BCHP Baseline Analysis for the Michigan Market

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Executive Summary

In Michigan there appears to be a moderate interest in BCHP, where over 40 technical companies are actively pursuing BCHP deployment and installation in the State. There are several large well-known engineering firms, as well as equipment manufactures and distributors who are aggressively pursuing the BCHP market in Michigan. One of the companies that are leading the way for BCHP in Michigan is DTE Energy Technologies, which is an unregulated affiliate of Detroit Edison, one of the largest electric utilities in Michigan. DTE, working under contract to United Technologies Research Center (UTRC), is involved in one of the seven BCHP Packaged System Development awards made by the Department of Energy, Office of Power Technologies (DOE-OPT) in 2001. The UTRC/DTE system will be based on the new 400kW DTE Energy Technologies Microturbine system coupled to Carrier absorption chillers. The use of waste heat driven ammonia water refrigeration systems, desiccant systems, and thermal storage are also being considered for use in the system. DTE is also actively marketing several lines of distributed energy technologies. Continued engagement of these companies is essential to the successful deployment of BCHP in Michigan.

The Midwest is home to many non-profit organizations and associations that have come forward to support the deployment of BCHP, in fact the Midwest appears to be leading the way in promoting the deployment of BCHP with such organizations as the Midwest CHP Initiative. In Michigan, Energy Michigan, a trade association for the cogeneration, independent power and waste to energy industries, helps support these industries by legislative and regulatory activities; intervening in cases on retail wheeling, competitive bidding, standby rates and other similar issues; by participating in State legislation, and in certain selected national cases and rule makings.

Focusing on BCHP systems in commercial installations, the Midwest CHP Application Center (MAC) identified a total of 14 BCHP systems, producing a little over 6,200 kW in Michigan. Landfill applications constitute the biggest installed BCHP market segment in Michigan (3,000 kW) followed by installations at Schools/Universities (2,400 kW). There is also a large potential market for over an additional 200,000 kW where thermal heat recovery technologies could be added to installations where there is only distributed generation. The largest potential for adding BCHP to existing distributed generation installation exists in the School/University (105,600 kW) and the Municipal Water /Resource Recovery sectors (45,800 kW).

Capital costs as well as operating costs are generally viewed as some of the major hurdles to utilize BCHP technologies. The predominant technologies in BCHP power generation are natural gas. They range in size from reciprocating engines and microturbines in the tens of kilowatts to gas turbines in the tens of megawatts range. The least expensive technologies (large natural gas turbines) installed start around $700/kW and increase in cost up to fuel cell technologies that run around $3000/kW. Natural gas reciprocating engines are the predominate technology, and can range in price from $800 to $1500/kW. Although prices of all of these technologies are expected to decrease as the technologies and system designs become more common. For smaller generating capacity units, this initial cost can have a long payback period unless electric costs are very high and thermal loads well matched.

For most BCHP systems natural gas constitutes the majority of the variable/operating cost. High natural gas prices, such as those experienced in the winter of 2000/2001, could have negative affects on the BCHP market development, but these high gas prices are not anticipated to reoccur. The EIA expects natural gas prices to be around $3 per MMBTU by 2020. The average price paid for natural gas by commercial customers in Michigan was $4.79 in 2000. Natural gas is readily available in Michigan; they produce about 25% of their own gas needs and have substantial gas storage facilities.

Standby rates and the cost of electricity affect the payback on BCHP installations. Detroit Edison's (Michigan's largest utility) Standby Rider (R3) is the rate that most affects the installation and operation of 100kW and above onsite electricity generation installations. This standby rate has charges for standby capacity based on a complicated formula of usage over a 12-month period. However, the rate provides a less complicated and restrictive option for those generating 2000 kW or less. Detroit Edison has a simpler Rider for installations under 100 kW: Rider DG that appears to be significantly less complex and restrictive to small-scale (<100kw) installations.

In Michigan the average cost of electricity is relatively high at 7.14¢/kWh ($20.92/Mbtu) across all customer classes in 1999, which ranks it 14th or 15th highest in the nation. The EIA predicts that on the average electrical prices will decline from 6.9¢/kWh to 6.3¢/kWh in 2005, then rise to 6.9¢/kWh by 2020.

Interconnection poses to be one of the biggest barriers to BCHP in Michigan because there is no State standard for the interconnection process and related fees, which is compounded by the large number of electric suppliers within Michigan, each with their own interconnection requirements and fees. However, in October 2000 the Michigan Public Service Commission's issued a report titled "Final Report on Establishing Interconnection Standard." The report recommends that proposals for interconnection standards be submitted to them and that they be based on principals of:

- Safety, protection of equipment, and preservation of service quality.
- Timeliness in the review of applications for interconnection
- Reasonable interconnection study costs

Detroit Edison and Consumers Energy, the two largest utilities in the State, both submitted very detailed proposed interconnection standards outlining fee structures, schedules and technology requirements. Both Energy Michigan and the staff of the MPSC recognized shortfalls in the proposals. Energy Michigan noted that there were no mandatory time frames for the completion of interconnect studies and guidelines for the cost of such studies. The MPSC Staff also commented that the application fees proposed in the company filings (Detroit Edison, Consumers Energy and Michigan Electric and Gas Association) would discourage the submission of applications, especially for smaller projects.

On a positive note, per the Michigan Customer Choice and Electricity Reliability Act (Public Act 141), there are no exit fees for those who decide to exit form the grid to provide their own electricity. Open access for all customers of utilities and large co-ops occurred on January 1, 2002. Open access to natural gas is available but has been slow to occur.

Public Act 141, Customer Choice and Electricity Reliability Act, is the biggest favorable move for BCHP in Michigan. Besides opening access to the grid, it provides for the Low Income and Energy Efficiency Fund, which may be to provide funds for BCHP projects because they meet the energy efficiency requirements. There are several other Bills that have been introduced to the State House of Representatives that while they are aimed at residential energy users, they show that the State is willing to consider tax incentives for energy efficiency projects.

The most effective deployment of BCHP technology will come from regional and local activities. This is true because most of the barriers are due to local issues, such as site permitting, interconnection requirements and studies, local utility pricing, and local building codes and standards. These barriers can be overcome with support from regional and local entities. Some of the entities that the MAC has identified that could assist with the development and/or deployment of a BCHP in Michigan are:

- Energy Michigan
- Midwest CHP Initiative
- Michigan Independent Power Producer Association
- Michigan Senate Technology and Energy Committee Members
- Michigan Senate Natural Resources and Environmental Affairs Committee Members
- Michigan House Energy and Technology Committee Members

A very favorable partner for BCHP is DTE Energy Technologies. As mentioned earlier, they are participating in one of the DOE packaged BCHP development projects (with United Technologies) and they are actively marketing distributed energy technologies.

ONSITE Energy Corporation in January 2000 prepared a study for the Energy Information Administration titled "The Market and Technical Potential for Combined Heat and Power in the Commercial/Institutional Sector." For Michigan, ONSITE estimated a total market potential for electric production to be in the range of 2,400 to 7,500 MW. This potential may only be realized if the regulatory and policy issues become more supportive of BCHP installations. Also if incentives are provided and use of thermal technologies is considered, additional market potential capacity could be realized.

Besides commercial and industrial applications BCHP systems also have potential market viability for multi-unit residences (those with 2 or more units). The MAC estimated that the potential Michigan market for BCHP installations in the multi-unit residential sector for 2001 to be about 21,700 units.

This report concludes with recommendations, which address the need to educate state regulators and private market participants on BCHP benefits. Case studies are needed which show the tremendous economic and environmental benefits of BCHP systems. As mentioned above alliances have to be formed with already influential companies in the BCHP field such as DTE Energy Technologies, Energy Michigan and others to develop synergies between these companies and the Midwest CHP Application Center to promote the use of BCHHP. Finally, the

Midwest CHP Application Center should partner with the Michigan Public Service Commission to reduce or remove regulatory barriers.

1. Introduction and Purpose

The purpose of this analysis is to assess the current status of the BCHP sector in Michigan and identify current hurdles that prevent the widespread use of BCHP systems. This information will be used to identify target markets for BCHP systems as well as development of education and market transformation programs, which will foster BCHP applications. Finally, an action plan will be developed to further BCHP deployment in Michigan.

Cooling, Heating, and Power for Buildings (BCHP) refers to technologies which generate electricity at or near the point of use, such as a building or building complexes, while simultaneously recovering up to 80% of the waste heat for heating, cooling and/or dehumidification purposes.

In order to assess the current state of BCHP in Michigan, a comprehensive survey of key players involved with this technology was conducted. Key engineering firms, manufacturers, distributors, architectural firms, energy suppliers and federal, state and local agencies were identified. Furthermore a survey of existing and pending BCHP installations was conducted. Also identified in this survey were distributed generating installations that do not recover the waste heat; these installation represent relatively good candidate sites for conversion to BCHP systems because only heat recovery equipment needs to be provided and therefore the cost differential is minimal and easier to justify.

In this report, the initial cost of current BCHP related technologies, the impact of standby-charges applied to self-generation installation and financial incentives were evaluated to assess their impact on the marketability of BCHP.

A status assessment of policy related issues' pertaining to BCHP was conducted. The assessment was performed for five policy areas; access and interconnection rules, exit fees, general progress with state electric deregulation, emerging legislation, and potential partners/advocates of BCHP.

The market capacity potential for BCHP in Michigan was evaluated to identify the best target sectors for deployment.

This report concludes with recommendations to effectively promote the deployment of BCHP in Michigan.

2. BCHP Contacts in Michigan

2.1 Key Michigan Firms with BCHP Project Experience or Capabilities

One of the major methods to promoting market acceptability of BCHP technologies is to engage the efforts of commercial firms that can promote the installation of BCHP technologies. Besides those that can benefit directly through profits and savings from BCHP, there are other firms which have the interest and capability to get involved with BCHP applications either because they promote energy efficiency, green building technologies, or have other BCHP supporting missions. The purpose of this section is to identify those key firms that currently exist in that can be allied with the Midwest CHP Application Center to promote the deployment of BCHP in Michigan.

There are about 40 companies in Michigan that are engaged in BCHP system applications or have BCHP system capabilities. This indicates a very moderate interest from the private market for the deployment of BCHP technologies. Hopefully in the near future interest in BCHP applications will increase through the activities of a multitude of local and regional organizations that are involved with the promotion of BCHP applications.

Architectural and Engineering firms are important to promoting BCHP technologies because the most economical time to install a BCHP system is during the construction of a new building or during an extensive renovation, when the central heating and cooling plant is being initially installed or completely replaced. This is because the payback period associated with the cost to install a BCHP system need only be justified on the cost differential between the BCHP system and a conventional central cooling/heating system which otherwise would have to be installed. Architectural and engineering firms are generally engaged in the design and installation of such facilities in commercial and light industrial applications. Appendix A respectively provide information on architectural firms and engineering firms that are potential allies in the to promotion of BCHP installation in Michigan. There are currently about 20 architectural and engineering firms that have developed and deployed BCHP systems in Michigan.

The American Institute of Architects (AIA) website (http://www.aia.org/consumer/) offers a detailed search engine called “Architect Finder” which allows to locate an architect by specialization. Specializations refer to building type (i.e. architects specialized in hotels, conference facilities, etc.) or by function (i.e. sustainable design, engineering, etc.). Other than sustainable design, there is no search category that refers to energy efficient buildings, green buildings, or other BCHP related specializations.

Manufacturers of power generation equipment, absorption chillers, and desiccant dehumidification equipment, and their sales representatives are important to promoting BCHP technologies for obvious reasons, to sell their equipment. In most cases these manufactures have established a market presence and have built relationships with those most likely to install BCHP technologies. However, these manufactures are now just beginning to work together to develop “package” integrated power, heating, and cooling systems. The Department of Energy, Office of Power Technologies (DOE-OPT) has awarded seven contracts for the development of packaged BCHP systems. DTE Energy Technologies, a subsidiary of Detroit Edison, is involved in the award given to United Technologies Research Center (UTRC). These awards are for the accelerated development of BCHP systems based on off-the-shelf components. The UTRC/DTE

system will be based on the new 400kW DTE Energy Technologies Microturbine system coupled to Carrier absorption chillers. Both recuperated and un-recuperated microturbine combinations will be used. Possible use of waste heat driven ammonia water refrigeration systems, desiccant systems, and thermal storage also are being evaluated under the award.

In the mean time, it is still important to strive to find technically and financially suitable applications where manufactures and their sales can work together, along with engineering and architectural firms to install "custom" systems. Appendix B provides information on manufacturers that promote BCHP installations in Michigan. There are currently 20 manufactures/sales offices involved in deployment of BCHP related technologies in Michigan.

Property management firms are important to promoting BCHP technologies because they are the operators of most commercial buildings in which BCHP technologies would be suitable and therefore are interested in reducing energy costs. They often are the decision makers as to what type of central service systems are installed. In many of the buildings that they operate, they are already required by newer building codes to provide some sort of emergency generation electric power generation equipment. Since they are already required to install generation equipment, the cost differential to install BCHP over a conventional central heating/cooling system is again smaller and easier to justify. In addition, it provides them the ability to provide more reliable power to tenants, which is becoming an important issue to many business operators. The two main organizations, which represent property management firms in Michigan, are BOMA (Building Owners and Managers Association) and IREM (Institute of Real Estate Managers), which accredits recognized real estate management organizations. Information on the Michigan BOMA chapter and IREM accredited Michigan property management companies can be found in Appendix C.

Local energy suppliers are also important to promoting BCHP. Many have formed subsidiary companies to promote distributed generation, especially the gas supply companies, however they are not necessarily considering BCHP because they often can justify cost based on the peak shaving savings of electrical generation and because BCHP can provide heat in winter it can also reduce the gas consumption for boilers/furnaces used for heating. A list of energy supply companies in Michigan is provided in Appendix D.

