairers	0.29	0.31	90	16.67	1.23	
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.67	0.48	500	19.91	1.03	
49-2095	Electrical and electronics repairers, powerhouse, substation, and relay	--	--	--	20.42	--	
49-9041	Industrial machinery mechanics	0.20	1.06	3540	20.20	1.10	
49-9042	Maintenance and repair workers, general	1.31	0.51	8920	18.11	1.22	
49-9043	Maintenance workers, machinery	0.18	0.28	300	17.50	1.06	
49-9098	Helpers--installation, maintenance, and repair workers	0.08	0.77	1640	11.54	1.17	
49-9099	Installation, maintenance, and repair workers, all other	0.02	1.70	2960	18.24	1.20	
51-0000	Production occupations	59.23	1.03	140770	14.04	1.18	
51-1011	First-line supervisors/managers of production and operating workers	3.33	1.07	9680	22.86	1.09	
51-2021	Coil winders, tapers, and finishers	4.94	--	--	13.62	--	
51-2022	Electrical and electronic equipment assemblers	15.19	1.33	3740	13.05	1.13	
51-2023	Electromechanical equipment assemblers	2.69	1.52	1210	13.78	1.10	
51-2031	Engine and other machine assemblers	0.73	0.37	220	13.14	1.10	
51-2041	Structural metal fabricators and fitters	0.67	0.47	620	16.27	1.25	
51-2092	Team assemblers	10.74	1.34	22360	12.73	1.07	
51-2093	Timing device assemblers, adjusters, and calibrators	0.23	3.96	130	14.46	1.02	
51-2099	Assemblers and fabricators, all other	1.32	1.26	4860	16.11	1.03	
51-4011	Computer-controlled machine tool operators, metal and plastic	1.72	1.69	3150	15.21	1.20	
51-4012	Numerical tool and process control programmers	0.04	1.60	380	21.23	1.15	
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.40	0.80	1000	16.22	1.06	
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	0.05	0.48	220	13.36	1.02	
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	2.50	1.04	3750	14.34	1.18	
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.57	0.95	540	14.21	1.25	
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.46	1.24	1650	13.89	1.26	
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.67	0.93	820	15.62	1.12	
51-4041	Machinists	2.25	1.14	5890	15.28	1.18	
51-4061	Model makers, metal and plastic	0.10	0.99	110	20.22	1.21	
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.91	1.53	3170	13.13	1.13	
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	0.68	0.68	880	15.50	1.27	
51-4111	Tool and die makers	0.60	1.24	1610	21.20	1.08	
51-4121	Welders, cutters, solderers, and brazers	2.07	0.91	4550	14.60	1.25	
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	0.62	0.51	330	16.19	1.28	
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.02	0.47	170	18.46	1.05	
51-4192	Lay-out workers, metal and plastic	0.02	0.53	70	14.22	1.08	
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	0.15	1.70	940	15.05	1.19	
51-4199	Metal workers and plastic workers, all other	0.23	0.67	430	12.98	0.80	
51-5023	Printing machine operators	0.03	2.02	5170	10.46	1.29	
51-9023	Mixing and blending machine setters, operators, and tenders	0.03	0.61	1150	13.10	1.23	
51-9061	Inspectors, testers, sorters, samplers, and weighers	2.86	0.76	4880	15.31	1.16	
51-9111	Packaging and filling machine operators and tenders	0.11	0.95	4890	12.75	1.07	
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.72	1.16	1580	13.98	1.30	
51-9123	Painting, coating, and decorating workers	0.03	1.05	420	11.65	1.00	
51-9194	Etchers and engravers	0.04	1.38	210	15.35	1.08	
51-9198	Helpers--production workers	0.82	0.96	6880	11.85	1.12	
51-9199	Production workers, all other	0.38	1.58	6090	15.86	1.18	
53-0000	Transportation and material moving occupations	2.81	0.85	109190	13.49	1.18	
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	0.10	1.08	2580	22.97	1.12	
53-3032	Truck drivers, heavy and tractor-trailer	0.13	0.79	17690	16.54	1.15	
53-3033	Truck drivers, light or delivery services	0.13	0.79	9880	13.82	1.12	
53-7051	Industrial truck and tractor operators	0.95	0.81	6780	13.99	1.25	
53-7062	Laborers and freight, stock, and material movers, hand	0.91	0.73	23000	12.36	1.19	
53-7063	Machine feeders and offbearers	0.10	0.50	1000	14.93	1.26	
53-7064	Packers and packagers, hand	--	1.01	11170	12.44	1.22	

