

**THE GREAT LAKES ENERGY AND RESEARCH PARK:
BRINGING MICHIGAN TO THE FOREFRONT OF ALTERNATIVE
ENERGY PRODUCTION AND TECHNOLOGY**

Grand Valley State University
Policy Process (PLS 205) Class Project, Winter 2008

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Prepared for M & M Energy, LLC

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INTRODUCTION

The PLS 205 (Policy Process) class was assigned the task of preparing a policy overview report on Michigan's energy policy environment and the dynamics surrounding the use of alternative energy technologies. A special emphasis was placed on the Great Lakes Energy and Research Park project. The goal was to develop a campaign messaging plan, policy overview report, and media contact list specifically to assist M & M Energy, LLC in the launching of their proposed Energy and Research Park in Gratiot County, Michigan. To accomplish the assigned task, project participants were placed into teams based upon their stated preferences and skill specialties, (see Appendix A) and then organized by team captains with overall coordination of the class project conducted by the Project Manager and Assistant Project Manager. The result was the creation of a simulated consulting group with the sole responsibility of generating three documents for M & M Energy, LLC. They were:

1. A policy overview report on the status of Michigan energy policy and trends with regard to alternative energy within the state and the proposed Great Lakes Energy and Research Park in Gratiot County, Michigan.
2. A campaign messaging plan to promote the Great Lakes Energy and Research Park and publicize the benefits of the project for the State of Michigan among legislators, the executive branch, and the voters of Michigan.

3. Preparation of a media contact list to identify media sources to promote the Great Lakes Energy and Research Park project in press releases and interviews.

This document represents the policy overview report component of the class project. The class consulting group extensively researched trends in energy policy and production in Michigan with a focus on alternative energy. The research team reviewed numerous documents including energy studies, public opinion polls, and press stories. The writing and editing teams spent several days preparing drafts of the documents and cross-referencing materials. The result was a thoroughly researched report that highlights Michigan's energy policy environment with regard to alternative energy and most importantly, the implications of current alternative energy policy on efforts by firms wishing to conduct alternative energy business in the state. Of particular focus was the Great Lakes Energy and Research Park project proposed by Florida-based M & M Energy, LLC. M & M Energy approached local government officials in Gratiot County, Michigan in 2005 with an idea to create an energy and research park that would serve two primary functions. First, to produce new energy supplies using the alternative energy technology, Integrated Gasification Combined Cycle. Second, conduct research on alternative energy technologies by utilizing Michigan's pool of graduates in the sciences from its state universities and the resources of research scientists from colleges around the country and internationally.

The campaign messaging plan was prepared as a special document to assist M & M Energy officials plan an advocacy campaign to promote positive changes in Michigan's energy policy and facilitate in the establishment of the Great Lakes Energy

and Research Park. The campaign messaging plan incorporates the findings of the policy overview report. Therefore, each component of the class project was carefully integrated for maximum effectiveness.

Executive Summary

- **Energy Technology in Michigan: Then and Now**

Historically, traditional coal-fired power plants have provided the majority of our energy generation. Concerns over the environment have been raised as related to traditional coal-burning methods. It is now up to voters to encourage their elected officials to support alternative energy legislation. Eighty percent of Michigan residents believe there is solid evidence that proves the Earth is warming. Eighty-two percent of those respondents believe the state government should have at least some responsibility for addressing global warming.¹ This can be addressed through the development and deployment of alternative energy technology. M & M Energy, LLC has proposed the development of an Integrated Gasification Combined Cycle plant in Michigan as a source of alternative energy. The proposed project is called the Great Lakes Energy and Research Park. This technology captures energy more efficiently than traditional coal-burning methods, and the Great Lakes Energy and Research Park will capture the byproduct gases for Enhanced Oil Recovery. Traditional coal-fired power plants capture the energy stored in coal by burning it to create heat, which is used to generate steam. The steam is then run through turbines, which generate the electricity. The problem with this technology, from an environmental standpoint, is that gases are emitted into the atmosphere when the coal is burned, thus creating harmful emissions. The Great Lakes Energy and Research Park will utilize Integrated Gasification Combined Cycle

¹ Rabe, B. (2008). Survey of Michigan Residents on the Issue of Global Warming and Climate Policy Options: Key Findings Report. In *Center for Local, State, and Urban Policy*. Ann Arbor: University of Michigan.

technology. A key benefit of this technology is its ability to capture carbon dioxide, which then will be pumped into oil wells for Enhanced Oil Recovery. This process combines carbon sequestration with the recovery of Michigan's stranded oil reserves.²

- **Creating a New Energy Policy for Michigan Through Positive Legislation**

With the passage of Public Act (PA) 141 in 2000, competition among energy providers was created in Michigan.³ The Great Lakes Energy and Research Park would be the first energy provider in Michigan to utilize Integrated Gasification Combined Cycle. Senate Bill No. 1164, the “Clean Energy Authority Act,” would include tax exemptions for Integrated Gasification Combined Cycle technology and would create a commission, the clean energy authority. The clean energy authority would develop and implement a statewide integrated energy resource plan.⁴ Senate Bill No. 1165 would add clause 6q to PA 3 to encourage electric utilities to invest in a pilot Integrated Gasification Combined Cycle facility, such as the Great Lakes Energy and Research Park. It also encourages the major utilities to accept Integrated Gasification Combined Cycle technology as a partner, as opposed to a competitor.⁵ Senate Bill No. 1166, the “Michigan Business Tax Act,” would allow a qualified taxpayer to claim a Michigan Business Tax credit for carbon dioxide emissions reductions and sequestration infrastructure.⁶ Finally, House Bill No. 5604, the “Michigan Business Tax Act”, would

² Storing CO₂ with Enhanced Oil Recovery. In *Department of Energy and National Technology Laboratory* . (2008). NETL/DOE. Retrieved April 16, 2008, from [http://www.netl.doe.gov/energy-analyses/pubs/Storing%20CO₂%20w%20EOR_FINAL.pdf](http://www.netl.doe.gov/energy-analyses/pubs/Storing%20CO2%20w%20EOR_FINAL.pdf)

³ Public Act 141, 90th Michigan Legislature, (2000)

⁴ “Clean Energy Authority Act,” SB 1164, 94th Michigan Legislature, (2008).

⁵ “Integrated Gasification Plant,” SB. 1165, 94th Michigan Legislature, (2008).

⁶ “Carbon Dioxide Reduction Credit,” SB. 1166, 94th Michigan Legislature, (2008).

allow a taxpayer to claim a tax exemption equal to the cost of purchasing, leasing, or constructing facilities capable of carbon dioxide capture.⁷

- **Traditional Views About Energy Production and the Reality of Future Needs**

Two major utilities, DTE Energy and Consumers Energy, provide electricity and natural gas for Michigan's ten million consumers. Fossil-fueled plants, hydroelectric dams, and nuclear power plants are all used to generate energy, but more than 56.5 percent of that energy is provided by coal-burning plants.⁸ Traditional coal-burning plants have been around for over 100 years and are viewed as the most cost effective method. Traditional utility companies are just starting to explore alternative energy solutions but lack technological methods, such as Integrated Gasification Combined Cycle technology, to produce additional energy. Even though Integrated Gasification Combined Cycle technology has higher initial costs, research shows 73 percent of Michigan residents are willing to pay more to support alternative energy research. The ever-advancing alternative energy industry is bound to surpass the limitations of traditional coal-burning technology in generating energy, especially in the event of a Renewable Portfolio Standard being enacted.

⁷ HB. 5604, 94th Michigan Legislature, (2007).

⁸ World Energy and Economic Outlook. In *Energy Information Administration / International Energy Outlook*. (n.d.). Retrieved April 5, 2008, from <http://www.eia.doe.gov/oiaf/ieo/pdf/world.pdf>

- **Benefits of Integrated Gasification Combined Cycle Technology and the Great Lakes Energy and Research Park Project**

The Great Lakes Energy and Research Park has the potential to bring 1,200 or more jobs to Michigan⁹. These will be construction jobs to create the park and jobs operating the park once it is constructed. The park will help bring stability to energy prices, especially when designated as a renaissance zone, cap-and-trade systems for emissions are implemented, and Renewable Portfolio Standards are in place.

Additionally, its location is central to many major universities and colleges. This allows for greater recruitment opportunities for graduates and the ability to participate in making Michigan a leader in alternative energy. The Great Lakes Energy and Research Park's use of carbon sequestration will grant the most efficient and effective access to stranded oil located beneath Michigan, bringing in new oil revenues to Michigan.¹⁰

- **Supporters of Integrated Gasification Combined Cycle Technology and the Great Lakes Energy and Resource Park Project**

The Great Lakes Energy and Research Park has accumulated an enormous amount of support, from both sides of the ideological spectrum. Bipartisan support has come from Governor Jennifer Granholm, United States Senators Debbie Stabenow and Carl Levin of Michigan, and numerous other Michigan Senate and House members.¹¹ In addition to support in the state and federal governments, the local governments are supporting and welcoming the Great Lakes Energy and Research Park to Gratiot County.

⁹ Vision Mid-Michigan article: "Alma the 'Sweet Spot' for Great Lakes Energy Park"

¹⁰ *Energy Park Presentation* (2008, February 20): M & M Energy. Retrieved April 17, 2008, from <http://www.mandmenergy.com/documents/GLERP_why_mid_michigan_022008.pdf>

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

Support from local governments for the Great Lakes Energy and Research Park includes the City of Alma, the City of St. Louis, the City of Ithaca, and Pine River Township.¹²

One of the Great Lakes Energy and Research Park's most valued supporters is the Western Wayne Oakland County Association of Realtors. Western Wayne Oakland County Association of Realtors' strong membership and its southeastern Michigan location make it an especially valuable supporter.¹³ Finally, the Great Lakes Energy and Research Park is collaborating with SemGroup, a major energy company with extensive experience in oil extraction, and ConocoPhillips, a corporation pioneering Integrated Gasification Combined Cycle technology.¹¹

¹² *Michigan's Electric Restructuring Is A Success* (2007, February). Retrieved April 17, 2008, from <http://www.customerchoicecoalition.com/pdfs/0207ReportFINAL.pdf>

¹³ *New Release: Western Wayne Oakland County Association of REALTORS* (2008, January 25). Retrieved April 16, 2008, from <http://www.wwocar.com/pdf/KB-4DCE24AB-562C-4872-878F-CC9741644AD7.pdf>

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

Preface

Energy production and stability has been a cause of concern, not only within the United States, but worldwide. The sustainability of the natural resources currently used to produce energy is an issue demanding increased attention. Energy consumption at its current rate is expected to double in 35 years. It is of vital importance that more efficient methods of energy production be developed to accommodate this demand.¹¹ A promising method already in use is Integrated Gasification Combined Cycle—Integrated Gasification Combined Cycle is more efficient in terms of energy generation than traditional coal burning methods. Integrated Gasification Combined Cycle technology was first successfully deployed in southern California at the Cool Water Project from 1984 to 1989. There are now Integrated Gasification Combined Cycle plants in operation throughout the United States, Europe, and Japan; the first having been established in 1994.¹²