In the case of energy supply companies, distributed generation may be viewed as a threat to the parent company which may have rate structures that pose a disincentive to the installation of distributed and therefore to BCHP. In these cases, distributed generation is viewed as more acceptable if it is on the electric suppliers side of the meter, which makes BCHP a difficult option to promote since the electric generation source may be at some distance form the customer making the use of waste heat impractical.

As mentioned above, DTE Energy Technologies is involved in one of the DOE packaged BCHP awards. They are also actively marketing a whole line of distributed energy technologies, working with such companies as:

- Stirling Thermal Motors
- Energy Conversion Devices
- Detroit Diesel
- Michigan Caterpillar

Energy Services companies (ESCOs) are just beginning to become interested in BCHP technologies. In the past they have not been interested because it is easier for them to find other cost saving measures like lighting retrofits and energy control systems in commercial and light industrial applications, and in many cases regulations and sitting requirements served as a disincentive for them to install BCHP. Appendix E lists ESCO's which are active in Michigan.

2.2 Associations and Organizations Involved with BCHP Deployment

Federal, State, and regional governmental entities are becoming interested and concerned about distributed energy with that comes potential opportunities for making BCHP systems an important part of that generation capacity. Governmental entities are increasing their interest in BCHP because of the energy savings and reduced emissions it provides. Many are promoting its development.

While the Federal government, through the Department of Energy, Office of Power Technologies, has provided substantial support, the most effective deployment of BCHP technology will come from regional and local activities. This is true because most of the barriers are due to local issues, such as site permitting, interconnection requirements and studies, local utility pricing, and local building codes and standards. These barriers can be overcome with support from regional and local entities.

The Midwest is home to many non-profit organizations and associations that have come forward to support the deployment of BCHP, in fact the Midwest appears to be leading the way in promoting the deployment of BCHP. Within the State of Michigan, Energy Michigan has the potential to be a strong ally in the deployment of BCHP. Energy Michigan is a trade association for the cogeneration, independent power and waste to energy industries in Michigan. Energy Michigan aids these industries by legislative and regulatory activities; intervening in Michigan Public Service Commission (MPSC) cases on retail wheeling, competitive bidding, standby rates and other similar issues; participating in legislation; and participating in certain selected national cases and rule makings. They have recently provided significant comments on recently submitted proposed interconnection standards submitted to the MPSC by Detroit Edison and Consumers Power (discussed further in section 5.1 Access and Interconnection Rules).

A list of these associations and organizations and their web-addresses, where available, is provided in Appendix F.

3. Survey of BCHP Installations and BCHP Targets in Michigan

3.1 Survey Summary

This survey was conducted to identify existing and pending BCHP installations in order to assess the current statutes of BCHP in Michigan; to establish a baseline and to identify those facility types were BCHP was most prevalent. Also identified in this survey were distributed generating installations that do not recover the waste heat. For the purposes of this survey, they represent relatively easy candidate sites for conversion to BCHP because they already have the generation source; they only have to justify the differential cost to install heat recovery equipment.

The information in this section is based on input from various sources including; personal interviews, manufactures and distributors, websites, associated organizations, and journals. The survey of BCHP installations and potential BCHP targets is primarily based on personal interviews as well as the use of published data. Published data consisted of the Energy Information Administration's "Inventory of Nonutility Electric Power Plants in the United States" (http://tonto.eia.doe.gov/FTPROOT/electricity/0095992.pdf), dated November 2000. Sites that are greater than 1 MW are easier to identify because they must file sitting reports with the Environmental Protection Agency (EPA). However sites less than 1 MW may or may not have a to file with the EPA. The sites identified represent the best efforts of the Midwest CHP Application Center to identify actual and potential BCHP installations in Michigan at the time of this report. Other existing or potential BCHP sites may exist; they will be added to the database and will be available over the website in the future as they are identified.

A total of 14 BCHP systems, producing a little over 5,200 kW, are known to be in operation in Michigan. Appendix G categorizes and lists the known distributed generation installations based on the facility type in which the system is installed and provides the size of the installed generation capacity. Where it is known, thermal heat recovery has been noted, or if the system is installed for peak shaving or back-up purposes power only. The table also lists the engineering and/or architectural firm involved with the installation, and whether the facility is in operation or pending. Where additional information is available about the installation configuration, it is provided.

This report focuses primarily on BCHP applications for buildings. However, for the purpose of providing a comprehensive overview, a similar summary table on industrial applications is attached to this report in Appendix H. Industrial applications also provide opportunities for CHP because while many have cogeneration installed and they may already the waste heat for industrial processes, they may also benefit from using the waste heat to operate thermal activated technologies to provide cooling or dehumidification to their building facilities.

3.2 Sector Analysis of the Survey Data

The sites identified during the survey represent the best efforts of the Midwest CHP Application Center to identify actual and potential BCHP installations in Michigan. Other existing or candidate BCHP sites may exist. An analysis of the survey information for the commercial and light industrial sectors is provided in Table 3-1 and Figure 3-1 below.

Table 3-1 BCHP Capacity Installed by Sector in Michigan

BCHP Sector	Installed Generation Capacity (kW)	% Installed Generation Capacity	Installed Generation w/ Heat Recovery (kW)	% w/ Heat Recovery
Hospitals	7,400	3%	300	5.7%
Municipal Water/Resource Recovery	46,300	22%	433	8.3%
Hotels/Offices	4,100	2%	60	1.2%
Schools/Universities	108,000	51%	2,400	26.9%
Landfill Gas/Others	47,700	22%	3,010	57.9%
Total:	**213,500**	**100%**	**6,203**	**100%**

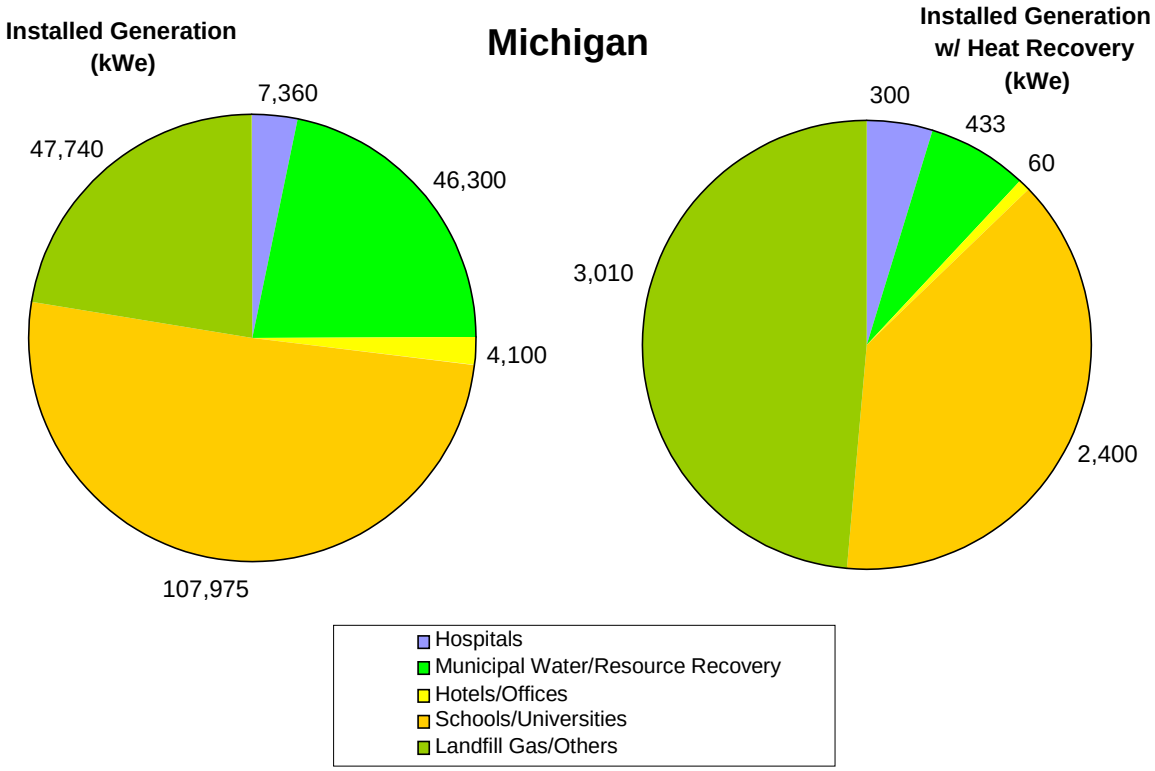


Figure 3-1 BCHP Capacity Installed by Sector in Michigan

As can be seen Landfill applications constitute the biggest installed BCHP market segment in Michigan followed by installations at Schools/Universities. There is a large potential market to add BCHP, especially for in the School/University and the Municipal Water /Resource Recovery sector where there is a large percentage of already of installed generation without heat recovery.

4. Current Pricing Issues

Capital costs as well as operating costs are generally viewed as some of the major hurdles to utilize BCHP technologies. This section will address these issues.

4.1 Equipment and Maintenance Costs

The predominant technologies in BCHP applications are reciprocating engines, combustion turbines, and microturbines. In the near future fuel cell technology is expected to become a prevalent BCHP technology as well.

Each technology operates at different efficiency and capacity size levels. The following table from "Combined Heat and Power: A Federal Manager's Resource Guide" indicates the cost and other relevant technical data bout the various types of generation equipment.

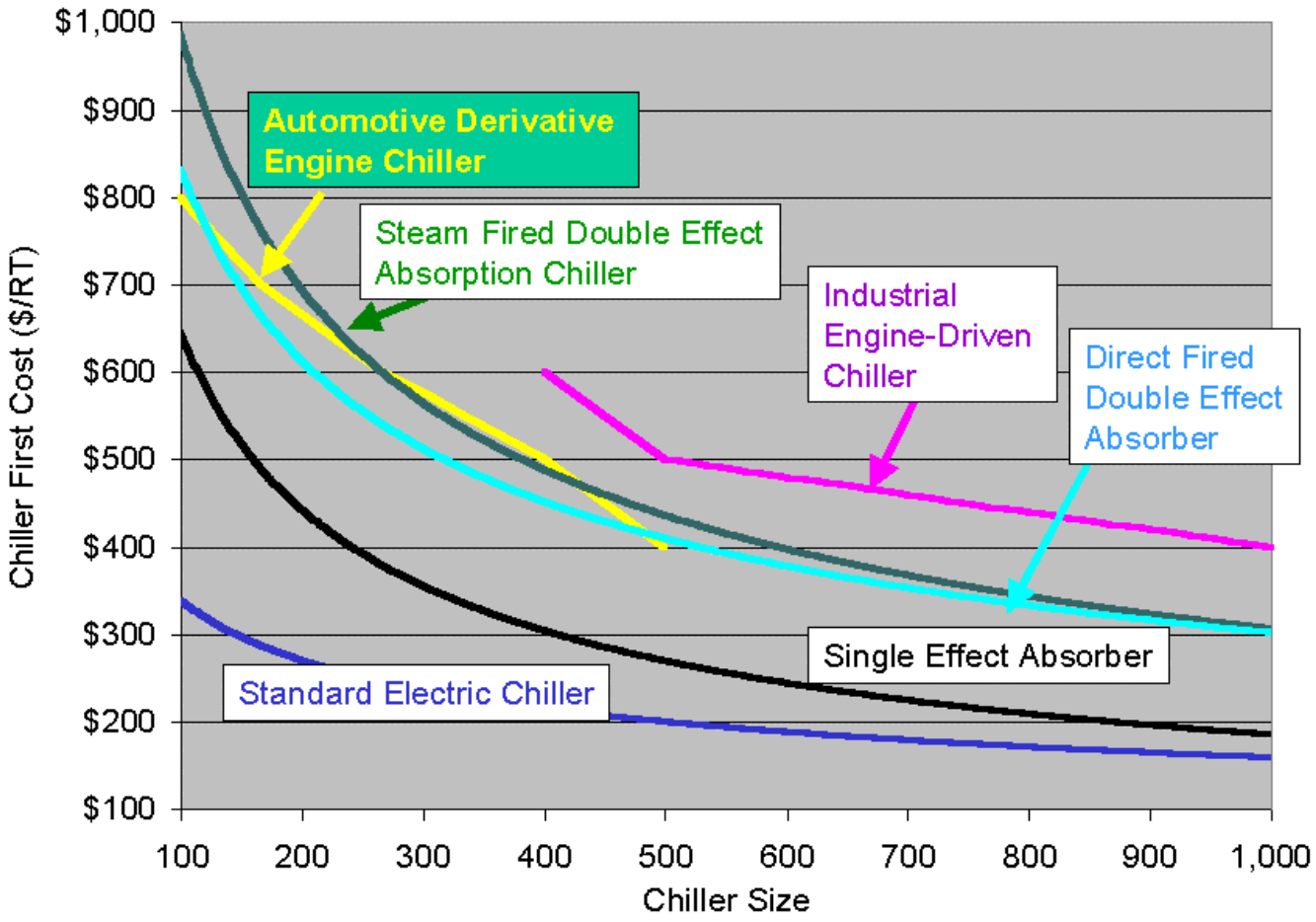
Table 4-1 Prime Mover Technologies

Parameter (Approximation)	Natural Gas Engine	Steam Turbine	Gas Turbine	Fuel Cell	Micro-Turbine
Capacity	25 kW-5 MW	Any	500 kW-25 MW	200 kW-2 MW *(testing down to 1 kW)*	25 kW-100 kW
Electric Efficiency	25-45%	30-42%	25-40% *(simple)* 40-60% *(combined)*	35-55%	25-30%
Foot Print (ft^2/kW)	0.22-.031	< 0.1	0.02-0.61	0.6-4.0	0.15-1.5
BCHP Installed Cost ($/kWh) *(typical)*	800-1500	800-1000	700-900	>3,000	700-1300
O&M Cost ($/kWh) *(typical)*	0.007-0.015	0.004	0.002-0.008	0.003-0.015	0.002-0.01
Availability	92-97%	Near 100%	90-98%	>95%	90-98%
NOx Emissions (lbs/MWh)	2.2-2.8	1.8	0.4-4.0	<0.02	0.4-2.2
Uses for Heat Recovery	Hot Water, LP Steam, District Heating	LP & HP steam, District Heating	Heat, Hot Water, LP & HP Steam, District Heating	Hot Water, LP & HP Steam	Heat, Hot Water, LP Steam
BCHP Output (Btu/kWh)	3,400	N/A	3,400 – 12,000	500 – 3,700	4,000 – 15,000
Useable Temperature for BCHP (°F)	180 –900	N/A	500 –1,100	140 – 700	400 – 650

Source: *"Combined Heat & Power: A Federal Manager's Resource Guide," Final Report, March 2000, Aspen Systems Corporation – Applied Management Sciences Group*

The following graphs shows the cost for each chiller technology in $/Refrigeration Ton (RT) as a function of chiller size.

