

MAKING IT GREEN

in Minneapolis Saint Paul



Phase I:

Initial Findings on Three Green Manufacturing Sectors &
Local Economic Development Opportunities

Report to the Mayors' Initiative on Green Manufacturing

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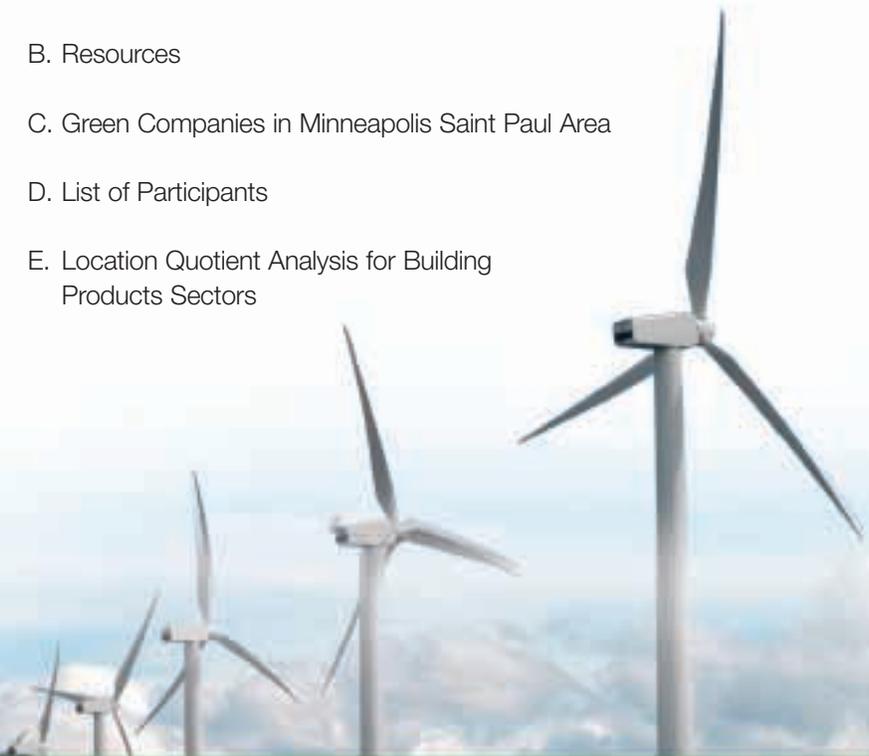
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EXECUTIVE SUMMARY

“Making it Green” is an initiative of Mayor R.T. Rybak in Minneapolis and Mayor Christopher B. Coleman in Saint Paul with the Blue-Green Alliance, a national partnership of the Sierra Club and the United Steel Workers, based in the belief that investments in solving critical environmental challenges, such as global warming, represent strategic economic opportunities for the future. Its mission is to recommend policies and actions to position Minneapolis and Saint Paul as national leaders in promoting and developing green manufacturing technologies and products while creating family supporting jobs. There is growth and opportunity in green manufacturing, especially in building products, renewable energy and transportation — **green enterprise is an estimated \$229 billion market sector.**¹

The Natural Marketing Institute projects that sales of green products of all kinds is “on track to jump (from \$200) to \$420 billion in just three years and then jump to \$845 billion by 2015.”² This report provides baseline information about these markets in Minneapolis and Saint Paul, best practices of other cities and a set of recommendations to guide the two cities. It calls for Minneapolis and Saint Paul to roll out a strategy to make increasing jobs, products and profits in green manufacturing a core element of their economic development plans.

This strategy was crafted by a cross section of community leaders who devoted time and expertise to identifying green markets and developing recommendations for the Mayors, other elected leaders and their staffs. From June to December, more than 70 representatives of green industry, labor, state and local government, environmental organizations and

educational institutions engaged in a process to jointly move toward “Making it Green” in Minneapolis and Saint Paul. This is a starting point — Phase I — in a multi-phased process of identifying the green products marketplace, our existing strengths to support its growth and ways to market our strengths and build up on them in the future.

The following highlights our findings:

- There is and will continue to be substantial **growth of markets for green products** — estimates range from 17-23% per year for building products to 40% per year for renewable energy production to 100% percent in 3 years for green products of all types.
- Minneapolis and Saint Paul have **significant strengths in manufacturing and green product opportunities.** Phase I of the Mayors’ Initiative looked at three

green manufacturing sectors with high potential for near term growth and job creation — green buildings, renewable energy and transportation industries. We identified a substantial base of manufacturers with product applications for 29 subsectors of these growing green industries. Further analysis of these products and manufacturers, as well as other green sectors, is needed to target expansion and recruitment to makers of these products and align existing public and private resources to support them.

- Minneapolis and Saint Paul are already **recognized leaders in green initiatives** – this provides an edge in recruiting companies that are seeking sites in a progressive green community, and gives clear market signals that their products will have customers here.

Green Product Opportunities for Minneapolis Saint Paul		
Green Building	Transportation	Renewable Energy
• Insulation	• Batteries	• Wind Turbine OEM suppliers – blades, gear boxes, other
• Windows & Doors	• Bio-Fuels	
• Glass/ Films	• Fuel Cells	• Bio-fuels systems – Ethanol, Bio-Diesel, Cellulosic possibilities
• HVAC (heating, ventilation and air conditioning) Systems and Controls	• Generators	
	• Lighting	• Bio-fuels Engine systems (parts)
• Wood Products (FSC-Forest Stewardship Council) - Certified)		• Hybrid Buses
	• Alternative Materials	• Neighborhood Electric vehicles (NEV)
• Site and landscape materials		• Electric cooling/ heating of vehicles
	• Distributed Power Management Systems	
• Adhesives		• Sensors & diagnostic equipment
• Paints		• Energy Efficient Products
• Testing Kits/ Remediation		• Energy Conservation & Green Energy products

¹ Management Information Services, Inc. Jobs Creation in the Environmental Industry in the U.S. and Nine States: Arizona, California, Connecticut, Florida, Michigan, Minnesota, North Carolina, Ohio, Wisconsin, April 2006.

² Lifestyles of Health and Sustainability, Press release May 24, 2007.



- The **“Making it Green” campaign focuses on packaging our existing strengths** to capture and grow more green manufacturers in Minneapolis and Saint Paul, create more family — supporting jobs for the future and maximize the community’s future return on investment by siting green manufacturing facilities on the two cities’ valuable industrial land.

The world is facing significant changes in energy policy and the environment. Those who help design and implement change first will reap the economic benefits. We recommend that the Mayors, city councils and their staffs adopt the following strategy:

- 1. Market Aggressively** — Initiate an aggressive, leadership-driven marketing plan — “Making it Green in Minneapolis & Saint Paul” campaign;
- 2. Realign Our Tools** — Realign our cities’ economic development tools to focus on the green “industries of the future”;
- 3. Grow Markets for Local Suppliers** — Grow receptive markets for these green manufacturers by sharpening our procurement and public policies;
- 4. Coalesce State Policies and Programs** — Create a set of state policies and incentives to support the creation of green jobs in Minneapolis and Saint Paul; and
- 5. Forge Enduring Partnerships** — Adopt and strengthen the culture of innovation and partnership of the cities of Minneapolis and Saint Paul with the on-going work of the Mayors’ Green Manufacturing Initiative through a restructured Mayors’ Green Manufacturing Development Team.

This initiative offers a pathway to a new green economy and a joint strategy for Minneapolis and Saint Paul to be in the forefront of this growth. This report details the findings and recommendations that led us to this strategy – the first chapter details the market growth and product opportunities in green manufacturing, the second chapter reviews strengths of Minneapolis and Saint Paul for recruiting and growing green manufacturers, the third chapter highlights best practices of other cities in addressing opportunities in the green economy, and the fourth chapter details the rationale and steps to implementation for each of the recommendations.

I. GREEN MANUFACTURING MARKET AND PRODUCT OPPORTUNITIES

Defining Green Manufacturing

The Mayors' Initiative chose to define green manufacturers as those who make products that have an impact on reducing global warming and creating immediate employment.

At the same time, we recognize the importance of working, over time, to encourage manufacturers of green products to improve in the areas of process, energy sources, buildings, sites and workforce. The Mayors' Initiative on Green Manufacturing is focused primarily on manufacturers that produce goods that reduce greenhouse gas emissions. The initiative intends to encourage and provide priority for manufacturers that also:

- Consider environmental factors and/or reduces environmental impacts;
- Maximize use of local suppliers;
- Reduce transportation impacts, including workers' transportation and goods' shipment;

- Reduce energy use in its product and process;
- Use renewable energy sources;
- Manage water in industrial sites and in manufacturing processes appropriately;
- Maximize healthy environment for workers; and
- Use and maintain green sites.

Because the primary goal of the Mayors' Initiative is to capture market opportunities for the products needed to address climate change — the Initiative chose to focus on opportunities in green building products, renewable energy and transportation. While they are not the only green industries, growth in renewable energy use, green building products (heating, ventilation and air conditioning (HVAC) systems, windows, doors, insulation and other energy-efficient building products) and green transportation options (reducing fossil fuel combustion)

hold the greatest promise to reduce global warming.

The EPA figures³ below illustrate that emissions are largest in transportation and electricity generation (e.g. coal-fired power plants) sectors; however, when the electricity produced is distributed to the sectors which consume it then industry, and residential and commercial sectors show greater emissions. For example:

“In the U.S. alone, buildings account for the following: 36 percent of total energy use and 65 percent of electricity consumption; 30 percent of greenhouse gas emissions; 30 percent of raw materials use; 30 percent of waste output and 136 million tons annually; and 12 percent of potable water consumption.”⁴

The Mayors' Initiative recognizes that significant opportunities exist in other green industries – e.g. green chemistry, water conservation, recycling and reuse, etc. We also see a growing interest among all manufacturers to “green” their processes

Figure ES-13

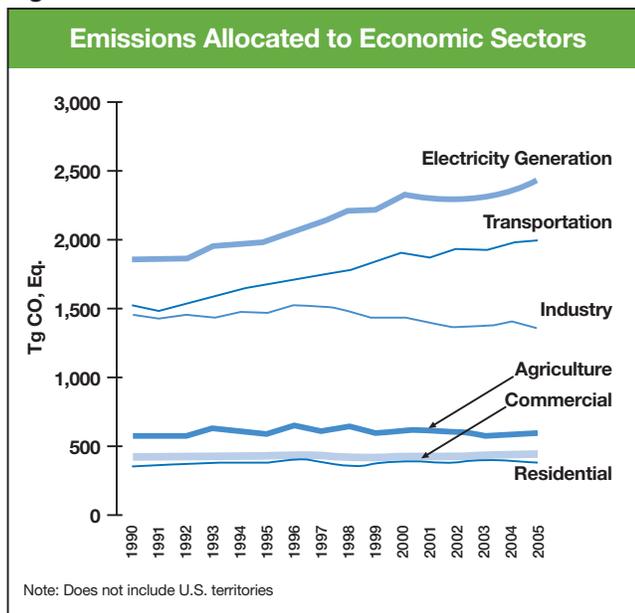
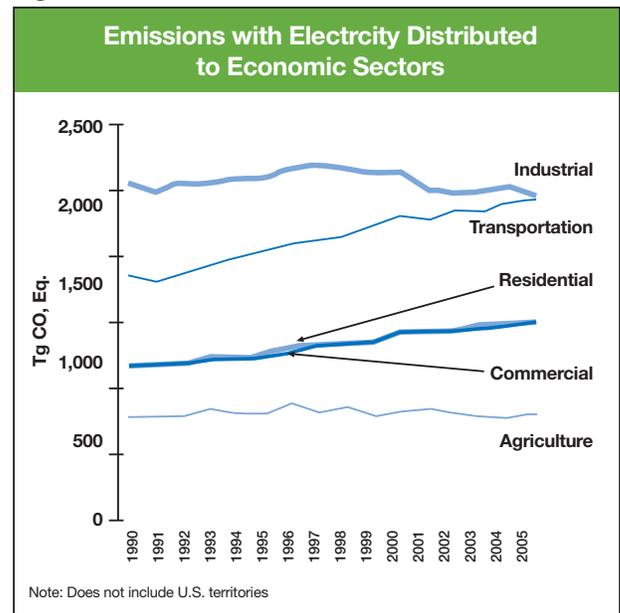


Figure ES-14



³ Figures ES 13 and Es 14 are from EPA U.S. Inventory of Greenhouse Gas Emissions and Sinks: 1990-2005, April 15, 2007, Pages ES14-15.