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation NAICS 335900

335900 Other Electrical Equipment and Component Manufacturing

Occ. Code	Occupation	Percent of Industry Employment	Minneapolis		Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
			/ Saint Paul Location Quotient				
00-0000	Industry Total					15.79	
17-0000	Architecture and engineering occupations	7.28	1.19		38670	28.42	0.97
17-2041	Chemical engineers	0.07	0.77		300	35.16	0.93
17-2061	Computer hardware engineers	0.06	--		--	44.20	0.92
17-2071	Electrical engineers	1.21	1.26		2480	33.31	1.00
17-2072	Electronics engineers, except computer	0.61	1.02		1790	33.19	0.93
17-2111	Health and safety engineers, except mining safety engineers and inspectors	0.04	0.73		240	31.14	1.08
17-2112	Industrial engineers	1.43	1.88		4980	31.26	1.07
17-2131	Materials engineers	0.20	0.46		130	32.58	0.99
17-2141	Mechanical engineers	1.06	1.33		3850	31.19	0.95
17-2199	Engineers, all other	0.26	--		--	37.94	--
17-3012	Electrical and electronics drafters	0.44	1.25		540	21.00	1.04
17-3013	Mechanical drafters	0.10	1.72		1670	20.59	1.12
17-3023	Electrical and electronic engineering technicians	0.89	1.19		2630	20.89	0.94
17-3024	Electro-mechanical technicians	0.04	0.49		100	16.97	1.05
17-3026	Industrial engineering technicians	0.40	2.49		2450	20.46	1.00
17-3027	Mechanical engineering technicians	0.32	2.47		1540	20.48	1.08
17-3029	Engineering technicians, except drafters, all other	0.10	1.72		1800	22.95	1.01
47-0000	Construction and extraction occupations	0.43	0.81		71990	21.49	1.48
47-2111	Electricians	0.35	0.83		6860	21.62	1.51
47-2152	Plumbers, pipefitters, and steamfitters	0.03	1.10		6390	22.03	1.47
49-0000	Installation, maintenance, and repair occupations	4.78	0.78		55740	19.70	1.17
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.35	0.92		5540	26.67	1.05
49-2094	Electrical and electronics repairers, commercial and industrial equipment	--	0.48		500	19.91	1.03
49-9041	Industrial machinery mechanics	--	1.06		3540	20.39	1.10
49-9042	Maintenance and repair workers, general	2.37	0.51		8920	18.94	1.22
49-9043	Maintenance workers, machinery	0.52	0.28		300	19.44	1.06
49-9044	Millwrights	0.04	0.77		550	20.47	1.22
49-9052	Telecommunications line installers and repairers	0.04	0.52		1080	13.17	0.87
49-9099	Installation, maintenance, and repair workers, all other	0.08	1.70		2960	18.59	1.20
51-0000	Production occupations	57.72	1.03		140770	13.82	1.18
51-1011	First-line supervisors/managers of production and operating workers	3.69	1.07		9680	23.48	1.09
51-2021	Coil winders, tapers, and finishers	0.93	--		--	12.32	--
51-2022	Electrical and electronic equipment assemblers	9.01	1.33		3740	11.93	1.13
51-2023	Electromechanical equipment assemblers	1.00	1.52		1210	12.22	1.10
51-2041	Structural metal fabricators and fitters	--	0.47		620	12.61	1.25
51-2092	Team assemblers	14.55	1.34		22360	12.97	1.07
51-2093	Timing device assemblers, adjusters, and calibrators	0.05	3.96		130	*	1.02
51-2099	Assemblers and fabricators, all other	0.54	1.26		4860	11.70	1.03
51-4011	Computer-controlled machine tool operators, metal and plastic	1.00	1.69		3150	15.75	1.20
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	3.78	0.80		1000	14.74	1.06
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	2.78	1.04		3750	13.74	1.18
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.67	0.95		540	15.42	1.25
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.21	1.24		1650	11.18	1.26
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.57	0.93		820	15.14	1.12
51-4041	Machinists	2.20	1.14		5890	17.43	1.18
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	2.35	1.53		3170	13.82	1.13
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	1.06	0.68		880	13.80	1.27
51-4111	Tool and die makers	1.13	1.24		1610	22.25	1.08
51-4121	Welders, cutters, solderers, and brazers	0.79	0.91		4550	13.08	1.25
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	0.40	0.51		330	12.78	1.28
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic	0.07	0.47		170	14.70	1.05
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	1.16	1.70		940	16.32	1.19
51-4199	Metal workers and plastic workers, all other	0.65	0.67		430	13.15	0.80
51-9011	Chemical equipment operators and tenders	0.04	--		--	16.71	0.79
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.04	0.47		260	12.65	1.63
51-9022	Grinding and polishing workers, hand	--	0.89		520	14.93	1.29
51-9023	Mixing and blending machine setters, operators, and tenders	0.14	0.61		1150	15.11	1.23
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.18	0.54		580	14.58	1.24
51-9061	Inspectors, testers, sorters, samplers, and weighers	3.28	0.76		4880	14.53	1.16
51-9111	Packaging and filling machine operators and tenders	1.01	0.95		4890	13.11	1.07
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.35	1.16		1580	12.54	1.30
51-9192	Cleaning, washing, and metal pickling equipment operators and tenders	0.02	0.39		80	13.82	1.43
51-9196	Paper goods machine setters, operators, and tenders	0.05	1.78		2700	11.54	1.07
51-9198	Helpers--production workers	2.04	0.96		6880	12.82	1.12
51-9199	Production workers, all other	--	1.58		6090	13.28	1.18
53-0000	Transportation and material moving occupations	5.91	0.85		109190	12.72	1.18
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	0.18	1.08		2580	20.75	1.12
53-3032	Truck drivers, heavy and tractor-trailer	0.06	0.79		17690	17.14	1.15
53-3033	Truck drivers, light or delivery services	0.03	0.79		9880	14.76	1.12
53-7011	Conveyor operators and tenders	0.12	0.66		440	15.27	1.04
53-7051	Industrial truck and tractor operators	1.55	0.81		6780	13.32	1.25
53-7062	Laborers and freight, stock, and material movers, hand	1.93	0.73		23000	12.01	1.19
53-7063	Machine feeders and offbearers	0.93	0.50		1000	13.58	1.26
53-7064	Packers and packagers, hand	1.05	1.01		11170	11.44	1.22