The public's desire for environmentally-safer energy production has focused energy research on producing energy that will preserve the integrity of the environment. One way this can be achieved is by capturing carbon dioxide produced through coal-fueled energy generation, instead of releasing it into the atmosphere.¹ Utilization of this process, called Carbon Capture and Sequestration, is not widespread, but several plants are operating prototypes in conjunction with their current energy operations to reduce

¹¹ Energy Information Administration. (2005). World Consumption of Primary Energy by Energy Type and Selected Country Groups. In *International Energy Annual 2005*. Washington, D.C.: Author. Retrieved April 12, 2008, from <http://www.eia.doe.gov/iea/wec.html>

¹² Clean-Energy.U.S. (2006, July 5). *About Integrated Gasification Combined Cycle Power*. Retrieved April 10, 2008, from <http://www.clean-energy.us/facts/igcc.htm>

¹ Rabe, B. (2008). Survey of Michigan Residents on the Issue of Global Warming and Climate Policy Options: Key Findings Report. In *Center for Local, State, and Urban Policy*. Ann Arbor: University of Michigan.

emissions. Once captured, the carbon dioxide can be sold for Enhanced Oil Recovery. Enhanced Oil Recovery involves pumping carbon dioxide into oil wells to retrieve stranded oil. For example, the Dakota Gasification Company in North Dakota currently sells their carbon dioxide to a Canadian oil field for Enhanced Oil Recovery.¹³

Florida-based M & M Energy has proposed a project for Gratiot County, Michigan that would utilize all three processes (Integrated Gasification Combined Cycle, Carbon Capture and Sequestration, and Enhanced Oil Recovery). Their proposed project, the Great Lakes Energy and Research Park, would be the first in the world to combine all of these processes. Alternative energy is an industry that has been touted by many, including the governor, as the way to bring Michigan economic prosperity.¹⁴ The development of Integrated Gasification Combined Cycle plants is relatively new with the initial costs being higher than those for a traditional coal-burning plant. However, the initial high cost is offset by M & M Energy's use of Carbon Capture and Sequestration and Enhanced Oil Recovery to recover oil from Michigan's presently abandoned wells, maximizing Michigan's oil resources. Sitting on a reserve of a potential one billion barrels of oil, mid-Michigan is a perfect candidate for Enhanced Oil Recovery.¹⁵

Goals of the Great Lake Energy and Research Park

There are four main objectives of the Great Lakes Energy and Research Park. The first is the production of more efficient energy to meet the growing needs of

¹³ *About Dakota Gasification Company and the Great Plains Synfuels Plant* (2008). Retrieved April 10, 2008, from <http://www.dakotagas.com/>

¹⁴ Granholm, J. (2008, January 29). *State of the State Address*. Retrieved April 15, 2008, from http://blog.mlive.com/michigan/2008/01/text_of_gov_jennifer_granholms.html

¹⁵ Kuuskraa, V., & Ferguson, R. (2008). Storing CO₂ with Enhanced Oil Recovery. In *Department of Energy*. Department of Energy. Retrieved April 11, 2008, from [http://www.netl.doe.gov/energy-analyses/pubs/Storing%20CO₂%20w%20Enhanced Oil Recovery_FINAL.pdf](http://www.netl.doe.gov/energy-analyses/pubs/Storing%20CO2%20w%20Enhanced%20Oil%20Recovery_FINAL.pdf)

Michigan consumers. The second objective is the protection of the environment by capturing emissions that would harm the atmosphere. Third, the Great Lakes Energy and Research Park will use the carbon dioxide captured during the energy generation process to recover stranded oil that traditional oil extraction methods cannot access. The last objective, and the most important for Michigan's future in alternative energy, is the inclusion of a Research and Development Center to research energy options. The center will recruit researchers and scientists from around the world, as this will be the first plant to combine Integrated Gasification Combined Cycle technology, Carbon Capture and Sequestration, and Enhanced Oil Recovery into one entity.¹¹

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

Section One: Energy Technology in Michigan: Then and Now

The Great Lakes Energy and Research Park will be the first project with an Integrated Gasification Combined Cycle power plant operating in Michigan. Not only will this project help decrease energy waste and greenhouse gas emissions, it will also facilitate Enhanced Oil Recovery in the State of Michigan. With the manufacturing industry on the decline, alternative energy is an important emerging industry for Michigan's economic future. Governor Granholm asked the state legislature, in her 2008 State of the State address, to set ambitious alternative energy goals for Michigan. She advocates producing "10 percent of our electrical energy from renewable sources by the year 2015, and a full 25 percent by the year 2025."¹⁷ In an article from the *Detroit News*, Governor Granholm described Michigan as "in the backwater" in terms of renewable energy. This, in part, stems from our reliance on traditional power generation methods, like coal burning.¹⁶

Traditional Power Generation

Traditional coal-based energy generation involves mining coal, transporting it to the power plant, and grinding it into a fine powder. The pulverized coal is then injected into a furnace where it burns and releases heat, which is used to boil water, creating steam. The steam is gathered in a contained area at a high pressure, so it can be used to

¹⁷ Granholm, J. (2008, January 29). *State of the State Address*. Retrieved April 15, 2008, from http://blog.mlive.com/michigan/2008/01/text_of_gov_jennifer_granholms.html

¹⁶ Hornbeck, M. (2008 February 27). Gov: Michigan is Behind in Green Jobs Race". *Detroit News*.

power a turbine connected to a generator, producing electricity.¹⁷ When the coal is burned, a large amount of gas and ash is produced, containing many undesirable pollutants. Sulfur dioxide, nitrogen oxide, and mercury are the most harmful of these pollutants. Mercury, released into the air from coal-burning plants, returns to the surface in rain and pollutes lakes, rivers, and oceans.¹⁸ Sulfur dioxide and nitrogen oxide also combine with water in the atmosphere, creating sulfuric acid and nitric acid, which falls as acid rain.¹⁹ In recent years, carbon dioxide has become a concern because of the apparent role it plays in the greenhouse effect and global climate change. Carbon dioxide is the most heavily-emitted greenhouse gas, and power generation accounts for 40 percent of the carbon dioxide released in the United States.²¹ According to the Intergovernmental Panel on Climate Change, “Warming of the climate is now unequivocal, as is now evident from observations of increases in average air and ocean temperatures, widespread melting of snow and ice, and rising global sea level.”²⁰ Traditional coal-burning methods release the highest rate of carbon dioxide per unit of electricity of all fossil fuels.²¹

¹⁷ *Coal to Electricity: How It Works*: Coal Utilization Research Panel. Retrieved April 13, 2008, from <http://www.coal.org/pdf/CoaltoElectricity.pdf#xml=http://prdtsearch001.americaneagle.com/service/search.asp?cmd=pdfhits&DocId=156&Index=F%3a%5cdtSearch%5ccoal&HitCount=32&hits=1+3+b+26+3b+55+58+5a+7d>

¹⁸ *Dirty Coal Power*: Sierra Club. Retrieved April 13, 2008, from <http://www.sierraclub.org/cleanair/factsheets/power.asp>

¹⁹ *Air Quality: Sulfur Dioxide, Nitrogen Oxides and Acid Rain* (2008, January 29). Retrieved April 16, 2008, from http://www.texasep.org/html/air/air_2std_nox.html

²¹ *Dirty Coal Power*: Sierra Club. Retrieved April 13, 2008, from <http://www.sierraclub.org/cleanair/factsheets/power.asp>

²⁰ *Energy supply. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. 2007. R.E.H. Sims, R.N. Schock, A. Adegbulgbe, J. Fenhann, I. Konstantinavičiute, W. Moomaw, H.B. Nimir, B. Schlamadinger, J. Torres-Martínez, C. Turner, Y. Uchiyama, S.J.V. Vuori, N. Wamukonya, X. Zhang, [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

²¹ *Dirty Coal Power*: Sierra Club. Retrieved April 13, 2008, from <http://www.sierraclub.org/cleanair/factsheets/power.asp>

Coal-fired power plants account for 56.5 percent of Michigan's net electricity generation, nuclear-powered plants account for 29.9 percent, natural gas-fired plants, ten percent, hydroelectric, one percent, and petroleum-fired plants, 0.2 percent. The other renewable sources of energy in Michigan only make up about 2.1 percent; these are solar, wind and biomass.⁸

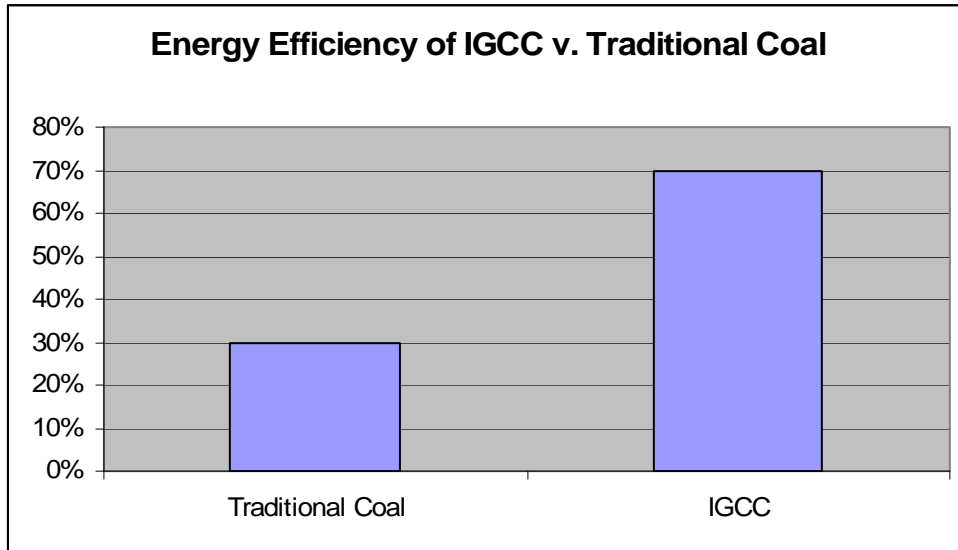
Integrated Gasification Combined Cycle Technology

The Great Lakes Energy and Research Park's use of Integrated Gasification Combined Cycle technology will combine with other proven technologies to capture and sequester carbon dioxide emissions and enhance Michigan's oil production through the flexible nature of Integrated Gasification Combined Cycle's chemical byproducts. Integrated Gasification Combined Cycle is more complex than traditional methods of producing electricity from coal. Traditional coal-burning methods burn coal to release heat; this captures 30 percent of the energy from the coal (See Figure 1-A).²¹ Gasification differs from combustion in that the coal itself is not burned. Instead, the coal is converted to a gas in a controlled environment that keeps it from burning. The gas produced, syngas, consists primarily of hydrogen gas and carbon monoxide. After the syngas is produced, it can easily be cleaned, to separate the potentially harmful chemicals found in coal. The final syngas product is burned to efficiently produce clean energy. Higher levels of efficiency are achieved by using excess heat from the entire process to make steam that is also used to produce electricity; this energy-capture process is known as Combined Cycle.

