Final Report – Condensed Version
Generating Economic Development
An Energy Study of U.P. Industrial Parks

Michigan Tech
Michigan Technological University

CUPPAD
Central Upper Peninsula Planning and Development Regional Commission
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All the businesses willing to take the time to meet with the project team to discuss operations and energy.

Project Team

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The following is a condensed version of the full EDA Report. The full report is available through CUPPAD, and contains details for each industrial park in this study.
EXECUTIVE SUMMARY

Economic development professionals, government officials, and businesses across Michigan’s Upper Peninsula (the U.P.) have collectively determined addressing energy challenges as a priority for job growth in the Region. The purpose of the “Generating Economic Development” project was to study and research the cost and feasibility of implementing alternative energy solutions at the industrial park scale across the U.P. Seven (7) industrial parks were chosen for the purpose of this study. This report seeks to fulfill three objectives –

1. Present a current snapshot of the diversity in the U.P.’s energy consumers, energy infrastructure, rates, needs, challenges and opportunities.
2. Wherever possible, create a business case for alternative energy adoption for industrial park customers and commercial customers alike.
3. Make policy agnostic recommendations for industrial park managers, local Economic Development Organizations (EDO’s), and local government to help secure long term energy cost savings to aid economic development and business retention.

Study Focus

The Michigan Public Service Commission defines “industrial” customers as businesses having at least 1MW (megawatt) of load for at least three consecutive months. Another useful distinction is that industrial customers are typically serviced at the transmission level and may own a portion of their transformer and distribution infrastructure. While industrial customers account for a significant portion of energy consumption in the U.P., most industrial park customers included in this study fall under the ‘commercial’ customer category.

While this focus on commercial businesses was not deliberate, it leverages a key insight - industrial customers have significant advantages over small and large commercial businesses in their ability to lower their energy costs. Due to their large consumption, they are able to secure competitive rate structures, either through negotiation with their utilities or exercising their Electric Choice option under current Michigan energy policy. They are more likely to have dedicated personnel on staff to routinely monitor their energy consumption and maximize efficiency of operations.

Indeed, this study revealed that many, if not most, businesses in these industrial parks recognize the value of energy savings, but few have made efforts to curb energy spending. Commercial customers in the Upper Peninsula account for nearly a quarter of all electricity in the U.P. Region, and pay nearly 27% of all electricity costs to the tune of $81 million every year. Indeed, the lack of widespread implementation of alternative energy technologies in the U.P. Region represents a ‘market failure’.

Key Findings

This project explored many options for making energy costs more affordable to businesses in industrial parks. For most businesses, the cost of electrical energy far exceeded the cost of heating; so low cost electrical generation is the primary need in U.P. industrial parks. Although there are many options for the self-generation of electricity, the dominating factors in low adoption are reliability and investment risk.

Businesses depend on a reliable electric supply. Lights come on and machines are expected to start-up with the flick of a switch. Current grid supplied electricity is very reliable. Businesses count on and depend on this reliability for scheduling and production. Businesses also require no investment to be a utility customer.

There appears to be a fear of reduced reliability when a business takes electricity generation into its own hands. For the vast majority of people and businesses, electricity is not well understood and borders on magic – you cannot see it, it is everywhere, and it can kill you if you don’t know what you are doing. In order to have a sizable portion of self-generated electricity, a significant investment is required not only in equipment but also in trained personnel.
From a purely technical and economic standpoint, we find that alternative energy technologies are viable in most industrial parks in the U.P. Based on extensive interviews with industrial park businesses, local planners, economic development agencies and industrial park managers, we observe that adoption of alternative energy technologies is universally not a priority for most businesses.

Many companies expressed no interest in investing in an area which was not part of their core business. Without qualified operators and maintainers, reliability is at risk. On small scales (<20KW), complete packages for solar and wind can provide a reduction in electrical costs without the need for bringing on additional personnel. As systems get larger and more complex, with integration to existing equipment and parallel operation with the utility, the need for dedicated energy personnel becomes mandatory. Businesses question where they will find these qualified people and how much it will cost and how much they will save in energy costs; versus paying for the high reliability utilities companies offer today.