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation NAICS 334400

334400 Semiconductor and Other Electronic Component Manufacturing

Occ. Code	Occupation	Minneapolis		Total Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	Salary Ratio (MSP/NAT)
		Percent of Industry Employment	/ Saint Paul Location Quotient			
00-0000	Industry Total				20.08	
15-0000	Computer and mathematical occupations	6.11	1.53	62720	38.91	1.03
15-1021	Computer programmers	0.37	0.90	4750	34.53	0.98
15-1032	Computer software engineers, systems software	1.54	1.33	5830	44.37	0.98
15-1041	Computer support specialists	0.65	1.19	8200	21.29	1.08
15-1051	Computer systems analysts	0.67	1.30	7770	34.48	1.00
15-1061	Database administrators	0.13	1.70	2490	38.82	1.06
15-1071	Network and computer systems administrators	0.44	1.81	7010	33.01	1.05
15-2031	Operations research analysts	0.03	2.07	1550	27.68	0.89
15-2041	Statisticians	0.02	1.22	320	39.07	0.94
17-0000	Architecture and engineering occupations	21.59	1.19	38670	32.32	0.97
17-2011	Aerospace engineers	0.02	0.09	100	39.31	0.87
17-2071	Electrical engineers	2.62	1.26	2480	39.86	1.00
17-2072	Electronics engineers, except computer	3.89	1.02	1790	40.02	0.93
17-2081	Environmental engineers	0.02	0.61	420	37.00	1.04
17-2112	Industrial engineers	2.48	1.88	4980	35.60	1.07
17-2131	Materials engineers	0.42	0.46	130	33.96	0.99
17-2141	Mechanical engineers	0.88	1.33	3850	36.91	0.95
17-2199	Engineers, all other	0.56	--	--	39.19	--
17-3012	Electrical and electronics drafters	0.52	1.25	540	23.19	1.04
17-3013	Mechanical drafters	0.11	1.72	1670	23.13	1.12
17-3019	Drafters, all other	0.04	0.69	210	21.66	1.08
17-3021	Aerospace engineering and operations technicians	0.02	--	--	14.62	--
17-3023	Electrical and electronic engineering technicians	4.09	1.19	2630	21.98	0.94
17-3024	Electro-mechanical technicians	0.43	0.49	100	20.57	1.05
17-3027	Mechanical engineering technicians	0.35	2.47	1540	23.05	1.08
17-3029	Engineering technicians, except drafters, all other	0.53	1.72	1800	21.88	1.01
49-0000	Installation, maintenance, and repair occupations	2.62	0.78	55740	21.15	1.17
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	0.24	0.92	5540	31.67	1.05
49-2011	Computer, automated teller, and office machine repairers	0.02	1.14	2130	21.23	1.08
49-2094	Electrical and electronics repairers, commercial and industrial equipment	0.38	0.48	500	22.12	1.03
49-9021	Heating, air conditioning, and refrigeration mechanics and installers	0.02	0.53	1770	26.62	1.27
49-9041	Industrial machinery mechanics	0.79	1.06	3540	21.43	1.10
49-9042	Maintenance and repair workers, general	1.03	0.51	8920	19.13	1.22
49-9043	Maintenance workers, machinery	0.04	0.28	300	17.73	1.06
49-9069	Precision instrument and equipment repairers, all other	0.01	0.69	120	18.93	0.97
49-9099	Installation, maintenance, and repair workers, all other	0.08	1.70	2960	21.37	1.20
51-0000	Production occupations	41.97	1.03	140770	13.10	1.18
51-1011	First-line supervisors/managers of production and operating workers	2.84	1.07	9680	25.06	1.09
51-2021	Coil winders, tapers, and finishers	1.09	--	--	10.55	--
