Residential, Commercial, and Industrial (RCI) Technical Work Group

Summary List of Recommendations and Pending Policy Options

	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO2e)	Level of Support
		2015	2025	Total 2009-2025			
RCI-1	Utility Demand-Side Management for Electricity and Natural Gas	0.0	13.6	86.3	-1,632	-19	Pending
RCI-2	Existing Buildings Energy Efficiency Incentives, Assistance, Certification, and Financing	17.6	53.8	428.6	-12,107	-28	Pending
RCI-3	Regulatory (PSC) Changes to Remove Disincentives and Encourage Energy Efficiency Investments by IOUs	*Not Quantifiable*					Unanimous Consent
RCI-4	Adopt More Stringent Building Codes for Energy Efficiency	3.5	9.7	81.3	-2,865	-35	Pending
RCI-5	Michigan Climate Challenge and Related Consumer Education Programs	*Not Quantifiable*					Unanimous Consent
RCI-6	Incentives to Promote Renewable Energy Systems Implementation	4.8	14.6	140.0	$11,773	$84.12	Pending
	RPS central station only	3.1	11.9	105.6	$4,566	$43.25	
	Wind	2.5	8.9	81.7	$3,910	$47.89	
	Biomass	0.6	2.4	20.6	$302	$15	
	Solar PV	0.0	0.4	2.2	$329	$152	
	Plasma Gasification	0.0	0.2	1.1	$25	$23	
	Distributed Generation 'Carve-out'	1.7	3.6	34.4	$7.207	$209.69	
	Solar Hot Water	0.0	0.2	1.2	$29	$24.03	
	Geothermal	0.1	0.2	1.6	$70	$44	
	Wind (distributed)	0.7	1.4	13.2	$3,261	$246	
	Solar PV (distributed)	0.5	0.9	8.9	$3,702	$414	
	Biogas	0.6	1.1	11.0	$216	$20	
RCI-7	Promotion and Incentives for Improved Design and Construction in the Private Sector	15.5	47.1	376	-11,693	-31	Pending
RCI-8	Net Metering for Distributed Generation	Fully incorporated into RCI-6 carve out					Pending
RCI-9	Training and Education for Building Design, Construction, and Operation	*Not Quantifiable*					Unanimous Consent

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	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2015	2025	Total 2009-2025			
RCI-10	Water Use and Management	*Not Quantifiable*					Unanimous Consent
	Sector Total After Adjusting for Overlaps*	**21.8**	**73.7**	**2,241.9**	***-14,909***	***-6.65***	**TBD**
	Reductions From Recent Actions	**Figures adjusted include recent actions**					**TBD**
	Sector Total Plus Recent Actions	**21.1**	***63.5***	***2,241.9***	***-14,909***	***-6.65***	**TBD**

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GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/tCO_2e$ = dollars per metric ton of carbon dioxide equivalent; PSC = Public Service Commission; IOU = investor-owned utility.

Note: The numbering is for reference purposes only; it does not reflect prioritization among these policy options. Negative net present values and cost effectiveness numbers above reflect "negative costs" or net savings.

*The figures listed show totals for the options net of recent legislation.

RCI-1. Utility Demand-Side Management (DSM) for Electricity, Natural Gas

Policy Description

This option focuses on increasing investment in electricity and natural gas demand-side management (DSM) programs through programs run by the investor owned, municipal and co-operative utilities, as well as energy service companies (ESCOs), large customers, or others, in order to meet the goal of overall reduction in energy consumption. Decreasing consumption will have immediate impacts on greenhouse gas emissions. DSM activities may be designed to work in tandem with other recommended strategies that can also encourage efficiency gains.

This policy recommendation focuses on improving energy efficiency through increased investment in demand-side management programs including energy efficiency, energy conservation and peak demand reduction efforts. Energy efficiency and conservation are the lowest cost resources for reductions in electricity and natural gas use by the residential, commercial and industrial sectors and thus for reduction of greenhouse gasses. There is a long track record of cost effective energy efficiency initiatives, typically called demand side management (DSM), at the local, state and regional levels in areas around the country and in Michigan. There is vast potential for improving the energy efficiency of homes, appliances, businesses and industry in Michigan. A number of DSM efforts are already underway or mandated in Michigan, and important new energy efficiency legislation – Public Act 295 of 2008 – was adopted as the MCAC was concluding its efforts.