⁴ U.S. Green Building Council

(reducing waste and toxic materials, increasing energy efficiency, enhancing worker productivity and safety, and considering life cycle cost – cradle to cradle analysis). Our first phase; however, focused on opportunities in the three critical industries:

- Renewable Energy
- Building Products
- Transportation

Growing Markets for Green Products

However defined, it is clear that the market for “green” products is large and getting larger at a rate far greater than average economic growth. There is and will continue to be substantial **growth of markets for green products** — estimates range from 17-23% per year for building products to 40% per year for renewable energy production to 100% percent in 3 years for green products of all types.

Some estimates of green products’ market size and growth in total revenue in the U.S., as quoted from a variety of reliable sources of data, include:

- The environmental sector is estimated by Management Information Systems, Inc., as a \$341 billion industry in 2006 providing 5.3 million jobs — “It creates three times more jobs than the chemical industry, six times more jobs than the apparel industry, and 10 times more jobs than the pharmaceutical industry.”⁵
- The renewable energy and energy efficiency industries generated 8.5 million new jobs, nearly \$970 billion in revenue, more than \$100 billion in industry profits, and more than \$150 billion in increased federal, state, and local government tax revenues in 2006.⁶

- The green segment of the construction industry is expected to climb from 2 percent of all housing starts in 2005 to between 5 and 10 percent in 2010.⁷
- Green building products are estimated to capture 3.3 - 6.7% of the total U.S. market for construction/renovation by 2010 (estimated at \$1-3 trillion).⁸ Annual growth rates between 17 and 23% are projected.⁹

According to Clean Edge, a publication focusing on the clean technology market, clean energy segments are also predicted to grow significantly:

- Biofuels, ethanol, and biodiesel will grow from \$15.7 billion in 2005 to \$52.5 billion by 2015
- Wind power will expand from \$11.8 billion in 2005 to \$48.5 billion in 2015
- Solar photovoltaics will grow from an \$11.2 billion industry in 2005 to \$51.1 billion by 2015.¹⁰

Venture capital is seeking out “green” companies. According to CleanTech Group, a firm that tracks these investments:

North American “cleantech” investing in 2007 grew by 38 percent, from \$2.87 billion invested in 2006 to \$3.95 billion invested in 2007. The number of deals increased by 15 percent, from 233 in 2006 to 268 in 2007. The average deal size

increased by 20 percent, from an average of \$12.3 million in 2006 to \$14.7 million in 2007. The top five sectors receiving venture investments were:

- Energy Generation: \$2.75 billion; 172 deals
- Energy Storage: \$471 million; 20 deals
- Transportation: \$445 million; 20 deals
- Energy Efficiency: \$356 million; 41 deals
- Recycling & Waste: \$291 million; 17 deals¹¹

Green Product Opportunities in Minneapolis and Saint Paul

Minnesota has its share of major players in this “green economic revolution.” Mortenson, headquartered in Minneapolis, is one of the top installers in the wind industry. According to a 2008 report in Windtech International, an online news source providing information on wind energy industry development,

Mortenson Construction recently celebrated the completion of its 50th wind power project. In the last decade, Mortenson has constructed 34 percent of the wind energy capacity in the U.S. to date.¹²

We also have some of the leading producers of energy efficiency products (windows, doors, HVAC

5 “Hendricks, Bracken “D.C. Invests in Green Collar Jobs,” Center for American Progress, September 17, 2007.

6 Roger Bezdek, Management Information Services, Inc. for American Solar Energy Society (ASES) report, *Economic Renewable Energy and Energy Efficiency: Drivers for the 21st Century*, 2007. pp. vii, 4-5. RE and EE includes hydroelectricity, biomass, geothermal, wind, photovoltaics, solar thermal, insulation sales, energy service co industry sales, U.S. recycling and reuse industry sales, vehicles that get at least 10% better mpg than CAFÉ mileage, Energy Star rated lighting and household appliances, windows and doors, and components of the industrial sector.

7 National Association of Home Builders, “Green Building to Become a \$40-50 Billion market by 2010,” NBN Online, April 2, 2007.

8 McGraw Hill, *Green Building SmartMarket Report 2006*.

9 SBI, *Green Building Materials in the U.S.*, November 2007.

10 www.cleantech.com

11 Cleantech Group press release, January 7, 2008.

12 Windtech International, 16 January 2008

systems, paints, adhesives, etc.) and many role models and trail blazers for other green manufacturers to follow, including:

- **Tennant Corporation** – Headquartered in Golden Valley, Minnesota, with a manufacturing plant in Minneapolis, is a leading manufacturer of machines and cleaning solutions that are environmentally friendly.
- **Quality Bicycle Products** - QBP (Bloomington, Minnesota) – recently built a green building as part of its commitment to environmental living. The QBP facility, which the USGBC awarded Gold level LEED certification in April 2007, features innovative wastewater technologies, high-efficiency appliances, and a design capitalizing on natural light. A 40-kilowatt solar power array—the largest in the Midwest—replaces energy normally provided by coal-fired power plants, preventing 65,000 fewer pounds of carbon dioxide from entering the atmosphere each year. The structure, which is 30 percent more efficient than required by Minnesota state code, will generate significantly lower long-term maintenance and operation costs than a conventional building.¹³
- **Remmele Engineering** – Remmele has about 500 employees in the Minneapolis-Saint Paul area including its automation division in Saint Paul. The company has an established market share in medical and defense markets but its intent is on growth in renewable energy. Recognizing the market opportunity in the upper Midwest region for wind energy installations, Remmele, working with Minnesota Department of Employment and Economic Development (DEED), is positioning itself to become a first-tier supplier to wind turbine original equipment manufacturers (OEMs) able to directly meet their demand for components, while building a robust supply chain, or a cadre of companies considered to be second-tier suppliers, to take

advantage of growing market opportunities in the wind industry.

- **Rock Tenn** – This hundred-year old Saint Paul paper mill processes 50% of Minnesota's paper into recycled materials for future use and employs 500 union workers locally with average annual salaries of \$60,000. The company, previously powered by steam from a now closed coal burning plant, has been actively exploring alternative energy sources for future use, including the burning of biomass.
- **Innovent** – This Minneapolis-based subsidiary of the larger Wisconsin based firm, Greenheck Fan, makes high efficiency air handling equipment for the HVAC market. It often seeks employees for both engineering and production positions. The assembly jobs start at \$14 per hour plus benefits.

A partial list of green companies located in Minneapolis and Saint Paul is included as an appendix to this report. In the next phase of this initiative, the Mayors will convene these companies to gather ideas about how to build the market presence and identify ways in which the cities can support the growth of these and other similar firms. Efforts in other cities and states like “Spec it Green” and the “Green Suppliers Network” can be used to offer local companies market opportunities created from city procurement policies and those of other local institutions like colleges and universities in the two cities and LEED certified projects and builders.

The scope of Phase I included an effort to tap the ideas and expertise of a number of local experts and national data sources to:

- identify the baseline of local manufacturers engaged in “green manufacturing” in the three sectors

- assess the strengths, weaknesses, opportunities and challenges of each sector
- identify opportunity sites for local growth and expansion

The Project Steering Committee met monthly from June 2007 to February 2008. Each sectoral subcommittee met 3 times as did the Green Manufacturing Development Team, a subset of the subcommittees' memberships. Finally, a group of finance experts also advised the Initiative. A full list of all participants is included in Appendix D.

The following lists the subcommittees and their leaders:

- **Building Products** – Co-Chairs Rick Carter, LHB and Gerry Flannery, Flannery Construction
- **Transportation Products** – Co-Chairs Lynn Hinkle, UAW 879 and Dee Long, retired Speaker of the MN House
- **Renewable Energy** – Co-Chairs Michael Noble, Fresh Energy and Julie Esch, Mortenson Company
- **Finance Focus Group** – Tom Halverson, Piper Jaffray

CDC Associates provided market analysis of each sector including major market and technology trends and a local baseline of firms. Using this data and the expertise of the subcommittees' members, the Mayors' Initiative identified 29 subsectors with opportunity for local economic development. CDC Associates provided market analysis of each sector including major market and technology trends and a local baseline of firms. Using this data and the expertise of the subcommittees' members, the Mayors' Initiative identified 29 subsectors with opportunity for local economic development. These subsectors offer hundreds of product and product lines worthy of further investigation and development in future phases of activity by the Mayors' Initiatives on Green Manufacturing.

¹³ October 4, 2007 media release, www.QBP.com

29 Green Product Opportunities for Minneapolis Saint Paul

Green Building	Transportation	Renewable Energy
• Insulation	• Batteries	• Wind Turbine OEM suppliers— blades, gear boxes, other
• Windows & Doors Glass/ Films	• Bio-Fuels	• Bio-fuels systems— Ethanol, Bio-Diesel, Cellulosic possibilities
• HVAC (heating, ventilation and air conditioning) Systems and Controls	• Fuel Cells	• Solar/PV
• Lighting	• Generators	• Solar Hot Water
• Wood Products (FSC-Forest Stewardship Council) - Certified)	• Bio-fuels Engine systems (parts)	• Geothermal – pumps
• Alternative Materials	• Hybrid Buses	• Pelletization systems
• Site and landscape materials	• Neighborhood Electric vehicles (NEV)	• Distributed Power Management Systems
• Adhesives	• Electric cooling/ heating of vehicles	• Sensors & diagnostic equipment
• Paints		• Energy Efficient Products
• Testing Kits/ Remediation		• Energy Conservation & Green Energy products

Greening our Business Base – Product versus Process

The focus of the Mayors’ Initiative is to identify ways to help create family supporting jobs in green manufacturers. Therefore the initial priorities are to assist existing local companies to expand production and employment here. Over time, efforts to bring in key manufacturers and suppliers to Minneapolis and Saint Paul industrial sites, to help existing manufacturers and startups begin to produce green

products, and to assist existing manufacturers to green their production processes need to be added. At this juncture, the priority rankings of targets for the “Making it Green” marketing strategy are companies with the opportunity to:

- 1. Expand existing manufacturing of green products**
- 2. Expand production into new lines of green products**
- 3. Create new start-up ventures to produce green products**

4. Establish new locations of existing companies with production facilities in other regions (including local OEMs like Cargill and 3M.)

5. Make existing manufacturing processes greener

This Phase I analysis identified key strengths and challenges in green manufacturing in the three targeted industry sectors:

	Green Building Products	Transportation Products	Renewable Energy Products
Strengths	<ul style="list-style-type: none"> • Windows & Doors • Energy-Efficiency-Related • HVAC System Controls • Alternative Materials 	<ul style="list-style-type: none"> • Hydraulic Systems for Trucks • Generator Sets • Neighborhood Electric Vehicles 	<ul style="list-style-type: none"> • Close to market & supply • State mandates for energy reduction
Challenges	<ul style="list-style-type: none"> • Certification systems quality/ costs 	<ul style="list-style-type: none"> • Energy Storage (Lithium-Ion battery R & D) • Sector has shallow/ unorganized local presence 	<ul style="list-style-type: none"> • Green Building Products • Lack of transmission lines • Ethanol slowdown • Urban site limitations esp. for turbine mfg.

We recommend that Phase II of the Initiative perform an in-depth analysis of these market opportunities as well as some in areas such as green chemistry, water conservation and recycling and reuse. Phase II should also provide qualified business prospects and location advice for the two cities, and a detailed marketing strategy for how to best approach these economic development opportunities.

Green Building Products

Building Products are a major sector of Minnesota’s manufacturing base, especially windows and doors, insulation (and related energy efficiency applications including HVAC systems and controls), FSC-certified wood, and site and landscape products. Minnesota has the potential to become a larger player in the bio-materials area, given local companies’ competencies and the research talent and capacity of the University of Minnesota, which is helping to develop these products. For example, Cargill’s NatureWorks whose Nebraska plant makes PLA, a corn-based fiber, is working on other bio-based applications and 3M is active in developing and producing coatings for glass with energy saving properties.

Minnesota and nearby Iowa are the home to several of the major producers of windows and doors for residential and commercial construction (Marvin, Anderson, Pella, Apogee). The supply chain for this sector ranges from sustainable wood and other bio-based products to adhesives and coatings as well as hardware, fittings and insulating materials and compounds.

