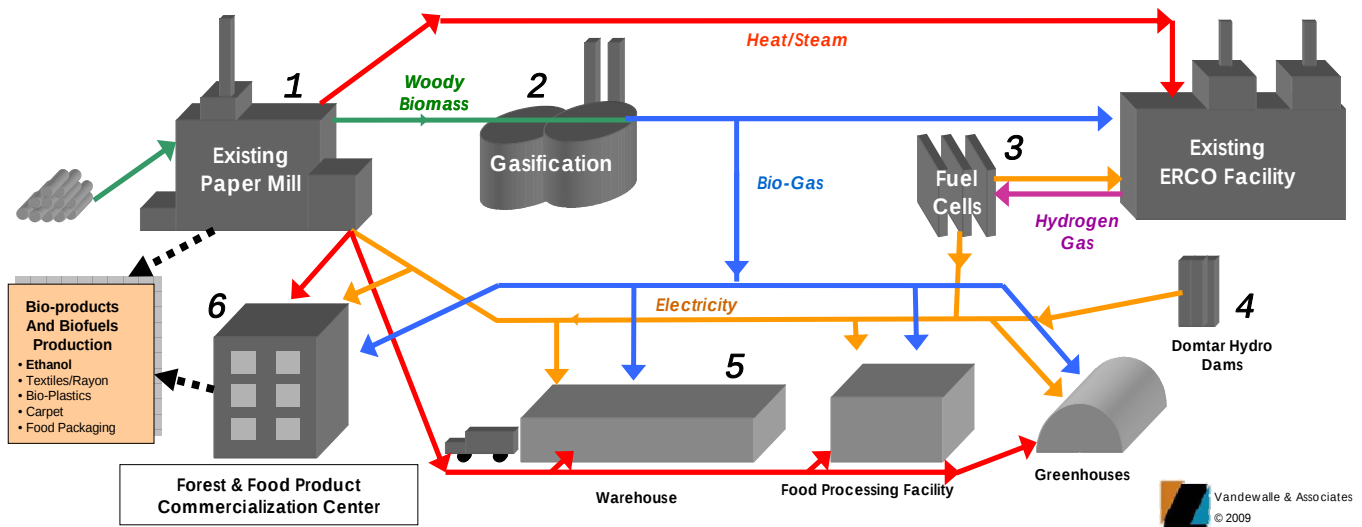


THE PORT EDWARDS GREEN ENERGY EMPLOYMENT DISTRICT:

Repositioning the Paper Industry, Launching Renewable Energy Systems, and Utilizing the Region's Bio-industry Strengths to Create Green Jobs

Port Edwards Green Energy Employment District and Forest & Food Product Commercialization Center

- 1. Wood Handling System** - Utilization of the vacant Domtar Mill's debarking, chipping, boilers, and storage capacity
- 2. Gasification System** - Gasify biomass to use as a natural gas replacement throughout the district
- 3. Fuel Cell Power** - Employ stationary fuel cells to convert ERCO's waste hydrogen to electricity
- 4. Hydro-Electric Power** - Distribute electricity from the existing on-site hydro dams to users in the district
- 5. End Users** - Use vacant land adjacent to the mill to attract employers in target sectors interested in on-site sources of carbon-neutral energy. Lease the Domtar warehouse to fill the region's unmet need for quality storage space
- 6. Forest & Food Product Commercialization Center** - Utilize the existing IT building for the proposed Commercialization Center providing shared facilities for companies and researchers developing new wood and agriculture based products and technologies