This policy option considers energy savings goals for electricity and natural gas, and the policy, program, and funding mechanisms that might be used to achieve these goals. These are intended to work in tandem with other strategies under consideration by the RCI and ES TWGs.

Policy Design

Goals and Timing: The goal of this policy is to bring the *total overall* demand reduction of existing actions, recent actions including notably newly-adopted Public Act 295 of 2008, plus new, additional DSM activities in Michigan to save in each year 2% of the prior year's electricity use and 0.75% of the prior year's natural gas use by the residential, commercial, institutional, municipal, and industrial sectors, compared to a three-year, weather-normalized Business-As-Usual (BAU) forecast that does not incorporate these goals. This goal derives in part from the efficiency goal identified in the Midwestern Governors Association's November 15, 2007 Energy Security and Climate Stewardship Platform.

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This goal is phased in as follows:

Tier 1: 2008-2012 Electricity Energy Optimization Program Savings

- Biennial incremental electricity savings in 2008–2009 equivalent to 0.3% of total annual retail electricity sales in MWh in 2007.
- Annual incremental electricity savings in 2010 equivalent to 0.5% of total annual retail electricity sales in MWh in 2009.

- Annual incremental electricity savings in 2011 equivalent to 0.75% of annual retail electricity sales in MWh in 2010.
- Annual incremental electricity savings in 2012 of 1.0% of annual retail electricity sales in MWh in 2011.

Tier 1: 2008-2012 Natural Gas Energy Optimization Program Savings

- Biennial natural gas savings in 2008–-2009 equivalent to 0.1% of total annual retail natural gas sales in decatherms or equivalent MCF in 2007.
- Annual incremental natural gas savings in 2010 equivalent to 0.25% of total annual retail natural gas sales in decatherms or equivalent MCF on 2009.
- Annual incremental natural gas savings in 2011 equivalent to 0.5% of total annual retail natural gas sales in decatherms or equivalent MCF in 2010.
- Annual incremental natural gas savings in 2012 of 0.75% of total annual retail natural gas sales in 2011.

Tier 2 (2013-2015):

- Annual gross savings for electricity equal to 1.33% in 2013, 1.66% in 2014 and 2.0% in 2015.
- 0.75% annual gross savings for natural gas by 2015 and each year thereafter based upon prior year sales; and

Tier 3 (long term):

- Annual incremental electricity savings in 2016 and each year thereafter through 2025 equivalent to 2.0% of total annual retail electricity sales in MWh in the preceding year.
- Annual incremental natural gas savings in 2016 and each year thereafter through 2025, equivalent to 0.75% of total annual retail natural gas sales in decatherms or equivalent MCF in the preceding year.

Parties Involved: All of the state's gas and electric distribution companies and by extension, all customers.

Deleted: Timing: Start in 2009 with a 6-year ramp-up to the full 2% electric and 0.75% natural gas savings per year by 2015, and continuing at that level through 2025. ¶

Implementation Mechanisms

As reflected in Public Act 295 of 2008, implementation of this policy option is envisioned to be – at least initially – through traditional utility-based DSM programs. Implementation may also be enhanced through integrated resource planning (IRP) processes regarding future demand.

Related Policies/Programs in Place

Few related policies are in place at this time, although constructive new legislation – Public Act 295 of 2008 – was adopted as the MCAC process neared its conclusion. The quantitative goals and results of this Act are shown below:

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Electric providers must achieve the following collective minimum energy savings:

- Biennial incremental energy savings in 2008-2009 equivalent to 0.3% of total annual retail electricity sales in megawatt hours in 2007.
- Annual incremental energy savings in 2010 equivalent to 0.5% of total annual retail electricity sales in megawatt hours in 2009.
- Annual incremental energy savings in 2011 equivalent to 0.75% of total annual retail electricity sales in megawatt hours in 2010.
- Annual incremental energy savings in 2012, 2013, 2014, and 2015 and each year thereafter equivalent to 1.0% of total annual retail sales in megawatt hours in the preceding year.