USGBC predicts that, by 2012, the annual market for green building products will be \$60 billion — twice the size of today’s market. Given Minnesota’s sizable number of

building products manufacturers there should be ample opportunity to capture additional growth and expansion within the confines of the cities of Minneapolis and Saint Paul. Appendix D lists the Minnesota companies that were identified in a search of data sources listing green companies, which include OIKOS ©, an information resource on energy efficiency and environmentally responsible building construction, and a proprietary database called Building Green Inc., which is the only database comprised of companies assessed by third party criteria for inclusion. Others list companies that

self select to be included. OIKOS lists 82 producers of green building products in Minnesota, 13 (16%), of which are located in Minneapolis and Saint Paul. Building Green Inc. lists 11 of a total of fifty (50) or 22% of Minnesota manufacturers of green building products in Minneapolis and Saint Paul.

The following matrix is a partial list of the emergent product opportunities in the Minneapolis – Saint Paul area that were identified by participants in the Mayors’ Initiative on Green Manufacturing. A deeper analysis of each of these subsectors would

Objective	Product Line	Local Products
Energy Use Reduction	Insulation	• Structural Insulated Panels (SIP)
		• Insulated Concrete Forms (ICF)
		• Spray Foam
	Windows & Doors	• Plastics
		• Post-Industrial
		• Post-Consumer
	Glass/ Films	• Low-Emittance (E)
• Argon-filled		
• Integrated HVAC/energy		
HVAC Systems and Controls	• Energy Recovery Ventilators (ERV)	
	• Heat Recovery Ventilators (HRV)	
	• Programmable Thermostats	
Testing Kits	• Air Leakage (Blower Door)	
Lighting	• Compact Fluorescent Lamps (CFL)	
Protect Natural Resources	Wood Products	• FSC- certified
		• Rapidly Renewable
		• Salvaged
Alternative Materials	• Bio-based materials	
Site and landscape	• Permeable pavers	
	• Irrigation/geo-thermal installations	
Indoor Environmental Quality	Adhesives/Coatings	• Water-solvent
		• Water-based
	Paints	• Low-Zero VOC (volatile organic compounds)
Testing Kits	• Radon – Testing for Remediation Purposes	

provide a prioritized list of local business expansion opportunities and identify prospects for recruitment to industrial sites in the two cities.

We identified the number of companies and employment in each of these industries classified according to the North American Industrial Classification System, (NAICS). Using the most recent (2005) County Business Pattern data and these NAICS codes, we assessed employment in the metro area and the state (see Appendix E.) This assessment is very rough as the NAICS codes do not align with the product application as much as the product content – e.g. adhesives for building products versus other industrial uses. Given these data limitations, we know that these building product sectors in the metro area currently employ approximately 30,000 workers. If only 10% of these are manufacturers of green products – that is nearly 3,000 jobs.

We also used the codes to evaluate the extent to which we had a concentration of workers in a particular industrial classification. The Location Quotient is an economic base analysis used to determine whether a local economy holds a greater share of a particular industry than a reference economy. For our purposes, we compared total employment in the industry locally to total employment locally to total employment in the industry nationally to total employment nationally. If the ratio is greater than 1, it means we have a concentration and the product is probably exported to other regions – if it is less than 1.0 it may mean that we import the product from elsewhere.

The tables in Appendix E show that the largest concentrations are in three sub-sectors – 1) wood windows and doors, 2) alternative materials/composites and 3) testing kits. Overall most of the ratios hover at or above 1.0, indicating a sufficient supply to meet local demand in



Minneapolis Mayor R.T. Rybak with the city's first plug-in hybrid vehicle.

the Minneapolis – Saint Paul area. While this data is not precise, it does provide an overall assessment of the size of some of the existing producers of building materials and gives us confidence in the capacity of the Minneapolis and Saint Paul building products' industry to respond to the rapidly growing market for green building products.

Transportation Products

Transportation products made in Minnesota primarily include recreational vehicles (boats, watercraft and snowmobiles); small airplanes, school buses and engine parts. The largest and most significant vehicle producer in the cities of Minneapolis and Saint Paul is the Ford Motor company employing nearly 2,000

workers at its Saint Paul site. It was recently announced that the plant is scheduled for closure in 2009. Saint Paul is also home to 3M whose transportation division makes reflective tape and transportation systems. Local producers of green transportation products include Cummins, supplying a range of low carbon emission engines for hybrid buses, Eaton Fluid Power Corporation, manufacturing hydraulic systems and generator sets for wind energy and hybrid applications, Donaldson, developing fuel cell technology, 3M, enhancing lithium ion battery construction and Thermo-King, increasing the energy efficiency of its refrigeration trucks among others.

The following lists growth opportunities and local companies active in green transportation products:

Green Transportation Product Opportunity	Local Company
Generators	Cummins (Fridley), Eaton (Eden Prairie)
Electric vehicles	E-Ride (Cambridge)
Fuel conversion systems –	TBD
Efficient systems (refrigeration trucks)	Thermo-king (Bloomington)
Storage/Batteries	3M (Maplewood)
Hydraulic systems	Eaton (Eden Prairie)
Fuel Cells	Donaldson (Minneapolis), Toro (Bloomington)
Off-Road Alternative fuels	Polaris (Medina, Wyoming)
Bio-Materials for road and highway construction	TBD

TBD (to be determined) as in-depth company research was limited in Phase I, no local suppliers were able to be identified.

As reported in *Minnesota LMI Trends*, June 2004:

Minnesota companies are already playing a role in defining the state of the art technology that goes into fuel cells. Donaldson, for example, has developed purification systems that allow the clean intake of air into fuel cells. This is critical since some fuel cell components are easily poisoned by environmental impurities. Other companies such as 3M, Entegris and ICM Plastics have developed fuel cell components that address some of the durability, cost and performance issues that currently plague the technology. While a hydrogen-powered vehicle may never roll off a Minnesota assembly line, Minnesota companies are working to insure that the state has its stamp on the final product.

Renewable Energy Products

The renewable energy products sector includes the products that generate renewable energy, equipment that manages energy systems

to achieve energy efficiency, and the products needed to assemble the production plant/site. This sector includes equipment used in renewable energy generation from sources such as wind, solar PV, solar thermal, geothermal, biofuels (ethanol, biodiesel, etc.), biomass, hydropower, municipal solid waste and landfill gas (MSW/LFG). The U.S. Department of Energy predicts that the biomass and wind energy industries will experience the most market growth between now and 2030. The renewable energy subcommittee of the Mayors' Initiative identified a number of potential growth opportunities for renewable energy products. The growth rates are drawn from a recent DOE analysis of annual growth over the long-term.

Minnesota is well positioned to participate in that growth as it is near the market of wind farms (North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin and Illinois) and the heart of biomass raw materials. Iowa has already attracted five wind turbine and turbine parts manufacturers since Minnesota enacted its ambi-



Photo courtesy of Green Institute.

tious Renewable Energy Standard (RES), requiring 25% of all electricity to be from renewable sources by 2020. A recent announcement of a wind turbine tower manufacturer, Hendricks Industries, to be located in Keokuk, Iowa will provide added market opportunity for suppliers in the Twin Cities region. The Minnesota

RE Source	Minnesota Product Opportunities	Projected Annual Growth Rate Nationally to 2030 (A,B)	Local Companies (C,D)
Wind	Suppliers to Turbine OEMs — blades, gear boxes, other	7.1%	Remmele Engineering, Eaton
Biofuels	Biodiesel, cellulosic, ethanol	5.6%	Cargill, CHS, Minnesota Corn Processing
Biomass	Turbines	9.5%	Bixby Energy Systems, Inc. (Elk River)
Solar	Solar Hot Water systems	Solar thermal (6.4%) Solar PV (19.5%)	Red Rock Energy (White Bear Lake)
Geo-Thermal	Heat Pumps	3.4%	ECONAR (Elk River)
Energy Efficiency	Monitoring & Management Systems, Energy Saving materials	10-30% (estimate from Building Products analysis)	Honeywell's Automation & Control Solutions (ACS) Division (Golden Valley)

(A) Energy Information Administration U.S. Annual Energy Outlook with projections to 2030 (early release) 2008; (B) CDC Associates; (C) www.energy.sourceguides.com; and (D) Minnesota Department of Employment and Economic Development (DEED)

Department of Employment and Economic Development (DEED) worked with the Mayors' Initiative to sponsor a meeting in each city to explain the opportunity for manufacturers to supply OEMs in the wind turbine industry. More than 30 companies attended these 2 sessions. They received the invitation to engage as part of the supply chain in this growing market and it was well received. DEED will continue to develop a wind energy supply chain marketing program in the coming year. The two cities have an opportunity to engage in this process and focus on increasing the participation of local machine shops in wind energy component parts.

The American Wind Energy Association recently announced that 2007 was a record year for additions to the installed production capacity of wind, adding 6,000 MW, a 45% increase from the previous year and the third consecutive record breaking year for wind. DEED estimates the wind turbine industry market in Minnesota alone to be \$14 billion over the next 10 years, a direct result of Minnesota's decision to pass the RES.

The actual number of manufacturers already in the Renewable Energy industry or its supply chain in Minnesota is undetermined. The



Renewable Energy Policy Project projects more than 500 potential suppliers in the Twin Cities metropolitan area, assuming a national renewable energy standard of 15%. Energy Source Guides (a self-identified list of renewable companies) lists 31 companies in Minnesota, 8 of which are located in Minneapolis and Saint Paul. (See Appendix C).

Minnesota Department of Commerce website points out that "Minnesota has more annual solar energy potential than Houston, Texas and nearly as much as Miami, Florida." However, the costs of installation for many residential users are expensive and have a long payback period.

MinnesotaSolar.com reports:

According to the Department of Energy, the costs of solar photovoltaics (PV) have dropped 200 percent over the last three decades. Costs today range from 10 to 40 cents per kilowatt-hour. The PV market is worth \$2 billion today, but is expected to grow to \$10 billion by 2010. The annual growth rate of solar PV products has grown by 20 percent annually and is expected to double every three years for the next 20 years.

Minnesota now has two Solar Rating and Certification Corporation (SRCC) listed manufacturers, although none in the cities of Minneapolis and Saint Paul. A recent joint application of the cities of Minneapolis and Saint Paul with the Minnesota Department of Commerce aims to increase installed solar (thermal and photovoltaic) capacity by 500% by 2010 with support of a pending Solar America Cities 2008 grant. International Brotherhood of Electrical Workers (IBEW), the National Electrical Contractors Association (NECA) and local technical college, Century College each have training and apprenticeship programs to certify solar installers.

County	Investment (\$millions)	Jobs
Hennepin	\$ 394.8	2,708
Ramsey	\$ 156.4	1,041
Anoka	\$ 80.4	586
Carver	\$ 68.8	475
Dakota	\$ 55.2	409
Washington	\$ 17.0	108
Total	\$ 772.6	5,327

Source: Renewable Energy Policy Project, Location of Wind Manufacturing, 2007

The Minneapolis IBEW has a 1000 sq ft lab designed to teach learning objectives set by NABCEP (North American Board of Certified Energy Practitioners). It works in conjunction with an active grid-tied solar array system. The array has 36 panels that can be distributed individually for students to learn how to install various types of solar systems. When not used in teaching, the panels are reconfigured to produce as much as 6000 watts. The Joint Apprenticeship Training Center (JATC) is currently certified to give the NABCEP Certificate of Knowledge exam at the IBEW St. Michael facility.

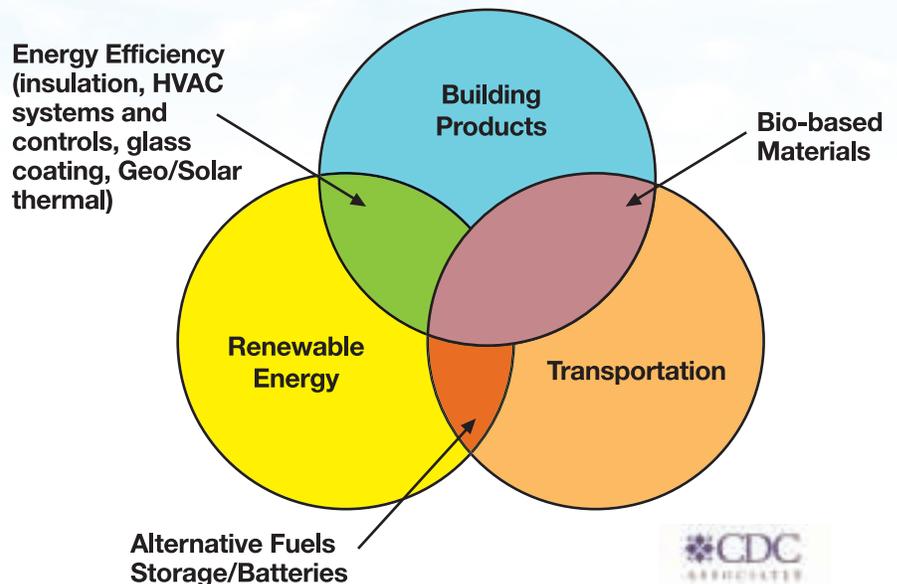
Longer-Term Opportunities

In addition to the immediate opportunities identified above, the Mayors' Initiative recommends concentrating research and development in the key enabling technologies identified below. These technologies are capable of supporting the growth of new companies and products in a number of new applications and green manufacturing subsectors.