Table 4-2 Absorption Chillers Suppliers and Sizes



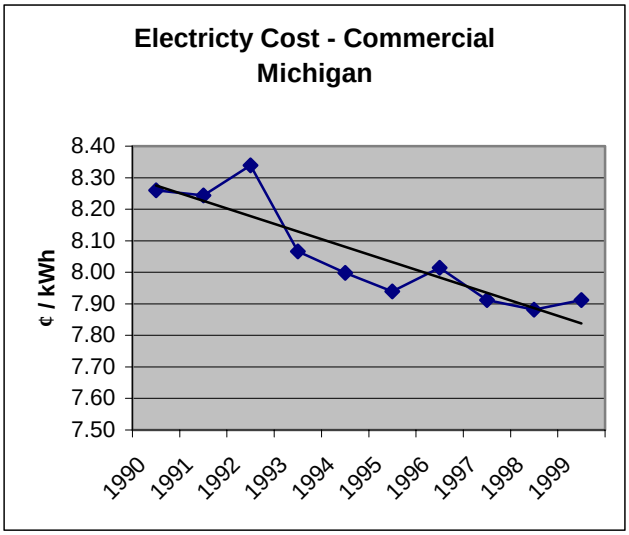
4.2 Electric Pricing

The EIA's State Energy Price and Expenditure Report (1999) provides a composite table of the historical energy prices in Michigan by sector and fuel type (www.eia.doe.gov/pub/

state.prices/pdf/MI.pdf). The EIA website also has a page that discusses provides extensive information on energy data in Michigan (www.eia.doe.gov/emeu/states/main_mi.html).

In the annual Energy Information Administration report titled "Annual Energy Outlook 2002 with Projections to 2020" (www.eia.doe.gov/oiaf/aeo/pdf/0383(2002).pdf), the EIA projects that the average electricity prices will decline from 6.9 cents per kilowatt-hour in 2000 to 6.5 cents per kilowatt-hour in 2020. Electricity industry restructuring contributes to declining projected prices through reductions in operating and maintenance costs, administrative costs, and other costs. Electricity prices are projected to decline to 6.3 cents per kilowatt-hour by 2006 then rise in the last 5 years of the forecast as natural gas prices rise.

In Michigan the cost of electricity for commercial customers has shown a relative decrease over the last recorded 10 year period (1990-1999) based on information from the EIA's State Energy Price and Expenditure Report 1999 (http://www.eia.doe.gov/emeu/sedr/contents.html). The cost of electricity to the commercial consumer has gone from $24.21/Mbtu in 1990 to $23.19/Mbtu in 1999. However there have been some minor fluctuations in pricing over that period.



***Source**: State Energy Price and Expenditure Report 1999, Table 145: Commercial Sector Energy Price and Expenditure Estimates, Selected Years 1970-1999,* Michigan

According to the EIA's, *State Energy Price and Expenditure Report 1999 (SEPER)*, Michigan ranked 14th highest in electricity costs at $20.92 per MMbtu (7.14¢/kWh) (ftp://ftp.eia.doe.gov/pub/state.prices/html/rank4.htm) for the average electricity cost to the customer across all customer classes. The average cost to the commercial customers across the united States for the first 10 months in 2001 was 7.80¢/kWh according to the EIA's Monthly Energy Review for October (http://www.eia.doe.gov/emeu/mer/txt/mer9-9).

There are five major electricity suppliers in Michigan are shown below in Table 4-3. Michigan however is host to over 50 Co-op and municipally owned electric suppliers.

Table 4-3 Five Largest Utilities by Retail Sales within the State, 1999 (Megawatthours)

Utility	All Sectors	Residential	Commercial	Industrial	Other
Detroit Edison Company	49,822,240	14,064,096	19,546,640	15,863,779	347,725
Consumers Energy Company	35,754,796	11,447,338	10,748,734	13,339,546	219,178
Wisconsin Electric Power Co.	2,923,501	154,276	137,695	2,629,321	2,209
Indiana Michigan Power Co.	2,879,769	1,099,219	697,170	1,071,567	11,813
Lansing Board of Water & Light	2,307,666	562,630	1,067,140	639,448	38,448
Total	**93,687,972**	**27,327,559**	**32,197,379**	**33,543,661**	**619,373**
Percentage of Utility Sales	91	89	92	91	65

***Source**: EIA Website State Electricity Profiles – Michigan (http://www.eia.doe.gov/cneaf/electricity/st_profiles/michigan/mi.html#t3)*

4.3 Standby Rates

Standby rates can be a disincentive for BCHP, since customers have to pay utilities for power "just in case" they need it. Detroit Edison's (Michigan's largest utility) Standby Rider (R3) (provided in Appendix I) is the rate that most affects the installation and operation of 100kW and above onsite electricity generation installations in their territory. This standby charges, as many others in the Midwest, is complex, and has charges for standby capacity based on a complicated formula of usage over a 12 month period. However, the rate provides a less complicated and restrictive option for those generating 2000 kW or less. Detroit Edison has a simpler Rider for installations under 100 kW: Rider DG (provided in Appendix J) that appears to be significantly less complex and restrictive to small-scale (<100kw) installations.

Consumer's Energy Company also has a standby rate (CG). An electronic version of this rate can be viewed at their website www.consumersenergy.com/welcome.htm, under Energy Information, Rates and Rules, Electric Tariffs, then Cogeneration. This rate too is somewhat complicated and charges for the highest standby demand experienced over the contract period, which has a minimum of one year. This means that the contract charge for standby power can only increase over the term of the contract.

The complexity the standby rate structures and the uncertainty of the cost of the maintaining standby power "just in case" underscores one of the major barriers in determining the actual economics of the installation and operation of larger BCHP installations.

4.4 Financial Incentives for BCHP Systems

On September 28, 2001, Michigan Governor John Engler signed the 2001-2002 Department of Consumer and Industry Services fiscal year appropriations bill which included a provision authorizing the Michigan Public Service Commission (MPSC) to begin making distributions from the Low-Income and Energy Efficiency Fund (LI/EE) of up to $60 million annually, for a period of 6 years. In response to that bill, on December 21, 2001 the MPSC issued a request for proposal (http://www.cis.state.mi.us/mpsc/execsec/low-incomerfp.htm) for LI/EE grant funds. It is possible that BCHP projects may be able to qualify for portions of this grant based on their high-energy efficiencies.

5. Summary and Status of BCHP Policy Issues

Policy issues at the State level play an important role in the deployment of BCHP within a State. The purpose of this section is to provide a summary and status of policy related issues pertaining to the advancement of BCHP in the State of Michigan. The following policy areas are summarized below: Access and Interconnection Rules, General Status on Progress of Deregulation, Emerging Legislation, Exit Fees, and Standby Charges.

5.1 Access and Interconnection Rules

In Michigan there is no State standard for the interconnection process and related fees, however, policy is in the process of being developed. On October 2, 2000 the Michigan Public Service Commission's (MPSC) issued a report titled "Final Report on Establishing Interconnection Standards" (http://efile.mpsc.cis.state.mi.us/efile/docs/ 12485/0005.pdf). The report recommends that, "all entities with local distribution facilities be directed to file proposed interconnection standards for interconnection to local distribution facilities." The report asks that these interconnection standards be consistent with the following principals.

- Safety, protection of equipment, and preservation of service quality.
- Timeliness in the review of applications for interconnection
- Reasonable interconnection study costs

The Michigan Staff proposal is modeled after Texas's approach. (Case No. U-12485 details @ http://efile.mpsc.cis.state.mi.us/efile/docs/12485/0005.pdf.)

Detroit Edison and Consumers Energy, the two largest utilities in the State, both submitted very detailed proposed interconnection standards outlining fee structures, schedules and technology requirements. While these proposals were detailed, both Energy Michigan (a trade association for the cogeneration, independent power and waste to energy industries in Michigan) and the staff of the MPSC recognized shortfalls in these proposals.

Energy Michigan stated in its comments of June 6, 2001 that "there must be mandatory time frames for the completion of interconnect studies and guidelines for the cost of such studies." Energy Michigan also commented on the proposed interconnection standards of Detroit Edison and Consumer's energy. These comments are located on the MPSC website at http://efile.mpsc.cis.state.mi.us/efile/docs/12485/0019.pdf.

Energy Michigan also pointed out in its comments that "For projects above 100kW, the guidelines proposed by Edison (*Detroit Edison*) and Consumers (*Consumer Energy*) do not appear to assure rapid processing at reasonable costs, nor do they assure that interconnection study costs will be reasonable and that interconnection study costs or work will be reasonable or performed on a timely basis."

The MPSC Staff also filed comments on June 6, 2001 that stated, "… that the application fees proposed in the company filings (Detroit Edison, Consumers Energy and Michigan Electric and Gas Association) will function to discourage the submission of application, especially for smaller projects." As part of the same comments they go on to say, "there should be nominal application fees sufficient to establish that an applicant is serious

about the proposed project." These comments are located on the MPSC website http://efile.mpsc.cis.state.mi.us/efile/docs/12485/0017.pdf.

5.2 Exit Fees

In the State of Michigan there are no exit fees charged to companies or others that decide to exit from the grid and produce their own electricity for on-site use, as stated in Section 6 of the Michigan Customer Choice and Electricity Reliability Act (Public Act 141) (http://198.109.173.11/printdocument.asp?objName=2000-PA-0141&version=txt).

5.3 General Status of Progress on Deregulation

Full open access for all customers of investor owned utilities (IOUs) and electric cooperatives equal to or greater than 1 MW occurred on January 1, 2002. Remainder of co-op customers will occur before January 1, 2005. MPSC Staff provides annual reports to the Governor and Legislature on the status of electrical restructuring. The latest report may be found @ http://cis.state.mi.us/mpsc/electric/ restruct/compreport2002.pdf. The EIA website provides the current status on a monthly basis of electric restructuring on a State-by-State basis; the latest for Michigan can be found @: www.eia.doe.gov/ cneaf/electricity/chg_str/tab5rev.html - MI.

The MPSC also approved a "green rate" (http://efile.mpsc.cis.state.mi.us/cgi-bin/efile/ viewcase.pl?casenum=13029) for Consumers Energy Company to buy zero emissions renewable energy and sell it back to consumers through their distribution system. The basis for "zero emissions" is a net reduction in existing emissions, therefore a bio-power application using a BCHP system might be eligible to provide green power to Consumer's Energy Company for resale.

Natural gas open access is proceeding without legislation. Utilities are participating voluntarily at this point. There has been slow growth in retail open access in the Detroit Edison service territory and very little activity in Consumers Energy territory.

Commercial* Customers Eligible or Participating Retail Natural Gas Choice Programs

(Status as of August 2001)

	Eligible		Participating		
Total 2000	**Total**	**Percent of 2000 Total**	**Total**	**Percent of Eligible**	**Percent of 2000 Total**
229,054	N/A	--	13,341	N/A	5.8%

NA = Not available. -- = Not applicable.

Sources: Total 2000 Residential Customers: *Energy Information Administration,* Natural Gas Annual 2000 *(November 2001).* ***Total 2001 Commercial Customers and Total Eligible and Participating:*** *Michigan Public Service Commission (October 2001)*

The EIA also provide a status of the unbundling of the natural gas industry on a State-by-State basis; the latest for Michigan can be found @ www.eia.doe.gov/oil_gas/natural_gas/restructure/state/mi.html.

Other links that might be of interest for deregulation in Michigan are:

Links to Tables on Restructuring Issues	Retail Access: www.eia.doe.gov/cneaf/electricity/chg_str/retail.html#MI Stranded Costs: www.eia.doe.gov/cneaf/electricity/chg_str/scosts.html#MI
Links to State Regulatory Commissions	Michigan Public Service Commission (MPSC): http://cis.state.mi.us/mpsc/ MPSC Restructuring Page: http://cis.state.mi.us/mpsc/electric/restruct/]

5.4 Emerging Legislation

Public Act 141, Michigan Customer Choice and Electricity Reliability Act, MCL 460.10d(6): Signed into law on November 28, 2001, established the Low-Income and Energy Efficiency Fund (LI/EE Fund). This fund is to be administered by the Michigan Public Service Commission (MPSC). In addition to providing funds for low-income families, it provides funds for energy efficient projects that support public interests. A request for proposals was issued on December 21, 2001. (Additional information @: http://198.109.173.11/printdocument.asp?objName=2000-PA-0141&version=txt)

There are several other bills that have been introduced into the Michigan House of Representatives that could indicate some favorable tax treatment toward energy efficiency measures, such as BCHP. They are:

HB 4476: Sales tax; other; cap on taxable portion of natural gas; provide for. Addresses residential natural gas, but again shows potential willingness of legislature to think about tax incentives. The same willingness is reflected in HB 4477 and HB 4479. (Additional information @ http://www.michiganlegislature.org/mileg.asp?page=getObject&objName=2001-HB)

HB 4477: Use tax; other; cap on taxable portion of natural gas; provide for. (Additional information @ http://www.michiganlegislature.org/mileg.asp?page=getObject&objName=2001-HB-4477&userid=)

HB 4479: Income tax; credit; cost of weatherization materials and energy efficient appliances; provide for under certain circumstances. (Additional information @ http://www.michiganlegislature.org/mileg.asp? page=getObject&objName=2001-HB-4479&userid=)

5.5 Potential Political Partners or Advocates of BCHP

As distributed generation becomes a more tangible player in the electrical supply arena, Federal, State, and regional governmental entities are becoming not only more interested, but also more concerned because of potential pollution issues with many of the distributed generation technologies. However, because of BCHP systems have lower emissions and higher energy efficiency, this concern provides opportunities for BCHP systems to be an important part of the distributed generation mix. Most of the potential political partners or advocates within Michigan are not well educated on the benefits of BCHP, if they are aware of it at all. In order to improve the regulatory environment for

BCHP it would be beneficial to approach the task by first educating those involved in the process to influence their support, before approaching change from the regulatory or legislative venue alone.