A natural gas provider shall meet the following minimum energy savings:

- Biennial incremental energy savings in 2008-2009 equivalent to 0.1% of total annual retail natural gas sales in decatherms (Dth)* or equivalent thousand cubic feet (MCF) in 2007.
- Annual incremental energy savings in 2010 equivalent to 0.25% of total annual retail natural gas sales in Dth or equivalent MCF in 2007.
- Annual incremental energy savings in 2011 equivalent to 0.5% of total annual retail natural gas sales in Dth or equivalent MCF in 2007.
- Annual incremental energy savings in 2012, 2013, 2014, and 2015 equivalent to 0.75% of total annual retail natural gas sales in Dth or equivalent MCF in the preceding year.

These legislated actions will result in the effects on energy consumption and greenhouse gas emissions shown in Table RCI-1 A, below.

Table RCI-1 A.

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Legislated Actions: Utility Demand Side Management for Electricity and Natural Gas	2015	2025	Units
GHG emission reductions	3.3	24.6	Million tons of CO_2
Cumulative net costs (present value) (2009-2025)		-$4,415	Million $
Cumulative emissions reductions (2009-2025)		193.9	Million tons of CO_2

* Decatherm: A measurement of the heat equivalent to one million BTUs (Dth)

Legislated Actions: Utility Demand Side Management for Electricity and Natural Gas	2015	2025	Units
Cost-effectiveness		-$23	$/ton of CO_2

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Also, the Customer Choice and Electricity Reliability Act of 2000 authorized the creation of a Low-Income and Energy Efficiency Fund (LIEEF), administered by the Michigan Public Service Commission via grants to qualifying organizations. The purpose of the fund is to provide shut-off and other protection for low-income customers and to promote energy efficiency by all customer classes. Since 2002, approximately $89 million (24% of available funds) has been used for efficiency-related grants.

Type(s) of GHG Reductions

Primarily CO2 reductions resulting from avoided electricity generation, but could reduce to some degree all six statutory GHGs (CO2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).

Estimated GHG Reductions and Costs or Cost Savings

The estimated GHG reductions and cost savings from this Policy Option that are additional to the results of the legislation portrayed in Table RCI-1 A above are as follows;

Table RCI-1 B.

RCI-1: Utility Demand Side Management for Electricity and Natural Gas	2015	2025	Units
GHG emission reductions	0.0	13.6	Million tons of CO_2
Cumulative net costs (present value) (2009-2025)		-1,632	Million $
Cumulative emissions reductions (2009-2025)		86.3	Million tons of CO_2
Cost-effectiveness		-19	$/ton of CO_2

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Data Sources: Projections for energy sales are based on the most recent U.S. DOE Energy Information Annual Energy Outlook projections for energy sales in Michigan. The cost of energy is based on the most recent data from the Energy Information Administration. The levelized cost of natural gas savings is based on an estimate provided (September, 2008) from the American Council for an Energy Efficient Economy. The levelized cost of electricity savings is also based on data that the American Council for an Energy Efficient Economy provided, base don its survey of numerous electricity efficiency programs across the country. Primary data source is Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies, American Council for an Energy Efficient Economy.

Quantification Methods: Energy savings for both electricity and natural gas are calculated by multiplying the percentage of energy to be saved by the amount of energy projected to be sold in the baseline year. Those electricity or natural gas savings are then multiplied by the cost of electricity and natural gas savings and by the avoided electricity and gas cost to produce a net total cost of the policy option. In the case of these energy efficiency measures, the total cost is negative – meaning the energy efficiency measures produce net savings.

Key Assumptions: All emissions reductions shown are incremental to any energy savings required by existing Michigan legislation. The goal of this policy option is 2% electricity savings and 0.75% natural gas savings, phased in between 2009-2015. The savings targets continue through the year 2025. The analysis also assumes that residential, commercial and industrial sectors meet the same energy savings goals and that all energy sales in all three sectors must meet the same energy savings targets.

The other key cost assumptions, based on the data sources described above, are as follows:

Table RCI-1 C.

Levelized Cost of Electricity Savings	$30/MWh
Avoided Electricity Delivery Cost	$60/MWh
Levelized Cost of Natural Gas Savings	$2.5/MMBtu
Avoided Delivered Natural Gas Cost	$7.7/MMBtu

Key Uncertainties

Key uncertainties are related to the assumed avoided cost of energy; if the assumed avoided costs of the energy (the energy that consumers do not need to purchase, as a result of energy efficiency measures) rises, then cost per ton of the policy option decreases. If the avoided cost of energy falls, then the cost, per ton of CO_2 reduced, increases.