In addition to several corporate and private research centers in the region working on related products, the University of Minnesota has research centers conducting basic and applied research in the following areas:

- **Institute for Renewable Energy and the Environment (IREE)**
<http://www1.umn.edu/iree/>
promotes statewide economic development, sustainable, healthy, and diverse ecosystems, and national energy security through development of bio-based and other renewable resources and processes.

Enabling Technologies



- **Center for Sustainable Building Research (CSBR)**
<http://www.csbr.umn.edu/>
organizes and effectively grows the research and outreach missions of the University of Minnesota's College of Design, as well as working with other units to enhance the college's teaching mission. CSBR serves as a resource for State of Minnesota, the design professions, and the building industry. There is a substantial and growing amount of building research activity in the following areas: sustainable design, energy-efficient buildings, windows and glazing research, building design process and evaluation, human factors, and building science.
- **Center for Transportation Studies (CTS)**
<http://www.cts.umn.edu/>
works with more than 75 faculty from 25 different departments in seven colleges — a spectrum of disciplines including engineering, planning, economics, public policy, computer science, human factors, and environmental studies.

There is great opportunity and momentum building in the commercialization of R & D and many synergies possible through better linking university research and business. Both cities and the university are supporting the development of the University Research Park as a center to house more industrial jobs in its 700 plus acres, located near the border of the two cities along the proposed Central Corridor LRT line. The park's focus is to draw upon its proximity to the University of Minnesota's Minneapolis and Saint Paul campuses to house R & D projects, start-up firms and research divisions of larger companies. In addition, the University of Minnesota's Carlson School of Management offers the Minnesota Cup competition for entrepreneurs with 'breakthrough' ideas to receive recognition, advice and some start-up funding. Its annual Commercialization Challenge sponsored by the University's Venture Center aims at getting university technology into the marketplace. This year, if a green product wins, it's eligible for \$1 million in start-up money — a non-green winner can only receive \$100,000.

II. BUILDING ON A SOLID GREEN FOUNDATION

Minneapolis and Saint Paul are building on their strengths in green initiatives, their policies to support strategic development of scarce industrial land and their many other assets as a location for green manufacturing. As early signatories of the U.S. Conference of Mayors' Climate Protection Agreement, Mayors R. T. Rybak and Christopher B. Coleman have demonstrated substantial leadership. Minneapolis and Saint Paul already have a number of green programs and initiatives in place such as the Sustainability Plan initiative in Minneapolis and the District Energy heating system in Saint Paul. An expanded list follows later in this section. Furthermore, the cities have distinct qualities to support the expansion of green manufacturing, but they need to be packaged and marketed in order to capture the full benefits of the emerging green economy.

Top 10 Greenest US Cities

(SustainLane, 2006)

1. Portland, OR
2. San Francisco, CA
3. Seattle, WA
4. Chicago, IL
5. Oakland, CA
6. New York City, NY
7. Boston, MA
8. Philadelphia, PA
9. Denver, CO
10. Minneapolis, MN

*Ranked against the 50 largest US Cities
Note: Saint Paul was not included in the ranking as it is not among the largest 50 cities in the U.S. (Minneapolis 48th largest). www.sustainlane.com*

Minneapolis and Saint Paul have each been recognized as being among the top "green" cities in the U.S. The Green Guide did rankings in 2005 and 2006 – Minneapolis was among the top ten in 2005 and Saint Paul was named in the top ten in 2006. Another ranking of green cities comes from SustainLane (www.sustainlane.com) that ranked the largest 50 US cities by sustainability factors. Finally, Minneapolis and Saint Paul ranked eleventh and twelfth respectively based on air quality, electricity use and transportation habits in *Popular Science Magazine's* 2008 "Top 50 Greenest Cities" (www.popsci.com).

The cities of Minneapolis and Saint Paul have already established themselves as early adopters of green initiatives. As early as 1993 the city councils of both cities adopted an advisory plan prepared by the UN sponsored International Council for Local Environmental Initiatives to work to reduce CO₂ emissions.

Since that time they have put in place many pioneering green features ranging from land use, transportation, energy efficiency, renewable energy, storm water reduction and urban greening. Some notable and recent efforts include:

- **Saint Paul District Energy** — the district heating and cooling system developed more than 20 years ago now serving 30.7 million square feet in downtown Saint Paul.
- **Minneapolis Sustainability Plan and GreenPrint** — The Minneapolis Sustainability Plan was adopted in 2003 after the public process that established 24 sustainability indicators. A subset of these indicators, the GreenPrint includes goals for

increasing the city's proportion of renewable energy used and reducing CO₂ emissions in its operations and citywide. It has also developed a set of sustainability indicators and publishes an annual report of its GreenPrint, tracking sustainability efforts.

- **Sustainable Saint Paul** — Saint Paul has been recognized by many national organizations for its efforts to build a citywide recycling program; combined heat power plant, reclaiming and redeveloping brownfield industrial sites; and building a nature center. The city also sponsors an annual Sustainable Saint Paul awards program to honor citizens and businesses that are making significant achievements in protecting and restoring the environment.
- **Energy Corridor in Saint Paul** — a proposal to link development of renewable energy to supply the Rock-Tenn recycling plant and other area businesses along the Central Corridor to benefits of reducing greenhouse gases and maintaining as many as 500 family supporting union jobs in this facility.
- **Minneapolis Solar Facilities** — The City of Minneapolis has been selected to receive a \$2 million grant to construct the largest urban solar array upper Midwest. The grant is funded through the Xcel Energy Renewable Development Fund, and will allow Minneapolis to build a 600 kilowatt array. The solar array is currently planned to be constructed on the roof of the City's Public Works Currie Maintenance Facility.

Joint Energy Efficiency Efforts

Both cities were early adopters of LEED or its equivalent, the MN Sustainable Building Guidelines, for newly built city-owned properties.

- Minneapolis and St. Paul are also committed to energy conservation efforts in their facilities including changing of traffic signal lights to LED's and hiring Energy Managers.
- Both cities supported Xcel Energy's plan called the Minnesota Metro Emissions Reduction Project (MERP) to significantly reduce air emissions from three Twin Cities' coal-powered generating plants including one in Minneapolis and another one in Saint Paul. The change to the Riverside plant alone will reduce CO2 emissions by one million tons per year
- The Cities are using the groundbreaking State of Minnesota Building, Benchmarking and Beyond (B3) guidelines developed by Xcel Energy, the Department of Commerce and the Weidt Group to identify and prioritize public buildings and make the necessary improvements to reduce CO₂ emissions and save taxpayer dollars.

Additional Minneapolis highlights include:

- The City Council passed a new ordinance requiring all new or significantly renovated city-owned buildings be built to LEED Silver national green building standards, the upcoming Hiawatha Maintenance Facility to be LEED Gold certified, and key staff be LEED AP.
- The city has 28 hybrid electric vehicles in its fleet, and Mayor R. T. Rybak's official City of Minneapolis car is a plug-in, gas-electric hybrid Toyota Prius that gets 70+ miles per gallon of gasoline. A new program will allow charging this vehicle with solar electricity.

- The City of Minneapolis has installed solar systems on four city buildings including a fire station and two public works facilities. The City's new 3rd Police Precinct building uses a passive solar heat exchanger to pre-heat air before it enters the building's ventilation system.
- The city is integrating general sustainable design criteria into economic development related Requests for Proposals. For example, Minneapolis recently negotiated commitments from two developers to obtain LEED certification on three projects.
- The city is currently updating its comprehensive plan, *The Minneapolis Plan for Sustainable Growth*. The updated plan will contain additional policies and implementation that expand the City's sustainability goals and renewable energy targets.
- In 2006, the City waived permit fees for the installations of twelve solar water heaters, as part of the SE Como Neighborhood Solar Thermal Project, each saving about 120 therms of natural gas each year.

Additional Saint Paul highlights include:

- District Energy Saint Paul owns and operates the largest hot water district heating system in North America, along with a large chilled water cooling system providing green energy to 80% of downtown Saint Paul buildings including the State Capitol complex from its new combined heat and power plant, fueled by 300,000 tons of clean urban wood waste per year.



- The zero-energy-consumption Science House Experiment Center on the Mississippi River in downtown St. Paul features a solar-powered classroom, an 8.4 kW photovoltaic laminate on standing-seam steel roof and includes passive solar design.
- The Saint Paul City Council unanimously passed a Sustainable Development Policy for New and Renovated Municipal Buildings in January 2007. All new or major renovated Saint Paul municipal facilities will use one of the following two well-established standards: 1) Leadership in Energy and Environmental Design (LEED) or 2) State of Minnesota Sustainable Building Guidelines. In December of 2007, the City opened the new Saint Paul Police Department's Western District Police LEED Silver facility.

More complete information on each city's efforts can be found at <http://www.ci.minneapolis.mn.us/sustainability/> and <http://www.stpaul.gov/initiatives/sustainable/>



The following table lists some key factors for green manufacturers and indicates that each city can provide them all.

According to the November 2007 release of Manufacturers' News, Inc., the publisher of directories of manufacturers:

- Minneapolis is home to the most industrial jobs in Minnesota with 13% of the state's manufacturing employment or 65,797 jobs.
- Saint Paul accounts for 47,644 manufacturing jobs. MNI reports the Twin Cities rank high among the top 25 cities in the US for industrial employment with Minneapolis ranking 13th in the nation and Saint Paul 25th.
- Together, their 2,028 plants rank Minneapolis/Saint Paul fourth in the nation for the number of manufacturers.

From: <http://www.manufacturersnews.com/news/release.asp?ID=101>

- The city now requires that all new affordable housing projects follow the Green Communities protocol and all new commercial projects utilize Xcel Energy's Energy Design Assistance program. With a grant from the Minnesota Pollution Control Agency (MPCA), the city convened a group of stakeholders to examine the city's policies and practices to encourage "green" development for all projects receiving public investments.
- The city awarded its first Sustainable Saint Paul Green Building Design award to Flannery Construction's new headquarters. The building uses 37% less energy than traditional architecture with a PV system, ground source heat pump and energy-efficient HVAC.

in place to attract industrial firms; both offer ready marketplaces for green products and suppliers, both have an increasing variety of renewable energy sources and green transportation/shipping options, such as the Mississippi River.

Other Location Advantages of Minneapolis and Saint Paul

Minneapolis and Saint Paul are leading centers of manufacturing including world-class manufacturers such as 3M, Medtronic, Cargill, Ecolab, General Mills, Andersen, Donaldson, Toro, and Pentair. In fact taken together, Minneapolis and Saint Paul are the 4th largest manufacturing city in the U.S. Both cities have policies

What companies need to thrive in a green economy:	What exists in Minneapolis Saint Paul
Market Opportunity	✓
Access to the Market (Concentrated Demand, Transportation Hub, Educated Workforce...)	✓
Appropriate Materials/Suppliers	✓
Accessible/ Trained Workforce	✓
Sufficient Finance for Growth	✓
Green Power	✓
Green Buildings/Sites	✓
Green Transit/Transport/Logistics	✓
Green Process Assistance	✓

Minneapolis and Saint Paul Opportunity Sites

As in many other cities, former industrial space has been converted to other uses and some awaits environmental remediation to enable it to be reused. Overall, land for manufacturing purposes is becoming scarcer within the cities of Minneapolis and Saint Paul. An analysis of data from the Metropolitan Council shows the loss of land dedicated to manufacturing uses.

Acres of Manufacturing Land				
	1990	2000	2005	% Chg. 00-05
Minneapolis	5460	4599	4010	-12.8
Saint Paul	4505	4520	4143	-8.3
TOTAL	9965	9119	8153	-10.6

Report to Saint Paul Port Authority, *Industrial Land Use Policy*, July 25, 2007.
Source: Metropolitan Council

Both Minneapolis and Saint Paul have taken measures to stem this decline and preserve scarce industrial land for industry with high employment densities (jobs per acre) and good wages. Through recent adoption of industrial land use policies, Minneapolis and Saint Paul have recognized the value of maintaining an industrial base and manufacturing jobs within their boundaries. Minneapolis has developed a number of employment zones where existing industrial buildings cannot be converted to living space or other non-confirming uses. Saint Paul has analyzed the real estate market trends and its position vis a vis the surrounding community and developed a plan to redevelop and market its available industrial land to achieve high employment density and living wage jobs. St. Paul's recent study suggests, "...appropriate preservation of employment-generating land is a critical strategy to maintain Saint Paul's healthy and diverse economy into the future."