VILLAGE OF PORT EDWARDS
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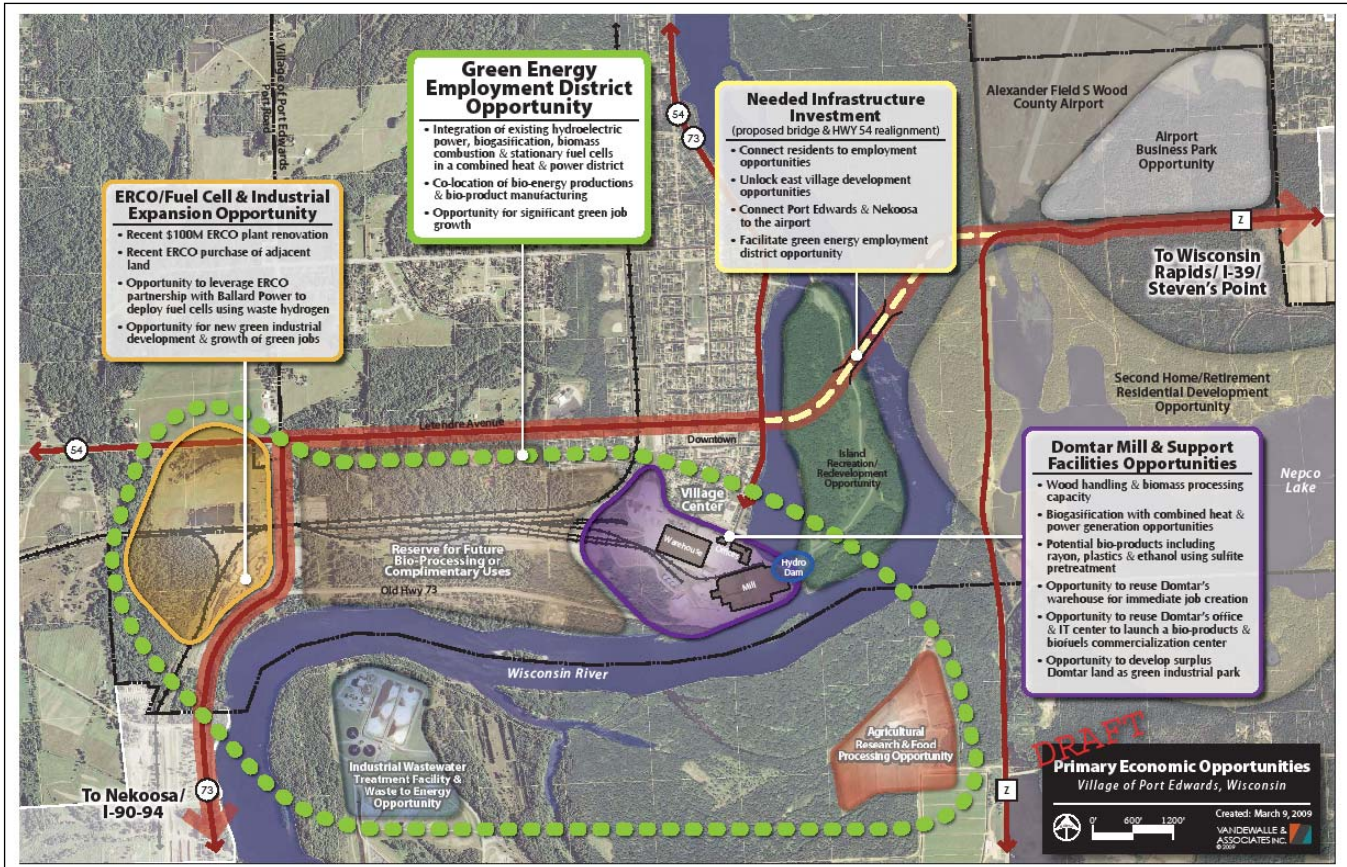
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Project Introduction

The Village of Port Edwards recently suffered a severe economic blow when the Domtar Paper Mill (the Village's largest employer and land owner) ceased operations in 2008. This closure was one of many recent examples of the ongoing decline of Wisconsin's paper industry. However, new opportunities are emerging to refocus the industry's resources and Port Edwards has a unique set of assets ideally-suited to launching a project that reutilizes the infrastructure and expertise of the state's paper industry.

Port Edwards' immediate focus is on rebuilding the local economy and creating new jobs to replace those lost with the Mill closure. However, the project also has the potential to open new opportunities for Wisconsin-based businesses, to provide opportunities for private researchers and university academics to commercialize new products, to position Central Wisconsin as a renewable energy leader, and to help create jobs throughout the state.



Repositioning Wisconsin's Woody Biomass Cluster

Wisconsin's pulp and paper industry is one of the world's largest and most advanced clusters of biomass processing infrastructure, technology, and expertise.