Additional Benefits and Costs

Energy efficiency measures that reduce the use of fossil fuels often reduce emissions of criteria pollutants and air toxics in addition to GHGs. These reductions offer indirect public health and related economic benefits, none of which are quantified or included here.

Feasibility Issues

The requirements for electricity recommended here are more ambitious than the one recently enacted by Michigan, and the one recommended for natural gas is less stringent than the one enacted. There are therefore no feasibility issues associated with the natural gas recommendation. Whether a future Legislature will strengthen the electricity requirements will likely depend upon the experience with the relatively modest one now on the books.

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

RCI-2. Existing Building Energy Efficiency Incentives, Assistance, Certification and Financing

Policy Description

The intent of this policy option is to improve the energy efficiency of existing buildings. Because Michigan has one of the weakest energy codes in the nation, and currently utilizes many of its World War II-era industrial buildings, energy efficiency improvements provide a significant opportunity to reduce Michigan's carbon footprint. This policy sets a goal for reducing energy usage in existing buildings by encouraging energy efficiency upgrades and operating improvements in existing institutional, municipal, commercial, residential and industrial buildings. Incentives, rebates and property tax abatements are imperative to foster state-wide participation in implementing energy efficient measures to reduce future energy generation and green house gas emissions. This policy is intended to support and work in conjunction with other policies (e.g., RCI-1) to help create a sustainable and cost-effective energy efficiency program for Michigan.

Policy Design

Goals:

- Reduce energy consumption per square foot of floor space in existing residential, commercial, institutional, and municipal buildings by 50% from 2002 levels by 2030.
- Reduce energy consumption in the industrial sector, where building systems and process systems are often intertwined, by 20% by 2030.

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Timing: Program begins in 2010.

Parties Involved: All parties involved in owning, operating, renovating, occupying, or other activities associated with Michigan's existing residential, commercial, institutional, municipal, and industrial building stock.

Implementation Mechanisms

Further development and implementation of this policy should take into account changes in building use and utilization, especially that which is brought about by the economic recovery of Michigan. This is particularly pertinent to the industrial sector.

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The following are proposed mechanisms:

- **Energy survey and audit programs to encompass all facilities, including residential:** The proposed programs will provide funding or partial funding for energy audits for existing buildings and homes, allowing for a free or reduced-cost residential energy survey or a reduced cost technical energy audit for each commercial, industrial or institutional customer through qualified energy service companies, i.e., Rebuild MI-approved providers. Funding will be based on total square footage of building and will require documentation of recommendations, return on investment (ROI) calculations if investment is required and calculated reductions in GHG emissions. Audit program will incorporate free energy

assessments for industries through Industrial Energy Assessment Centers & Department of Energy (DOE) Save Energy Now Program. Incentives and assistance will be available for follow up and implementation of audit recommendations. It may also be appropriate to target existing buildings through time-of-sale and/or change-of-occupancy energy efficiency audits. Such audits can be implemented on a voluntary or mandatory basis, and can be applied toward several purposes (e.g., as a threshold to qualify for incentives, as a screening tool for utility DSM investments, or simply for disclosure in buyer-seller transactions).

- **Incentives and rebates for energy efficiency measures and improvements:** This program will provide financial incentives for all state energy consumers to install energy efficient equipment in their homes and businesses. Residential customers will have a separate rebate program to include common and largest energy consuming equipment such as clothes washers/dryers, refrigerators, furnaces and compact fluorescent lamps. All equipment must be EnergyStar rated. For all other customer classes the rebate basis will be for prescriptive technologies such as lighting, HVAC and motors including agricultural technologies. Rebates only apply to full time Michigan residents and businesses.

- **Property tax abatement for achieving Leadership in Energy and Environmental Design (LEED) certification* for existing buildings (LEED) by the U.S. Green Building Council (USBGC) and/or other tax incentives for energy efficiency:** This program will provide property tax abatement by achieving LEED Certification. Abatements will be scaled to the level of certification achieved. Governmental facilities and operations are excluded from these incentives however should be encouraged or required to comply with minimum ranking through existing executive order. (Covered in more detail in RCI-7.) In addition, tax credits could be made available to homeowners and residential rental property owners for energy-efficiency upgrades.