⁸ World Energy and Economic Outlook. In *Energy Information Administration / International Energy Outlook*. (n.d.). Retrieved April 5, 2008, from <http://www.eia.doe.gov/oiaf/ieo/pdf/world.pdf>

²¹ Sawruk, Mike. Grand Valley State University. Allendale, MI. 28 February 2008.

FIGURE 1-A²⁵: Energy efficiency between Integrated Gasification Combined Cycle and traditional coal combustion technology.



Beyond the efficient production of electricity, Integrated Gasification Combined Cycle’s “polygeneration” potential encourages scientific research. Polygeneration describes the wide variety of useful chemicals produced by Integrated Gasification Combined Cycle. Some of the chemicals containing nitrogen and sulfur that would normally be released into the atmosphere, could be converted into useful industrial and research chemicals with Integrated Gasification Combined Cycle.²⁶

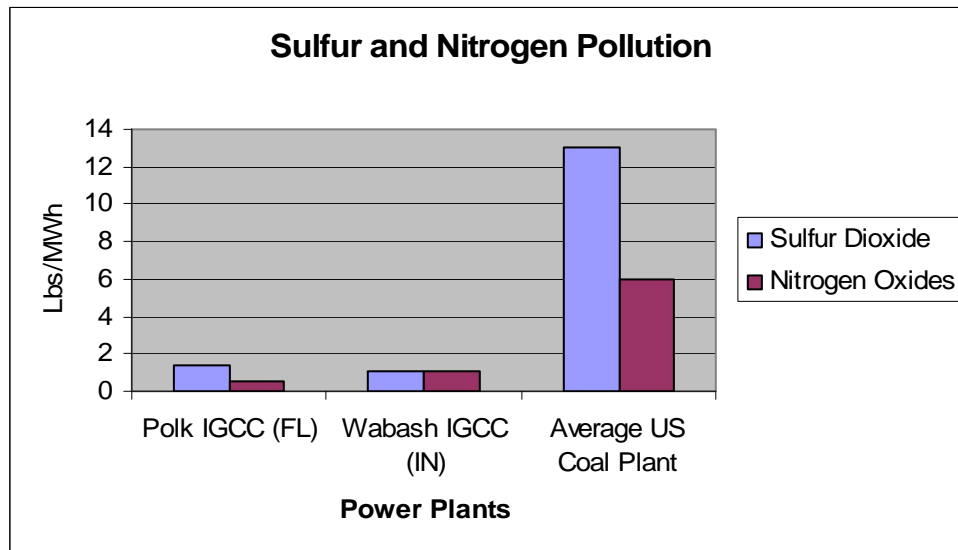
Since the Integrated Gasification Combined Cycle process turns coal into gas before burning anything, separation of pollutants is extremely efficient. This quality makes Integrated Gasification Combined Cycle technology easily adaptable for Carbon Capture and Sequestration. Carbon Capture and Sequestration is the process of capturing

²⁵ Sawruk, Mike. Grand Valley State University. Allendale, MI. 28 February 2008.

²⁶ "IGCC & CCS Background Document." Clean Energy. 19 June 2006. Environmental Protection Agency. 11 Apr. 2008.

carbon dioxide before it is released into the atmosphere and then sequestering it, usually in some kind of natural geological formation underground.²⁶ The primary advantage Integrated Gasification Combined Cycle technology has over traditional coal-burning methods, in terms of pollution, is the large reduction in carbon dioxide, sulfur dioxide, nitrogen oxide, and mercury emissions (see Figure 1-B).²⁷ ²⁵ Unfortunately, Integrated Gasification Combined Cycle technology is not widely accepted due to the increased financial costs associated with capturing carbon dioxide. A visual representation of Integrated Gasification Combined Cycle technology is shown in Figure 1-C on page 6.

FIGURE 1-B²⁷ ²⁵: The difference between Integrated Gasification Combined Cycle emissions and traditional coal-burning plants.



²⁶ *The Midwest Regional Carbon Sequestration Partnership (MRCSP): Phase I Stand Alone Executive Summary, Period of Performance :October 2003-September 2005.* December 2005. Battelle. DOE Cooperative Agreement No: DE-FC26-03NT41981

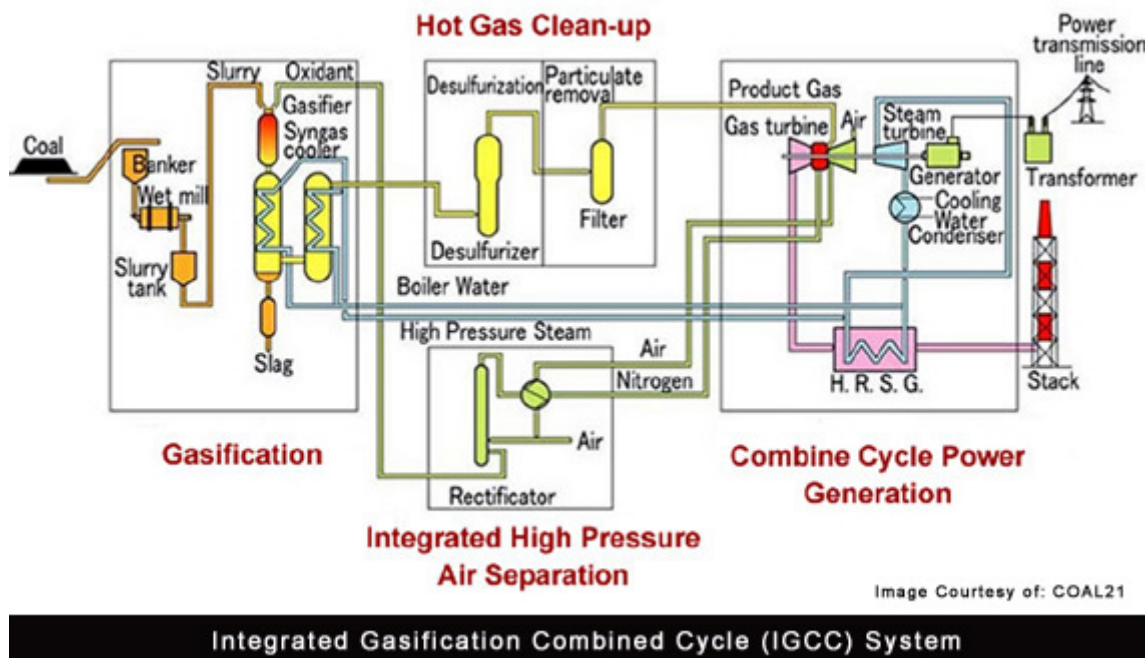
²⁷ "Air Emissions." *Clean Energy*. 28 Dec. 2007. Environmental Protection Agency. 11 Apr. 2008 <<http://www.epa.gov/solar/energy-and-you/affect/air-emissions.html>>.

²⁵ "IGCC & CCS Background Document." *Clean Energy*. 19 June 2006. Environmental Protection Agency. 11 Apr. 2008.

²⁷ "Air Emissions." *Clean Energy*. 28 Dec. 2007. Environmental Protection Agency. 11 Apr. 2008 <<http://www.epa.gov/solar/energy-and-you/affect/air-emissions.html>>.

²⁵ "IGCC & CCS Background Document." *Clean Energy*. 19 June 2006. Environmental Protection Agency. 11 Apr. 2008.

FIGURE 1-C²⁶



Enhanced Oil Recovery

Enhanced Oil Recovery refers to any process increasing the flow of oil from an already existing oil well. These processes have been successfully employed in western Texas, eastern New Mexico, and in smaller projects in several other states.²⁸ One of the most common methods of Enhanced Oil Recovery is carbon dioxide injection (see Figure 1-D).²⁹ Carbon dioxide Enhanced Oil Recovery has also been successfully tested in

²⁶ *The Midwest Regional Carbon Sequestration Partnership (MRCSP): Phase I Stand Alone Executive Summary, Period of Performance :October 2003-September 2005.* December 2005. Battelle. DOE Cooperative Agreement No: DE-FC26-03NT41981.

²⁸ *Enhanced Oil Recovery/C02 Injection:* U.S. Department of Energy. Retrieved April 13, 2008, from <http://www.fossil.energy.gov/programs/oilgas/eor/index.html>

²⁹ *Green Energy and Research Opportunities* (2007). Retrieved April 16, 2008, from http://www.mandmenergy.com/documents/igcc_Great Lakes Energy and Research Park.pdf

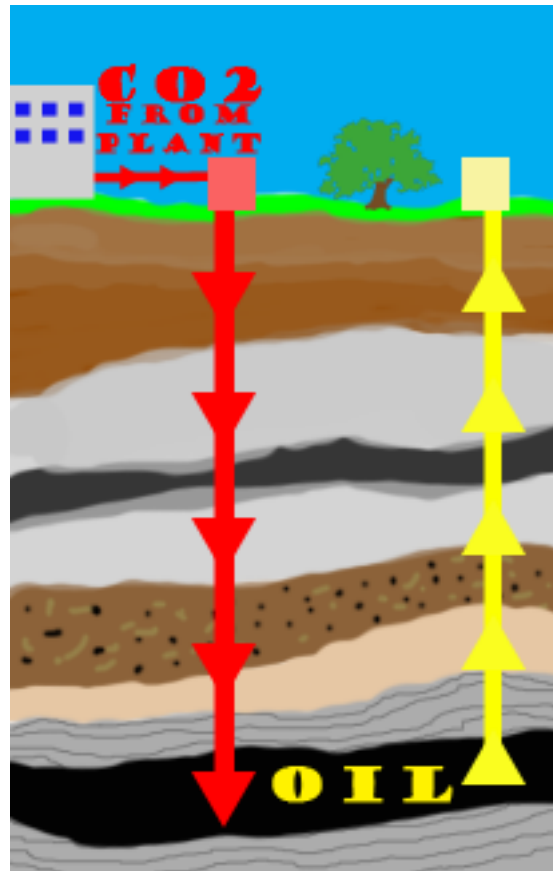
Michigan on three small oil fields.³⁰ Michigan oil fields Dover 33, 35, and 36 experienced an increase of 25 percent oil extraction. The Great Lakes Energy and Research Park will utilize the same technique when extracting stranded oil from Michigan's oil reserves. Carbon dioxide, collected as waste from the power plant, will be injected into an abandoned oil field. Oil production from the field will increase significantly from the injection.

Statewide, it is estimated that over one billion barrels of stranded oil could be recovered using carbon dioxide Enhanced Oil Recovery.³⁰ If the oil was sold at today's prices, it would bring billions of dollars to Michigan's economy. This oil is a valuable resource and economic driver that Michigan cannot afford to ignore, and the best way to retrieve it is with carbon dioxide Enhanced Oil Recovery.