The Pulp and Paper Industry's Importance to the Wisconsin Economy

- Wisconsin is the nation's #1 paper producing state
- Papermaking employs 103,000 Wisconsin workers
- Papermaking indirectly supports another 125,000 jobs
- Wisconsin generates 5.3 million tons of annual paper production
- The industry produces \$2.55 billion in annual wages to Wisconsin workers
- Pulp and paper generate \$4.38 billion in economic activity statewide
- Wisconsin generates \$12.4 billion in annual shipments of paper, lumber, and wood products that are sent around the world

Sources: Wisconsin Paper Council, Energy Center of Wisconsin

As the nation's leading paper producer, Wisconsin is unmatched in its combination of abundant forest resources, extensive harvesting supply chain, sophisticated processing facilities, technical expertise, and cutting-edged research related to the utilization of biomass. Historically, these assets have been used in the production of paper products. However, increasing reliance on electronic communication and competition from low-cost international producers has led to a gradual decline in Wisconsin's paper industry. The closure of the Domtar Mill in Port Edwards is the latest loss in this decline.

While the paper industry is faltering, new opportunities to utilize the state's biomass assets are emerging. Wisconsin is already making strides as a bioenergy leader with federal funds and state resources focused on growing the sector. The particular assets of the Port Edwards site offer an opportunity to build on these statewide efforts with a unique project implementing multiple renewable energy concepts.

Impacts of the Port Edwards Mill Closure

The Domtar Mill in Port Edwards was a vital hub of Wisconsin's bio-economy and a key convergence point within state's biomass harvesting and processing network.

Economic Impacts of the Port Edwards Mill Closure

Key Regional and Statewide Impacts:

- Immediate loss of 500 mill jobs and 800 indirect jobs
- Up to \$65 million in lost wages and associated tax revenues
- Net loss of 10Mw in power demand
- Long term loss of 1,700 mill jobs and 2,200 indirect jobs
- Dismantling of supply chain network for biomass harvesting, shipping, processing, and sales.

Key Local Impacts:

- Potential tax base loss of up to \$19 million
- \$83,000 reduction in water utility income
- \$51,000 reduction in wastewater treatment income
- Increase from 20% to 38% in students eligible for free and reduced lunches
- Family stress and reported domestic violence increase
- Loss of downtown businesses

Sources: WI Dept. Workforce Development, Alliant Energy, Village of Port Edwards, Wisconsin Rapids Family Center, Port

The closure of Domtar's Port Edward's Mill in 2008 sent a shockwave through the community and the local economy. The most direct economic impacts of the closure are felt by the Village of Port Edwards itself, but closing the facility was a regional economic loss with implications for Wisconsin's economy as a whole.

The closure was the final step in a long term reduction in employment at the facility. When it closed in 2008, the total number of jobs at the Mill was already less than one third of its peak employment a decade ago.

The impacts of the mill's gradual decline and recent closure include direct economic impacts such as lost jobs and wages, indirect economic impacts affecting supporting businesses and industries, and qualitative family and community impacts.

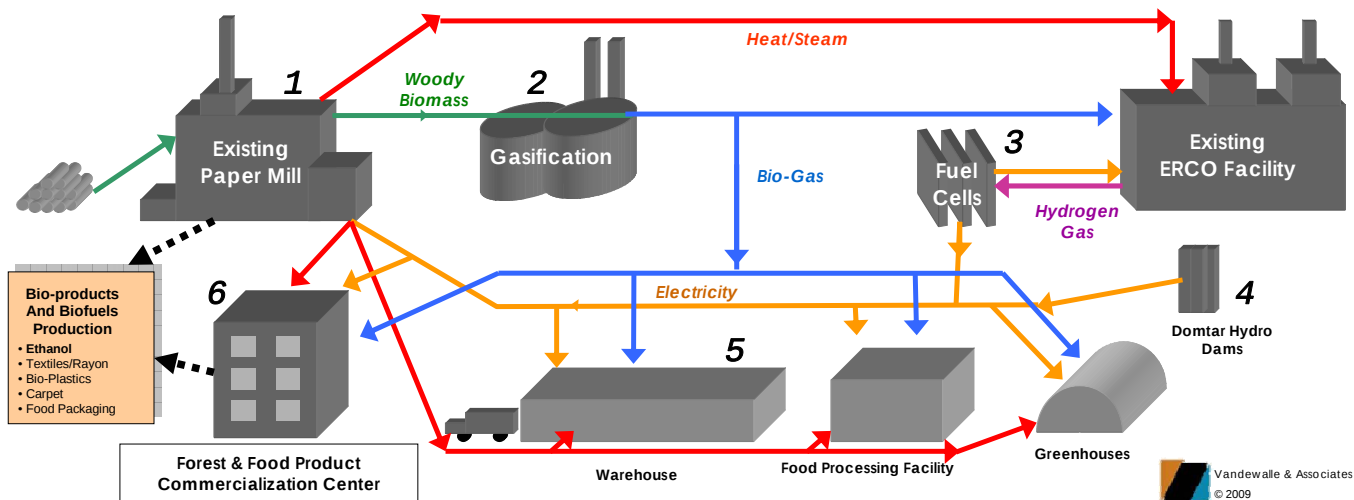
The Port Edwards Green Energy Employment District