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- **Short-term, low- or no-interest loans:** Applies to businesses or energy service companies (ESCO's) that implement energy savings measures with verification & monitoring activities. Loans are secured and bound by purchased equipment and distributed directly to customer or to third party energy service provider. This program will have established ROI terms and is available to all residential and small businesses (SBA members). This program will also complement and promote all other initiatives considered in this policy. Loans will be prioritized and quantified by customer class and applicable to qualified prescriptive technology measures only. Low income class customers may also utilize Michigan's LIEEF for supplemental or full funding of energy improvements.

- **Energy efficiency reinvestment funds:** Establish a fund which will act as a bank for guaranteed performance based energy improvement projects by issuing internal unsecured loans. Applies to businesses or energy service companies (ESCO's) that implement energy savings measures with verification & monitoring activities. This program will have established ROI terms and is available to all customer classes excluding residential. Projects are approved on short term simple payback basis as long as the debt service from savings does not exceed existing utility costs. Loans will be prioritized and quantified by customer class and applicable to qualified prescriptive technology measures only. Interest on loans to

* Leadership in Energy and Environmental Design (LEED) is a third-party certification program and nationally accepted benchmark for the design, construction and operation of high performance green buildings.

be fixed with portion appropriated for administrative fees and profit (to be used to increase fund size).

Related Policies/Programs in Place

From www.michigan.gov website:

- Rebuild Michigan

  The Rebuild Michigan Program fosters partnerships that promote increased energy efficiency within a community. Partners may include local governments, schools, universities, businesses, non-profit organizations and public housing authorities. With assistance from state government and other partners each community can determine energy saving opportunities and goals and work to implement an energy action plan.

- State Facility Energy Savings Plan

  On November 14, 2007, the MI Department of Management & Budget (DMB) began its compliance of Executive Directive 2007-22; an energy reduction strategy to reduce utility expenditures by 10% by the end of fiscal year 2008 (September 30, 2008), based on 2002 utility expenditures of approximately $16 million on DMB managed and owned buildings. Additionally, energy consumption must be reduced by another 10% by the end of fiscal year 2015 (September 30, 2015), compared to a 2006 baseline. This strategy incorporates benchmarking state-owned facilities through ENERGY STAR in partnership with the MI Department of Labor & Economic Growth/Energy Office.

- Energy Cost Avoidance Certification (P.A. 122)

  Public Act 122 (P.A. 122) of 1987 encourages ongoing energy management in state-owned facilities by offering a financial incentive to departments that have taken energy-saving actions and can document the energy cost savings. Departments may retain seventy-five percent (75%) of their certified energy cost avoidance to fund additional energy efficiency projects during the next fiscal year.

- ENERGY STAR Building Label Incentive

  The ENERGY STAR Building Label is awarded to buildings that exhibit high energy efficiency without sacrificing occupant safety and comfort. These buildings are given national recognition for their energy performance. Also, each recognized building is presented with a plaque that can be mounted in the building visible to occupants, visitors and community members. To receive the ENERGY STAR Building Label the building owner must:
  - benchmark their building(s)
  - have a professional engineer verify and prepare a statement of energy performance
  - submit a completed application

- The Energy Office staff is available to assist with the benchmarking and application processes. This Office is also offering a limited time incentive to help public agencies pay for the statement of energy performance.

From DSIRE website (www.dsireusa.org):

- Low-Income and Energy Efficiency Fund (LIEEF)

  Michigan's statewide public benefits fund, the Low-Income and Energy Efficiency Fund (LIEEF), was authorized by the state's restructuring legislation (Act 141), enacted in June 2000. The purpose of the LIEEF is to provide energy assistance for low-income customers, to provide conservation and efficiency measures to reduce energy use and energy bills of low-income customers, and to promote energy efficiency among all customer classes.

  The LIEEF is administered by the Michigan Public Service Commission (PSC), which issues periodic requests for proposals (RFPs) for prospective projects. The most recent RFPs include $55 million for low-income energy assistance, $10 million for low-income energy efficiency, and $15 million for energy efficiency in all customer classes. The deadline for proposal submissions on all three RFPs was May 1, 2008.