³⁰ *Basin Oriented Strategies For CO2 Enhanced Oil Recovery: Illinois & Michigan Basins* (2006, February): Advanced Resources International. Retrieved April 17, 2008, from http://www.fossil.energy.gov/programs/oilgas/publications/eor_co2/Illinois_&_Michigan_Basin_Document.pdf

³⁰ *Basin Oriented Strategies For CO2 Enhanced Oil Recovery: Illinois & Michigan Basins* (2006, February): Advanced Resources International. Retrieved April 17, 2008, from http://www.fossil.energy.gov/programs/oilgas/publications/eor_co2/Illinois_&_Michigan_Basin_Document.pdf

FIGURE 1-D²⁹: In this diagram, carbon dioxide is injected into the abandoned well and oil production is increased.



²⁹ *Green Energy and Research Opportunities* (2007). Retrieved April 16, 2008, from http://www.mandmenergy.com/documents/igcc_Great Lakes Energy and Research Park.pdf

Section Two: Creating a New Energy Policy for Michigan Through Positive Legislation

Current Energy Regulatory Environment in Michigan

The current energy regulatory environment in Michigan was established in 2000 by the passage of Public Act (PA) 141. PA 141, Section 10(1) ensures all customers in Michigan have a choice of electric providers, fostered by competition among electric suppliers (Sec. 10(1)). The primary objective of PA 141 is to diversify ownership of electric generation in Michigan by opening up competition among old and new electricity providers. Furthermore, PA 141 allows the Public Service Commission (PSC) to regulate the electric suppliers. The PSC establishes rates, terms, and conditions of electric service that promote and enhance the development of new generation, transmission, and distribution technologies (Sec. 10b(1)). As a result, companies are compelled to provide reliable, lower cost electric power to consumers. PA 141 also ensures consumers are not deceived in any way and are given full disclosure with regard to utility companies (Sec. 10r). Finally, PA 141 does not prevent individuals from obtaining self-service power; electricity generated and consumed at an industrial site, including electricity generated from the use of byproduct fuels and electricity (Sec. 10(1)).³

The importance of keeping PA 141 in effect is significant in order for the energy environment in Michigan to continue evolving. PA 141 allows new alternative energy projects, such as the Great Lakes Energy and Research Park, to compete with traditional coal-burning firms. However, utility companies in Michigan are currently attempting to

³ Public Act 141, 90th Michigan Legislature, (2000)

repeal PA 141 to prevent competition from alternative energy providers.³¹ A repeal of PA 141 would significantly reduce opportunities for alternative energy production. Michigan Attorney General, Mike Cox, has recently argued against efforts by traditional utility companies to eliminate customer choice granted by PA 141.³²

In order to increase the efficiency of energy production and decrease the harmful environmental effects from traditional coal-burning used by the utility companies, alternative energy policies and procedures must be developed that include Integrated Gasification Combined Cycle technology. Furthermore, since the passage of PA 141, rates in Michigan have increased the least of all Midwest states with all rate increases being below the national average (see Figure 2-A).³³ Consumer advocacy groups, such as the Customer Choice Coalition, have expressed their support for keeping PA 141 in place.³⁴ Since PA 141 allows competition within the energy market, consumers are given choices allowing for the selection of new, more efficient and environmentally-friendly energy.

³¹ Eggert, D. (2008, April 7). "Utilities Lobby Hard to Change Policy". *Associated Press*

³² *Cox Opposes PA 141 Changes, R.P.S. As Economic Development*: Gongwer News Service (2008, March 11). Retrieved April 13, 2008, from <http://www.customerchoicecoalition.org/mediaclips/Gongwer031108CoxOpposesPA141ChangesRenewablePortfolioStandardAsEconomicDevelopment.pdf>

³³ "Retail Electric Rates" (2007, May). Retrieved April 14, 2008, from www.customerchoicecoalition.com.

³⁴ *New data in: Competition holding down rates, MPSC shows*: Customer Choice Coalition. Retrieved April 13, 2008, from <http://www.customerchoicecoalition.org/>

FIGURE 2-A³³

Since the passage of PA 141, commercial and industrial rate increases in Michigan have been the lowest in the Midwest. Residential increases have remained stable.

Retail Electric Rates
Cents per kilowatt-hour
 May 2007 (most recent available)

	Residential	Commercial	Industrial
Michigan	10.18	9.12	6.08
Illinois	10.40	8.43	6.57
Indiana	8.74	7.28	4.94
Ohio	9.97	8.89	5.77
Wisconsin	11.12	8.69	6.22
Regional Average	10.04	8.57	5.81
National Average	10.76	9.48	6.25

May 2001 (when Public Act 141 was passed)

	Residential	Commercial	Industrial
Michigan	8.5	8.2	5.1
Illinois	9.1	7.2	4.4
Indiana	7.4	5.9	3.6
Ohio	8.8	7.6	4.7
Wisconsin	7.7	6.1	4.0
Regional Average	8.4	7.2	4.4
National Average	8.32	7.11	4.41

Increase from May 2000 to May 2007

	Residential	Commercial	Industrial
Michigan	19.8%	11.2%	19.2%
Illinois	14.3%	17.1%	49.3%
Indiana	18.1%	23.4%	37.2%
Ohio	13.3%	17.0%	22.8%
Wisconsin	44.4%	42.5%	55.5%
Regional Average	19.5%	19.0%	32.0%
National Average	29.3%	33.3%	41.7%

Source: Energy Information Administration

³³ "Retail Electric Rates" (2007, May). Retrieved April 14, 2008, from www.customerchoicecoalition.com.

State Legislative Efforts to Support Integrated Gasification Combined Cycle Production Methods

Three Senate Bills and one House Bill have been drafted to support Integrated Gasification Combined Cycle production methods. The bills address the creation of a clean energy authority, tax incentives for Integrated Gasification Combined Cycle, and incentives to invest in these facilities.

Senate Bill No. 1164: Clean Energy Authority Act

Senate Bill No. 1164 is known as the “Clean Energy Authority Act” and is sponsored by Senators Kahn, Barcia, Kuipers, Richardville, Pappageorge, Allen, Brown, and Hardiman. It has been referred to the Committee of Energy Policy and Public Utilities.⁴

The bill proposes the creation of a clean energy authority to consist of five members and would define the powers and duties this authority would possess. The authority would develop and implement a statewide integrated energy resource plan which, under Clause 13, would include the following:⁴

1. The development of facilities to capture, sequester, or both capture and sequester greenhouse gases,
2. The development of gasifiers,
3. The promotion of enhanced oil recovery from Michigan land using captured greenhouse gases,
4. The promotion of alternative and renewable energy facilities in this state,

⁴ “Clean Energy Authority Act,” SB 1164, 94th Michigan Legislature, (2008).

⁴ “Clean Energy Authority Act,” SB 1164, 94th Michigan Legislature, (2008).

5. The exploration for and development and production of oil, gas, and mineral resources in this state.⁴

The newly-created authority would be allowed to borrow money as well as issue bonds and notes. It would also include the creation of a clean energy fund to support clean energy production and provide tax exemption based on usage.⁴

The bill includes a list of alternative energy types to be included for tax exemption. It encourages the utilization of at least one Integrated Gasification Combined Cycle facility capable of producing 250 megawatts of electric power.¹¹ The facility would also include a gasifier capable of capturing greenhouse gases and would be required to provide an annual status report to the legislature in order to track the progress of the facility. This bill is essential to the Great Lakes Energy and Research Park because it would promote the technology the Great Lakes Energy and Research Park utilizes. Additionally, it would provide tax exemptions for facilities such as the Great Lakes Energy and Research Park.

Senate Bill No. 1165: Regulation and Control of Public and Certain Private Utilities and Other Services Affected with a Public Interest within this State Act

Senate Bill No. 1165, known as the “Regulation and Control of Public and Certain Private Utilities and Other Services Affected with a Public Interest within this State Act,” would amend PA 3 of 1939 by adding Clause 6q. Senator Barcia is the bill’s primary sponsor; co-sponsors are Senators Kahn, Brown, Kuipers, Hardiman,

⁴ “Clean Energy Authority Act,” SB 1164, 94th Michigan Legislature, (2008).

⁴ “Clean Energy Authority Act,” SB 1164, 94th Michigan Legislature, (2008).

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

Pappageorge, Richardville, Gleason, and Allen. It has been referred to the Committee of Energy Policy and Public Utilities.⁵

The key objective of Clause 6q is to encourage electric utilities to invest in a pilot Integrated Gasification Combined Cycle facility such as the one outlined in Senate Bill No. 1164. Senate Bill No. 1165 would amend PA 3 of 1939 to do the following:

1. Require the PSC to implement procedures for an electric utility to recover its costs of investing in a pilot Integrated Gasification Combined Cycle facility,
2. Include Integrated Gasification Combined Cycle technology in the Renewable Portfolio Standard percentage for an electric utility,
3. Authorize the PSC to provide additional incentives for participation in an Integrated Gasification Combined Cycle pilot project,
4. Require the PSC to issue an order authorizing the recovery of costs by an electric or gas utility from substituting natural gas or electric power produced by an Integrated Gasification Combined Cycle facility or gasifier.⁵

Senate Bill No. 1165 aims to include Integrated Gasification Combined Cycle technology as part of the Renewable Portfolio Standard. A Renewable Portfolio Standard would require a certain percentage of energy to be produced from alternative energy sources. This bill allows the Great Lakes Energy and Research Park to team up with the major utilities to provide electricity to consumers. It also encourages the major utilities to accept projects utilizing Integrated Gasification Combined Cycle technology as partners as opposed to competitors.⁵

⁵ “Intergrated Gasification Plant,” SB. 1165, 94th Michigan Legislature, (2008).

⁵ “Intergrated Gasification Plant,” SB. 1165, 94th Michigan Legislature, (2008).

⁵ “Intergrated Gasification Plant,” SB. 1165, 94th Michigan Legislature, (2008).

Senate Bill No. 1166: Michigan Business Tax Act

Senate Bill No. 1166, known as the “Michigan Business Tax Act,” would amend the PA 36 of 2007 by adding Clause 451. It is sponsored by Senators Kuipers, Kahn, Brown, Hardiman, Barcia, Pappageorge, and Richardville. Like Senate Bills No. 1164 and 1165, it has been referred to the Committee on Energy Policy and Public Utilities.⁶

The bill would amend the Michigan Business Tax (MBT) Act to allow a qualified taxpayer to claim a MBT credit for carbon dioxide emission reductions and sequestration infrastructure. The amount of the credit would be equal to the per ton market price of commodity carbon dioxide multiplied by one or both of the following:

1. Number of tons of eligible reductions in emissions or carbon dioxide,
2. Annual capacity in tons of critical carbon dioxide sequestration infrastructure, including carbon dioxide pipelines and other related equipment developed by the taxpayer.⁶

The maximum credit that could be accumulated per year for a qualified facility would be capped at \$20 million. Total credit accumulation for all facilities in any given year would not be allowed to exceed \$250 million. Any excess credit would be carried forward as an offset of tax liabilities for three subsequent tax years or until the credit was used up. The Department of Treasury would be in charge of oversight of the application and certification process for the credit, as well as the evaluation of pricing for commodity carbon dioxide.⁶

As a Carbon Capture and Sequestration facility, the Great Lakes Energy and Research Park would qualify for a large amount of tax credits. This, combined with the

⁶ “Carbon Dioxide Reduction Credit,” SB. 1166, 94th Michigan Legislature, (2008).