With multiple on-site renewable energy opportunities combined with complementary industries and available land, Port Edwards has the potential to create a renewable power employment district

The unusual combination of assets in Port Edwards and at the mill site presents the opportunity to create a distributed energy district that showcases energy technologies in an industrial park powered by reliable, on-site, green power systems. The district would utilize the site's existing hydro-power, biomass energy generation from the mill, and fuel cell electricity generated through the hydrogen byproduct from the ERCO chemical facility.

Port Edwards Green Energy Employment District and Forest & Food Product Commercialization Center

- 1. Wood Handling System** - Utilization of the vacant Domtar Mill's debarking, chipping, boilers, and storage capacity
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Components of the Green Energy Employment Opportunity

Fuel Cell Power System

Hydrogen fuel cells are widely believed to be one of the long term solutions to future energy needs. However, the most significant barrier to widespread fuel cell commercialization has been developing economical and reliable sources of hydrogen. Port Edwards is home to a chlor-alkali chemical plant that is owned and operated by a Toronto-based company called ERCO Worldwide. One of this plant's byproducts is hydrogen gas which creates a rare opportunity for fuel cell implementation utilizing an industrial byproduct from an existing local facility. Not coincidentally, ERCO has an existing business relationship with another Canadian company called Ballard Power Systems, which is considered to be the world's leading fuel cell company.

Recognizing the power of this opportunity to position Port Edwards as a fuel cell leader, the Village opened a dialogue with ERCO and Ballard about launching a project. The Village is currently working with an engineering team from Ballard to conduct a feasibility assessment of this opportunity and lay the groundwork for a 2MW fuel cell power plant. The initial results of the study look very positive but the project will likely need an infusion of state or federal funding to get the project up and running.

The first phase of this effort will be to implement a fuel cell power plant. However, in order to utilize ERCO's byproduct hydrogen, the plant will need to replace it with an alternative combustible fuel. In the short term, that fuel will likely be natural gas, purchased from the utility, to allow ERCO to redirect its hydrogen toward a higher use in fuel cells. In the long term, there is also the possibility of replacing ERCO's hydrogen with a biogas generated from wood and wood waste material from Domtar's mills in Nekoosa and Port Edwards.

Biomass Gasification System

Because the community was built around its sawmill and then its pulp and paper mill, Port Edwards has an intact network of suppliers, a stockpile of wood handling and processing equipment, and deep local expertise in fields related to breaking down and using wood. There are a number of current and future technologies that the Mill could implement for energy production including bio-digestion, gasification, and/or pyrolysis. These processes can be used to generate a biogas that is equivalent to natural gas and could be distributed within the green energy district.

A gasification system could be designed to utilize some of Domtar's wood handling equipment on site, as well as waste wood material from the Nekoosa mill, to generate a biogas that could feed the ERCO plant allowing ERCO's hydrogen to be used in fuel cell power generation. Domtar has an existing relationship with a gasification company called Nexterra and, as discussed above, ERCO has a business relationship with Ballard Power. This opportunity to utilize local assets to integrate a hydrogen fuel cell system with a biogasification system would truly be a one-of-a-kind project.

Hydroelectric Power

In addition to these renewable energy opportunities, Port Edwards is already a community that generates carbon-neutral electricity. The on-site hydro dam at the Domtar mill is an existing place-based energy resource that is generating clean, renewable, and reliable power. The existing hydro power gives this site an inherent advantage as a location for a green power business/industrial park and creates a unique opportunity to collocate new and old renewable energy systems. Highlighting and marketing the availability of carbon-neutral and highly-reliable electricity could strengthen the Village's ability to attract companies and would integrate nicely with the other potential renewable energy opportunities.

Domtar Warehouse, Office, and IT Center

The Domtar property includes a state-of-the-art 300,000 square foot warehouse. The warehouse is a climate controlled facility with multiple truck docks and direct rail access. The region currently has a shortage of high-quality, climate-controlled storage space and this warehouse could quickly be reused to help fill this demand. Domtar's existing office building and IT center could similarly provide a short term opportunity to create several jobs and bring productive uses back to the site. As a longer term opportunity, these buildings could become a commercialization center focused on developing new products and launching new companies integrated with the green energy and bioproducts focus of the larger site (more on this concept below).