- Nonrefundable Business Activity Credit

  Businesses certified by the NextEnergy Authority that locate in the NextEnergy Zone may claim a nonrefundable credit for the tax year equal to the lesser of (1) the amount by which a business's "tax liability attributable to qualified business activity" for the tax year exceeds the business's "baseline tax liability attributable to qualified business activity," or (2) 10% of the amount by which the business's "adjusted qualified business activity" performed in Michigan, outside of a "Renaissance Zone," for a tax year exceeds such activity for the 2001 tax year under former MCL § 208.39e. Under either formula, a business may not claim the credit for any tax year in which its "tax liability attributable to qualified business activity" did not exceed the "baseline tax liability attributable to qualified business activity" in 2001. These credits initially took effect beginning in 2003 and were scheduled to expire at the end of 2007 with the repeal of MCL § 208.39e. In 2007 however, they were renewed without substantive alteration as part of a larger reworking of state business taxing policy.

- Refundable Payroll Credit

  Businesses certified by the NextEnergy Authority that locate in the NextEnergy Zone to develop "alternative energy technologies," as defined by the Michigan Next Energy Authority Act, may claim a credit for the their qualified payroll amount. If the credit exceeds the tax liability of the business for the tax year, the portion of the credit exceeding the tax liability will be refunded. This credit initially took effect beginning in 2003 and was scheduled to expire at the end of 2007 with the repeal of MCL § 208.39e. In 2007 however, it was renewed as part of a larger reworking of state business taxing policy.

- Wisconsin Public Power, Inc. - Renewable Energy Rebate

  Rebates for renewable-energy systems are available to residential and small commercial customers of all Wisconsin Public Power, Inc. (WPPI) utilities, including these Michigan utilities: Alger Delta CEA, Baraga Electric Utility, Gladstone Power & Light, L'Anse Electric Utility, Negaunee Electric Department, and Norway Power & Light. Customers must reside in the service territory of the participating utility, and the system must be installed on the customer's property. Projects must be approved by the utility before installation.

- DTE Energy

  DTE Energy launched a small energy efficiency pilot program in May 2008 offering rebates of up to $5,000 to customers of its natural gas utility, MichCon, for products and services that help conserve energy. Under the pilot program, a limited number of $250 rebates are available to customers who purchase a high efficiency furnace or have a professional energy audit performed on their home. The company also is offering six rebates of $5,000 to builders who construct new energy efficient homes.

Financial Assistance Programs offered through the Department of Environmental Quality:

- Retired Engineers Technical Assistance Program (RETAP) (www.michigan.gov/deq/0,1607,7-135-3585_4848---,00.html)

  Retired professionals are available through the Retired Engineer Technical Assistance Program (RETAP) to assist businesses and institutions in Michigan with pollution prevention. Each assessor has thirty to forty years of experience with Michigan industries. Businesses of 500 employees or fewer in the state and institutions of any size are eligible. This program provides confidential and non-regulatory on-site pollution prevention/ energy assessments for Michigan businesses and institutions, free of charge. Teams of RETAP professionals review operations for potential waste reduction strategies and opportunities; including source reduction, reuse, recycling, and energy efficiency.

- Small Business Pollution Prevention Loan Program (P2 Loans)

  This program provides loans of up to $400,000 at an interest rate of 5% or less to existing independently owned businesses with 500 or fewer full time employees. Projects that qualify for P2 loan funding include those that either eliminate or reduce waste at the business location (source reduction), result in environmentally sound reuse and recycling for the loan applicant's generated wastes, conserve energy or water on-site, or are a qualified agricultural energy production system. Funding for the P2 Loan Program comes from a revolving loan fund, made possible through passage of the Clean Michigan Initiative in November of 1998. Low interest loans are available to all Michigan businesses including manufacturing, farming, retail and service.

- Energy Research and Demonstration Centers (www.warmtraining.org/medc/)

  Michigan's Energy Office supports the Michigan Energy Demonstration Centers located throughout the State. The Michigan Energy Demonstration Centers promote energy efficiency, renewable energy, green building and sustainable living solutions for Michigan residents and businesses.