Each city has programs to support growth in manufacturing employment and strategic use of valuable industrial lands. The Mayors' Initiative reinforces these efforts by identifying growth opportunities in clean industries with family-supporting manufacturing jobs. There have been many strides here and nationally in developing green sites such as The Enterprise Foundation's effort with a number of other national organizations to develop green communities targeted at affordable housing development in U.S. Cities. Their checklist assesses the "green"-ness of their projects. The Saint Paul Port Authority (SPPA), best known locally for putting the Energy Park Business Center in place in response to the 1970s energy crisis and redeveloping the city's industrial sites and brown-fields, judges manufacturers "green"-ness according to their use of green inputs, green products, green process and green R &D.

St. Paul Port Authority has taken efforts to green their business centers in the following ways¹⁶:

- provide access to district heating,
- install state-of-the-art stormwater ponding and stormwater management systems,
- clean-up polluted lands for new development, and
- advise business center tenants on energy efficient construction, high performance (e.g. LEED or equivalent) building and sustainable site design including employee productivity design elements.

Among the green product manufacturers in the Saint Paul Port Authority Business Centers are¹⁷:

- Capital Wood Products which designs wood fixtures from "green" wood.
- NW Sheet Meta which sells high-efficiency products (e.g. air conditioners).
- Twin City Glass which sells low-e glass.
- University Enterprise Labs which produces biodegradable plastic bags.
- Warners' Stellan which markets high-efficiency appliances (e.g. washer/dryers).
- Westway which ships biodiesel fuels.
- Hawkins which produces ethanol additives.

¹⁶ Saint Paul Port Authority, *Memorandum to Board of Commissioners, re: Port Authority Green Initiatives*, January 15, 2008

¹⁷ *Ibid.*

The Mayors' Initiative calls for the establishment of Minneapolis and Saint Paul as a Green Zone for manufacturers. Each city should work toward aligning its programs, policies and development incentives to support green manufacturers expanding on industrial land anywhere within its existing municipal boundaries.

Minneapolis and Saint Paul Can Offer Green Sites to Manufacturers

- buildings and land with existing infrastructure
- close to suppliers – supply chain density
- redeveloped brownfields
- short commutes
- access to transit
- access to green power sources
- access to multiple transportation modes

During Spring Semester 2008, a graduate class of the Humphrey Institute of Public Affairs at the University of Minnesota is further exploring the development of criteria for green industrial sites as well as priority job opportunities and existing and needed incentives to further support the Mayors' Initiative's recruitment of green manufacturers to a potential green zone with workforce training and other incentives

III. REVIEW OF BEST PRACTICES IN GREEN ECONOMIC DEVELOPMENT

The Mayors' Initiative on Green Manufacturing proposes a unique approach — one that joins the two cities in a joint endeavor and makes green manufacturing a core element of its economic development strategy. In our analysis of other cities, we found a number of green initiatives — even a few related to green manufacturing — but no other city and no two cities acting together have embarked on a strategy the same as that proposed here.

The following diagram shows the range of city initiatives from providing a base of leadership on green initiatives to greening internal city operations to working extensively with businesses to encourage economic growth in green businesses and as targets for economic development.

Increasingly, U.S. cities are transforming their infrastructure, leadership and regulatory practices to demonstrate a commitment to the reduction of greenhouse gas emissions. The strategy proposed by the Mayors' Initiative on green manufacturing focuses primarily on these three steps:

- Leading by example with commitment and focus
- Making markets by supporting



- demand for green products
- Adopting green business as an economic development strategy

awards and certifications are key strategies to move people and businesses toward green practices and development.

Listed below are examples from other cities which also focused on these three elements.

1. Leading by example with commitment and focus

The establishment of benchmarks, such as local greenhouse gas reduction goals/targets, the appointment of staff and advisory councils and the recognition and promotion of outstanding green performance through

Local Greenhouse Gas Reduction Goals/Targets: Seattle

Seattle Mayor Greg Nickels was the first mayor to sign the Mayors' Climate Protection Agreement, which advances the goals of the Kyoto Protocol, as set out in 2005. He challenged mayors across the country to join him and, subsequently, launched the Mayors Climate Protection Center to track the activities of signatories. By May 2006, 232 mayors representing 45 million

Americans had committed to the Agreement. By March 2008 there are 802 signatories to the Agreement.

Leadership by key officials

In 2003, Iowa Governor Tom Vilsack challenged the State's utilities and regulators to work toward achieving 1,000 megawatts (MW) of renewable energy by 2010. In addition, thirty Iowa mayors signed the Mayors' Climate Protection Agreement. The combined leadership of the state and city governments and the establishment of an effective legislative and regulatory environment, including significant tax credits, have secured large-scale investments in wind. The State of Iowa has developed the third largest wind capacity (863 MW), after California and Texas. According to news sources, current and promised jobs and investment in plants and equipment in the Iowa wind industry total 1,500 and \$160 million respectively.¹⁸ Central to much of Iowa's success in attracting wind turbine manufacturers and suppliers was the personal commitment of the Governor to attend meetings with prospective companies, including manning the Iowa booth for an entire day at the annual wind energy conference in Los Angeles.

Office of Sustainability: Chicago and Miami

Milwaukee, Chicago and Miami have appointed permanent staff and advisors to the implementation of environmental goals. In 2007, Mayor Daley created two new positions: that of Chief Environmental Officer to the Chicago Department of Environment and that of Deputy Environmental Officer to the Mayor's Office to oversee citywide environmental efforts and to ensure that the City's environmental strategies were on track to position Chicago as "The Most Environmentally-Friendly City" in the U.S. The Miami Office of Sustainable Initiatives (MSI) is the designated office responsible for

addressing the city's environmental programs by coordinating with other city departments and environmental experts to assure that the City of Miami becomes a model for environmental best practices.

Advisory Council: San Francisco

San Francisco and Miami have both recruited business, education and community representatives to guide and to inform green economic development efforts. San Francisco's Clean Technology Advisory Council was generated out of the City's "Clean Technology Initiative," with the mission of creating high-skilled, high-wage clean-tech jobs using a strategy modeled after the city's biotechnology initiative. The Advisory Council, comprised of 16 members drawn from the clean tech industries, was charged with acting as ambassadors-at-large and attracting clean tech businesses to San Francisco. Coordinating with the Mayor's Office of Economic and Workforce Development, the Department of the Environment and the San Francisco Public Utility Commission, the Advisory Council markets and implements clean tech business attraction strategies.

Green Awards/Recognition/Certification Programs: Chicago and Boston

Mayors have provided awards and recognition to businesses, non-profits, schools and/or government agencies making great strides in their practices to be "green." Every two years, Mayor Daley's GreenWorks Awards, for example, recognize businesses, non-profits, schools and government agencies with buildings, practices, and products or services, which demonstrate environmental responsibility. Mayor Menino honors Boston businesses that demonstrate exemplary green business practices, green business products and green business services. The City of San Francisco developed a Green

Business designation and hosts a green business resource and database, which provides free assessments, technical support and rebate information on "greening" business operations in the areas of resource conservation, waste minimization and pollution prevention practices.

2. Making markets – supporting demand for green products

Cities have taken on a number of roles in supporting demand for green products: making renewable energy purchases; establishing high performance building standards and related job training; procuring green products and promoting public transit, pedestrians and bicycle-use.

Renewable Energy Purchases: Philadelphia

Philadelphia negotiated a long-term service contract with Trigen under the agreement that the company, which would provide steam heat to 70% of downtown, and retrofit its entire system to be 70 percent more fuel efficient. Not only did the system reduce transmission and distribution losses and increase fuel use efficiency, more than 400 local construction jobs were created to build the combined heat and power (CHP) system in what became one of the largest private investment projects ever in Philadelphia.

High Performance Building Standards: Albuquerque, Seattle, San Francisco and Chicago

Mayor Martin Chavez's nationally-recognized Albuquerque Green Program is now requiring all newly-constructed city buildings to be carbon neutral and powered from 100% renewable energy by 2030. Seattle requires all city-funded projects over 5,000 SF to meet LEED Silver standards. While San Francisco prioritizes LEED Gold buildings for building permit review,

¹⁸ www.windaction.org

Chicago's Green Permit Program expedites building permits and waives fees if developers use green techniques.

Green Jobs Training: New York, Boston and Trenton

As the demand for green building increases, so do the jobs in the manufacture of specialty products and technologies. Cities such as Seattle, Trenton and Oakland, have recognized that installing, servicing, testing and maintaining renewable energy equipment create job opportunities. Specialized workforce training programs have been implemented to prepare the next generation of workers with the skills required for energy retrofits and audits, alternative vehicle maintenance, wind farm maintenance, waste recycling and remediation.

Initiatives are linking new green building projects and retrofits in low-income neighborhoods with apprenticeships or other job training programs in construction or other building trades. The International Brotherhood of Electrical Workers (IBEW), for example, has established training programs for solar installation in New York and the Boston area. In St. Michael, Minnesota, the International Brotherhood of Electrical Workers (IBEW) has the first certified solar PV training center for apprentices. While Seattle has been developing a clean tech program, which includes green building and energy auditing training, with the South Seattle Community College, the Green Jobs Corps of Oakland, is retained on contract to teach skills related to biofuels, solar energy and fuel cell mechanics and their proper installation. The success of the latter model has led to its consideration by U.S. Congress for replication on a national scale.



Courtesy of Flannery Construction, Saint Paul, MN

The Trenton Green Initiative, a consortium of the City, the Public Service Enterprise Group (PSEG), various State agencies, the County and the Board of Public Utilities, has identified a number of immediate green-collar job project opportunities for local residents. As part of this initiative, the Trenton Public Service Electric and Gas Company recently announced a \$5 million carbon abatement program designed to train low-income residents and businesses in Trenton and Newark to become more energy-efficient.

Trenton's Green Initiative, a public-private partnership, has a number of employment-related programs including:

- The Pilot Green Collar Careers Program is a partnership which creates demonstration projects with local vendors, suppliers, manufacturers and energy companies providing job training and jobs related to climate protection.
- The Energy Smart Home Inspection and Maintenance Initiative provides home inspection services to local residents. Youths and adults conduct energy auditing services and perform solar installation and remediation services.

- The Green Roof Initiative encourages the planting of rooftop gardens on government buildings, schools and businesses in Trenton.
- The School Bus Biodiesel Initiative will develop a small-scale commercial biodiesel production plant to provide school buses and other local vehicles, with locally produced biodiesel, or fuel made from local waste vegetable oil. This plan will generate jobs in biodiesel production, distribution and community education.¹⁹

Promotion of public transit, pedestrians and bicycle-use: Portland and Denver

Portland offers free transit downtown and its controlled city limits have led to high density, mixed-use development, such as downtown's Pearl District, which has emerged as an urban model for cities across the nation. Mayor John Hickenlooper of Denver persuaded voters and mayors from the seven county region to back a sales-tax hike to fund a \$4.7 billion mass-transit project to reach the City's suburbs, increase research into lower carbon fuels and solar energy and to help reach the city's goal of 10% renewable energy use by 2015.

¹⁹ "State Capital Thinks Green To Promote Jobs and Growth," NJBIZ, October 8, 2007.

3. Adopting green business as economic development strategy

Protection of the environment and development of the economy have, traditionally, been presented as conflicting activities. Recently, however, many political leaders, and particularly mayors, have begun to assert that addressing environmental challenges presents an opportunity to create new jobs and to enhance the livability of cities. These mayors have adopted “green,” or sustainable, business economic development strategies that incorporate environmental objectives into timely, economic development goals. Their most common tools have been procurement linked economic development practices, green business economic development support, green job training, and the establishment of green zones/ corridors/ centers for green businesses, some coupled with green R&D centers.