Co-located Employers

The Port Edwards mill site's potential for on-site green power combined with emerging regional economic clusters creates an exciting opportunity to co-locate complementary uses within a green, Combined Heat & Power district. For example, the region's rapidly growing cranberry industry has shown an interest in the market value of locating a processing facility on a site powered by on-site green sources.

Biofuels Production Opportunity

The central opportunity to reuse the mill and reposition the economic assets of Port Edwards is to create the Green Energy Employment District outlined above. However, other unique aspects of the mill property and the site in Port Edwards create additional potential opportunities to create jobs by using the mill to make alternative bio-products or biofuels. These additional opportunities could occur in tandem with the larger, Green Energy District opportunity outlined above. If the mill is ultimately reused to produce biofuels or other products, there will be a number of potential opportunities to utilize byproducts and co-products from the biofuels plant and for other companies and operations to co-locate with the facility. A biofuels plant alone will help create some jobs and bring the mill back into productive use, but the true economic power and job creation potential of launching a biofuels project will come from integrating it into a larger context that includes other related industries and green energy inputs.

New research recently published by the federal Forest Products Lab in Madison has identified a new sulfite pre-treatment process to help breakdown woody-biomass to create ethanol. Some companies are beginning to look at sulfite-based processes for ethanol conversion and a sulfite pulp mill could be an ideal location to scale-up this technology. The Port Edwards Mill is one of just a few remaining sulfite mills in Wisconsin and its facilities are ideal for launching a pilot project focused on this new ethanol process. In addition, researchers at UW – Stevens Point are also looking at potential bio-fuels conversion opportunities utilizing woody biomass. The UWSP faculty members are aware of the vacant Port Edwards facility and indicated that it could be a good location to scale up their process.

Creating ethanol from cellulosic bio-materials has long been the “holy grail” of biofuels development, but it has been a long struggle to develop processes that are efficient enough to be economically viable. However, new research and new processes are quickly emerging, pilot-scale projects are being built, and some of the nation’s largest energy companies and fuel refiners are investing in cellulosic ethanol technologies. Port Edwards is well-positioned to take advantage of new technologies and funding opportunities targeted toward commercializing cellulosic ethanol technologies.

The Forest & Food Products Commercialization Center

The Forest and Food Products Commercialization Center in Port Edwards will take advantage of the region's economic strengths and key industry clusters to create a center focused on commercializing bio-based research and bringing new bio-products into the marketplace

Port Edwards sits at a strategic location within Wisconsin's bio-based economy. The Village is located among Wisconsin's woody biomass resources and processing, at the heart of the state's cranberry growing and processing region, and near key centers of research and expertise in biomass energy at UW Stevens Point and Mid-State Technical College.

This location provides the opportunity to integrate Wisconsin's advanced research and technology in key industry clusters to develop new products. The Food and Forest Commercialization Center will attract both new and established businesses to launch research and development efforts focused on commercializing new products and technologies in targeted sectors, specifically:

- **Agriculture and Food Processing**

Port Edwards sits at the heart of Wisconsin's growing cranberry production and processing sector as well as a diverse agricultural area that includes dairy, beans, corn, and other food products. New technologies and new products related to food and food processing would be tested and developed at the center.

- **Woody Biomass-Based Fuels, Energy Systems and Products**

With a major biomass processing facility at the site and an emerging bio-energy system powering the larger district around the site, this would be an ideal location to commercialize and test bioenergy systems and products. Additionally, as a potential location for fix-station fuel cells, fuel cell technology could also be commercialized at this site. With changing federal laws and growing markets for "green" products, this site could be used as a location for developing new wood based fabrics and textiles.

Integrated into the Green Energy Employment District

The Commercialization Center is part of the vision for the Green Energy Employment District. The Center would be located within the district, possibly using one of Domtar's currently-vacant surplus buildings. Key synergies could be achieved by integrating this concept into the Green Energy Employment District. For example, researchers and entrepreneurs within the center would utilize the wood-handling availability of the mill to support pilot projects using biomass, or could take advantage of waste streams and byproducts derived from the mill to create new, value-added bioproducts. The fact that the Center would be green powered would add to the attractiveness of this site for research and development by companies and entrepreneurs in green, bio-based industries.