51-2022	Electrical and electronic equipment assemblers	10.93	1.33	3740	11.45	1.13
51-2023	Electromechanical equipment assemblers	1.72	1.52	1210	11.61	1.10
51-2041	Structural metal fabricators and fitters	0.01	0.47	620	12.20	1.25
51-2092	Team assemblers	4.54	1.34	22360	10.94	1.07
51-2093	Timing device assemblers, adjusters, and calibrators	0.01	3.96	130	15.01	1.02
51-2099	Assemblers and fabricators, all other	0.71	1.26	4860	12.00	1.03
51-4011	Computer-controlled machine tool operators, metal and plastic	0.69	1.69	3150	13.35	1.20
51-4012	Numerical tool and process control programmers	0.04	1.60	380	16.88	1.15
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.08	0.80	1000	11.30	1.06
51-4022	Forging machine setters, operators, and tenders, metal and plastic	0.02	0.63	260	15.13	1.09
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	0.71	1.04	3750	11.80	1.18
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic	0.12	0.95	540	12.41	1.25
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	0.04	1.24	1650	10.66	1.26
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	0.08	0.93	820	14.96	1.12
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	0.01	0.85	330	16.54	1.20
51-4041	Machinists	1.05	1.14	5890	16.51	1.18
51-4061	Model makers, metal and plastic	0.01	0.99	110	23.89	1.21
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	0.39	1.53	3170	12.32	1.13
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	0.23	0.68	880	14.35	1.27
51-4111	Tool and die makers	0.10	1.24	1610	21.28	1.08
51-4121	Welders, cutters, solderers, and brazers	0.79	0.91	4550	12.22	1.25
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	0.13	0.51	330	11.73	1.28
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic	0.86	1.70	940	12.72	1.19
51-4199	Metal workers and plastic workers, all other	0.07	0.67	430	13.80	0.80
51-5022	Prepress technicians and workers	0.06	1.63	1540	13.03	1.33
51-5023	Printing machine operators	0.10	2.02	5170	13.25	1.29
51-8021	Stationary engineers and boiler operators	0.01	1.84	1050	28.75	1.09
51-8031	Water and liquid waste treatment plant and system operators	0.03	0.67	950	17.27	1.26
51-9011	Chemical equipment operators and tenders	0.05	--	--	14.71	--
51-9023	Mixing and blending machine setters, operators, and tenders	0.04	0.61	1150	14.48	1.23
51-9032	Cutting and slicing machine setters, operators, and tenders	0.02	1.26	1310	12.09	1.25
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.01	0.54	580	13.05	1.24
51-9051	Furnace, kiln, oven, drier, and kettle operators and tenders	0.03	--	--	13.43	--
51-9061	Inspectors, testers, sorters, samplers, and weighers	3.92	0.76	4880	13.32	1.16
51-9111	Packaging and filling machine operators and tenders	0.01	0.95	4890	12.34	1.07
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	0.14	1.16	1580	12.92	1.30
51-9131	Photographic process workers	0.04	2.08	670	12.64	1.36
51-9132	Photographic processing machine operators	0.01	1.20	800	9.15	1.14
51-9141	Semiconductor processors	8.21	--	--	15.72	--
51-9194	Etchers and engravers	0.08	1.38	210	11.74	1.08
51-9198	Helpers--production workers	0.44	0.96	6880	10.41	1.12
51-9199	Production workers, all other	1.34	1.58	6090	12.69	1.18