⁶ “Carbon Dioxide Reduction Credit,” SB. 1166, 94th Michigan Legislature, (2008).

⁶ “Carbon Dioxide Reduction Credit,” SB. 1166, 94th Michigan Legislature, (2008).

renaissance zone proposed in Senate Bill No. 1164, would allow the Great Lakes Energy and Research Park to operate with significantly less taxation than a newly-created traditional coal plant. Less taxation would allow the Great Lakes Energy and Research Park to recover its costs quicker and increase its chances for success.⁶

House Bill No. 5604: Michigan Business Tax Act

House Bill No. 5604 would amend Public Act 36 (2007), the Michigan Business Tax Act, by adding section 453. The bill was introduced and sponsored by Representative Opsommer. House Bill No. 5604 has been referred to the Committee on Tax Policy.⁷

House Bill No. 5604's addition of Section 453 would allow a taxpayer to claim a tax exemption equal to the cost of purchasing, leasing or constructing facilities capable of carbon dioxide capture technology. In addition, Section 453 would allow a tax credit for equipment, or pipeline infrastructure and the cost of materials in preparing, maintaining, or capping a carbon dioxide injection well during the same year the tax credit is claimed. House Bill No. 5604 would further also allow taxpayers to claim an exemption for the construction and utilization of alternative energy facilities. Similar to Senate Bill No. 1165, House Bill No. 5604 provides tax credits for facilities like the Great Lakes Energy and Research Park, who would have otherwise had to operate under heavier cost burdens.⁷

⁶ "Carbon Dioxide Reduction Credit," SB. 1166, 94th Michigan Legislature, (2008).

⁷ HB. 5604, 94th Michigan Legislature, (2007).

⁷ HB. 5604, 94th Michigan Legislature, (2007).

Section Three: Traditional Views About Energy Production and the Reality of Future Needs

Current Energy Context and Markets Created by Utility Companies in Michigan

CMS Energy is the parent company of Consumers Energy, an electric and natural gas utility. Consumers Energy provides utilities for about 6.5 of Michigan's 10 million citizens. Consumers Energy employs fossil-fueled plants that use coal, natural gas and oil to heat water and produce steam. These plants account for almost 80 percent of their electric generating capacity. Because of its price advantage, coal is used to meet approximately 70 percent of Consumers Energy customers' demand.³⁵

As previously noted in Section One of this report, traditional coal-burning methods utilize only 30 percent of the coal's energy, and therefore waste 70 percent of the remaining stored energy. Burning coal to generate energy releases high amounts of harmful pollutants including carbon dioxide and mercury into the atmosphere.⁴⁰ It is the least environmentally-friendly method that Consumers Energy employs in its energy generation, yet it accounts for the highest percentage of produced energy. Consumers Energy also uses 13 hydroelectric dams that create clean, renewable power, but only enough to provide for 66,000 people, representing only a tiny fraction of their total consumers. Nuclear energy provides about 17 percent of Consumers' total electrical capacity.

³⁵ *Projected Environmental Characteristics of Consumers Energy Electricity* (2006, October 1). Retrieved April 18, 2008, from <http://www.consumersenergy.com/uploadedFiles/Environment/BillBackJANUARY08.pdf>

⁴⁰ Petras, C. (Executive Producer). (2007, April 23). *Political Update -Season #1, Episode #9* [Television Broadcast]. MI.

Today, only about five percent of the electricity Consumers Energy provides to customers comes from renewable resources. Hydroelectric and waste wood make up the bulk of that renewable energy.³⁶ An example of this would be the Filer City project near Manistee that generates 60 MW of power through biomass generation.³⁷ Their goal is to increase renewable energy generation to ten percent by 2015.³⁶

Two of DTE Energy's subsidiaries are Detroit Edison and Michigan Consolidated Gas Co. (Michcon). Detroit Edison generates, transmits and distributes electricity to 2.2 million customers in southeastern Michigan. MichCon is engaged in the purchase, storage, transmission, distribution, and sale of natural gas to approximately 1.3 million customers in Michigan.⁴²

The production methods DTE and Consumers Energy currently employ have been in use for over 100 years. Coal dominates Michigan's electricity generation, supplying nearly 56.5 percent of the market.⁸ Coal currently provides more than 50 percent of the United States's electricity, which is far more than any other source of power.³⁹

Coal use in the United States has nearly tripled since 1960, and the trend is likely to continue given the power industry has proposed the construction of over 100 new power plants. The industry's reasoning for coal generation is cost effectiveness.

³⁶ *Projected Environmental Characteristics of Consumers Energy Electricity* (2006, October 1). Retrieved April 18, 2008, from <http://www.consumersenergy.com/uploadedFiles/Environment/BillBackJANUARY08.pdf>

³⁷ *Integrated Gasification Combined Cycle-Integrated Gasification Combined Cycle*: Tondu Corporation. Retrieved April 13, 2008, from [http://www.tonducorp.com/Integrated Gasification Combined Cycle.htm](http://www.tonducorp.com/Integrated%20Gasification%20Combined%20Cycle.htm)

³⁶ *Projected Environmental Characteristics of Consumers Energy Electricity* (2006). Retrieved April 17, 2008, from <http://www.consumersenergy.com/uploadedFiles/Environment/BillBackJANUARY08.pdf>

⁴² *DTE Energy utility businesses* (2008). Retrieved April 13, 2008, from <http://www.dteenergy.com/businesses/utility.html>.

⁸ World Energy and Economic Outlook. In *Energy Information Administration / International Energy Outlook*. (n.d.). Retrieved April 5, 2008, from <http://www.eia.doe.gov/oiaf/ieo/pdf/world.pdf>

³⁹ Freese, B., & Deyette, J. (2006). Cleaning Up Coal's Act. *Catalyst- The Magazine of the Union of Concerned Scientists*, 5. Retrieved April 15, 2008, from <http://www.ucsusa.org/publications/catalyst/cleaning-up-coals-act.html>

However, this does not take into account the potentially catastrophic environmental costs.³⁹

Consumers Energy and DTE Energy are two major utilities in opposition to the Great Lakes Energy and Research Park and other alternative energy competitors. Support for the Great Lakes Energy and Research Park is so substantial that the major utility companies have spent a combined \$525,600 in lobbying efforts.³¹ While both have alternative energy programs in progress, both companies maintain that they cannot develop these projects without first repealing PA 141.¹² The repeal of PA 141 would allow the two utility companies to avoid competition from alternative energy facilities. The feasibility of these projects needs to be examined, as well as the effects they will have on Michigan.

Comparing Integrated Gasification Combined Cycle Alternative Energy to Traditional Alternative Energy Methods

The DTE Energy Hydrogen Technology Park is a demonstration project seeking to find hydrogen's place in the energy industry. According to DTE, the process involves generation, storage, and conversion of hydrogen into energy. It operates by producing hydrogen gas from tap water using power from an electric grid. It also compresses and stores hydrogen and will be able to deliver enough electricity to power 20 homes, as well

³⁹ Freese, B., & Deyette, J. (2006). Cleaning Up Coal's Act. *Catalyst- The Magazine of the Union of Concerned Scientists*, 5. Retrieved April 15, 2008, from <http://www.ucsusa.org/publications/catalyst/cleaning-up-coals-act.html>

³¹ Eggert, D. (2008, April 7). "Utilities Lobby Hard to Change Policy." *Associated Press*

¹² *Michigan's Electric Restructuring Is A Success* (2007, February). Retrieved April 17, 2008, from <http://www.customerchoicecoalition.com/pdfs/0207ReportFINAL.pdf>

as an adequate amount of compressed hydrogen gas to power three vehicles per day. The technology has not yet been developed and is currently still in the research stage.⁴⁰

DTE Energy has also proposed a wind farm. Wind power is a completely renewable source of energy that has minimal environmental impact since the wind turbines can be placed on existing farmland. Meteorological towers would need to be installed to measure the suitability of sites for wind turbines. The proposed farm would be located in Huron, Tuscola, and Sanilac Counties and would take 18 months to develop.^{41 42}

In order to be economical, the wind farm must be very large. The cost of wind power depends on wind speed, construction and maintenance costs. The larger the wind farm, the lower the cost of energy; the higher the wind speed, the lower the cost of energy. The disadvantage of a wind farm is wind speed variation. A wind farm project must be financed on a stand-alone basis and transmission, tax, and environmental policies can also affect the economics of wind energy. Wind energy can cause electric rates to rise. Hypothetically, if wind energy costs two cents more per kilowatt-hour (kWh) than the current utility provider, and the provider decides to use wind energy to generate ten percent of its electricity, then the added cost per customer is two cents per kWh. If the average United States home uses 800 kWh per month, it costs the customer an extra \$1.60 per month; about a nickel per day.⁴⁶

⁴⁰ *DTE Energy ventures* (2008). Retrieved April 13, 2008, from <http://www.dteenergyventures.com/initiatives.html>

⁴¹ *DTE Energy* (2008). Retrieved April 2, 2008, from <http://www.dteenergy.com/environment/pdfs/theWhatAndHowsOfWindPower.pdf>

⁴² Lane, A. (2007, October 29). It's in the wind; DTE lays groundwork for more renewable energy sources. *Crain's Detroit Business*, pp. 01, 02.

⁴⁶ *American Wind Energy Association* (2007). Retrieved April 13, 2008, from www.awea.org/faq/wwt_costs.html

A DTE Energy program, already in effect, is Green Currents. It is a renewable energy option seeking to make green energy an affordable option for customers' energy needs. There is a residential and a business component to this program. The residential program and the business program both give the option of 100 percent enrollment, matching 100 percent of energy consumption for an extra two cents per kWh. Another residential option allows customers to choose their own participation level in the form of 100 kWh block enrollment. Each block is \$2.50 per month and customers may purchase a maximum of ten kWh. Businesses may also choose unlimited block enrollment with 1000 kWh blocks at \$20.00 per block per month.⁴⁴

DTE Energy is a member of the United States Department of Energy's Midwest Regional Carbon Sequestration Partnership. DTE Energy is participating in a field test, which stores carbon dioxide in underground rock formations near Gaylord, Michigan. Using carbon dioxide to enhance oil recovery is a familiar and frequently-used technique in Michigan and around the country. However, the goal of this field test is to store carbon dioxide, not to reuse it for Enhanced Oil Recovery. Therefore, the Great Lakes Energy and Research Park will be showcasing a more economically viable method for dealing with captured carbon dioxide emissions.