We observe that a massive barrier to alternative technology adoption is the uncertainty in policy and legislative landscape. All businesses expressed strong reluctance in assuming the risk of making any capacity investments in face of unpredictable and rapid changes in energy policy. The future of the electric utility industry is unknown with all the federal and state regulatory proposals and plans currently on the table. Indeed, indulging in any cost/benefit analysis for each alternative energy technology for each industrial park is likely to become outdated and irrelevant in as little as six months, when Michigan legislature is expected to overhaul Michigan’s energy policy. Then throw in the rapidly changing technology and the future cost of energy becomes extremely difficult to predict. Financial managers seem wary to make substantial investments in alternative energy strategies when there is no clear short term return-on-investment.

With this background, it is not surprising that the single most common solution adopted by businesses in U.P. industrial parks reduce energy costs is also most policy agnostic – energy efficiency. Regardless of changes in legislation or advances in alternative energy technology, using less energy quite simply means reduced energy costs.

We find common themes among businesses that have maximized energy savings through energy efficiency –

- A proactive approach to monitoring energy consumption, rates and costs. Early adopters of energy efficiency in U.P. industrial parks demonstrate a thorough understanding of their itemized monthly energy bills and the effects of energy rates on long term operational cost of running their business. When presented with opportunities for retrofitting or facility expansion, they have prioritized energy efficient lighting and equipment.
- Leveraging support from external agencies and programs. At many U.P. businesses, successful adoption of energy efficient technologies was prompted by an energy audit, initiated either by a professional energy efficiency contractor or energy optimization programs offered through their utilities. When presented with a clear business case for investing in energy efficiency technologies to reduce long term energy costs, we observe that businesses are quick, willing and eager to adopt.

In light of this, the single strongest recommendation for businesses in U.P. industrial parks is to develop a better understanding of energy costs, and to aggressively pursue energy efficiency. Several barriers may limit businesses from following up on such recommendations. For some businesses, utility bills may be handled off-site at a central office. Many businesses might not be able to dedicate the manpower to continuously monitor energy use.

Therefore, planners and economic development agencies in the U.P. should look to disrupt the ‘market failure’ of alternative energy adoption. At a very basic level, these professionals can support adoption by organizing periodic energy audits by qualified professional energy engineers, helping businesses access utility energy efficiency programs and by updating and providing clarity on local zoning and permitting ordinances.
Based on our above discussion and evidenced by the current snapshot of U.P. industrial parks, alternative technologies are viable at many locations but are unlikely to be pursued as a priority by most businesses. However, visionary leadership from local planners and EDOs can elevate many of these technologies from priority to possibility, making the difference between neglect and adoption.

An example would be a study for the installation of a natural gas generator in an area with high electrical prices and low gas prices. In the Houghton Industrial Park, the cost of one KW of electricity is about eight times higher than the cost of one KW of natural gas. When all the mechanical and electrical efficiencies are taken into consideration, a natural gas generator can produce electrical power at half the cost of utility supplied power. This sounds like a terrific option for affordable electricity. Accounting for capital costs and installation of an EPA certified prime power generator, the potential return-on-investment would be about 6 years. Even if the generator is sized for future growth, there is still a need to have the utility as a backup during times of maintenance in order to avoid a complete business shutdown. Also, the generator operates most efficiently at its design point of rated power and low power running during evenings and weekends is inefficient and better handled by the utility. With volatility in long term natural gas prices – no single business is willing to make a commitment on a long term prediction, adding risk to investment in this technology. Local EDOs can foster partnerships between Alternative Energy Suppliers (AES), utilities and park tenants. Private AES developers can leverage economies of size with a large single natural gas generator providing locally generated cheap and clean power to industrial park tenants.

Individual businesses in Ironwood Industrial park that lack appropriate roof-space for solar PV can benefit from joint ownership in a large ‘community solar’ project. Indeed, current park infrastructure can support such a facility. Similarly, individual businesses in Luce County could benefit from long term Power Purchase Agreements (PPA) from just a single independent large turbine wind project located within park boundaries. As batteries and energy storage technology continues to mature, businesses in Norway-Vulcan industrial park could charge their batteries during inexpensive “off-peak” rates at nights, without necessitating moving all operations to the second workshift.