Below is a list of groups, other than the Midwest Application Center, that could assist with the development and/or deployment of a BCHP in Michigan.

- Energy Michigan
- Midwest CHP Initiative
- Michigan Independent Power Producer Association
- Michigan Senate Technology and Energy Committee Members
- Michigan Senate Natural Resources and Environmental Affairs Committee Members
- Michigan House Energy and Technology Committee Members

Obviously, the Michigan Governor, the Mayor of Detroit, or the leadership in the Michigan House or Senate could also help, however, they are likely to be more difficult to reach and/or influence. Members of their staff's may be better targets with any BCHP initiative. The groups listed above are not to be viewed as all-inclusive, as there are other groups and or organizations to be targeted. Those listed above, however, should make for a good starting point.

A very favorable partner for BCHP is DTE Energy Technologies. As mentioned earlier, they are participating in one of the DOE packaged BCHP development projects (with United Technologies) and they are actively marketing distributed energy technologies. In September of 2001, they hosted a very well attended distributed energy conference, "Micro Generation to Power Parks" to which significant time was given to the subject of BCHP.

6. The Market Capacity Potential of BCHP in Michigan

The previous sections identified the key parties currently involved with BCHP technology and detailed some of the areas preventing market transformation. However, market transformation in favor of BCHP technologies is only viable if the market potential exists. Therefore in the following discusses the market potential for each BCHP category, industrial, commercial and multi-unit residential.

Estimates for the Industrial/Commercial Sector were derived from a previous study conducted by ONSITE-SYCOM Energy Corporation (ONSITE). Estimates for the Multi-family Residential Sector are based on Midwest CHP Application Center research.

6.1 Industrial and Commercial Market

ONSITE Energy Corporation in January 2000 prepared a study for the Energy Information Administration titled "The Market and Technical Potential for Combined Heat and Power in the Commercial/Institutional Sector." This study identified potential BCHP application sites using the iMarket, Inc. MarketPlace Database to select commercial/industrial building types based on SIC codes.

The potential buildings were: hotels/motels, nursing homes, hospitals, schools, colleges, commercial laundries, car washes, health clubs, golf clubs, museums, correctional facilities, water treatment plants, extended service restaurants, supermarkets and refrigerated warehouses. The buildings were divided into different groups based on their electric demand. The electric demand was estimated using data from Wharton Economic Forecasting. As a result ONSITE selected 1,431,805 buildings in the United States as suitable for BCHP applications requiring a capacity of 77,281 MW.

There study focused on applications where thermal energy load was in the form of steam or hot water usage. It did not take into consideration the use of thermal activated technologies such as absorption chillers or desiccant dehumidifiers as potential candidates for thermal load. Taking into consideration these technologies will likely increase the market potential from their estimates.

On a state-by-state basis, ONSITE estimated the following potential:

For Michigan, ONSITE estimated a total market potential for electric production to be in the range of 2,400 to 7,500 MW. This represents 30 to 94% of the projected DOE long-term goal of 8 gigawatts of installed BCHP capacity that was developed as part of the BCHP Roadmap Workshop. This potential may only be realized if the regulatory and policy issues become more supportive of BCHP installations. Also if incentives are provided, additional market potential capacity could be realized.

6.2 Multi-Family Residential Market

Besides commercial and industrial applications BCHP systems also have potential market viability for multi-unit residences (those with 2 or more units). Compared to conventional HVAC systems, the installation of BCHP systems are particularly competitive when it comes to new construction or complete replacement of old HVAC systems.

Since all new and replacement HVAC systems need to be permitted in Michigan, permitting data provides a good estimate of buildings where BCHP systems may be a potential alternative. Applying the following assumptions the potential market for BCHP applications for multi-unit residences can be estimated:

- New construction remains at or near the same level as in the year 2000 (10,113 units),
- HVAC systems need to be replaced every 20 years, therefore units installed in 1980 would need to be replaced in the year 2000, and
- The number of HVAC units replaced in 2000 is consistent with the number of units installed in 1980 (11,614 units).

Applying these assumptions the new building permit data was obtained for 1980 and 2000, those with less than 2 units were not considered. Therefore the market potential for multi-unit residential BCHP installation in Michigan for 2001 is estimated to be about 21,700 units.

7. Conclusions and Recommendations

7.1 Conclusions

7.1.1 Interest Level

In Michigan there appears to be a moderate interest in BCHP, where over 40 technical companies are actively pursuing BCHP deployment and installation in the State. There are several large well-known engineering firms, as well as equipment manufactures and distributors who are aggressively pursuing the BCHP market in Michigan.

The Midwest is home to many non-profit organizations and associations that have come forward to support the deployment of BCHP, in fact the Midwest appears to be leading the way in promoting the deployment of BCHP with such organizations as the Midwest CHP Initiative.

7.1.2 Installation Status

There is not a significant amount of BCHP in Michigan; the Midwest Application Center (MAC) identified a total of 14 BCHP systems, producing a little over 6,200 kW in Michigan. Landfill applications constitute the biggest installed BCHP market segment in Michigan (3,000 kW) followed by installations at Schools/Universities (2,400 kW). There is also a large potential market for over an additional 200,000 kW where thermal heat recovery technologies could be added to installations where there is only distributed generation. The largest potential for adding BCHP to existing distributed generation installation exists in the School/University (105,600 kW) and the Municipal Water /Resource Recovery sectors (45,800 kW).

7.1.3 Barriers

Interconnection poses to be one of the biggest barriers to BCHP in Michigan because there is no State standard for the interconnection process and related fees. This is compounded by the large number of electric suppliers within Michigan, each with their own interconnection requirements and fees.

However, in October 2000, in a move towards standardization, the Michigan Public Service requested electric service providers to submit proposed interconnection standards. Detroit Edison and Consumers Energy, the two largest utilities in the State, both submitted very detailed proposed interconnection standards however, both Energy Michigan and the staff of the MPSC recognized shortfalls in the proposals. Shortfalls cited were:

- Lack of mandatory time frames for the completion of interconnection studies and guidelines for the cost of such studies.
- High application fees proposed would discourage the submission of applications, especially for smaller projects.

Capital costs and payback time frames are of concern. The least expensive electric generating technologies (large natural gas turbines) installed start around $700/kW and increase up in cost to fuel cell technologies that run around $3000/kW. Additional costs, associated with thermal recovery equipment and engineering costs further add to the cost of the project. Prices are expected to decrease as the technologies and system designs

become more common. For smaller generating capacity units, this initial cost can have a long payback period unless electric costs are very high and thermal loads well matched.

Operating costs due to fluctuating gas prices as seen in the winter of 2000/2001 may be perceived as a concern, even though prices have returned to previous levels. The EIA expects natural gas prices to be around $3 per MMBTU by 2020. The average price paid for natural gas by commercial customers in Michigan was $4.79 in 2000.

Standby charges and ***Electricity rates*** are also a factor in BCHP because they affect the payback period. Detroit Edison's Standby Rider (R3) affects the onsite electricity generation installations of 100kW or more. This rate can be a disincentive for BCHP because charges for standby capacity are calculated on a complicated method based on standby usage over a 12-month period. However, the rate provides a less complicated and restrictive option for those generating 2000 kW or less. Detroit Edison also has Rider DG, which is less restrictive and complicated for installations less than 100 kW, which may be viewed as more favorable towards BCHP installations.

The average cost of electricity in Michigan is also relatively high at 7.14¢/kWh ($20.92/Mbtu) across all customer classes in 1999, which ranks it 14th or 15th highest in the nation for electrical costs, which makes BCHP more competitive. The EIA predicts that on the average electrical prices will decline; that adversely affect the payback time period of BCHP unless gas prices also decline.

7.1.4 Favorable Characteristics

Open access to the grid was made available on January 1, 2002 to all customers of utilities and large co-ops. Open access to natural gas is available but has been slow to occur.

Exit fees do not apply to those decide to exit form the grid to provide their own electricity. This was provided for in the Michigan Customer Choice and Electricity Reliability Act (Public Act 141).

Favorable political climate for energy efficient technologies appears to exist in Michigan. Low Income and Energy Efficiency Fund, established by Public Act 141, Customer Choice and Electricity Reliability Act, may be to provide funds for BCHP projects because they can be considered energy efficient. There are several other Bills that have been introduced to the State House of Representatives that while aimed at residential energy users, show that the State is willing to consider tax incentives for energy efficiency projects.

Favorable alliances exit in Michigan. The Midwest appears to be leading the way in promoting the deployment of BCHP with such organizations as Energy Michigan. Energy Michigan helps support self generating interests by legislative and regulatory activities; intervening in cases on retail wheeling, competitive bidding, standby rates and other similar issues. Another very favorable partner for BCHP in Michigan is DTE Energy Technologies. They are participating in one of the DOE packaged BCHP development projects (with United Technologies) and they are actively marketing distributed energy technologies.

Market potential appears to be reasonable for BCHP. ONSITE Energy Corporation estimates for Michigan a total market potential of between 2,400 to 7,500 MW. Besides commercial and industrial estimates by ONSITE the MAC estimated that the potential Michigan market for BCHP installations in the multi-unit residential sector to be about 21,700 units.

Availability of natural gas is good in Michigan; they produce about 25% of their own gas needs and have substantial gas storage facilities.

7.2 Recommendations

1) Increase Interest and Market Penetration

   Develop a higher level of interest in BCHP by providing information and education to Architects, Engineers, Property Management Firms on the

   - Technical and financial benefits of BCHP.
   - Sitting and permitting process.
   - Successful BCHP installations (Case Studies).
   - Technical and financial assessments tools and resources available.

2) Influence the Removal of Regulatory Barriers

   Work with the Michigan Public Service Commission and educate State Regulators on the

   - Energy, environmental, and financial benefits of BCHP.
   - Need to address uniform interconnection standards and fees, and stand-by charges.
   - Need to consider appropriate incentives for BCHP such as tax incentives and subsidies such as is being done in with renewable energy technologies.

3) Build Alliances

   Build alliances with potential partners such as:

   - Large Architect/Engineering Firms with BCHP capabilities
   - Energy Michigan
   - DTE Energy Technologies

Appendix A Architect and Engineering Firms Promoting BCHP Technologies in Michigan

1) American Institute of Architects, Michigan (AIAMI)
555 East Jefferson Ave.
Detroit, MI 48226
Tel: (313) 965-4100

2) Charles Equipment Co.
1340 S. Waverly Road
Lansing, MI 48917
(517) 322-0864
Capabilities: BCHP Turnkey Installations

3) Cummins & Barnard, Inc. Consulting Engineers
5405 Data Court, Suite 100
Ann Arbor, MI 48108
Capabilities: BCHP Turnkey Installations

4) La Salle Associates
3700 North Southport
Chicago, IL 60613
Capabilities: BCHP Turnkey Installations

5) Stanley Consultants, Inc.
225 Iowa Avenue
Muscatine, IA 52761
(563) 264-6457
Capabilities: BCHP Engineering, Environmental and Construction Services

6) Montgomery Watson Harza
175 West Jackson Blvd
Chicago, IL 60604-2814
Contact: Stephen J. Chippas, P.E.
(312) 831-3999
Capabilities: BCHP Turnkey Installations

7) Ballard Engineering
3555 Electric Avenue
Rockford, IL 61125
(815) 229-1800
Capabilities: BCHP Turnkey Systems

8) CMS Energy Corporation
Fairlane Plaza South
Suite 1100
330 Town Center Drive
Dearborn, MI 48126

9) DTE Biomass Energy
425 South Main Street, Suite 201
Ann Arbor, MI 48104
(800)216-3338, x2092

10) DTE Energy Technologies, Inc.
37849 Interchange Drive
Farmington Hills, MI 48335
(877) DTECH11 (383.2411)

11) GKC-EME
205 W. Wacker Drive
Chicago, IL 60606
Capabilities: BCHP Turnkey Installations

12) Americas Power Partners, Inc.
105 East First Street
Hinsdale, IL 60521
Contact: David Boyce
Capabilities: BCHP Turnkey Installations

13) Primera Engineering
25 E. Washington St.
Suite 510
Chicago, IL 60602
Contact: Ken Panunci
(312) 606-0629
Capabilities: HVAC Engineering, BCHP Potential

14) GLHN A&Es
Capabilities: HVAC Engineering, BCHP Potential

15) Cuh2a, Inc.
Capabilities: HVAC Engineering, BCHP Potential

16) Epstein and Sons International, Inc.
Capabilities: HVAC Engineering, BCHP Potential

17) Jacobs Facilities, Inc.
Capabilities: HVAC Engineering, BCHP Potential

18) General Energy Corp
Capabilities: HVAC Engineering, BCHP Potential

19) Globetrotters Engineering Corporation
Capabilities: HVAC Engineering, BCHP Potential

20) Patrick Engineering, Inc.
Capabilities: HVAC Engineering, BCHP Potential

21) Sebesta Blomberg & Associates, Inc.
Capabilities: HVAC Engineering, BCHP Potential

NOTE: *This list represents only those firms that the MW BCHP Application Center was able to identify at the time of this report. Other firms may exist that promote BCHP; they will be added to the database and will be available over the website in the future as they are identified.*

Appendix B Equipment Distributors/Manufactures That Promote BCHP Technologies in Michigan