The Consumers Energy utility has developed the Balanced Energy Initiative. The Balanced Energy Initiative outlines potential investments in new power plants. The program will use 500 MW of gas fired combined cycle capacity by 2011 through either purchasing or building a new facility.⁴⁵ Reports indicate gas-fired combined cycle plants are a more economical way of generating power in the short term. However, the

⁴⁴ *DTE Energy* (2008). Retrieved April 2, from my.dteenergy.com/products/greenCurrents/index.html

⁴⁵ *Building a New Generation of Power in Michigan* (n.d.). Retrieved April 17, 2008, from <http://www.consumersenergy.com/welcome.htm?/content/newgen.aspx?id=420>

volatility of the natural gas market is making future fuel costs for plants of this type very unstable and potentially economically unfeasible. According to a listing of power generation plants for sale at the time of this publishing, the most prevalent type of plant for sale is gas-fired.⁴⁶

Consumers Energy has indicated a desire to get involved in an expansion of the Karn/Weadock Generation Complex in Bay City, Michigan. The expansion would include building a new “advanced supercritical pulverized” clean coal power plant. According to Consumers Energy, the expansion will cost two billion dollars and would be operational by 2015.⁴⁵

While a clean coal power plant may be relatively inexpensive to build and run, it may not be a viable long term plan. Some estimate that by 2010, the cost of carbon dioxide will make pulverized coal plants uneconomical.⁴⁷ With the likely imposition of an emissions cap, the ability of the Karn/Weadock Generation Complex to economically generate clean power would be severely limited.

Cost Comparisons of Integrated Gasification Combined Cycle Technology and Traditional Methods

If new government regulations such as an emissions cap-and-trade system are adopted, the rates for coal generated electricity could increase up to 50 percent, depending on the regulation system created. Cap-and-trade systems require companies to

⁴⁶ *Fossil-fueled Plants* (2005). Retrieved April 17, 2008, from <<http://www.consumersenergy.com/welcome.htm>>

⁴⁵ *Building a New Generation of Power in Michigan* (n.d.). Retrieved April 17, 2008, from <http://www.consumersenergy.com/welcome.htm?/content/newgen.aspx?id=420>

⁴⁷ Freese, B., & Clemmer, S. (2008, September). *"Gambling with Coal"*. Retrieved April 7, 2008, from www.ucsusa.org

purchase permits for their emissions. The permits are tradable between the companies requiring them. Clearly, the traditional coal-burning methods are outdated and will not bring about pricing stability in the energy market. Granted, in the context of short term periods, traditional energy costs will be less than energy from Integrated Gasification Combined Cycle technology.⁴⁷ However, 73 percent of Michigan residents are willing to pay extra money to increase the production of renewable energy sources.¹ Furthermore, if a Renewable Portfolio Standard is adopted in Michigan, emissions laws will make coal plants a “reckless financial gamble.”⁴⁷ As alternative energy resources become more advanced, the economic viability of “conventional coal plants will become uncompetitive when compared to energy efficient and renewable energy plants.”⁴⁷

⁴⁷ Freese, B., & Clemmer, S. (2008, September). *"Gambling with Coal"*. Retrieved April 7, 2008, from www.ucsusa.org

¹ Rabe, B. (2008). Survey of Michigan Residents on the Issue of Global Warming and Climate Policy Options: Key Findings Report. In *Center for Local, State, and Urban Policy*. Ann Arbor: University of Michigan.

⁴⁷ Freese, B., & Clemmer, S. (2006, September): Union of Concerned Scientists. *Gambling with Coal*. Retrieved April 17, 2008, from <http://www.ucsusa.org/assets/documents/clean_energy/gambling_with_coal_final_report_sept_06.pdf>

⁴⁷ Freese, B., & Clemmer, S. (2006, September): Union of Concerned Scientists. *Gambling with Coal*. Retrieved April 17, 2008, from <http://www.ucsusa.org/assets/documents/clean_energy/gambling_with_coal_final_report_sept_06.pdf>

Section Four: Benefits of Integrated Gasification Combined Cycle Technology and the Great Lakes Energy and Research Park Project

The Great Lakes Energy and Research Park offers numerous benefits to Michigan. In addition to generating clean energy for Michigan, the Great Lakes Energy and Research Park will provide jobs, stability to energy prices, opportunities for research, and generation of oil revenues for the state. The Great Lakes Energy and Research Park will revitalize Michigan's job market, higher education research, and economy. Most importantly, the Great Lake Energy and Research Park will place Michigan at the forefront of alternative energy. When combined, these benefits offer Michigan promising opportunities to be a leader in alternative energy production and research, while increasing energy supplies and pricing stability.

Creation of Jobs

In 2004, it was estimated that changing the national Renewable Portfolio Standard to ten percent would bring more than 2,700 jobs to Michigan, almost three times as many as fossil fuels are expected to bring. This would mean an additional \$70 million in income.⁴⁸ Constructing the Great Lakes Energy and Research Park would generate approximately 1,200 jobs.⁹

Construction jobs alone would total approximately 1,000 with the ground breaking of the Great Lakes Energy and Research Park planned for 2010 and the facility operating by 2015. The Great Lakes Energy and Research Park is scheduled to operate at

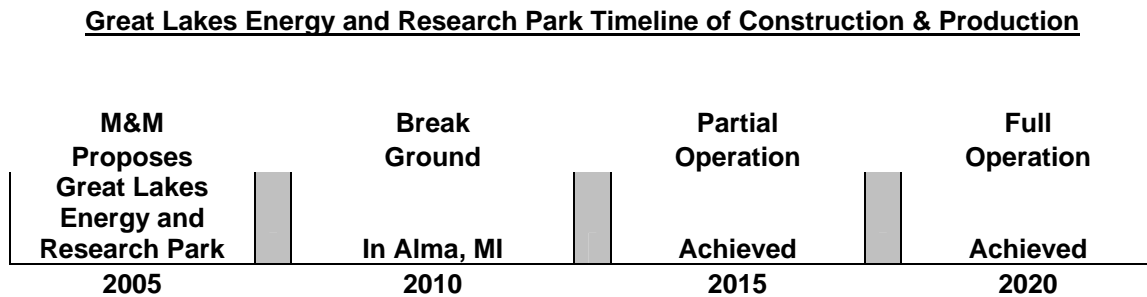
⁴⁸ Union of Concerned Scientists. "A 10 Percent National Renewable Electricity Standard Will Create Jobs and Save Consumers Money". *Renewing Michigan's Economy: 2004 Analysis*.

⁹ Vision Mid-Michigan article: "Alma the 'Sweet Spot' for Great Lakes Energy Park"

full capacity starting in 2020 (see Figure 4-A).⁵⁰ Skilled labor jobs would be vital throughout the construction period. Most importantly, these would be jobs that could not be outsourced.

The permanent jobs the Great Lakes Energy and Research Park would provide number between 100 and 250, not including any ripple-effect employment opportunities.⁹ Operation of the facility as well as research positions would create these jobs. In addition, the Great Lakes Energy and Research Park would be close to most of Michigan’s major universities. This would inspire interaction between these universities and the research facilities within the Great Lakes Energy and Research Park for internship and research opportunities.

FIGURE 4-A⁴⁹



Enhanced Stability in Energy Pricing and Supplies

Wall Street’s three biggest banks, Citigroup Inc., J.P. Morgan Chase & Co. and Morgan Stanley, announced plans in early February 2008 to align funding with new

⁵⁰ Sawruk, Mike. Grand Valley State University. Allendale, MI. 28 February 2008.

⁹ Vision Mid-Michigan article: “Alma the ‘Sweet Spot’ for Great Lakes Energy Park”

⁴⁹ Sawruk, Mike. Grand Valley State University. Allendale, MI. 28 February 2008.

environmental standards likely to be imposed on emissions by the federal government. However, the banks are likely to provide financing for energy technology designed to capture greenhouse gas emissions and store them underground, such as the Great Lakes Energy and Research Park. This is reflected in the banks' concern over the likely implementation of a carbon dioxide cap-and-trade system. It also demonstrates the decreased viability of traditional coal plants.

A report issued in 2007 by the United States Department of Energy shows the ability of advanced coal plants using Carbon Capture and Sequestration to offer competitive prices. The following graph, Figure 4-B, demonstrates the price comparability, assuming \$35/mt carbon dioxide in 2020.²

FIGURE 4-B²

Cost of Electricity in Year 2020 with Sale of CO2

Power Generation Option	Cost of Electricity (2020)		
	Initial* Cost (\$/MWh)	CO2 Sale Offset (\$/MWh)	Final* Cost (\$/MWh)
1. Pulverized Coal without CCS	\$59.70	-	\$59.70
2. Advanced Coal without CCS	\$62.00	-	\$62.00
3. Advanced Nuclear	\$66.00	-	\$66.00
4. Advanced Coal with CCS	\$80.80	(\$23.50)	\$57.30

*Costs are for 2020 and include transmission

² Kuuskraa, V., & Ferguson, R. (2008). Storing CO2 with Enhanced Oil Recovery. In *Department of Energy*. Department of Energy. Retrieved April 11, 2008, from http://www.netl.doe.gov/energy-analyses/pubs/Storing%20CO2%20w%20EOR_FINAL.pdf

² Kuuskraa, V., & Ferguson, R. (2008). Storing CO2 with Enhanced Oil Recovery. In *Department of Energy*. Department of Energy. Retrieved April 11, 2008, from http://www.netl.doe.gov/energy-analyses/pubs/Storing%20CO2%20w%20EOR_FINAL.pdf

As cap-and-trade systems are implemented and states continue to adopt a Renewable Portfolio Standard, traditional coal plants will have to turn to alternative sources. Meanwhile, alternative energy sources like the Great Lakes Energy and Research Park will already be in compliance with the new emissions standards. They will also receive economic development incentives and offer competitive pricing in the sales of carbon dioxide, as shown in Figure 4-B; this enhances pricing stability.