Rising energy rates, aging energy infrastructure, sheer diversity in businesses, utilities, rate structures and costs, and the dynamic policy landscape present challenges to energy cost reduction in U.P. businesses. Identifying, targeting and capitalizing on opportunities within those challenges can only be championed by proactive and strong leadership at local planning and development agencies.

*The website [www.saveupenergy.com](http://www.saveupenergy.com) was created as part of this project to keep businesses, EDO’s, planners, and others informed with updates on legislation, maps, resources, etc.*
Summary of Rates

The four-quadrant chart above demonstrates balance between energy rates and demand rates, and provides a useful tool to visualize prioritizing alternative energy technologies.

1. **Low Energy rates and High Demand rates** – Typically large energy consumers like manufacturing facilities. Industrial park customers that find themselves in this quadrant can realize energy cost savings by opting in for optional fixed flat rates. Some businesses may also realize savings by shifting operations to off-peak hours. This approach might be more ideal for operations with smaller workforces, as the challenge of finding qualified workforce willing to work second shift and weekends might outweigh the benefits of lower energy rates.

2. **High Energy and High Demand Rates** – Double whammy for ratepayers. The high demand rates of OCREA present a steep barrier to business retention, and job development in the region. To further the burden, OCREA does not offer a competitive rate structure to promote efficient use of electricity. Nearly all commercial and industrial customers regardless of the size of their operation are charged at high rates. While high energy rates offer viability for alternative energy adoption, customers are unable to significantly lower energy costs because the power demand portion of the bill is such a significant portion. Unlike most utilities, OCREA does not offer mechanisms to reduce demand like optional time of use rates, customer natural gas generation programs, and interruptible power options.

3. **Low Energy rates and Low Demand Rates** – Ideal for lowest energy costs, and subsequently presents low viability for many alternative energy options.

4. **High Energy rates and Low Demand Rates** – Typically offered to small commercial enterprises. The absence of demand rates offers viability for reducing energy consumption through adoption of alternative energy options. Michigan energy policy offers limited support for net-metered alternative energy solutions, but the absence of demand rates allows businesses to install such solutions “behind the meter”. Phrased differently, for businesses in this quadrant, energy generated on site using alternative energy technologies is analogous to simply reducing their energy consumption, thereby saving energy costs.
Summary of Electricity Consumed by Sector and by Utility

The Sankkey diagram below represents the total energy consumption by utility on the left hand side, and consumption by sector on the right.

Data source - Michigan Public Service Commission. Created by Abhilash (Abhi) Kantamneni (@akantamn) with feedback from Tony Szedlik
Summary of Average Monthly Electric Bills

**Small Commercial 1**

- Delta: $97
- SSM: $127
- Luce: $127
- Menominee: $126
- Ironwood: $123
- Norway: $174
- Houghton: $220

Average Monthly Electric bills of a Small Commercial business (as defined by the Michigan Public Service Commission with a monthly power demand of 5 kW and energy consumption of 1,000 kWh) at the seven industrial parks studied for this report.

**Small Commercial 2**

- Delta: $453
- SSM: $584
- Luce: $584
- Menominee: $516
- Ironwood: $558
- Norway: $751
- Houghton: $988

Average Monthly Electric bills of a Small Commercial business (as defined by the Michigan Public Service Commission with a monthly power demand of 25 kW and energy consumption of 5,000 kWh) at the seven industrial parks studied for this report.
Average Monthly Electric bills of a Large Commercial business (as defined by the Michigan Public Service Commission with a monthly power demand of 100 kW and energy consumption of 21,600 kWh) at the seven industrial parks studied for this report.

### Large Commercial 1

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### Large Commercial 2

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Average Monthly Electric bills of a Large Commercial business (as defined by the Michigan Public Service Commission with a monthly power demand of 100 kW and energy consumption of 28,800 kWh) at the seven industrial parks studied for this report.
Average Monthly Electric bills of a Large Commercial business (as defined by the Michigan Public Service Commission with a monthly power demand of 100 kW and energy consumption of 36,000 kWh) at the seven industrial parks studied for this report.