1) Caterpillar
   Distributor: Michigan CAT
   19500 Dix Toledo Rd.
   Brownstown Township, MI 48183-1040
   Capabilities: Electric Generation Equipment Manufacturer

2) Solar Turbines Incorporated
   40 Shuman Blvd. Suite 350
   Naperville, IL 60563
   (630) 527-1700
   Capabilities: Electric Generation Equipment Manufacturer

3) Trane
   3353 Lousma Drive S.E.
   Grand Rapids, MI 49548
   Capabilities: HVAC systems, Air Handling Products

4) Generac Power Systems
   5625 Van Born Ct.
   Dearborn Hts., MI
   Capabilities: Power Generators

5) Detroit Diesel Corporation
   Corporate Offices
   13400 Outer Drive West
   Detroit, Michigan, 48239-4001

6) Hess Microgen
   12 Industrial Parkway, Unit B-1
   Carson City, NV 89706
   (775) 884-1000
   Capabilities: Generators with Heat Recovery

7) Eisenmann
   150 E. Dartmoor Dr.
   Crystal Lake, IL 60014
   Contact: Mark West
   (815) 455-4100
   Capabilities: Air Purification

8) ADA Systems
   955 North Lively Boulevard
   Wood Dale, IL 60191
   Capabilities: Evaporative Cooling Systems, Energy Recovery

9) Huntington Environmental Systems, Inc.
   707C West Algonquin Road
   Arlington Heights, IL 60005
   Capabilities: Emissions Control Equipment

10) Munters
Capabilities: Desiccant Dehumidification Products

11) GE Power Systems
Capabilities: Combustion Turbine Products

12) Ingersold Rand
Capabilities: Microturbines

13) International Fuel Cells, Inc.
Capabilities: Fuel Cells

14) Yazaki
Capabilities: Thermally Activated Chillers

15) Wartsilla
Capabilities: Recip. Engines

16) York
Capabilities: HVAC Systems

17) Waukeshaw
See Charles Equipment|
Capabilities: Recip. Engines

18) Honeywell
Capabilities: Microturbines

19) Broad
Capabilities: Thermally Activated Chillers

NOTE: *This list represents only those firms that the MW BCHP Application Center was able to identify at the time of this report. Other firms may exist that promote BCHP; they will be added to the database and will be available over the website in the future as they are identified.*

Appendix C Property Management Organizations and Firms in Michigan

1) BOMA Detroit Metro
38800 Country Club Dr.
Farmington Hills, MI 48331-3411

2) Mid-Michigan BOMA
730 E Hazel Street
Lansing, MI 48912

3) BOMA Greater Grand Rapids
c/o Campau Square Plaza Building
99 Monroe Ave., NW
Suite 202
Grand Rapids, MI 49503-2639

IREP Accredited Real Estate Management Firms:

4) McKinley Properties
Nancy E. Dolan
320 N. Main Street, Suite 200
Ann Arbor, Michigan 48104

5) McNeil Real Estate Management, Inc.
Laura S. Johnson
49000 Denton Road, Building 27, Suite 103
Belleville, Michigan 48111

6) The FOURMIDABLE Group, Inc.
J. Ronald Slavik
32605 W. 12 Mile Road, Suite 350
Farmington Hills, Michigan 48334

7) Village Green Management Co.
Michael Hirschelman
30833 Northwestern Highway, Suite 300
Farmington Hills, Michigan 48334-2551

8) Piper Realty Co.
Robert S. Piper
5454 Gateway Centre, Suite B
Flint, Michigan 48507

9) Phoenix Properties, LLC
Steven W. Cadwallader
PO Box 200000
Kalamazoo, Michigan 49019-1000

10) First Housing Corp.
Gleason E. Amboy, Jr.
4275 Five Oaks Drive
Lansing, Michigan 48911

11) P.M. One, Ltd.
Michael G. McGhie
5215 Jolly Cedar Court
Lansing, Michigan 48911

12) Meadow Management, Inc.
Cleon J. Wills
27780 Novi Road, Suite 110
Novi, Michigan 48377

13) Farbman Management Group of Michigan, Inc.
Lawrence Miller
28400 Northwestern Highway, #400
Southfield, Michigan 48034

14) Schostak Brothers & Co., Inc.
Jerome L. Schostak
25800 Northwestern Highway, Suite 750
Southfield, Michigan 48075

15) Signature Associates, Inc.
Marvin Perlin
1 Towne Square, Suite 1200
Southfield, Michigan 48076

16) Kirco Management Services, Ltd.
Inta Hubbard Davis
201 W. Big Beaver Road, Columbia Center, Suite 1200
Troy, Michigan 48084

17) The Hayman Co.
Cheryl Boul
5700 Crooks Road, Suite 400
Troy, Michigan 48098

NOTE: *This list represents only those firms that the MW BCHP Application Center was able to identify at the time of this report.*

Appendix D Energy Supply and Service Companies in Michigan

Natural Gas Providers:

1) Aurora Gas Company
   7038 Black River Road
   Onaway, MI 49765

2) Citizens Gas Fuel Company
   127 North Main Street
   Adrian, MI 49221-0040

3) Consumers Energy Company
   212 West Michigan Avenue
   Jackson, MI 49201-2277

4) Michigan Consolidated Gas Company
   500 Griswold Street
   Detroit, MI 48226

5) Michigan Gas Utilities, a Division of UtiliCorp United, Inc.
   899 S. Telegraph Road
   Monroe, MI 48161

6) Peninsular Gas Company
   4205 S. 94th Street
   Omaha, NE 68127

7) Peoples' Natural Gas Company, a Division of UtiliCorp United, Inc.
   1815 Capitol Avenue
   Omaha, Nebraska 68102

8) Presque Isle Electric & Gas Coop., Inc.
   19831 M-68Onaway, MI 49765

9) SEMCO Energy Gas Company a division of SEMCO Energy, Inc.
   405 Water StreetP.O. Box 5026
   Port Huron, MI 48061-5026

10) Superior Energy Company|
    14428 Wuoski
    Kaleva, MI 49645

11) Wisconsin Public Service Corp.
    700 N. Adams St.P.O. Box 19001
    Green Bay, WI 54307-9001

12) Xcel Energy
    1414 W. Hamilton
    P.O. Box 8
    Eau Claire, WI 54702-0008

Electricity Providers:

Investor Owned Electric Utilities

1) Alpena Power Company
   310 North 2nd Avenue
   Alpena, MI 49707
   (517)356-2293
   FAX:517-356-4760

2) American Electric Power Company
   (Indiana Michigan Power Company)
   110 West Michigan
   Suite 1000-A
   Lansing, Michigan 48933-1603

3) Consumers Energy Company
   212 W. Michigan Avenue
   Jackson, MI 49201-2277

4) The Detroit Edison Company
   2000 Second Avenue
   Detroit, MI 48226-1279

5) Edison Sault Electric Company
   725 E. Portage Avenue
   Sault Ste. Marie, MI 49783

6) Michigan Electric Power Coord. Center
   1901 S. Wagner Road
   Ann Arbor, MI 48103

7) Upper Peninsula Power Company
   600 Lakeshore Drive
   P.O. Box 130
   Houghton, MI 49931-0130

8) Wisconsin Electric Power Company
   231 W. Michigan St.
   P.O. Box 2046
   Milwaukee, Wisconsin 53201

9) Wisconsin Public Service Corporation
   700 N. Adams St.
   P.O. Box 19001
   Green Bay, Wisconsin 54307-9001

10) Xcel Energy (formerly Northern States Power)
    1414 West Hamilton Avenue
    P.O. Box 8
    Eau Claire, Wisconsin 54702-0008

Cooperative Electric Utilities

11) Alger Delta Cooperative Electric Association
426 North 9th Street
Gladstone, MI 49837

12) Bayfield Electric Cooperative, Inc.
P.O. Box 68
Iron River, Wisconsin 54847

13) Cherryland Electric Cooperative
5930 U.S. 31 South
P.O. Box 298
Grawn, MI 49637

14) Cloverland Electric Cooperative
Highway M-28
P.O. Box 97
Dafter, MI 49724

15) Great Lakes Energy Cooperative
1323 Boyne Ave.
P.O. Box 70
Boyne City, MI 49712-0070

16) Midwest Energy Cooperative
901 E. State St.
P.O. Box 127
Cassopolis, MI 49031

17) Ontonagon County Rural Electrification Association
500 J.K. Paul Street
P.O. Box 97
Ontonagon, MI 49953

18) Presque Isle Electric & Gas Co-op
19831 M-68 Highway
P.O. Box 308
Onaway, MI 49765

19) Thumb Electric Cooperative
2231 Main Street
P.O. Box 157
Ubly, MI 48475-0157

20) Tri-County Electric Cooperative
7973 E. Grand River Avenue
P.O. Box 379
Portland, MI 48875

21) Wabash Valley Power Association
722 North High School Rd.
Indianapolis, Indiana 46214

22) Wolverine Power Supply Cooperative, Inc.
[Unregulated by the Michigan Public Service Commission (MPSC)]
10125 West Watergate Rd.
P.O. Box 229

Municipal Electric Utilities
[Unregulated by the MPSC]

23) Village of Baraga
100 Hemlock Street
P.O. Box 290
Baraga, MI 49908-0290

24) Bay City Electric Light & Power
900 S. Water Street
Bay City, MI 48708-7098

25) City of Charlevoix
210 State Street
P.O. Box 550
Charlevoix, MI 49720-1345

26) Chelsea Electric and Water Department
305 South Main Street, #100
Chelsea, MI 48118-1085

27) Clinton Board of Public Works
119 E. Michigan Avenue
Clinton, MI 49236

28) Coldwater Board of Public Utilities
28 W. Chicago Street,
P.O. Box 469
Coldwater, MI 49036-0469

29) Croswell Light & Power Dept.
120 E. Sanborn Avenue
P.O. Box 197
Croswell, MI 48422-1224

30) City of Crystal Falls
401 Superior Avenue
Crystal Falls, MI 49920-1424

31) Daggett Electric Department
Daggett, MI 49821-9999

32) Detroit Public Lighting Department
9449 Grinnell Avenue
Detroit, MI 48213

33) Dowagiac Department of Public Services
241 South Front Street
P.O. Box 430
Dowagiac, MI 49047-0430

34) City of Eaton Rapids
City Hall
200 S. Main
Eaton Rapids, MI 48827-1256

35) Escanaba Electric Department
1711 Sheridan Road
Escanaba, MI 49829-1800

36) City of Gladstone
1100 Delta Avenue
P.O. Box 32
Gladstone, MI 49837-0032

37) Grand Haven Board of Light & Power
1700 Eaton Drive
Grand Haven, MI 49417-2872

38) Harbor Springs Municipal Utility
170 Zoll Street
Harbor Springs, MI 49740-1513

39) Hart Hydro Electric
407 State Street
Hart, MI 49420-1228

40) Hillsdale Board of Public Utilities
45 Monroe St.
Hillsdale, MI 49242-1236

41) Holland Board of Public Works
625 Hastings Avenue
Holland, MI 49423-5427

42) Village of L'Anse
101 N. Main Street
P.O. Box 166
L'Anse, MI 49946-1101

43) Lansing Board of Water and Light
1232 Haco Drive
P.O. Box 13007
Lansing, MI 48901-3077

44) Lowell Light and Power
127 N. Broadway Street
P.O. Box 229
Lowell, MI 49331-0229

45) Marquette Board of Light and Power
2200 Wright Street
Marquette, MI 49855

46) City of Marshall
323 W. Michigan Avenue
Marshall, MI 49068-1547

47) Michigan South Central Power Agency
P.O. Box 62
720 Herring Road
Litchfield, MI 49252-0062

48) Negaunee Electric Department
100 Silver Street,
P.O. Box 70
Negaunee, MI 49866-1434

49) Newberry Water & Light Board
307 East McMillan Avenue
P.O. Box 493
Newberry, MI 49868-1550

50) Niles Utilities Department
322 E. Main Street
P.O. Box 217
Niles, MI 49120-0217

51) Norway Electric Department
915 Brown Street
P.O. Box 99
Norway, MI 49870-1243

52) Paw Paw Department of Public Services
111 E. Michigan Avenue
P.O. Box 179
Paw Paw, MI 49079-0179

53) City of Petoskey
101 East Lake Street
Petoskey, MI 49770-2311

54) Portland Light and Power Board
259 Kent Street
Portland, MI 48875-1458

55) Sebewaing Light & Water Department
110 W. Main
Sebewaing, MI 48759

56) South Haven Board of Public Works
539 Phoenix St.
South Haven, MI 49090-1499

57) Stephenson Utilities Department
W. 628 Samuel Street
Stephenson, MI 49887

58) Sturgis Municipal Electric Plant
130 N. Nottawa
P.O. Box 280
Sturgis, MI 49091

59) Traverse City Light & Power Department
400 Boardman Avenue
Traverse City, MI 49684

60) Union City Electric Department
208 N. Broadway
Union City, MI 49094

61) Wakefield Electric Light Department
311 Sunday Lake St.
Wakefield, MI 49968

62) Wyandotte Municipal Service Commission
3005 Biddle Avenue
Wyandotte, MI 48192

63) Zeeland Board of Public Works
350 E. Washington Avenue
Zeeland, MI 49464

Links to Major Utilities in Michigan	Consumers Energy: www.consumersenergy.com/ Detroit Edison: www.detroitedison.com/ Michigan Public Power Agency: www.mpower.org/
List of Electrical Suppliers in Michigan	Utilities Suppliers**:** www.eia.doe.gov/cneaf/electricity/utility/esraddr7.txt Non-Utility Suppliers**:** www.eia.doe.gov/cneaf/electricity/nonutility/nc_km_fac.txt

Appendix E Energy Service Companies

1. Thermax Inc.
   S. S. Shastri
   President
   Novi, MI

2. CMS MS&T Michigan
   One Jackson Square
   Jackson, MI 49201

3. Siemens Building Technologies
   Branch Detroit
   31623 Industrial Rd
   Livonia MI, 48150

4. Siemens Building Technologies
   Branch Grand Rapids
   1525 Gezon Pkwy SW
   Suite A
   Wyoming MI 49509

5. ESG Energy Systems Group
   Detroit, MI

NOTE: *This list represents only those firms that the MW BCHP Application Center was able to identify at the time of this report. Other firms may exist that promote BCHP; they will be added to the database and will be available over the website in the future as they are identified.*