Greater Research Capabilities of Alternative Energy Solutions

The Great Lakes Energy and Research Park is proposed for Alma, Michigan. This is an ideal location due to its proximity to Michigan's major universities and colleges. These include: Michigan State University, Central Michigan University, Ferris State University, Saginaw Valley State University, Alma College, Mott Community College, Mid Michigan Community College, Montcalm Community College, Davenport University, Delta College and Lansing Community College. The Great Lakes Energy and Research Park offers students and graduates the chance for hands-on involvement and job opportunities in the alternative energy industry. This enhances Michigan's attractiveness as a leader in alternative energy production.¹¹

Safe and Effective Recovery of Stranded Oil in Michigan

The Great Lakes Energy and Research Park will allow for Enhanced Oil Recovery in Michigan. Governor Granholm noted this aspect in a February 2008 article published in *The Morning Sun* newspaper, and is looking forward to working with M & M

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

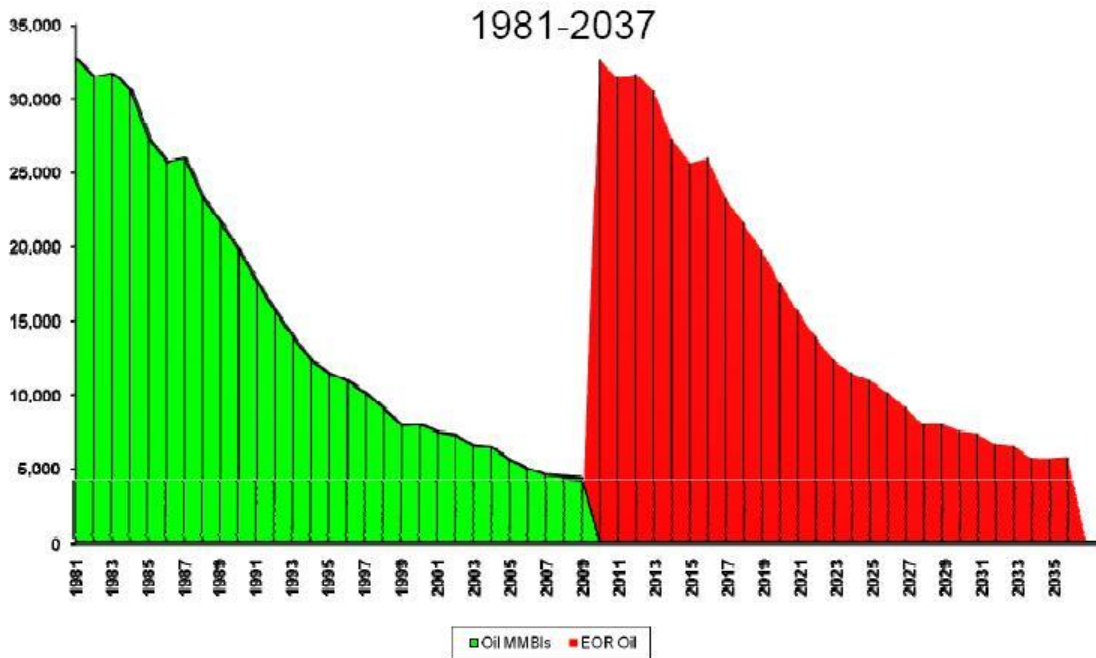
Energy.⁵⁰ The Great Lakes Energy and Research Park will sequester carbon dioxide, which would normally be released into the air, and pump it underground using injection wells. The accumulated pressure forces stranded oil to the surface, making it useful. This technology has been used safely and successfully in Saskatchewan, Canada. Called the “Weyburn Project,” it has successfully sequestered five million tons of carbon dioxide into the Weyburn oil field, while doubling the field’s oil recovery rate. If the methodology used in the Weyburn Project was successfully applied on a worldwide scale, one-third to one-half of carbon dioxide emissions could be eliminated in the next 100 years, and billions of barrels of oil could be recovered.⁵¹ The Great Lakes Energy and Research Park would utilize this technology in Michigan, reducing greenhouse gas emissions and generating more oil revenues for the state.

⁵⁰ Gittleman, L. (2008, February 2). “Granholm Interested in Alma Project”. *The Morning Sun*

⁵¹ *Successful Sequestration and Enhanced Oil Recovery Project Could Mean More Oil and Less CO2 Emissions* (2005, November 15); U.S. Department of Energy. Retrieved April 17, 2008, from <http://www.doe.gov/news/2673.htm>.

FIGURE 4-C⁵²: In the past 20 years, oil production in Michigan has declined significantly. When the Great Lakes Energy and Research Park is fully operational, oil production will increase and eventually return to the oil capacity levels of 1981.

Michigan Oil Production with EOR



⁵² Great Lakes Energy and Research Park presentation, by M & M Energy, LLC. Accessed 13 April 2008. http://www.mandmenergy.com/documents/GLERP_why_mid_michigan_022008.pdf.

Section Five: Who Supports Integrated Gasification Combined Cycle Technology and the Great Lakes Energy and Research Park Project?

The Great Lakes Energy and Research Park is a vital project to Michigan and is also widely backed by a diverse group of people. Support for the Great Lakes Energy and Research Park includes individuals in the political arena—national, state, and local; associations; and business partners. The primary political support comes from Governor Granholm. Not only is Governor Granholm in support of alternative energy production, she is specifically in support of the Great Lakes Energy and Research Park.⁵⁰ Other political supporters include Senators Stabenow and Levin, Michigan State Senate Majority Leader Bishop, State Senators Kahn and Barcia, and State House Representative Opsommer.¹¹ The Great Lakes Energy and Research Park is also supported by the Western Wayne Oakland County Association of Realtors (WWOCAR), a 4,000 member strong organization out of southeastern Michigan.¹³ Finally, the Great Lakes Energy and Research Park is partnered with SemGroup, a major energy industry player in oil extraction, and ConocoPhillips, a corporation helping to provide Integrated Gasification Combined Cycle technology.¹¹

⁵⁰ Gittleman, L. (2008, February 2). “Granholm Interested in Alma Project”. *The Morning Sun*.

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

¹³ *New Release: Western Wayne Oakland County Association of REALTORS* (2008, January 25). Retrieved April 16, 2008, from <http://www.wwocar.com/pdf/KB-4DCE24AB-562C-4872-878F-CC9741644AD7.pdf>

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

Bipartisan Support

Governor Granholm has consistently supported alternative energy. “We are in the midst of negotiating a very significant energy package,” she said in an article published in *The Morning Sun*.⁵³ She also mentioned the Great Lakes Energy and Research Park as “...one of the centers of excellence we are considering.”⁵³ Her enthusiasm was palpable in *The Oakland Press*; “Michigan can lead the nation in renewables.”⁵⁴ She gave the Great Lakes Energy and Research Park specific mention at the Michigan Press Association luncheon in early February 2008, saying, “I know our team met with the leadership of [M & M Energy] and we definitely want to work with them to find a way to make a good business case for them to stay here.”⁵⁰ She is not alone in her support of alternative energy; many legislators in Lansing have spoken out in favor of the Great Lakes Energy and Research Park as well.

Current legislators supporting the Great Lakes Energy and Research Park include United States Congressman Camp and State Representative Opsommer. Representative Opsommer introduced House Bill No. 5604 in an effort to provide funding for the Great Lakes Energy and Research Park. Representative Opsommer said in a recent article in *The Morning Sun* that he is looking to renew Michigan and create ways to allow companies, like M & M Energy, to produce power here.⁵⁵ Representative Bishop stated, “The state needs the economic revitalization this legislation can bring.”⁵⁶ Congressman

⁵³ Greg Nelson. “Governor: Alma under Consideration as ‘Center of Energy Excellence.’” *The Morning Sun*. 7 March 2008.

⁵³ Greg Nelson. “Governor: Alma under Consideration as ‘Center of Energy Excellence.’” *The Morning Sun*. 7 March 2008.

⁵⁴ Charles Crum. “Governor Touts Renewable Energy.” *The Oakland Press*.

⁵⁰ Linda Gittleman. “Granholm Interested in Alma Project.” *The Morning Sun*. 2 Feb. 2008.

⁵⁵ Gittleman, L. (2007, July 18). Energy park may get federal boost. *Morning Sun*, pp. 1A, 2A.

⁵⁶ “Plan to Boost Clean Energy Unveiled.” From Senate Majority Leader Michael Bishop’s Senate site. 22 January 2008.

Camp pushed a \$500,000 grant in support of the project through the House, which went through the Senate December 19, 2007.⁵⁵

Members of the Michigan State Senate are showing support for the Great Lakes Energy and Research Park by sponsoring Senate Bills 1164, 1165, and 1166. For example, Senator Kahn is sponsoring all three bills and specifically mentions the Great Lakes Energy and Research Park as being a positive economic opportunity.⁵⁶ Senator Kahn is one of many legislators that realized “one of the emerging segments of our economy is not blue or white collar, it’s green collar.”⁵⁷ Senator Kahn is not alone in his view; he is joined by numerous State Senators and Representatives in support of the Great Lakes Energy and Research Park. Senator Kuipers stated the Great Lakes Energy and Research Park will both “...protect our environment for future generations...” and “...bring investment and jobs to Michigan.”⁵⁶ Support for the Great Lakes Energy and Research Park comes from all areas of Michigan, including Saginaw, Holland, and Dewitt. Michigan Senate Majority Leader Bishop has expressed the need to “...maintain the balance between development and environmental preservation.”⁵⁶

Michigan’s two United States Senators, Debbie Stabenow and Carl Levin, followed in accordance as well. Senators Stabenow and Levin are supporting legislation in the United States Senate, already passed by the House, which would set aside specific funding for the Great Lakes Energy and Research Park. According to a press release

⁵⁵ Gittleman, L. (2007, July 18). Energy park may get federal boost. *Morning Sun*, pp. 1A, 2A.

⁵⁶ Plan to boost clean energy unveiled (2008, January 22). Retrieved April 19, 2008, from <http://www.senate.michigan.gov/gop/readarticle.asp?id=1054&District=32>

⁵⁷ Dr. Roger Khan. “Energy Plan can Transform State Economy.” *Saginaw News*. 3 February 2008.

⁵⁶ “Plan to Boost Clean Energy Unveiled.” From Senate Majority Leader Michael Bishop’s Senate site. 22 January 2008.

⁵⁶ “Plan to Boost Clean Energy Unveiled.” From Senate Majority Leader Michael Bishop’s Senate site. 22 January 2008.

issued by the Senators, \$500,000 will be given to the development and construction of the Great Lakes Energy and Research Park.⁵⁸ In the summer of 2007, a letter was sent out and signed by both Senators Stabenow and Levin to Henry Paulson, the Secretary of the Treasury, and Samuel Bodman, the Secretary of Energy. The letter expressed the Senators' support for tax credits for the Great Lakes Energy and Research Park; "We believe that this project is uniquely qualified for the advanced coal project tax credit."⁵⁹ The letter also expressed that "the Great Lakes Energy [and Research] Park gasification power plant will be the first project to leverage America's coal resources to produce a secure, clean electricity supply, permanently sequester greenhouse gases and recover and process more of America's oil resources."⁵⁹

Local governments are emphasizing their support for the Great Lakes Energy and Research Park as well. For example, Alma Mayor Nyman said the mid-Michigan area is now "...poised to be the epicenter of Michigan's new energy future...federal funds will help us get some important projects off the ground."⁶⁰ The City of Alma and Pine River Township have already voiced their support of the Great Lakes Energy and Research Park, which demonstrates the collaboration among local governments.⁶¹ The City of St. Louis supports and is directly working with the City of Alma in planning for the creation of the Great Lakes Energy and Research Park. The city feels the project will be a

⁵⁸ Levin, C., & Stabenow, D. (2007, December 18). *Stabenow, Levin: Omnibus Bill Includes Millions for Michigan Projects*. Retrieved April 16, 2008, from <http://stabenow.senate.gov/press/2007/121807omnibus.htm>

⁵⁹ as described by D. Stabenow and C. Levin (personal communication, July 14, 2006)
Stabenow, D., & Levin, C. *Letter to Secretary Paulson*

⁵⁹ as described by D. Stabenow and C. Levin (personal communication, July 14, 2006)
Stabenow, D., & Levin, C. *Letter to Secretary Paulson*

⁶⁰ Gittleman, L. (2007, December 21). Alma energy park draws federal support. *The Morning Sun*. Retrieved April 20, 2008, from http://www.themorningsun.com/stories/122107/loc_alma.shtml

⁶¹ *City of St. Louis* (2008). Retrieved April 2, 2008, from http://www.stlouismi.com/1/stlouis/Energy_Park_Project.asp

“tremendous positive impact to the entire area.”¹² In addition, the City of Ithaca is discussing legislation that would provide for green energy tax credits through energy generation. Figure 5-A lists the supporters of the Great Lakes Energy and Research Park, Senate Bills No. 1164, 1165, 1166, and House Bill No. 5604.