Procurement policies linked to local green manufacturing: Chicago and Chattanooga

Under the leadership of Mayor Daley, the City aggressively pursued leading manufacturers Spire Solar and Solargenix by providing them with incentives and by bolstering market demand for their products through city procurement policy. Promised \$2 million from the City of Chicago, \$6 million from ComEd and \$6 million in product procurement, Spire Solar, a manufacturer of PV panels, moved its manufacturing to Chicago’s Center for Green Technology, a former brownfield site. In turn, Spire Solar Chicago created twenty-five local jobs to fulfill its contracts. Major municipal buildings, including seven major museums and eight public school buildings were retrofitted with PV systems. Eventually, through grants from the Chicago Solar Partnership, ComEd, IBEW, Community Energy Cooperative, the State and BP Solar, the systems

were made affordable to low-income housing projects.

Solargenix was recruited from Jacksonville, Florida in 2004. The City of Chicago lent Solargenix \$1.7 million - interest-free - and, with a consortium of utilities, foundations and the State, procured \$5 million worth of solar thermal collectors for installation on their buildings. Over the next three years, the City offered \$5 million in grants to businesses and institutions with large hot water consumption, such as laundromats, health clubs and affordable housing developments. Businesses and institutions were required to pay for the installation costs while the City’s grants covered the purchase of the solar thermal systems. Using patented technology from the University of Chicago, Solargenix continues to provide solar thermal collectors all across the City and employs approximately 25 persons.

Despite changes in the health of local companies and global market, Chattanooga’s green investment continues to payoff over time due to local procurement, industry experience and R & D talent. In 1992, as part of a local sustainability strategy, Chattanooga planned an electric transit system for its waterfront. The local manufacturing/design company Advanced Vehicle Systems (AVS) constructed eighteen electric buses and helped establish two downtown electric transit routes for Chattanooga. AVS grew from ten workers in 1992 to 120 employees in 2003, sold 29 buses to other markets in the US and in the world and at one time commanded more than 60% of national electric transit vehicle sales. It closed in 2003. However, a new hybrid electric bus company, EV America, started up in Chattanooga in 2006. The CEO of the new company was hired from the university-based research center and EV America’s Atlanta-based founder

decided to headquarter the company in Chattanooga because of the local base of knowledge and experience in this field.

The ongoing support of the Advanced Transportation Technology Institute (ATTI -- formerly Electric Transit Vehicle Institute), a private non-profit organization was key to the success of AVS and EV America and Chattanooga’s rise as a leading center in the electric vehicle market. Originally a program of applied research from the University of Tennessee at Chattanooga (UTC), ATTI assisted AVS and the City of Chattanooga through the development and deployment of “clean energy” transportation technologies, transit systems, fleets and demonstration projects. Since that initial effort, ATTI has assumed a national presence by extending its services to cities trying to develop their own “clean energy” transportation systems.

Green zones/corridors coupled with green R&D centers: Milwaukee, Houston, and Western Pennsylvania.

The establishment of green zones/corridors coupled with R&D centers and/or industry cluster development is another key strategy for advancing local green industries. Cities, such as Milwaukee, and Houston and regions such as Western Pennsylvania have used these synergetic approaches to gain strong reputations and expertise in specialized renewable energy applications:

- **Milwaukee, Lithium Ion Battery** — The Milwaukee 7 Economic Development Consortium is leading seven counties in an effort to support “next generation manufacturers” in lithium ion battery development. With a \$15-20 million investment from the Pennsylvania firm C&D, Milwaukee’s core manufacturers,

like Johnson Controls Inc., were presented with the opportunity to lead in the design and manufacture of the next generation of lithium ion batteries. While the agreement is contingent on three to four years of federal funding, the project received an \$800,000 earmark in 2007 and expects \$3-5 million per year for the next 2-3 years. Mayor Barrett has supported a \$225,000 forgivable loan to C&D, provided the initiative maintains employment levels.

● **Houston, Electric Hybrid Truck**

– Houston Advanced Research Center (HARC) hosted a meeting in October 2007 to discuss the prospect of establishing a Texas Hybrid Truck Coalition. The primary objective of such a coalition would be to help accelerate the commercialization of hybrid technology and deployment of hybrid trucks in Texas. Attendees heard several presentations from both the manufacturer and end-user perspectives followed by a lively discussion highlighting some of the issues holding back rapid deployment of hybrid trucks into the marketplace. HARC is a 501(c)(3) not-for-profit organization based in The Woodlands, Texas dedicated to improving human and ecosystem well-being through the application of sustainability science and principles of sustainable development. As a \$20 million research organization, HARC's mission is to move knowledge to action to improve human well-being and the environment.

● **Green Building Alliance of Western Pennsylvania** – Green Building Alliance (GBA), a non-profit organization serving all of western Pennsylvania for 15 years, is a leading advocate for smart solutions for the built environment in western Pennsylvania. GBA:

– Educates the region's building industry professionals in green building practices.

- Brings together building professionals to build new networks of collaboration in the region.
- Funds the development of innovative green building products.
- Offers research services and technical support for green building projects.
- Advocates for the economic benefits of green building.
- Champions western Pennsylvania as a leader in green building.

The Alliance launched a green products development initiative in 2006 to support the growth of more green building products manufacturers in the region.

Green Incubators and Business Parks

Concentrating support and offering opportunities for co-location often helps build new companies and technologies. The National Renewable Energy Lab lists 17 business incubators with a focus on clean technology. Green incubators with notable success in areas of green business economic development include:

- Minneapolis, MN — The Phillips Eco-Enterprise Center focuses on housing environmentally friendly businesses and organizations.
- Fresno, CA—The Water Energy Technology (WET) Incubator at California State University focused on water, energy and other environmental technology development.
- Austin, TX—The Clean Energy Incubator (CEI) and Austin Technology Incubator (ATI) specializes in applied clean energy technology. Formed in 1999 by the National Renewable Energy Laboratory (NREL), CEI successfully brought clean energy tech-

nology to the market. Working with the utility, Austin Energy, CEI has recently been developing internet-controlled irrigation and wind and geothermal energy technologies.

● **San Jose, CA** — The Environmental Business Cluster focuses on electric and hybrid-electric vehicles. In collaboration with the City of San Jose, San Jose State University, the National Renewable Energy Laboratory and the utility Pacific Gas and Electric, the Electronic Transportation Collaboration Center specializes in the early-stage development of alternative fuels and hybrid commercial vehicles.

● **Berkeley, CA** — The University's R&D center specializes in biofuels and energy. With \$500 million in funding from BP, Berkeley will serve as a test bed for research and development in biofuels and renewable energy.

● **Chicago, IL** — The Environmental Institute/Center for Green Technology — Chicago's LEED Platinum Center for Green Technology is a city-owned, mixed-use facility that sits on a brownfield project site, which was successfully redeveloped in 2002 with \$9 million from various HUD loans and funds from the Department of Energy (DOE). Spire Solar, manufacturer of PV panels, now leases a 5,000 SF space from the facility.

Collectively, these best practices have proven to be effective drivers and enhancements to traditional economic development policies. In a word, they have helped focus their cities on capturing jobs in the "industries of the future."

IV. DETAILED STRATEGY RECOMMENDATIONS

“Making it Green”: A Strategy for Capturing and Growing Green Manufacturing in Minneapolis and Saint Paul.

Minneapolis and Saint Paul are leaders in green initiatives and are home to a vibrant concentration of small and medium sized manufacturers. Over the past 6 months, we have identified significant market opportunities in green products already being produced here. Additionally, there are opportunities for new products that businesses located in Minneapolis and Saint Paul could easily manufacture. This strategy calls for 5 action steps to help our cities capture the benefits of the expanding green economy.

We have seen that, in other communities, branding, marketing, strategic investment, and key leadership participation are important ingredients to success. Minneapolis and Saint Paul have most of the basic tools in place – we only need to focus them to succeed in making our communities a center for green manufacturing in America.

Our strategy is based on the following five recommendations:

- 1. Market Aggressively** — Initiate an aggressive, leadership-driven marketing plan, “Making it Green in Minneapolis and Saint Paul;”
- 2. Realign Our Tools** — Realign our cities’ economic development tools to focus on the green “industries of the future;”
- 3. Grow Markets for Local Suppliers** — Grow receptive markets for these green manufacturers by sharpening our procurement and public policies;



Mayor Chris Coleman of Saint Paul, speaking at the Green Jobs press conference, November 26, 2007 with Mayor R.T. Rybak and United Steelworkers representative, Gerry Parzino.

4. Coalesce State Policies and Programs

— Create a set of state policies and incentives to support the creation of green jobs in Minneapolis and Saint Paul, and

5. Forge Enduring Partnerships

— Adopt and strengthen the culture of innovation and partnership of the cities of Minneapolis and Saint Paul with the on-going work of the Mayors’ Green Manufacturing Initiative through a restructured Mayors’ Green Manufacturing Development Team.

1. Market Aggressively

Initiate an aggressive, leadership-driven marketing plan – “Making it Green in Minneapolis & Saint Paul”.

The Mayors’ Initiative on Green Manufacturing recommends that the Cities of Minneapolis and Saint Paul use their existing strengths in green initiatives to promote the two cities as premiere places to build and expand green manufacturing enterprises. This would include declaring the industrial land in both cities to be a Green Zone, and offering support

to green manufacturers locating or expanding here. The Initiative proposes that the two cities work together to increase green manufacturers, green sites and green jobs in its policies, programs and incentives (see recommendation #2) by building on current efforts to promote clean, well paying, and concentrated employment opportunities on available industrial land.

We recommend that the cities develop a comprehensive marketing and promotions plan to capture the best opportunities for the Green Zone. Based upon both projected market growth and local industry presence and expertise, this initiative has identified 29 subsectors in three leading green industries with hundreds of products/product lines that are strongest prospects for growth in manufacturing in Minneapolis and Saint Paul. A detailed strategy for each of these subsectors and products/product lines is required in order to appropriately promote the growth of our existing companies and to successfully recruit green manufacturers and suppliers to locate within the Green Zone of Minneapolis and Saint Paul.

The major pieces of a targeted marketing and promotions plan for the “Making it Green” campaign include:

Phase 1: Research

- Conduct in-depth market analysis of each of the 29 subsector and products/product lines to identify expansion opportunities and site requirements.
- Analyze effectiveness of various workforce, business support and development incentives to grow and recruit these businesses.
- Conduct focus groups with existing industry leaders to identify market and technology opportunities and challenges.
- Identify target companies within subsectors’ product opportunity areas.

Phase 2: Development

- Develop overall marketing strategy and implementation plan to marry targeted manufacturers with product opportunities.
- Prepare collateral (web site content, brochures, etc.) that promotes sites, existing workforce skills and skill development programs, green energy and other initiatives, market access, supply chain availability, and cities’ other amenities and quality of life to use at appropriate trade shows and missions.
- Select strategic trade shows and companies to schedule visitations/calls for Mayors and cities staffs to market opportunities in Minneapolis and Saint Paul.

Phase 3: Implementation

Design and Roll-Out Initial Marketing Efforts

- Create Mayors’ Green Manufacturing Awards.
- Promote green achievements of each city.

- Identify and promote R & D capacity related to target industries.
- Provide leadership to help organize markets and match local manufacturers to market product opportunities, such as recruiting/hosting industry conferences/symposia, supporting and promoting information on green manufacturing market opportunities/ supply chain development.
- Make calls on business prospects; develop additional leads through trade shows, ads and other methods to show available sites, green advantages and other support in Minneapolis and Saint Paul.

2. Realign Our Tools

Realign our cities’ economic development tools to focus on the green “industries of the future”.

Both Minneapolis and Saint Paul have staff, programs and tools to support green manufacturing. The Mayors’ Initiative on Green Manufacturing recommends that the city councils adopt supporting policy initiatives and that appropriate departments of the cities of Minneapolis and Saint Paul:

- Review the strategic goals of the marketing campaign.
- Take appropriate actions to align their staff and development tools to focus on the green subsectors and products/product lines opportunities identified.
- Develop methods to make resources and opportunities known to green manufacturers.
- Assess workforce and finance programs to support green manufacturing growth and development.

3. Grow Markets for Local Suppliers

Grow receptive markets for these green manufacturers by sharpening our procurement and public policies.