Appendix F Associations/Organizations Associated with BCHP Deployment in Michigan

Michigan/Regional Organizations

	Organization	Website
1.	American Institute of Architects	http://www.aia.org
2.	BOMA Building Owners and Managers Association	http://www.boma.org
3.	Center for Neighborhood Technology	http://www.cnt.org
4.	Delta Institute	http://www.delta-institute.org
5.	Ecology Center of Ann Arbor	http://www.hvcn.org/info/ecaa/about.html
6.	Energy Michigan	http://www.energy-michigan.org/
7.	Energy Resources Center – University of Illinois at Chicago	http://www.erc.uic.edu
8.	Environmental Law and Policy Center	http://www.elpc.org
9.	Gas Technology Institute	http://www.gastechnology.org
10.	Interstate Renewable Energy Council (IREC)	http://www.eren.doe.gov/cro
11.	Manufacturing Extension Program (MEP)	http://www.mep.nist.gov/index3.html
12.	Michigan Department of Natural Resources	http://www.dnr.state.mi.us/
13.	Michigan Electric and Gas Association	http://www.gomega.org
14.	Michigan Electric Cooperative Association	http://www.countrylines.com
15.	Michigan Environmental Council	http://www.mecprotects.org/
16.	Michigan Independent Power Producer Association	http://www.mippa.net/
17.	Michigan Public Service Commission	http://www.cis.state.mi.us/mpsc/
18.	Midwest CHP for Buildings Application Center	*Contact through Gas Technology Institute or Energy Resources Center*
19.	Midwest CHP Initiative	http://www.nemw.org/usBCHPa/regional.htm#midw
20.	Midwest Cogeneration Association	http://www.cogeneration.org
21.	Midwest Energy Efficiency Alliance (MEEA)	http://www.elpc.org/energy/index.htm
22.	State of Michigan, Department of Environmental Quality	http://www.deq.state.mi.us/
23.	University of Michigan Industrial Assessment Center	http://www.engin.umich.edu/prog/pim/iac.html

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promote BCHP; they will be added to the database and will be available over the website in the future as they are identified.

Federal Government Agencies

	Agency	Website/Contact Information
1.	DOE Combined Heat and Power (BCHP) Initiative	http://www.eren.doe.gov/der/BCHP/
2.	DOE Distributed Energy Resources (DER) Taskforce	http://www.eren.doe.gov/der/
3.	DOE Distributed Power (DP) Program	http://www.eren.doe.gov/distributedpower/
4.	DOE Energy Efficiency and Renewable Energy Network (EREN)	http://www.eren.doe.gov/
5.	DOE Energy Information Administration	http://www.eia.doe.gov/
6.	DOE Industries of the Future (IOF)	http://www.oit.doe.gov/industries.shtml
7.	DOE Inventions & Innovation Program (I&I)	http://www.oit.doe.gov/inventions/
8.	DOE Office of Energy Efficiency and Renewable Energy (EERE)	http://www.eren.doe.gov/ee.html
9.	DOE Office of Industrial Technologies	http://www.oit.doe.gov/
10.	DOE Office of Power Technologies (OPT)	http://www.eren.doe.gov/power/
11.	EPA Climate Protection Division (CPD)	http://www.epa.gov/cpd.html
12.	EPA Office of Air & Radiation	http://www.epa.gov/oar/
13.	EPA Office of Air Quality Planning and Standards	http://www.epa.gov/oar/oaqps/
14.	EPA-DOE Energy Star Program	http://www.energystar.gov
15.	Federal Energy Management Program (FEMP)	http://www.eren.doe.gov/femp/
16.	Federal Laboratory Consortium for Technology Transfer	http://www.fedlabs.org
17.	Manufacturing Extension Partnership (MEP)	http://www.mep.nist.gov/
18.	US Department of Energy (DOE)	http://www.energy.gov
19.	US Department of Housing & Urban Development (HUD)	http://www.hud.gov/
20.	US Environmental Protection Agency (EPA)	http://www.epa.gov

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Others Associations and Organizations

	Organization/Association	Website/Contact Information
1.	Alliance to Save Energy	http://www.ase.org
2.	American Council for an Energy-Efficient Economy (ACEEE)	http://aceee.org
3.	American Planning Organization (APA)	http://www.apa.org
4.	Brookhaven National Laboratory	http://www.bnl.gov
5.	Consortium for Energy Efficiency (CEE)	http://www.ceeformt.org/
6.	Distributed Power Coalition of America (DPCA)	http://www.dpc.org
7.	Electric Power Research Institute (EPRI)	http://www.epri.com
8.	Electric Power Supply Association (EPSA)	http://www.epsa.org
9.	International District Energy Association (IDEA)	http://www.districtenergy.org/
10.	National Association of Regulatory Utility Commissioners (NARUC)	http://www.naruc.org
11.	National Association of State Energy Officials (NASEO)	http://www.naseo.org
12.	National Energy Technology Laboratory	http://www.netl.doe.gov
13.	National Renewable Energy Laboratory	http://www.nrel.gov
14.	Natural Resources Defense Council (NRDC)	http://www.nrdc.org
15.	Northeast Midwest Institute	http://www.nemw.org
16.	Oak Ridge National Laboratory	http://www.ornl.gov
17.	Regulatory Assistance Project	http://www.rapmaine.org
18.	U.S. Combined Heat and Power Association (USBCHPA)	http://www.nemw.org/usBCHPa/

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Appendix G Distributed Generation – Commercial/Light Industrial Facilities in Michigan

	Considered BCHP Installation for purposes of this study

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Hospitals					
Henry Ford Medical Center	0.3	Recip Engine		Operation	Adsorption
Hutzel Hospital - Generator 2	0.8	Gas Combustion Turbine	Natural Gas	Standby	
Hutzel Hospital - Generator 1	0.8	Gas Combustion Turbine	Natural Gas	Standby	
Oakwood Hospital & Med Center - Generator 1	0.5	Gas Combustion Turbine	Natural Gas	Operating	
Oakwood Hospital & Med Center - Generator 2	0.5	Gas Combustion Turbine	Natural Gas	Operating	
Oakwood Hospital & Med Center - Generator 3	0.5	Gas Combustion Turbine	Natural Gas	Operating	
St Lawerance Hospital	0.16	Recip Engine		Standby	No
William Beaumont Hospital - Generator 1	1.9	Gas Combustion Turbine	Light Oil	Standby	
William Beaumont Hospital - Generator 2	1.9	Gas Combustion Turbine	Light Oil	Standby	
Total DG	**7.36**				
Total BCHP	**0.3**				
Municipal Water/Resource Recovery					
Central Wayne Air Quality Energy Recovery Project	22	Steam Turbine	Natural Gas	Standby	
City of Adrian - Fresh Water System - Backup	0.5	Recip Engine		Standby	No
City of Ann Arbor - Water Pumping Station	0.6	Recip Engine		Standby	No

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
City of Benton Harbor		Recip Engine		Standby	Yes
City of Gross Pointe Park – Backup Pumping	0.113	Recip Engine		Standby	Jacket
City of Gross Pointe Park – Backup Pumping	0.224	Recip Engine		Standby	Jacket
Detroit Water Department – Backup Unit	0.11	Recip Engine		Standby	No
Jackson County Resource Recovery Facility	3.7	Steam Turbine	Natural Gas	Operating	
Kent County Waste to Energy Facility	18	Steam Turbine	Natural Gas	Operating	
Lansing Waste Water Treatment Plant	0.275	Recip Engine		Operation	Yes
Lansing Water Department	0.113	Recip Engine		Standby	No
Lansing Water Department	0.225	Recip Engine		Standby	No
Ludington Water Department	0.113	Recip Engine		Standby	No
Oakland County – Backup Pumping	0.113	Recip Engine		Standby	No
Pontiac Waste Water Treatment Plant	0.113	Recip Engine		Operation	Jacket
Pontiac Water Department	0.056	Recip Engine		Standby	No
Saline Waste Water Treatment Plant	0.045	Recip Engine		Operation	Yes
Total DG	**46.3**				
Total BCHP	**0.433**				
Hotels/Offices					
Blue Cross Blue Shield - Corporate Headquarter	0.45	Recip Engine		Standby	Yes

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Clarion Hotel	0.06	Recip Engine		Operation	Yes
McNamana Federal Building (Detroit)	0.625	Recip Engine		Standby	No
Park Davis - Pharmaceutical Laboratory	0.16	Recip Engine		Standby	No
Parkedale Pharmaceuticals Inc	2.8	Gas Combustion Turbine	Light Oil	Operating	
Schuler Corp.		Recip Engine		Standby	No
Total DG	**4.1**				
Total BCHP	**0.06**				
Schools/Universities					
Eastern Michigan University	0.65	Recip Engine		Standby	Yes
Focus Hope - Technical School/Tooling Comp.	0.425	Recip Engine		Standby	No
Focus Hope - Technical School/Tooling Comp.	0.5	Recip Engine		Operation	Ebullient
Focus Hope - Technical School/Tooling Comp.	1	Recip Engine		Operation	Ebullient
Michigan State University		Recip Engine		Standby	Yes
Michigan State University - Generator 1	12.5	Steam Turbine	Coal	Operating	
Michigan State University - Generator 2	12.5	Steam Turbine	Coal	Operating	
Michigan State University - Generator 3	15	Steam Turbine	Coal	Operating	
Michigan State University - Generator 4	21	Steam Turbine	Coal	Operating	
University Microfilm	0.45	Recip Engine		Operation	Ebullient

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
University of Detroit Mercy	0.45	Recip Engine		Operation	Ebullient
University of Michigan - Generator 1	12.5	Steam Turbine	Light Oil	Operating	
University of Michigan - Generator 2	3.5	Gas Combustion Turbine	Light Oil	Operating	
University of Michigan - Generator 3	4	Steam Turbine	Light Oil	Operating	
University of Michigan - Generator 4	10	Steam Turbine	Light Oil	Operating	
University of Michigan - Generator 5	10	Steam Turbine	Light Oil	Operating	
University of Michigan - Generator 6	3.5	Gas Combustion Turbine	Light Oil	Operating	
Total DG	**107.975**				
Total BCHP	**2.4**				
Landfill Gas/Others					
BFI Lyons - Landfill Gas	1	Recip Engine		Operation	Yes
BFI Marshall - Landfill Gas	1	Recip Engine		Operation	Yes
BFI Toledo - Landfill Gas	0.298	Recip Engine		Operation	No
Cadillac Renewable Energy	39.6	Steam Turbine	Natural Gas	Operating	
Country Fresh Dairy	0.5	Recip Engine		Operation	Ebullient
Ealon Rapids Gas Storage Co	0.45	Recip Engine		Operation	Yes
EQ Waste Energy Services Inc - Generator 1	0.5	Internal Combustion Engine	Landfill Gas	Operating	
EQ Waste Energy Services Inc - Generator 2	0.4	Internal Combustion Engine	Landfill Gas	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
EQ Waste Energy Services Inc - Generator 3	0.4	Internal Combustion Engine	Landfill Gas	Operating	
EQ Waste Energy Services Inc - Generator 4	0.4	Internal Combustion Engine	Landfill Gas	Operating	
Genix	1.05	Recip Engine		Standby	No
Great Lakes Gas	0.483	Recip Engine			
Martin Mariette - Freshwater Pumping		Recip Engine		Standby	No
Southeastern Michigan Gas	0.06	Recip Engine		Operation	Absorption
Southeastern Michigan Gas		Recip Engine		Operation	No
Venice Resources Gas Recovery – Generator 1	0.8	Internal Combustion Engine	Landfill Gas	Operating	
Venice Resources Gas Recovery – Generator 2	0.8	Internal Combustion Engine	Landfill Gas	Operating	
Total DG	**47.74**				
Total BCHP	**3.01**				
TOTAL DG	**213.475**				
TOTAL BCHP	**6.203**				

NOTE: *This list represents only those commercial and light industrial facilities that the MW BCHP Application Center was able to identify at the time of this report. Other commercial and light industrial facilities may exist that have distributed generation; they will be added to the database and will be available over the website in the future as they are identified.*