Projected Job Creation

Implementing all the components of the Port Edwards Green Energy Employment District and the Bio-Product Commercialization Center has the potential to create up to 1,500 permanent jobs in Central Wisconsin in key industries well positioned to succeed in the changing global economy.

Creating new jobs to replace those lost with the mill closure is one of the primary goals of this effort. A fully-implemented Green Energy Employment District described above has the potential to create a large number of new jobs in growing industries with a green energy focus. At this stage, it is impossible to accurately estimate the total number of jobs the Green Energy Employment District could create. However, with a few broad assumptions, it is possible to provide preliminary projections of job-creation potential.

- Byproduct Hydrogen fuel cell system:
30 temporary jobs, 3 permanent jobs
- Renovation of the Domtar IT center for the Forest & Food Commercialization Center:
30 temporary jobs, 35 permanent jobs
- Development of a food processing facility linked to green energy systems
50 temporary jobs, 100 permanent jobs
- Reuse of the Domtar Warehouse
10 temporary jobs, 350 permanent jobs
- Biogasification system integration
30 temporary jobs, 3 permanent jobs
- Reuse of the Domtar Mill for a biofuels project
150 temporary jobs, 100 permanent jobs

Total Potential Job Creation Potential: ~250 temporary jobs, ~600 permanent jobs

Funding Needs to Advance the Project

The following is a summary of the Village's immediate needs and priorities to begin implementation of the projects described above.

1. Hydrogen Fuel Cell Stationary Power Generation Prototype: The opportunity to utilize byproduct hydrogen from ERCO as a power source for stationary fuel cells is an exciting opportunity and Port Edwards is one of a handful of locations around the world with this potential. Launching this project will require a separate, highly-technical study to evaluate this opportunity.

- \$12,500 for waste hydrogen to fuel cell technical assessment (match to OEI grant)
- \$2,000,000 capital investment in a fuel cell system to make competitive with traditional electric generation

2. Feasibility and Technical Assessment of the Green Energy Employment District:

As described above, the Green Energy Employment district combines multiple renewable energy systems into a Combine Heat & Power District designed to serve industrial users. This is a preliminary concept at this stage, but the unique resources to make it happen are in place. A detailed technical assessment is now needed to evaluate the feasibility of the project. This assessment would evaluate the potential generating biomass power with the Domtar facility and the opportunity to integrate such a system with a fuel cell system at ERCO.

- \$250,000 for technical feasibility study

3. Forest and Food Product Commercialization Center: As described, the commercialization center will focus on new product and business development around renewable energy, wood and bio-based products, and food processing. The Village is seeking to utilize the former Georgia Pacific R&D building which could be ideally-suited for this use.

- \$50,000 for concept refinement, business plan development and fundraising
- \$300,000 - 750,000 for building improvements

4. Biofuels Opportunity: The opportunity to maximize the economic potential of a biofuels project utilizing the Domtar facility will require the working closely with the ultimate producer, creating detailed assessments of potential byproduct utilization opportunities and potential partners, the identification of a related technologies, developing business-to-business partnerships, and significant capital investment in start-up and operations.

- \$250,000 for research, feasibility assessment, company recruitment, and preliminary engineering.
- \$8 - \$20 million for project implementation

5. Infrastructure for Industrial Development: The vacant sites identified for the Green Energy Employment District require road and utility extensions to facilitate new industrial development. Specifically, the 13-acre vacant site adjacent to the Mill and the Village's downtown will require utility connections as well as the extension of Market Street and River Drive to provide site access.

- \$7 - \$12 million to construct utility and road extensions/improvements

Contacts and Next Steps

The Port Edwards Village Board of Trustees has expressed its support for this project and has directed the Village staff and economic development consultants to move forward with the concepts outlined in this summary white paper. The immediate next steps will be continue building partnerships in the region to advance the components of the project, securing state and federal funding support to provide the infrastructure and feasibility assessments needed to move forward, and to continue reaching out to the potential corporate partners to implement the gasification and fuel cell technologies..

The Village is working with the state officials, regional economic development organizations, and other partners to uncover potential sources of funds and to bring these conceptual ideas into sharper focus and closer to reality. The Village's goal is to have components of the concept for the Green Energy Employment District implemented and operational in the short term while continuing to work toward the full vision. The details of this concept are likely to change but Port Edwards is committed to proactively responding to the loss of its primary employer and to developing a forward-looking approach to encouraging long term economic development in the community.

For more information, please contact:

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