Both cities have sufficient market power to create demand for green products. This demand can drive business opportunities for local companies and provide opportunities to recruit expanding manufacturers to locate here. The Mayors’ Initiative on Green Manufacturing recommends that the cities of Minneapolis and Saint Paul review their procurement policies for opportunities to:

- Leverage Minnesota’s rapid growth in renewable energy production to encourage growth in renewable energy equipment and component parts, by conducting regular meetings between OEM’s and parts producers in Minneapolis and Saint Paul to identify opportunities and barriers to growth.
- Link procurement with the recruitment of manufacturers of those products (similar to the Chicago Solar Initiative.)
- Guide local manufacturers to increased market opportunities for their green products in other cities (created by environmental efforts such as the work of U.S. Conference of Mayors and the Clinton Initiative.)
- Seek out opportunities to aggregate local purchasing power through alliances with colleges and school systems, counties, and other municipalities (particularly building on the efforts of the GREEN (Governments for Responsible EPP and Environmental Networking) Group of metro counties coordinated by the Minnesota Pollution Control Agency, whose goal is currently to increase environmentally preferable procurement (EPP) by state and local governments by 30% over 2001 levels by 2011.)

The Mayors' Initiative on Green Manufacturing also recommends that the cities play a role in supporting green manufacturers and their supply chain by helping to:

- Develop a directory of local green product manufacturers and a green suppliers network.
- Create of a "green chamber of commerce."

Finally, the Mayors' Initiative on Green Manufacturing recommends that the cities catalyze and coordinate market development by leading efforts to:

- Develop R&D partnerships with the U of MN that facilitate conversion of advanced research capacity into manufacturing and start-up opportunities.
- Involve local financial institutions in creating public/private partnerships to fund markets for energy efficiency products and building retrofitting to support our green building products companies.
- Create workforce development programs with all Minneapolis and Saint Paul learning institutions to promote job skill programs from high school to advanced degrees that reflect the clean energy economy.

4. Coalesce State Policies and Programs

Create a set of state policies and incentives to support the creation of green jobs in Minneapolis and Saint Paul.

Recently passed state legislation has established ambitious objectives and benchmarks in the area of environmental quality. However, these policies are also creating important, new economic development opportunities. Just as Minnesota's nation-leading Renewable Energy Standard has created a \$14 billion wind energy industry, its other "Big Five" environ-

mental reforms will create new markets in energy efficiency, biofuels, water management and green house gas reduction. Not only does this set a precedent for the Mayors' Initiative, it provides momentum and ample opportunity for future collaboration among government agencies for the enhancement of policies and incentives to advance green manufacturing and green job creation in the cities of Minneapolis and Saint Paul.

Minnesota's "Big Five" Environmental Reforms

1. Renewable Energy Standard
2. Energy Efficiency/Conservation Improvement Program (CIP)
3. 25x25 Biofuels
4. Clean Water Legacy
5. Greenhouse Gas Emissions Reduction Act

The State of Minnesota can support and strengthen the Mayors' Initiative

on Green Manufacturing by concomitant efforts to:

- Perform a state-wide market analysis and assess job creation the potential of each of our Big Five environmental legislative initiatives.
- Add criteria into existing laws and state economic development incentives, which give preference to projects creating green manufacturing jobs –e.g. products that reduce green house gas emissions, use green processes, suppliers, sites, buildings, etc.
- Establish green manufacturing R & D parks in high density core cities areas with significant manufacturing job losses, which draw on the expertise of the University of Minnesota and Minnesota State Colleges and Universities (MnSCU) and utilize state development incentives.
- Institute a Green Job Corps for green job training, enlisting the



support of the Jobs Skills Partnership Board and Workforce Development Fund.

- Replicate Saint Paul's Energy Efficiency Loan Program on a state-wide basis in which pay back is realized through savings from lowered energy costs.
- Prioritize permitting of green economic development projects through the use of "enabling language".
- Establish state level incentives reserved for the creation of green manufacturing jobs at the local level with a \$5 - 10 million allocation from the Minnesota Investment Fund.

5. Forge Enduring Partnerships

Adopt and strengthen the culture of innovation and partnership of the cities of Minneapolis and Saint Paul with the on-going work of the Mayors' Green Manufacturing Initiative through a restructured Mayors' Green Manufacturing Development Team.

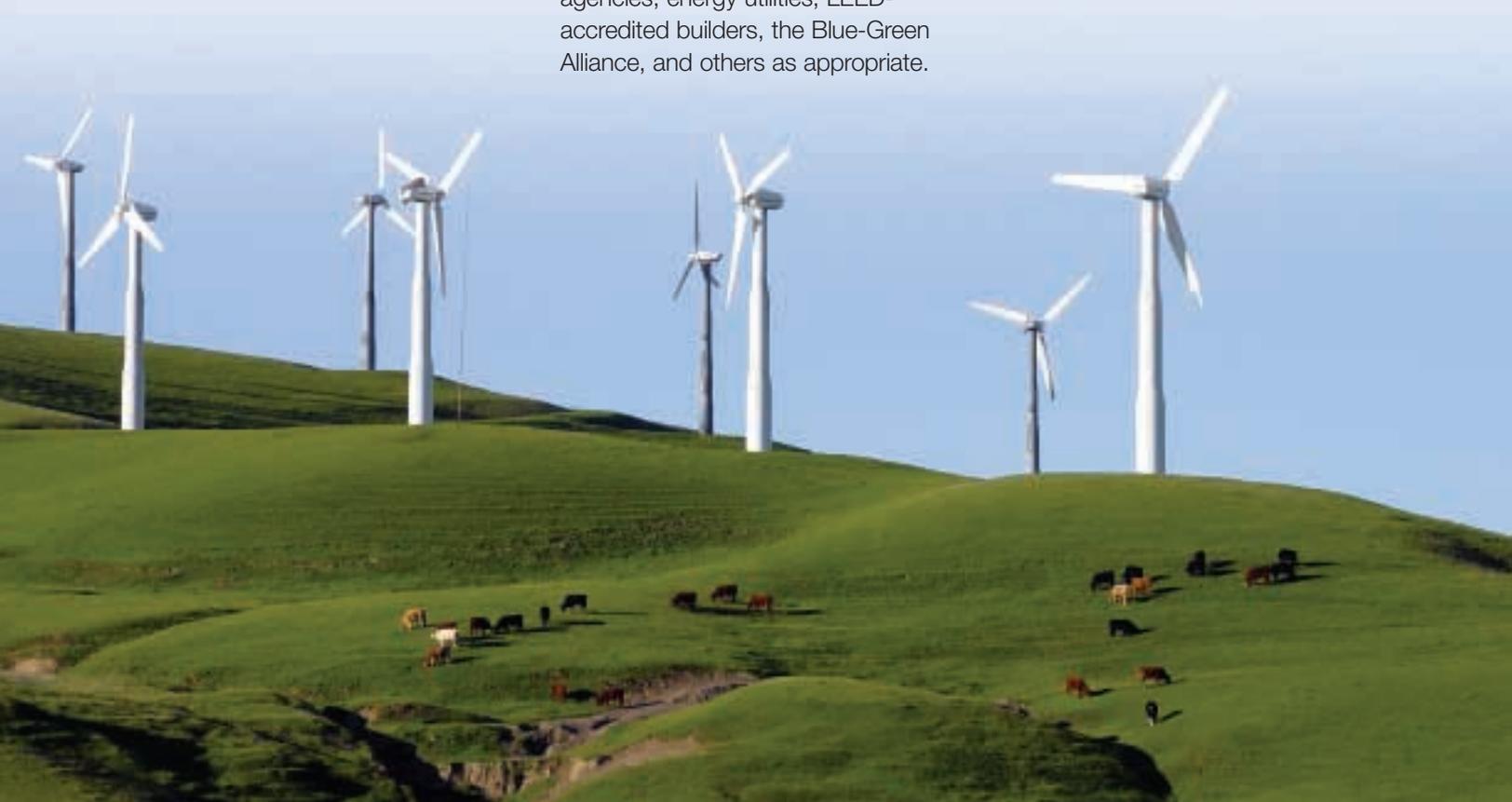
A leadership group of individuals from each of the Mayors' offices, city development agencies, business, state agencies, educational institutions and allied environmental and labor organizations helped to build this Initiative and formulate its strategy. This body will be critical for the future, helping to coordinate across cities and industries. It will be an important tool to build momentum, partnerships and supporting initiatives as the marketing plan is further developed and implemented. It will also play an important role in supporting legislative initiatives and organizing financial and other support among community partners.

We recommend restructuring the Green Manufacturing Development Team and its project steering committee to include representatives of manufacturing industries, private finance, labor, environmental organizations, University of Minnesota, MnSCU, Minneapolis CPED, St. Paul PED, Saint Paul Port Authority, state agencies, energy utilities, LEED-accredited builders, the Blue-Green Alliance, and others as appropriate.

This effort will require the continued leadership and commitment of the Mayors' offices and their implementation partners to effectively seize the economic opportunities of the green economy.

Thank you to funders of the Mayors' Initiative on Green Manufacturing!

- Blue Green Alliance
- City of Minneapolis
- City of Saint Paul
- Minnesota Pollution Control Agency
- Rock Tenn Corporation
- Saint Paul Area Trades and Labor Assembly
- Saint Paul Building Trades Council
- Saint Paul Port Authority
- Sierra Club
- The McKnight Foundation
- United Steelworkers
- Xcel Energy



APPENDIX A: MAYORS' CLIMATE PROTECTION AGREEMENT

1. Inventory global warming emissions in City operations and in the community, set reduction targets and create an action plan.
2. Adopt and enforce land-use policies that reduce sprawl, preserve open space, and create compact, walkable urban communities;
3. Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit;
4. Increase the use of clean, alternative energy by, for example, investing in “green tags”, advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology;
5. Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money;
6. Purchase only Energy Star equipment and appliances for City use;
7. Practice and promote sustainable building practices using the U.S. Green Building Council's LEED program or a similar system;
8. Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel;
9. Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production;
10. Increase recycling rates in City operations and in the community;
11. Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO₂; and
12. Help educate the public, schools, other jurisdictions, professional associations, business and industry about reducing global warming pollution.

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APPENDIX C: GREEN COMPANIES IN MINNEAPOLIS SAINT PAUL AREA

3M*

3M Automotive*

3M Consumer Safety and Light Management*

3M Fire Protection Products*

3M Specified Construction Products Department*

Acucraft Fireplace Systems

ADDCO*

ADO Products

Adobe International, Inc.

Advanced Aero Technologies, Inc.*

Advanced Bioenergy, LLC*

AFM Corporation

Agassiz Energy, LLC

Agri-Energy, LLC

AI-Corn Clean Fuel

All Paper Recycling, Inc.

Alliant Techsystems, Inc.

American Energy Systems, Inc.

Andersen Windows

AnyBattery

Arden Architectural Specialties, Inc.*

Associated Foam Manufacturers

ATR Electronics, Inc.

Baltix Furniture, Inc.

BASF Corporation – BASF Building Systems

Bedford Industries, Inc.

Bernard Dalsin Mfg Co

Best Power Intl. LLC*

Bixby Energy Sytems, Inc.*

Bossaire, Inc.*

Building Components Manufacturing, Inc.*

Bushmills Ethanol, Inc.

Cardinal Glass Industries

Cargill *

Central Boiler

Central MN Ethanol Co-op

Charmaster Products Inc.

Chippewa Valley Ethanol Company, LLLP

CHS, Inc.

Colonial Craft

Concepts, Inc.

Conklin Company, Inc.

Continental Bridge

Copper Sales, Inc.

Corn Plus, LLP

Crown Iron Works Company*

Cummins Power Generation*

CWMF, Inc.

Cymbet Corporation

Dankoff Solar Products, Inc.