Appendix H Distributed Generation - Industrial Facilities in Michigan

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Industrial Facilities					
Ada Cogeneration LP - Generator 1	23.000	Gas Combustion Turbine	Natural Gas	Operating	
Ada Cogeneration LP - Generator 2	10.100	Steam Turbine	Natural Gas	Operating	
Adrian Energy Associates LLC - Gen 1	0.800	Internal Combustion Engine	Natural Gas	Operating	
Adrian Energy Associates LLC - Gen 2	0.800	Internal Combustion Engine	Natural Gas	Operating	
Adrian Energy Associates LLC - Gen 3	0.800	Internal Combustion Engine	Natural Gas	Operating	
Ajax Metal Processing		Recip Engine		Operation	Ebullient
ASA		Recip Engine		Operation	Hot Water
ASA		Recip Engine		Operation	Hot Water
Battle Creek Gas		Recip Engine		Operation	Yes
Brent Run Generating Station	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Cargill Salt Inc - Generator 1	2.000	Steam Turbine	Coal	Operating	
Cargill Salt Inc - Generator 2	1.300	Steam Turbine	Coal	Operating	
Cellu Tissue Holdings Inc	2.500	Steam Turbine	Coal	Operating	
Champion International Corp	28.000	Steam Turbine	Black Liquor	Operating	
Chase Brass and Copper	0.600	Recip Engine		Standby	Yes
City of Saginaw		Recip Engine		Standby	No
Consumer Power	0.045	Recip Engine		Standby	No
Crown Paper Co Parchment Mill - Generator 1	9.400	Steam Turbine	Light Oil	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Crown Paper Co Parchment Mill - Generator 2	9.400	Steam Turbine	Light Oil	Operating	
Dearborn Industrial Generation	159.000	Gas Combustion Turbine	Natural Gas	Operating	
Fletcher Paper Co	3.200	Steam Turbine	Natural Gas	Operating	
Formidable Brookhaven - Retirement Community	0.105	Recip Engine		Operation	Yes
Formidable Shorhaven Manor - Retirement Community	0.060	Recip Engine		Operation	Yes
Genesee Power Station LP	39.500	Steam Turbine	Natural Gas	Operating	
GM WFG Pontiac Site Power Plant	28.900	Steam Turbine	Coal	Standby	
Grand Blanc Generating Station - Generator 1	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Grand Blanc Generating Station - Generator 2	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Grand Blanc Generating Station - Generator 3	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Grand Rapids East	1.100	Gas Combustion Turbine	Natural Gas	Operating	
Granger Electric Generating Station Generator 1	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Electric Generating Station Generator 2	0.800	Internal Combustion Engine	Light Oil	Operating	
Granger Electric Generating Station Generator 3	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Electric Generating Station Generator 4	0.800	Internal Combustion Engine	Light Oil	Operating	
Granger Electric Generating Station Generator 5	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Electric Generating Station Generator 6	0.800	Internal Combustion Engine	Light Oil	Operating	
Granger Electric Generating Station Generator 7	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Electric Generating Station Generator 8	0.800	Internal Combustion Engine	Light Oil	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Granger Electric Generating Station Generator 9	0.800	Internal Combustion Engine	Light Oil	Operating	
Granger Ottawa Generating Station Generator 1	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Ottawa Generating Station Generator 2	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Ottawa Generating Station Generator 3	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Ottawa Generating Station Generator 4	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Ottawa Generating Station Generator 5	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Ottawa Generating Station Generator 6	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Granger Seymour Road Generating Station	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Grayling Generating Station LP	38.000	Steam Turbine	Natural Gas	Operating	
Greater Detroit Resource Recovery Facility	68.400	Steam Turbine	Light Oil	Operating	
Hillman Power Co LLC	20.000	Steam Turbine	Natural Gas	Operating	
James River Corp of Virginia - Generator 1	10.000	Steam Turbine	Natural Gas	Operating	
James River Corp of Virginia - Generator 2	1.800	Steam Turbine	Natural Gas	Operating	
Kalamazoo Paper Division	7.500	Steam Turbine	Coal	Operating	
Kalamazoo River Generating Station	73.100	Gas Combustion Turbine	Natural Gas	Standby	
Kimberly Clark Corp	6.300	Steam Turbine	Coal	Operating	
LaFarge Corp Alpena - Generator 1	12.000	Steam Turbine	Coal	Operating	
LaFarge Corp Alpena - Generator 2	10.000	Steam Turbine	Coal	Operating	
LaFarge Corp Alpena - Generator 3	11.000	Steam Turbine	Coal	Operating	
LaFarge Corp Alpena - Generator 4	11.000	Steam Turbine	Coal	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
LaFarge Corp Alpena - Generator 5	3.200	Steam Turbine	Coal	Operating	
Langenberg Machine	0.140	Recip Engine		Standby	Yes
Livingston Generating Station - Generator 1	42.900	Gas Combustion Turbine	Natural Gas	Standby	
Livingston Generating Station - Generator 2	42.400	Gas Combustion Turbine	Natural Gas	Standby	
Livingston Generating Station - Generator 3	42.400	Gas Combustion Turbine	Natural Gas	Standby	
Livingston Generating Station - Generator 4	42.400	Gas Combustion Turbine	Natural Gas	Standby	
Louisiana Pacific Co	6.200	Steam Turbine	Coal	Operating	
Marco Acquisition Corp	2.500	Internal Combustion Engine	Diesel Oil	Operating	
Mead Paper Corp - Generator 1	22.100	Steam Turbine	Black Liquor	Operating	
Mead Paper Corp - Generator 2	54.000	Steam Turbine	Black Liquor	Operating	
Mead Paper Corp - Generator 3	27.200	Steam Turbine	Black Liquor	Operating	
Michigan Cogeneration Sys Inc - Generator 1	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Michigan Cogeneration Sys Inc - Generator 2	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Michigan Power LP - Generator 1	58.000	Steam Turbine	Natural Gas	Operating	
Michigan Power LP - Generator 2	96.100	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 1	13.500	Steam Turbine	Diesel Oil	Operating	
Midland Cogeneration Venture - Generator 2	380.000	Steam Turbine	Waste Heat	Standby	
Midland Cogeneration Venture - Generator 3	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 4	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 5	87.200	Gas Combustion Turbine	Natural Gas	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Midland Cogeneration Venture - Generator 6	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 7	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 8	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 9	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 10	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 11	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 12	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 13	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 14	87.200	Gas Combustion Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 15	410.000	Steam Turbine	Natural Gas	Operating	
Midland Cogeneration Venture - Generator 16	5.300	Internal Combustion Engine	Diesel Oil	Standby	
N American Natural Resources	3.200	Internal Combustion Engine	Landfill Gas	Operating	
Ominex	0.870	Recip Engine		Operation	No
Omni-Source	0.870	Recip Engine		Operation	No
Pine Tree Acres - Generator 1	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Pine Tree Acres - Generator 2	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Pine Tree Acres - Generator 3	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Pine Tree Acres - Generator 4	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Pine Tree Acres - Generator 5	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Powertrain Warren GMC	4.000	Gas Combustion Turbine	Natural Gas	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Rawsonville Plant Ford Motor Co	4.500	Gas Combustion Turbine	Natural Gas	Operating	
Riverview Energy Systems - Gen 1	3.300	Gas Combustion Turbine	Natural Gas	Operating	
Riverview Energy Systems - Gen 2	3.300	Gas Combustion Turbine	Natural Gas	Operating	
Romulus Operations Powertrain Division	10.700	Gas Combustion Turbine	Natural Gas	Standby	
S D Warren Co 1 Muskegon - Gen 1	3.500	Steam Turbine	Black Liquor	Operating	
S D Warren Co 1 Muskegon - Gen 2	19.100	Steam Turbine	Black Liquor	Operating	
S D Warren Co 1 Muskegon - Gen 3	28.400	Steam Turbine	Black Liquor	Operating	
Smurfit Stone Container Corp	14.800	Steam Turbine	Coal	Operating	
Sumpter Energy Associates - Generator 1	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Sumpter Energy Associates - Generator 2	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Sumpter Energy Associates - Generator 3	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Sumpter Energy Associates - Generator 4	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Sumpter Energy Associates - Generator 5	0.800	Internal Combustion Engine	Landfill Gas	Operating	
Sumpter Energy Associates - Generator 6	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 7	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 8	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 9	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 10	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 11	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 12	0.800	Internal Combustion Engine	Natural Gas	Operating	

Project Name	Generator Capacity *(MW)*	Generator Type	Primary Energy Source	Generating Unit Status	Heat Recovery
Sumpter Energy Associates - Generator 13	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 14	0.800	Internal Combustion Engine	Natural Gas	Operating	
Sumpter Energy Associates - Generator 15	0.800	Internal Combustion Engine	Natural Gas	Operating	
TES Filer City Station LP	70.000	Steam Turbine	Coal	Operating	
Viking Energy of Lincoln	18.000	Steam Turbine	Railroad Ties	Operating	
Viking Energy of McBain	18.000	Steam Turbine	Railroad Ties	Operating	
Voss Lantz	0.500	Gas Combustion Turbine	Natural Gas	Operating	
Voss Lantz	0.500	Gas Combustion Turbine	Natural Gas	Operating	
Voss Lantz	0.500	Recip Engine		Operation	Ebullient
Voss Steel	0.500	Recip Engine		Operation	Ebullient
Voss Taylor	0.500	Gas Combustion Turbine	Natural Gas	Operating	
Voss Taylor	0.500	Gas Combustion Turbine	Natural Gas	Operating	
Warner Lambert Co	2.800	Gas Combustion Turbine	Light Oil	Operating	
Total	**3126.39**				

NOTE: *This list represents only those industrial facilities that the MW BCHP Application Center was able to identify at the time of this report. Other industrial facilities may exist that have distributed generation; they will be added to the database and will be available over the website in the future as they are identified.*

Appendix I Detroit Edison Parallel Operation and Standby Service (Rider 3)

THE DETROIT EDISON COMPANY

STANDARD CONTRACT RIDER NO. 3
PARALLEL OPERATION AND STANDBY SERVICE
SYNOPSIS

Effective for service rendered on and after January 22, 1994

APPLICABLE TO: General Service Rate Schedule Designation D3
Interruptible General Service Rate Schedule Designation D3.3
Large General Service Rate Schedule Designation D4
Primary Supply Rate Schedule Designation D6
Alternative Primary Supply Rate Schedule Designation D6.1
Interruptible Supply Rate Schedule Designation D8
Primary Pumping Schedule Designation E4
Secondary Pumping Schedule Designation E5

STANDBY SERVICE: Customers who desire to run electrical generating equipment in parallel with the Company's system or customers who desire the Company to serve load that is normally served by the customer's generator or prime mover must take standby service under the provisions of this rider and must take supplemental service on one of the applicable filed rates listed above.

Customers who desire to run electrical generating equipment in parallel with the Company's system must have written permission by the company for parallel operation. Any customer operating in parallel with the Company's system under written permission by the Company but not taking service under Rider No. 3 as of January 1, 1989, will not be required to take service under Rider No. 3 as long as there is no change in the customer's generating facilities or other source of energy.

Customers purchasing their entire energy requirements from the Company with generators or prime movers installed for use only in emergency will not be considered as taking standby service. The effective date for service under this rider will be the first full billing cycle for each customer which begins on or after July 1, 1989. All customers operating in parallel with the Company's system must install the necessary equipment to permit metering by July 1, 1989. The Company will supply the metering equipment. Parallel operation without metering will not be permitted after July 1, 1989, except by written permission of the Company.

PARALLEL OPERATION: The customer must meet the interconnection requirements of Detroit Edison specified in "Protective Relaying Operating and Telemetering Guidelines for Independently-Owned Generation," published by the Company, as approved by the Michigan Public Service Commission, before parallel operation will be

permitted. The Company must approve in writing any subsequent changes in the interconnection configuration before such changes are allowed. Operating in parallel with the Company's system without written approval by the Company of the interconnection and any subsequent changes to the interconnection will make the customer subject to disconnection.
Except for the acts or omissions of the Company's employees or agents which occur on the Customer's side of the point of interconnection the customer shall indemnify, defend and hold the Company and its officers, agents and employees harmless from any liabilities, claims, losses, demands, costs, damages or damage which (i) occur on the Customer's side of the point of Interconnection resulting from the installation, maintenance, possession or operation of the Facility, or (i i) occur on the Company's side of the point of interconnection up to the first point of the Company's General Facility Protection if at the time of the injury or damage, the Company is not providing electric energy to the customer and the injury or damage was caused by the customer's intentional defeat of the protective relays.

The Company shall indemnify, defend and hold the Customer and its officers, agents and employees harmless from any liabilities, claims, losses, demands, costs, damages or judgments, including reasonable attorneys' fees, arising out of all personal injuries or property damages which occur on the Company's side of the point of interconnection resulting from the installation, maintenance, possession or operation of the Company's General Facilities; (i) except for the acts or omissions of the Customer's employees or agents which occur on the Company's side of the point of interconnection; and (i i)except for those injuries or damages for which the Customer is to indemnify the Company pursuant to the preceding paragraph.

The Customer shall maintain and furnish current evidence of comprehensive general liability insurance in the amount of $2,000,000 per occurrence. This insurance can be a combination of primary and excess insurance. The Company shall be named as an additional insured under the customer's policy. The customer need not provide insurance if it can demonstrate that its current assets exceed current liabilities by $7,500,000 or more. If the customer fails to provide insurance or does not meet the requirements of the preceding sentence for waiver of insurance, then the Company will purchase insurance in the amount of $2,000,000 to protect the Company (but not the customer). The cost of such insurance will be paid by the customer. The customer’s insurance, its waiver, or insurance purchased by the Company shall not limit the Customer's indemnity obligations. Parallel operation will not be permitted (or will be terminated) if the Customer fails to provide insurance, meet the waiver requirements or pay the cost of insurance obtained by the Company.

STANDBY CONTRACT CAPACITY: **Standby contract capacity in kW will be established for electric capacity sufficient to meet the customer's standby load according to the following method.**

If the customer's generating unit has a least 5000 hours of metered operation with output greater than zero kW over the latest 12-month period, then the standby contract capacity

for the next 12 months will be set at the 1001st highest hourly kW output. At the customer's option, the standby contract capacity for June through October will be set at the 501st highest hourly kW output during the months of June through October and the standby contract capacity for November through May will be set at the 501st hourly kW output during the months of November through May. A customer may not later choose the 1001-hour determination above, unless with the Company's permission for permanent changes in the customer's facilities. For multiple generating units, "output" means the simultaneous output of all units.

If the customer's generating unit does not have at least 5000 hours of metered operation with output greater than zero kW over the latest 12-month period, then the standby contract capacity will be set at the generator's nameplate rating for one year, after which time paragraph (a) above will apply if the generator's output has been greater than zero for at least 5000 hours. If not, then the standby contract capacity will continue at nameplate rating for the next 12-month period. Where multiple nameplate ratings are specified, the rating at 60 degrees Fahrenheit will be used.

For customers demonstrating unusual operating conditions, including but not limited to generation greater than the customer's own load, standby contract capacity may be set by mutual agreement of the Company and the customer.

For generators which do not operate during the months of November through May, standby contract capacity will be set at zero for November through May and will be set at the nameplate rating for June through October.

The standby contract capacity shall not be decreased over the life of the contract, except by mutual agreement of the Company and the customer for permanent changes in a customer's facilities and except as provided for in paragraph (f) below. Such a reduction in standby contract capacity will not be allowed more than once per year.