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>

Green Transportation 325100

325100 Basic Chemical Manufacturing

Occ. Code	Occupation	Minneapolis / Saint Paul		Total		Salary Ratio (MSP/NAT)
		Percent of Industry Employment	Location Quotient	Minneapolis / Saint Paul Employment	Median Hourly Wage (\$)	
00-0000	Industry Total				22.89	
15-0000	Computer and mathematical occupations	1.39	1.53	62720	30.20	1.03
15-1021	Computer programmers	0.20	0.90	4750	33.41	0.98
15-1031	Computer software engineers, applications	0.16	2.20	13880	38.51	0.98
15-1041	Computer support specialists	0.35	1.19	8200	22.26	1.08
15-1051	Computer systems analysts	0.39	1.30	7770	34.08	1.00
15-1061	Database administrators	0.09	1.70	2490	30.07	1.06
15-1071	Network and computer systems administrators	0.05	1.81	7010	29.54	1.05
15-1081	Network systems and data communications analysts	0.09	1.66	4510	29.56	1.12
15-1099	Computer specialists, all other	0.03	2.44	5870	19.82	0.94
17-0000	Architecture and engineering occupations	5.82	1.19	38670	36.11	0.97
17-2031	Biomedical engineers	0.02	3.47	650	36.73	1.01
17-2041	Chemical engineers	2.29	0.77	300	39.38	0.93
17-2051	Civil engineers	0.03	0.81	2570	35.83	1.01
17-2071	Electrical engineers	0.16	1.26	2480	39.61	1.00
17-2081	Environmental engineers	0.12	0.61	420	38.81	1.04
17-2111	Health and safety engineers, except mining safety engineers and inspectors	0.62	0.73	240	33.73	1.08
17-2112	Industrial engineers	0.71	1.88	4980	35.13	1.07
17-2131	Materials engineers	0.06	0.46	130	33.96	0.99
17-2141	Mechanical engineers	0.32	1.33	3850	35.38	0.95
17-2199	Engineers, all other	0.57	--	--	42.48	--
17-3013	Mechanical drafters	0.07	1.72	1670	22.76	1.12
17-3023	Electrical and electronic engineering technicians	0.17	1.19	2630	26.14	0.94
17-3025	Environmental engineering technicians	0.14	0.29	80	25.10	1.30
17-3026	Industrial engineering technicians	0.19	2.49	2450	21.49	1.00
17-3029	Engineering technicians, except drafters, all other	0.12	1.72	1800	26.96	1.01
19-0000	Life, physical, and social science occupations	7.92	1.29	21180	24.28	1.10
19-1022	Microbiologists	0.05	1.10	230	22.90	0.86
19-2031	Chemists	2.53	1.43	1540	29.97	1.01
19-2041	Environmental scientists and specialists, including health	0.10	1.00	1040	23.88	0.99
19-3021	Market research analysts	0.20	2.27	6470	34.05	1.08
19-4021	Biological technicians	0.15	0.39	370	22.22	1.00
19-4031	Chemical technicians	4.39	0.76	610	21.89	1.04
19-4091	Environmental science and protection technicians, including health	0.03	0.90	420	20.94	1.08
49-0000	Installation, maintenance, and repair occupations	10.96	0.78	55740	23.41	1.17
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	1.23	0.92	5540	33.55	1.05
49-2092	Electric motor, power tool, and related repairers	0.11	0.31	90	20.47	1.23
49-2094	Electrical and electronics repairers, commercial and industrial equipment	1.24	0.48	500	26.02	1.03
49-3023	Automotive service technicians and mechanics	0.05	0.80	6840	21.19	1.09
49-3031	Bus and truck mechanics and diesel engine specialists	0.13	0.87	2960	18.43	1.10
49-9012	Control and valve installers and repairers, except mechanical door	0.05	0.89	500	22.31	1.04