**REGIONAL SUMMARIES**

**Western Upper Peninsula**

Energy in the Western U.P is a study of contrasts. The high cost of electricity at the Houghton County Airport Industrial Park is a serious issue, placing barriers on current tenants and future economic growth. Locating a business in the Houghton Industrial Park can cost anywhere between 25% - 125% more in energy expenses compared to any other industrial park included in this study. The last Cost of Service Study (COSS) for OCREA showed that industrial/commercial customers are over paying and subsidizing the seasonal residential customers. Businesses have no defined representation on OCREA Board of Directors and OCREA’s rates are not subject to regulatory oversight from the Michigan Public Service Commission.

At a time when utilities around Michigan and the country are working with their large energy consumers to reduce peak demand, lower energy consumption and increase customer owned self-generation, OCREA offers limited opportunities for commercial businesses to reduce their energy costs. A limited state-mandated energy optimization program offers energy efficiency retrofits like LED lighting. However, customers receive no respite from OCREA’s demand rates, which are the highest in the state of Michigan. As a small rural utility with less than 5000 customers and supplying less than 0.03% of all electricity in Michigan, OCREA might be ill equipped to serve the needs of commercial and industrial customers.

While natural gas from SEMCO is available, reliable and currently affordable year round, long supply is term capacity limited by infrastructure, as the Western UP region is serviced by a narrow gas pipeline. The next manufacturing business that might require very large natural gas generator for its operations is unlikely to be guaranteed uninterrupted service during peak winter months.
The Ironwood Industrial Park is in a good position relative to its energy with affordable rates from their service provider - Xcel. With a large multi-state utility and only a small footprint in Michigan, the Ironwood area reaps the benefits. With such low rates, most alternative energy options are likely to remain a low priority for most businesses. The Ironwood Industrial Development Corporation (IIDC) represents an active business community, with a Board of Directors that includes park tenants and utility representatives. Such a proactive business community presents unique opportunities for alternative energy adoption at the scale of the entire industrial park. Overall, the Ironwood industrial park community can serve as a role model for proactive governance of an industrial park in the UP.

**Central Upper Peninsula**

The Delta County Industrial AirPark enjoys the lowest electric rates in the region through its city utility, Escanaba Power and Light. City of Escanaba is a Midcontinent Independent Systems Operator (MISO) market participant, and has historically offered very low rates. As a municipal utility Escanaba Power and Light has greater flexibility in offering custom and competitive rate structures to industry park businesses in support of the city's economic development goals. Municipal utilities in Michigan can also offer on-bill financing for alternative energy upgrades on their customer's facilities. Escanaba Power and Light is also studying the feasibility of a community solar project, allowing for greater solar adoption for businesses that might not have adequate rooftop solar potential on their own facilities.

From a purely energy perspective, the Delta County Industrial AirPark is among the best destinations for businesses moving to the U.P., with a robust energy infrastructure and cheap electric rates.

Menominee County Industrial Park is in an envious position with very affordable energy rates, offered through Wisconsin Public Service (WPS) for both natural gas and electricity. WPS has a large service territory in Wisconsin, but covers only half of Menominee county in Michigan. Despite such a small footprint, WPS is the third largest utility in the UP by total electric energy supplied. The greatest issues facing Menominee Industrial Park is an aging infrastructure in the original Park and the lack of any infrastructure in the area available for expansion. With the City of Menominee owning the infrastructure, there may be unique opportunities for upgrading infrastructure in support of economic and community development. Currently, the hard numbers on Menominee’s energy infrastructure are not available, impeding further expansion.

In the Norway-Vulcan Industrial Park, an old railway line separates the service territories Wisconsin Electric (WE) and City of Norway Power and Light for electricity. At present, all businesses are located on one side of this line and are serviced by WE, which has the second highest electric rates of all industrial parks included in this study. All business customers expressed a dissatisfaction with their rates. Additionally, they remain frustrated at their inability to choose service from their own city utility, which produces nearly 80% of its energy locally using clean hydropower. Businesses moving into the park are advised to incorporate these dynamics into their choice of location within the industrial park. Natural gas is not available at all park locations.