The standby contract capacity will be adjusted on an annual basis according to paragraphs (a) and (b) above.

For customers with multiple generating units which do not have 5000 hours of metered operation with simultaneous output greater than zero over the latest 12-month period, the standby contract capacity may be set by mutual agreement of the Company and the Customer for one year.

For the first time only that a customer takes service under this rider, if the customer has not previously operated in parallel with the company's system and if the customer's generating unit does not have at least 5000 hours of metered operation with output greater than zero over the latest 12-month period, then the standby contract capacity will be set at zero kW for 30 days, after which paragraph (b) above will apply.

SUPPLEMENTAL POWER: Supplemental power is electric energy and capacity provided by Detroit Edison to serve the customer's total internal load which is in addition

to that portion of the customer's total internal load equal to the standby contract capacity. For each point of service, total internal load equals the output of the customer's generation plus the power supplied by the Company. Supplemental demand equals total internal load less standby contract capacity, but not less than zero. Supplemental power will be billed under the applicable rate schedule for supplemental service ("supplemental rate schedule").

METERING REQUIREMENTS: The output of customer generation or, if appropriate, the load served by another source of power or the customer's prime mover will be metered by Detroit Edison. For customers served on supplemental rate schedules D3, D3.3, D4, and E5, the entire load served by the Company will be metered with demand-recording equipment.

STANDARD CONTRACT RIDER NO. 3
PARALLEL OPERATION AND STANDBY SERVICE RATES:

Service Charge:
$210.00 per customer per month for customers served at primary voltages and above.
$ 70.00 per customer per month for customers served at secondary voltages.

Monthly Generation Reservation Fee:
$0.86 times the standby contract capacity in kW, per month.

Non-Generation Charge:
Monthly non-generation fixed charges per kW of standby contract capacity will be as follows.

For standby contract capacity set according to paragraph (d) of the "Standby Contract Capacity" section above, the charge for all months will be based on the standby contract capacity specified for June through October.
$1.51 per kW at transmission voltage
$2.36 per kW at subtransmission voltage
$3.25 per kW at primary voltage
$3.80 per kW at secondary voltage

Demand Charge:
A daily on-peak demand charge for back-up or maintenance demand will be charged based on the determination of supplemental and back-up or maintenance power coincident with the daily highest 30-minute integrated reading during on-peak hours of the demand meter which measures the total load served by Detroit Edison.
The daily on-peak demand charge for back-up power is $0.90 per kW per day. Back-up demand equals standby contract capacity minus the 30-minute output of the customer's generator, but not less than zero, and not greater than the total load served by the Company, measured during periods other than maintenance periods as defined below. If the customer's total internal load is less than or equal to the output of the generator, then back-up demand will be zero for that day.

The daily on-peak demand charge for maintenance power is $0.48 per kW per day. Maintenance demand equals standby contract capacity minus the 30-minute output of the customer's generator, but not less than zero, and not greater than the total load served by the Company, during maintenance periods as defined below. If the customer's total internal load is less than or equal to the output of the generator, then maintenance demand will be zero for that day.

Energy Charge:
An energy charge for back-up and maintenance power will be charged based on standby contract capacity less the output of the customer's generator, but not less than zero. For customers served on supplemental rate schedules D4, D6, D6.1, D8, and E4, the energy charge will be the D6 on-peak energy charge, 2.49¢ per kWh, plus appropriate credits and surcharges, including but not limited to off-peak credit, voltage level credit, and substation credit. For customers served on supplemental rate schedules D3, D3.3, and E5, the energy charge will be the applicable energy charge plus surcharges less a credit per kWh equal to the non-generation fixed charge per kW, $3.80, divided by 500, applied to the first 500 hours use of standby contract capacity per month for back-up or maintenance power. The energy gas stated herein is also subject to the provision of schedule designation B-4.6 PSCR clause.

Waivers and limits for demand/energy rates:
For customers served on supplemental rates schedules D4, D6, D6.1, D8, and E4, the following applies:

If the total of daily demand charges for the month is less than the monthly generation reservation fee, then the daily demand charges will be waived for that month.
If the total of daily demand charges for the month is greater than the monthly generation reservation fee, then the generation reservation fee will be waived for that month.
If the total of daily demand charges for the month is greater than the D6 on-peak billing demand charge times the standby contract capacity plus the difference between the product of the D6 maximum demand charge times the standby contract capacity and the standby non-generation fixed charges, then the customer will pay the D6 on-peak billing demand charge times the standby contract capacity plus the above difference. For customers on supplemental rate schedule D4, the above difference will be set to zero.

Waivers and limits for energy-only rates:
For customers served on supplemental rates schedules D3, D3.3, and E5, the following Applies:

If the total of daily demand charges for the month is less than the monthly generation reservation fee, then the daily demand charges will be waived for that month.

If the total of daily demand charges for the month is greater than the monthly generation reservation fee, then the daily demand charges will be waived for that month provided that the supplemental rate continues as an energy-only rate. If not, then paragraphs 6(b) and 6(c) above will apply.

MAINTENANCE PERIODS: A customer may specify, subject to conditions below set by the Company, up to 20 on-peak days during a year as maintenance days. In addition, the day after Thanksgiving and on-peak days occurring during the period from December 24 through January 1 plus contiguous recognized legal holidays may be scheduled as maintenance days subject to conditions below excluding (d). A maintenance day is a calendar 24-hour day.

Conditions:

The customer must request maintenance days in writing.

The Company must receive the request at least 45 days before the first requested maintenance day.

Requests will be honored according to the date received.

Requests may be refused by the Company if they conflict with the Company's own schedule of maintenance and expected demands. The Company will offer alternative maintenance days.

After the Company and the customer have agreed upon maintenance days, if there is a substantial change in circumstances which make the agreed upon schedule impractical for either party, the other party upon request shall make reasonable efforts to adjust the schedule in a manner that is mutually agreeable.

ADJUSTMENT OF PRIOR RATCHETS: When a customer takes standby service under Rider No. 3, the setting or the increasing or decreasing of standby contract capacity will affect the existing ratchet levels on the supplemental rate as follows:

An amount in kW equal to the initial standby contract capacity (or to the increase or decrease) will be subtracted from (or subtracted from or added to) the existing ratcheted maximum demand level for customers on supplemental rates D6, D6.1, D8, and E4.
An amount in kW equal to 65% of the initial standby contract capacity (or of the increase or decrease) will be subtracted from (or subtracted from or added to) the existing ratcheted on-peak billing demand level for customers on supplemental rates D4, D6, D6.1, and D8.
An amount in kW equal to 50% of the initial standby contract capacity (or of the increase or decrease) will be subtracted from (or subtracted from or added to) the existing ratcheted on-peak billing demand for customers on supplemental rate E4.

INTERRUPTIBLE STANDBY SERVICE:

Interruptible standby service is supplied in conjunction with supplemental rates D8 and D3.3, provided that the customer qualifies for D8 or D3.3 under the provisions of the respective rates.

For customers taking service on supplemental rate D8, the daily demand charge for back-up power and maintenance power will be waived on a day that the Company requests interruption, provided that the customer is assessed neither a non-interruption fee nor a non-interruption penalty under the terms of the D8 rates.

For customers taking service on supplemental rate D3.3, the customer's generator, prime mover, or other source of energy must be connected only to the interruptible circuit. The energy charge for back-up power and maintenance power will be the same as the energy charge for the D3.3 rate. The daily demand charge will be waived on a day that the Company interrupts the circuit.

Interruptible standby service will also be supplied in conjunction with any new interruptible supplemental rates approved by the Michigan Public Service Commission after January 1, 1989, under terms to be incorporated in this section.

EXPERIMENTAL STANDBY PROVISION:

Customers taking service on rates D3, D3.3, and E5 who install generating equipment on or after January 1, 1989, or who are operating generating equipment installed prior to January 1, 1989, with the Company's written permission may take standby service under this provision subject to conditions herein.

The total of standby contract capacity from all customers permitted under this provision may not exceed 2000 kW.

Customers requesting service under this provision will be eligible to take service in the order that the Company approves their applications for interconnection. If a customer does not begin parallel operation within 12 months of the date of initial Company approval of the interconnection, then the customer must submit a new request for service under the provision.

A customer without generation facilities installed and operating with the Company's written permission prior to January 1, 1989, and who is being served at a supplemental rate other than D3, D3.3, and E5 may not change supplemental service to rates D3, D3.3, or E5 and take service under this provision.

This provision will terminate on December 31, 1993.

For customers served under this provision:
The service charge will be waived.
The monthly generation reservation fee will be waived.
The non-generation reservation fee will be waived.
The daily demand charge will be waived.

The Company will reimburse the customer for the cost of liability insurance specified in the "Parallel Operation" section above that is in excess of the customer's cost prior to interconnection, or the Company may waive the additional insurance requirement and accept the customer's current level of insurance.
The credit to the first 500 hours use of standby contract capacity, described in paragraph 5 of the "Rates" section above, will not apply.

SUBSTATION CREDIT: Available to customers served at subtransmission voltage level (24 to 41.6 kW) or higher who provide the on-site substation including all necessary transforming, controlling, and protective equipment. A credit of $.30 per kW shall be applied to the non-generation charge per kW of standby capacity.

BASE RATE REDUCTION: A credit of 3.227% applied to the base bill.

5% SECURITIZATION REDUCTION: A credit of 5% applied to the base bill and surcharges.

LATE PAYMENT CHARGE: See Schedule Designation B-2.10.

SCHEDULE OF ON-PEAK HOURS: See Schedule Designation B-4.4

POWER FACTOR CLAUSE: The rates and charges under this tariff are based on the customer maintaining a power factor of not less than 85% lagging. Customers are responsible for correcting power factors less than 70% at their own expense. The size, type and location of any power factor correction equipment must be approved by the Company. Such approval will not be unreasonably withheld. A penalty will be applied to the total amount of the monthly billing for supplemental and standby service for power factor below 85% lagging in accordance with the table in Power Factor Determination, Schedule Designation B-4.5. The penalty will not be applied to the on-peak billing demand ratchet nor to the minimum contract demand of the supplemental rate, but will be applied to metered quantities.

SPECIAL TERMS AND CONDITIONS: Customer-owned equipment must be operated so that voltage fluctuations on the Company's system shall not exceed permissible limits. Upon the request of a customer, the Company will provide monthly reports of the data from the meters measuring the load served by the Company and the output of the customer's generators, for a charge of $10.00 per report per month. Each report contains data from one meter. Application of Rider No. 2 for redundant service for customers served under this rider will be the same as for customers without generating equipment. Service under this rider will not be affected by ownership of the generation facility provided that:

The generation facility is located on the customer's site,
The load served by the generation facility is on the same site, and
The total output of the generation facility is utilized by the customer or sold to the Company.

CONTRACT TERM: The contract term is for a five-year period unless terminated by mutual consent and extending thereafter from month to month until terminated by mutual consent or by thirty day's written notice by either party.

DISPUTE RESOLUTION PROCEDURE: Any customer who disputes a determination or interpretation made by the Company under this rider may deliver a written notice of such dispute to the customer's service representative at the Company. The Company will respond to the notice in writing within 20 working days.

Disputes between the Company and the customer may be presented to the Michigan Public Service Commission for informal resolution.

Any customer who disputes a determination made by the Company under this rider may at any time file a formal complaint with the Office of the Secretary of the Michigan Public Service Commission.

Appendix J Detroit Edison Company Standard Contract Rider Distributed Generation

THE DETROIT EDISON COMPANY
STANDARD CONTRACT RIDER DG
DISTRIBUTED GENERATION
SYNOPSIS

Issued: March 7, 2001 Effective for service rendered on and after February 14, 2001

STANDARD CONTRACT RIDER DG
DISTRIBUTED GENERATION

APPLICABLE TO: Residential Service Rate Schedule Designation D1
General Service Rate Schedule Designation D3
Large General Service Rate Schedule Designation D4

AVAILABILITY OF SERVICE: Available to customers with on-site distributed generation desiring tooperate in parallel with the Company's system and take service for their supplemental needs underone of the applicable tariffs listed above. The on-site generation capacity shall be no greater than 100 kW at a single location. Distributed generation resources include reciprocating engine generator sets, small turbine-generators, fuel cells, regenerative dynamometers and renewable resources.

PARALLEL OPERATION: The customer must meet the interconnection requirements of the Companyspecified in "Protective Relaying, Operating and Telemetering Guidelines for Independently Owned Generation" ('Guidelines') published by the Company, as approved by the Michigan Public ServiceCommission, and have written permission from the Company before parallel operation will bepermitted. For single-phase equipment less than 25 kVA, the requirements are simplified and can usually be satisfied by performing an automatic shutdown test as described in Section 5.1 of the Guidelines.

The customer is advised to consult its insurers and insurance policies regarding the existence of coverage for on-site distributed generation resources. Homeowners' policies and insurers may afford varying degrees of coverage for this exposure, or may exclude it altogether. This statement is not to be viewed as the rendering of advice regarding the customer's insurance coverage.

RATES: The customer shall pay all direct costs of controlling and protective equipment necessitated by the presence of a source of power on his premises and costs to comply with the Guidelines.

Sell-Back Energy Rate:

For customers with a standard energy meter, the Company's monthly average top incremental costof power will be applied to all kilowatt-hours delivered to the Company's system.
For customers with a time-of-day meter, the Company's average monthly top incremental cost of power for each time-of-day period will be applied to all kilowatt-hours delivered to the Company's system during that time-of-day period.

For customers with an interval meter, the Company's top incremental cost for each hour will be applied to all kilowatt-hours delivered to the Company's system during that hour.

METERING REQUIREMENTS: The Company will install separate metering for energy sold by the Company to the customer and for energy sold-back to the Company by the customer. The Company will, at the customer's request, upgrade the sell-back meter to either a time-of-day or interval meter, but the incremental cost of such upgrade is the responsibility of the customer.

CONTRACT TERM: Open order, terminable on three day’s written notice by either party. Where special services are required, the term will be as specified in the applicable contract rider.