Delta Light *

Dero Bike Rack Co. *

Dimensions Unlimited, Inc.*

District Energy Saint Paul

Diversified Energy Company LLC *

DiversiFoam Products

Donaldson *

Duluth Timber Company

Eaton Corporation

Ecolab

ECONAR Energy Systems Corp



EcoWater Systems LLC
 Elastomeric Roofing Systems, Inc.
 Energy & Environmental Building Association (EEBA)
 Energy Saving Devices Inc.
 Energy Structures, Inc. *
 Environ Biocomposites, LLC
 Equaris Corporation
 e-ride Industries
 Extreme Panel Technologies, Inc.
 Fabcon, Inc.*
 Fagen, Inc.
 FDR Design, Inc.
 Feetigue
 FJS Distributors, Inc.
 Foam Enterprises, Inc.*
 Gemini Incorporated
 Gempak
 Global Ethanol*
 Great River Energy
 Heartland Corn Products
 Heron Lake BioEnergy, LLC
 Honeywell Home & Building Controls*
 illbruck Sealant Systems, Inc.*
 Industrial and Environmental Concepts, Inc.*
 Innovative Power Systems*
 Innovent Air Handling Equipment*
 Integrity Windows and Doors – Marvin Marketing Office
 Jonti-Craft
 LA Cork of Canada
 Land O' Lakes
 Landscape Structures Inc.
 Lester Building Systems
 LHB*
 LSI Corporation of America, Inc.*
 Mammoth Inc.
 Marvin Windows and Doors



Master Mark Plastics
 Maxxon Corporation
 McQuay International*
 Midwest Hardwood Corporation
 Millwright Mechanical Inc.
 Mineral Solutions, Inc.
 Minnesota Soybean Processors
 Mortenson Company*
 Natural Built Home*
 Navitas Energy, Inc.*
 NCE – National Custom Enterprises, Inc./ Diversified Medical NCE
 NewBio E Systems, Inc.
 North Shore Architectural Antiques
 Northern Alternative Energy, Inc.
 Northern Insulation Products
 Northern Wholesale Supply
 Norwesco, Inc.
 Onan Corporation*
 Otter Tail Ag Enterprises
 Otter Tail Power Company
 Paul's Insulation
 Pentstar, Corp.*
 Phenix Biocomposites, Inc.
 Poly-Foam, Inc.
 Prairie Restorations, Inc.
 Prinsco, Inc.
 Protean Construction Products Inc.
 R&D Batteries, Inc.
 Raydot, Inc.
 R-Control Building Systems

Red Rock Energy
 Reprocessed Plastics, Inc.
 Reuter, Inc.
 Rock-Tenn
 Safco Product Co.
 SAGE Electrochromics, Inc.
 Segetis Co.
 Shelter Architecture*
 Shelter Supply, Inc
 ShetkaWorks LLC
 Sisal Rugs Direct
 SMI and Hydraulics
 Snappy Air Distribution Products
 SolarAttic, Inc.
 Solarhardware.com*
 SoyMor Biodiesel, LLS
 Spray Control System, Inc.
 Standard ICF Corp.
 Styrotech, Inc.
 Sun Energy-CMC, LLC
 Sustainable Lifestyles
 The Energy Conservatory*
 The ReUse Center*
 Tjernlund Products, Inc.
 Toro Co.
 TSI, Inc.
 Ttek Assemblies Inc.
 TwoWayBattery.com
 Unipower*
 United Hydro Services

United Steel Products Company
 Up North Plastics
 Uponor
 US BioEnergy Corp.*
 USP Structural Connectors
 Verisae, Inc.*
 Viracon
 Water Heater Innovations, Inc.
 Western Petroleum Company
 Wilkening Fireplace Co.
 Winco Inc.
 Wind Energy America, Inc.
 Wind Turbine Industries Corporation
 WindLogics Inc.*
 Winkelman's Environmentally
 Responsible Construction
 Winland Electronics, Inc.
 Xcel Energy*
 XeteX, Inc.

**Denotes companies with locations/addresses within the cities of Minneapolis or Saint Paul*

Sources:

Building Green Inc. <http://www.buildinggreen.com>

Piper Jaffray

www.geothermalnetwork.com/Geothermal_contacts.xls

OIKOS, Inc.: <http://oikos.com/>

<http://energy.sourceguides.com/businesses/byB/mfg/mfg.shtml>.

Each of these databases contains company name and contact information, some also have specific product and company information. Of these data sources, Building Green, Inc. is the only proprietary database which lists companies based on its proven performance in a set of green building criteria. Other databases contain companies and products that self-select to be included. In addition to these on-line sources, there are a number of industry associations whose membership lists would provide contacts for manufacturers as well as product registries and general business databases that would need to be queried in order to provide a comprehensive picture of manufacturers in each of the 29 product opportunity areas identified by Phase I of the Mayors' Initiative on Green Manufacturing.

APPENDIX D: LIST OF PARTICIPANTS IN THE MAYORS' INITIATIVE ON GREEN MANUFACTURING

Co-Chairs:

- The Honorable R. T. Rybak, Mayor of Minneapolis*
- The Honorable Christopher B. Coleman, Mayor of Saint Paul*
- David Foster, Executive Director of the BlueGreen Alliance*

Steering Committee

- David Foster, Blue-Green Alliance*
- Harry Melander, Saint Paul Building Trades*
- Cara Letofsky, Policy Aide to Mayor R.T. Rybak*
- Anne Hunt, Office of Mayor Coleman*

- Tim Nolan, Minnesota Pollution Control Agency*
- Corey Brinkema, Forest Stewardship Council (formerly Green Institute)*
- Brett Smith, Sierra Club*
- Joshua Low, Blue-Green Alliance*
- Lynn Hinkle, UAW 827 (retired)*
- Shar Knutson, Saint Paul Trades and Labor Assembly*
- Monte Hilleman, Saint Paul Port Authority*
- Emily Stern, Minneapolis Community and Economic Development*

Renewable Energy Subcommittee

- Co-Chair Mike Noble, Fresh Energy
- Co-Chair Julie Esch, M. A. Mortenson Company*
- Liaison Timothy Nolan, Minnesota Pollution Control Agency (MPCA)*
- Initiative Co-Chair David Foster, BlueGreen Alliance*
- Paul Adelman, Xcel Energy*
- Senator Ellen Anderson, Minnesota Senate *
- Council Member Scott Benson, Minneapolis City Council*
- Ken Bradley, Fresh Energy*

- Mary Bujold, Maxfield Research*
- Robert Elde, Dean, College of Biological Sciences, University of Minnesota*
- Jack Greenshields, RockTenn*
- Tom Halverson, Piper Jaffray*
- Mike Harley, Minnesota Environmental Initiative *
- Steve Haselmann, RockTenn*
- Dentley Haugesag, Minnesota Department of Employment and Economic Development*
- Dick Hemmingsen, University of Minnesota Institute for Renewable Energy and the Environment*
- Anne Hunt, Office of Mayor Christopher B. Coleman*
- Amy Johnson, BioBusinessAlliance*
- Susan Kimberly, Saint Paul Chamber of Commerce*
- Shar Knutson, Trades and Labor Assembly*
- Michael Krause, Kandiyohi Development Partners*

- Linda Limback, Minnesota Dept of Commerce*
- Diana McKeown, Green Institute*
- Representative Tim Mahoney, Minnesota House of Representatives*
- Anders Rydaker, District Energy Saint Paul*
- Bill Sierks, Minnesota Pollution Control Agency
- Ken Smith, Saint Paul District Energy
- Kelly Warden, Saint Paul Port Authority*
- Brian Winkelaar, IBEW 110

Transportation Subcommittee

- Co-Chair Lynn Hinkle, UAW Local 879*
- Co-Chair Dee Long, retired*
- Travis Bunch, Minneapolis Chamber of Commerce*
- Council Member Sandy Colvin Roy, Minneapolis City Council*
- Jan Holman, Metro Transit

- David Kittleson, University of Minnesota- Mechanical Engineering Center for Diesel Research
- Rod Larkins, 3M*
- Kurt Bauerly, E-Ride
- Alfred Marcus, Carlson School of Management - University of Minnesota*
- Bill McCarthy, Minneapolis Central Labor & Union Council*
- Laurie McGinnis, Center for Transportation Studies U of M
- Brian McMahon, University United
- Karri Plowman, Central Corridor Partnership
- Joel Silverman, Minnesota Electric Auto Association
- Brett Smith, Sierra Club*
- Eivind Stenerson, Donaldson Company
- Dave Van Hattum, Transit for Livable Communities*
- Representative Jean Wagenius, Minnesota House of Representatives*
- Kelly Warden, Saint Paul Port Authority*

Building Products Subcommittee

- Co Chair Rick Carter, LHB*
- Co Chair Gerry Flannery, Flannery Construction*
- Liaison Corey Brinkema, Forest Stewardship Council (formerly Green Institute)*
- Representative Jim Davnie, Minnesota House of Representatives*
- Jamie Flannery, Flannery Construction



- Councilmember Lee Helgen, City of Saint Paul*
- Monte Hilleman, Saint Paul Port Authority*
- Gary Hobart, MEDA*
- Duane Kell, Ankeny, Kell and Associates*
- Jim Keller, Gausmann & Moore (USGBC– State Chair)
- Cara Letofsky, Office of Mayor R. T. Rybak*
- Rachel Maloney, Natural Built Home
- Peter Martin, Cambria
- Bill Mason, H. B. Fuller (retired)
- William McCully, Rehbein Environmental Solutions
- Harry Melander, Building and Construction Trades Council*
- Laura Millberg, Minnesota Pollution Control Agency (MPCA)
- Jeff Moening, Thermal Technologies
- Doug Pierce, Minnesota Chapter of the American Institute of Architects (AIA)
- Alicia Richman, New Morning Windows
- Rachelle Schoessler Lynn, Studio 2030
- Kurt Schultz, St Paul Planning and Economic Development (PED)*
- Emily Stern, City of Minneapolis Community Planning and Economic Development (CPED)*
- Sheldon Strom, Center for Energy and Environment*
- Rich Strong, University of Minnesota Center for Sustainable Building Research (CSBR)



- Deputy Commissioner David Thornton, Minnesota Pollution Control Agency
- JoAnna Villone Hicks, Ryan Companies*
- Edward VonThoma, Building Knowledge
- David Foster, BlueGreen Alliance*
- Kelly Warden, Saint Paul Port Authority*

Finance Focus Group Participants

- Rick Brimacombe, Sherpa Partners
- Chris Flannery, Piper Jaffray
- Tom Halvorson, Piper Jaffray*
- Scott Harder, EFG Carbon
- Peter Heegard,, Lowry Hill Capital (retired)
- Norm Jones, Winthrop & Weinstine
- Pete Klein, Saint Paul Port Authority

- Cara Letofsky, Office of Mayor R.T. Rybak*
- Dan Lieberman, Lieberman Companies
- Bob Lind, Business Finance, Minneapolis Community Planning & Economic Development
- Dan O’Neill, Northland Securities

CDC Associates

- Candace Campbell, Principal
- Agatha Vaaler, Associate
- Doug Petty, Project consultant

Research assistants arranged by Sierra Club

- Tom Prebich, University of Minnesota
- Brian Newman, University of Minnesota
- Jennifer Tahtinen, Hamline University Law School

**Denotes participant in Green Manufacturing Development Team*

APPENDIX E: BUILDING PRODUCTS LOCATION QUOTIENTS

Energy Use Reduction Product Opportunities					
Sector (NAICS code)	Minnesota Employment	Metro Employment	Metro Concentration (LQ)	Leading Local Green Mfg.	Competing Cities/regions
Insulation (326150, 326140)	625	649	0.95 (326150) 0.55 (326140)	ADO, AFM, Paul's	
Windows & Doors (332321, 326113, 321911)	10,025	6,415	0.54 (332321) 1.7 (326113) 4.42 (321911)	Marvin, Andersen, Sage	Iowa, Canada, Wisconsin
Glass (332312, 327215)	3,176	820	0.43 (327215) 0.41 (332312)	Apogee, Cardinal	
Films (326113)	1,395	1,131	1.7	3M	
HVAC System & Controls (333415, 333411, 333412, 333414)	3,951	2,207	1.33 (333415) 1.25 (333411) 0.73 (333412) 0.31 (333414)	BossAire, Honeywell, Energy Conservatory, ECONAR, Innovent	Canada
Lighting (335122)	279	44	N.A.		

Calculated by CDC Associates from employment data of U.S. Census Bureau, County Business Patterns, 2005.

Sustainable Materials Product Opportunities					
Sector (NAICS code)	Minnesota Employment	Metro Employment	Metro Concentration (LQ)	Leading Local Green Mfg.	Competing Cities/regions
Wood Products for Building (321912, 321918, 321214, 321999, 321211, 321113)	5,410	1,338	1.39 (321214)	Re-Use Center, Midwest Hardwood, Duluth Timber	Wisconsin, Michigan, Washington
Wood Cabinets & countertops (337110)	7,194	3,993	1.67	LSI, Art	
Partitions, shelving (337215)	1,844	1,140	1.34	LSI, Stylmark	
Alternative Materials/ Composites (326199)	10,080	8,630	1.89	LSI, Environ, Cargill, Bedford, Master Mark, Cambria, Shetka	Nebraska, CA

Calculated by CDC Associates from employment data of U.S. Census Bureau, County Business Patterns, 2005.

Indoor Environmental Quality Product Opportunities					
	Minnesota Employment	Metro Employment	Metro Concentration (LQ)	Leading Local Green Mfg.	Competing Cities/regions
Adhesives (325520)	453	462	1.51	HB Fuller	
Paints (325510)	697	688	1.27	Valspar	
Testing Kits (334519)	1397	1321	3.25	FDR	

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MAKING IT GREEN

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