**Eastern Upper Peninsula**

Luce County and Sault St. Marie industrial parks are serviced by Cloverland Electric Cooperative. Effective January 2016, Cloverland returned to being member-regulated in an effort to reduce costs of MPSC fees and to have greater flexibility in establishing policies and rates to benefit their customers. Cloverland has a large contiguous service area in the Eastern U.P. with reasonable electric rates.

The largest energy consumers in both industrial parks are proactive and clearly demonstrate the vitality of U.P. businesses. All companies have taken actions to make their operations as efficient as possible, and continue to look for additional opportunities.
The biggest issue at these parks was the unknown infrastructure capacity. With three currently large electric consumers at the Luce County Industrial Park, remaining capacity could be a limiting factor for growth. As a park in general nears its capacity, expansion to additional capacity is expensive and could be the primary deterrent to future development.

**Overall Summary**

For most businesses in this study, we find that access to transportation, communication infrastructure, operational supply-chain efficiency and availability of skilled workforce take precedence over energy costs as barriers for economic development and job growth. With the exception of businesses in Houghton-County and Norway-Vulcan industrial parks, customers in other industrial parks expressed a general satisfaction with the electric rates and service of their utility service provider.

That is not to say that businesses are not concerned about energy costs. Indeed, monthly electric and gas bills form a significant portion of operational expenses for most businesses. Most businesses interviewed for this study recognize the value of energy savings, but few have made efforts to curb energy spending.

From a purely technical and economic standpoint, we find that alternative energy technologies are viable in most industrial parks in the U.P. However, systems large enough to provide significant energy savings requires a significant investment is required not only in equipment but also in trained personnel. Businesses question where they will find these qualified people and how much it will cost and how much they will save in energy costs; versus paying for the high reliability utilities companies offer today.

We observe that a massive barrier to alternative technology adoption is the uncertainty in policy and legislative landscape. All businesses expressed strong reluctance in assuming the risk of making any capacity investments in alternative solutions in the face of unpredictable and rapid changes in energy policy. Indeed, just within the timeline of this study, changes to Michigan’s energy policy and dangers of pending legislation necessitated redaction of early findings and recommendations.

The future of the electric utility industry is unknown with all the federal and state regulatory proposals and plans currently on the table. Any specific recommendations made here are likely to be outdated in as early as six months.

With this background, identifying, targeting and capitalizing on opportunities for energy cost reduction can only be championed by visionary leadership in this region. All regional stakeholders – industrial park businesses, local EDCs, planning and development agencies, and in many cases, utilities share common goals of reducing energy expenditure. Yet, achieving widespread reduction of energy expenditure might beyond the capability of any individual stakeholders.
This report presents a simple, elegant and long term solution for UP stakeholders to disrupt this market failure – put in place a single qualified professional or organization to serve as an Energy Manager for the entire Upper Peninsula region. Key responsibilities would include, but not be limited to:

- Continuously monitor the policy landscape, and align regional objectives with state and federal goals.
- Helping businesses understand their energy bills and costs.
- Keep up with advances in alternative energy technologies, and identify opportunities for adoption.
- Help businesses access energy optimization programs offered through utilities.
- Organize routine and periodic energy audits.
- Consolidate economies of scale, and create opportunities for affordable energy adoption at an industrial park scale. For example, partnering with an alternative energy supplier to build community solar or wind projects to benefit all businesses in the park.
- Create a business case for affordable energy options for businesses in industrial parks. For example, partner with energy efficiency contractors to offer performance-guaranteed upgrades to equipment.
- Work with local units of government to create funding tools like PACE financing to facilitate alternative and affordable energy adoption.
- Help industrial park managers understand the capacity limits of their energy infrastructure.
- Assist businesses in securing representation on boards of utilities that lack regulatory oversight from MPSC.

With commercial customers in the UP spending roughly $81 million every year in electricity costs, and with risk of volatility in long term price of natural gas, the benefits of saving at least 0.1% of energy expenditure will far outweigh the payroll costs of UP’s own Energy Manager.

Until this position is defined, refined and filled, for the near future local stakeholders can continue to use www.SaveUpEnergy.com to access resources and tools to remain informed on most of the above issues.