49-9041	Industrial machinery mechanics	3.31	1.06	3540	22.82	1.10
49-9042	Maintenance and repair workers, general	3.59	0.51	8920	21.14	1.22
49-9043	Maintenance workers, machinery	0.48	0.28	300	23.51	1.06
49-9044	Millwrights	0.18	0.77	550	24.20	1.22
49-9098	Helpers--installation, maintenance, and repair workers	0.05	0.77	1640	11.15	1.17
49-9099	Installation, maintenance, and repair workers, all other	0.10	1.70	2960	21.50	1.20
51-0000	Production occupations	42.78	1.03	140770	21.77	1.18
51-1011	First-line supervisors/managers of production and operating workers	4.72	1.07	9680	30.84	1.09
51-2092	Team assemblers	0.64	1.34	22360	13.30	1.07
51-2099	Assemblers and fabricators, all other	0.02	1.26	4860	15.20	1.03
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic	0.10	0.80	1000	13.80	1.06
51-4041	Machinists	0.70	1.14	5890	18.56	1.18
51-4111	Tool and die makers	0.09	1.24	1610	24.08	1.08
51-4121	Welders, cutters, solderers, and brazers	0.31	0.91	4550	19.85	1.25
51-8021	Stationary engineers and boiler operators	0.14	1.84	1050	22.61	1.09
51-8031	Water and liquid waste treatment plant and system operators	0.04	0.67	950	20.45	1.26
51-8091	Chemical plant and system operators	16.34	--	--	24.72	0.85
51-8099	Plant and system operators, all other	0.29	1.25	230	23.51	0.94
51-9011	Chemical equipment operators and tenders	7.73	--	--	20.74	0.79
51-9012	Separating, filtering, clarifying, precipitating, and still machine setters, operators, and tenders	1.84	0.12	70	18.43	0.98
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	0.12	0.47	260	15.05	1.63
51-9023	Mixing and blending machine setters, operators, and tenders	3.82	0.61	1150	15.00	1.23
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	0.23	0.54	580	15.43	1.24
51-9061	Inspectors, testers, sorters, samplers, and weighers	1.41	0.76	4880	17.77	1.16
51-9111	Packaging and filling machine operators and tenders	2.06	0.95	4890	14.02	1.07
51-9192	Cleaning, washing, and metal pickling equipment operators and tenders	0.03	0.39	80	11.64	1.43
51-9198	Helpers--production workers	0.81	0.96	6880	12.53	1.12
51-9199	Production workers, all other	0.39	1.58	6090	17.90	1.18
53-0000	Transportation and material moving occupations	8.09	0.85	109190	17.00	1.18
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	0.28	1.08	2580	22.69	1.12
53-1031	First-line supervisors/managers of transportation and material-moving machine and vehicle operators	0.24	1.17	3430	29.25	1.01
53-3031	Driver/sales workers	0.03	1.13	5980	17.34	1.05
53-3032	Truck drivers, heavy and tractor-trailer	2.57	0.79	17690	19.10	1.15
53-3033	Truck drivers, light or delivery services	0.65	0.79	9880	14.16	1.12
53-7051	Industrial truck and tractor operators	0.98	0.81	6780	14.34	1.25
53-7061	Cleaners of vehicles and equipment	0.03	0.95	4230	9.85	1.20
53-7062	Laborers and freight, stock, and material movers, hand	1.33	0.73	23000	13.01	1.19
53-7063	Machine feeders and offbearers	0.25	0.50	1000	20.14	1.26
53-7064	Packers and packagers, hand	0.44	1.01	11170	11.53	1.22
53-7121	Tank car, truck, and ship loaders	0.20	0.15	30	16.61	1.55

Source: US Bureau of Labor and Statistics. <http://stats.bls.gov>