Western Wayne Oakland County Association of Realtors

The Western Wayne Oakland County Association of Realtors (WWOCAR) Board of Directors has voted to support the Great Lakes Energy and Research Park because it will produce Michigan jobs and will promote environmentally safe energy. In a January 25, 2008 press release, WWOCAR stated it “...is committed to supporting efforts to bring new jobs to Michigan, generate revenues for the state’s budget, and use technologies that are environmentally safe.”¹³

“Rejuvenating Michigan’s economy and supporting efforts to generate alternative forms of energy that use environmentally safer technologies is something WWOCAR supports,” said WWOCAR President Gordon McCann in the press release. “The Great Lakes Energy and Research Park project in Gratiot County, Michigan offers Michigan residents a sign of positive things to come and is a step in the right direction in bringing new jobs to Michigan and additional revenues for the state’s budget,” added McCann. “We have examined the data and believe that the build-out from the Great Lakes Energy and Research Park would create thousands of combined direct and indirect jobs for Michigan workers who desire to own their homes and make Michigan their permanent

¹² *Michigan's Electric Restructuring Is A Success* (2007, February). Retrieved April 17, 2008, from <http://www.customerchoicecoalition.com/pdfs/0207ReportFINAL.pdf>

¹³ *New Release: Western Wayne Oakland County Association of REALTORS* (2008, January 25). Retrieved April 16, 2008, from <http://www.wwocar.com/pdf/KB-4DCE24AB-562C-4872-878F-CC9741644AD7.pdf>

residence.” McCann went on to say, “This is something that all the citizens of Michigan will benefit from.”¹³

The Michigan Department of Environmental Quality has recommended that carbon dioxide emissions standards should be changed to those generated by the same technology used by M & M Energy. McCann added, “A great opportunity exists through this project to reduce our reliance on foreign energy products, while, at the same time, boosting Michigan’s economy and protecting the environment from additional CO₂ emissions.”¹³

SemGroup

SemGroup, L.P. is a privately owned midstream energy company headquartered in Tulsa, Oklahoma. It services the energy field by collecting, carrying, storing, and distributing energy. Since its creation in 2000, SemGroup has acquired the assets of around 35 companies. Through its various subsidiaries, SemGroup has stayed at the forefront of North America’s oil and gas fields. Through more than 2,600 miles of pipeline from Canada to the Gulf of Mexico, SemGroup’s SemCrude subsidiary moves about 541,000 barrels of crude oil a day. SemGas controls natural gas-gathering pipelines stretching 407 miles. SemStream distributes natural gas liquids, feedstock equipment, and propane among consumers in 46 states, while SemFuel supplies refined petroleum products.⁶² SemGroup provides a variety of services for companies dealing with crude oil and natural gas, and the Great Lakes Energy and Research Park is the

¹³ *New Release: Western Wayne Oakland County Association of REALTORS* (2008, January 25). Retrieved April 16, 2008, from <http://www.wwocar.com/pdf/KB-4DCE24AB-562C-4872-878F-CC9741644AD7.pdf>

¹³ *New Release: Western Wayne Oakland County Association of REALTORS* (2008, January 25). Retrieved April 16, 2008, from <http://www.wwocar.com/pdf/KB-4DCE24AB-562C-4872-878F-CC9741644AD7.pdf>

⁶² *SemGroup* (2005). Retrieved April 16, 2008, from <http://www.semgroup.com/>

essence of this combination. They are partnered with M & M Energy on the Great Lakes Energy and Research Park's energy development and logistics.¹¹

ConocoPhillips

ConocoPhillips is the second largest refiner in the United States and the fifth largest non-governmental refiner in the world.⁶³ The company also has 15 years experience in Integrated Gasification Combined Cycle applications, which they tout as “highly efficient” and “environmentally superior.”⁶⁴ They are providing the technology for the Great Lakes Energy and Research Park project. This is a very strong endorsement for an energy endeavor, and ConocoPhillips is committed to helping the environment.

ConocoPhillips is part of the United States Climate Action Partnership, and John Lowe, Executive Vice President, stated before Congress that ConocoPhillips supports “...Congressional enactment of mandatory framework to reduce carbon emissions.”⁶⁵ ConocoPhillips is not only a strong backer of the Great Lakes Energy and Research Park, but their company's values match the objectives of the Great Lakes Energy and Research Park. This endorsement represents the strength and potential of the Great Lakes Energy and Research Park project.

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

⁶³ *Our Business* (2007): Conocophillips. Retrieved April 16, 2008, from http://www.conocophillips.com/about/who_we_are/our_business/index

⁶⁴ *Coal IGCC* (2004, March 16). Retrieved April 16, 2008, from http://www.coptechnologysolutions.com/egas/coal_igcc.html

⁶⁵ John Lowe. “ConocoPhillips Favors Developing All Forms of Energy—Conventional, Renewable, and Alternative.” *ConocoPhillips*. 1 Apr. 2008.

FIGURE 5-A

<u>Support for Great Lakes Energy and Research Park and/or Senate Bills 1164-1166/House Bill 5604</u>		
<u>Local Supporters</u> ⁶⁶	<u>State Supporters</u> ^{50 7 6 4 5}	<u>Federal Supporters</u> ^{67 58 60}
City of Alma	Governor Jennifer Granholm	Senator Debbie Stabenow Senator Carl Levin
City of Saint Louis	House Rep. Opsommer	Rep. Dave Camp – R Rep. John Dingell - D
Pine River Township	Senator Kahn Senator Barcia	Rep. Peter Hoekstra - R Rep. Carolyn Kilpatrick - D
<u>Organizations</u> ^{13 11}	Senator Kuipers	Rep. Sander Levin - D
Western Wayne Oakland County of Realtors (WWOCAR)	Senator Richardville Senator Pappageorge Senator Allen	Rep. Candice Miller - R Rep. Bart Stupak - D Rep. Tim Wahlberg - R
Semgroup	Senator Brown Senator Hardiman	Rep. John Conyers - D Rep. Vernon Ehlers - R
ConocoPhillips	Senator Gleason	Rep. Dale Kildee - R Rep. Joe Knollenberg - R Rep. Thaddeus McCotter - R Rep. Cong. Mike Rogers - R Rep. Cong. Fred Upton - R

⁶⁶ Alma City Commission Meeting (2007, July 24). Retrieved April 18, 2008, from <http://www.ci.alma.mi.us/docs/City%20Commission%20minutes%202007/070724%20mins.pdf>

⁵⁰ Linda Gittleman. "Granholm Interested in Alma Project." *The Morning Sun*. 2 Feb. 2008.

⁷ HB. 5604, 94th Michigan Legislature, (2007).

⁶ "Carbon Dioxide Reduction Credit," SB. 1166, 94th Michigan Legislature, (2008).

⁴ "Clean Energy Authority Act," SB 1164, 94th Michigan Legislature, (2008).

⁵ "Intergrated Gasification Plant," SB. 1165, 94th Michigan Legislature, (2008).

⁶⁷ *Great Lakes Energy and Research Park Fact Sheet* (2008). Retrieved April 18, 2008, from http://www.mandmenergy.com/documents/energypark_handout_022708.pdf

⁵⁸ Levin, C., & Stabenow, D. (2007, December 18). *Stabenow, Levin: Omnibus Bill Includes Millions for Michigan Projects*. Retrieved April 16, 2008, from

⁶⁰ Gittleman, L. (2007, December 21). Alma energy park draws federal support. *The Morning Sun*. Retrieved April 20, 2008, from http://www.themorningsun.com/stories/122107/loc_alma.shtml

¹³ *New Release: Western Wayne Oakland County Association of REALTORS* (2008, January 25). Retrieved April 16, 2008, from <http://www.wwocar.com/pdf/KB-4DCE24AB-562C-4872-878F-CC9741644AD7.pdf>

¹¹ *M & M Energy* (2007). Retrieved April 16, 2008, from <http://www.mandmenergy.com/>

Section Six: M & M Energy Brings Michigan into the Future

The Great Lakes Energy and Research Park incorporates several technologies into a system that will use coal for fuel, produce electricity, syngas, and retrieve stranded oil with limited emissions into the atmosphere. The Integrated Gasification Combined Cycle technology, which will be utilized by the Great Lakes Energy and Research Park, is much cleaner than traditional coal-burning methods. Along with a cleaner process, the Great Lakes Energy and Research Park would reinvigorate Michigan's oil production, creating billions in state revenue.

The Great Lakes Energy and Research Park has the capacity to produce numerous positive effects for Michigan. Among these are environmental effects, for example, potentially reducing greenhouse gas emissions. Economic benefits include the creation of a number of much needed jobs in addition to the state revenues for oil retrieved using Enhanced Oil Recovery. Furthermore, Michigan will be defined as a leader in alternative technology. Integrated Gasification Combined Cycle power generation, Carbon Capture and Sequestration, and Enhanced Oil Recovery are all proven technologies on the cutting edge of modern energy production. When built, the Great Lakes Energy and Research Park will be one of the first operations in the world to incorporate all three techniques into an efficient, clean, and economical energy production center. The location of the Great Lakes Energy and Research Park in Michigan gives the state a chance to be at the forefront of the development of clean energy technology.

With the passage of Senate Bills 1164, 1165, 1166 and House Bill 5604, Integrated Gasification Combined Cycle will be defined as alternative energy, allowing

the Great Lakes Energy and Research Park to develop and revitalize Michigan's economy. Its construction would promote the creation of more Integrated Gasification Combined Cycle projects within the state, allowing Michigan to be one of a few select states utilizing this positive energy technology. M & M Energy has put forth a strong effort to make Michigan a leader in alternative energy and is dedicated to the future of this state.

Appendix A

Research Teams:

Captain of all Research Teams:

Caitlin O' Rourke

Co-Captain of Legislative and Public Opinion Teams:

Sam Christensen

Co-Captain of the Opposition and Technology Teams:

Christian Goetz

Legislative Research Team:

Darcy Filipiak

Maureen Germaine

Public Opinion Team:

Kevin Sunderland

JC Faaola

Steve Staple

Opposition Research Team:

Nicole Price

Brandy Henderson

Gabriel Wise

Technology Research Team:

John Wardell

Communications Teams:

Captain of all Communications Teams:

Alex Van Ameyde

Co-Captain of the Documentation Team:

Emily Brown

Co-Captain of the Media Team:

Kyle McGregor

Co-Captain of Editing Team:

Paul Cormendy

Documentation Team:

Anna Lane

Morgan Wagner

Media:

Krysten Rife

Editing Team:

Caroline Heaton