- Other Grants and Loans (www.michigan.gov/deq/0,1607,7-135-3307_3515---,00.html)

  Other grant and loan programs include Brownfield grants and loans; the State Revolving Loan Fund; and Nonpoint Source Grant Funds. Additional information can be found at the above website.

Other Outreach Websites and Information

- Sustainability (www.michigan.gov/deq/0,1607,7-135-3585_30068_48393---,00.html)
- Energy Efficiency Resources (www.michigan.gov/deq/0,1607,7-135-3585_30068_27504---,00.html)

Type(s) of GHG Reductions

Primarily CO2 reductions resulting from avoided electricity generation, but could reduce to some degree all six statutory GHGs (CO2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).

Estimated GHG Reductions and Costs or Cost Savings

The estimated GHG reductions and cost savings are as follows;

Table RCI-2 A.

RCI-2: Energy Efficiency Incentives, Assistance, Certification and Financing	2015	2025	Units
GHG emission reductions	17.6	53.8	Million tons of CO_2
Cumulative net costs (net present value) (2009-2025)		-$12,107	Million $
Cumulative emissions reductions (2009-2025)		428.6	Million tons of CO_2
Cost-effectiveness		-$28	$/ton of CO_2

Note: Negative numbers represent costs savings.

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Data Sources: As laid out in quantification memo. Primary data sources are US Department of Energy price and fuel projections as well as data on residential, commercial and industrial energy use, the Michigan 21st Century Energy Plan and Midwest Independent System Operator. In addition, the cost of energy efficiency measures for electricity and natural gas is derived from the

American Council for an Energy Efficient Economy. US Census Bureau data is used for projections of population growth in Michigan.

Quantification Methods: The first step in the quantification was to use Energy Information Administration (EIA) data to project industrial, commercial and residential energy consumption over the period through 2025. The second step was to calculate a percentage reduction in energy use for each year, based on the phase in of the 20% and 50% energy use reduction goal for industrial and residential/commercial energy use respectively. Growth factors for residential, commercial, institutional, and municipal floor space came from the EIA and from the Michigan 21st Century Energy Plan, and the next step was to calculate the reduction in energy use for the overall residential, commercial, institutional, and municipal sectors on a per square foot basis. Industrial energy use reductions were calculated for each of the major industrial fuels – fuel oil, natural gas, electricity, liquefied petroleum gas (LPG) and coal. Finally, based on these annual reductions in energy use, the cost, per year, of these reductions was calculated. The net present value (NPV) of these figures, along with cumulative greenhouse gas emissions as well as emissions reductions in 2015 and 2025 is shown in Table RCI-2 A, above and in the Summary Table of all options on page 1.

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Key Assumptions: The key assumptions for this analysis are as follows:

Table RCI-2 B.

Levelized Cost of Electricity Savings	$30.00	$/MWh
Levelized Cost of Natural Gas Savings	$2.50	$/MMBtu
Avoided Electricity Cost	$60.00	$/MWh
Avoided Natural Gas Cost	$7.70	$/MMBtu

The quantification model is also based on assumed growth rates for housing that take into account growth in Michigan population as projected by the U.S. Census Bureau. For example, population growth is projected to be 1.02% for 2008-2009. Based on the 21st Century Energy Plan, commercial floor space is expected to grow by 40 million square feet per year.

Key Uncertainties

Significant uncertainty exists with respect to baseline (2002) levels of energy consumption per square foot, particularly at any high-resolution level like building-specific figures at the residential or commercial level.

One key uncertainty relates to the ability to reach the goals as stated in this policy option. It is possible, for instance, that the ambitious goal of 50% reduction in commercial and residential energy use might not be achieved. If, for instance, the State achieved only 50% of this goal, the results would be as follows in Table RCI-2-C.

Table RCI-2 C.

RCI-2: Energy Efficiency Incentives, Assistance, Certification and Financing	2015	2025	Units
GHG emission reductions	10.8	35.5	Million tons of CO_2
Cumulative net costs (net present value) (2009-2025)		-$7,268	Million $
Cumulative emissions reductions (2009-2025)		272.5	Million tons of CO_2
Cost-effectiveness		-$26.7	$/ton of CO_2

Note: Negative numbers represent costs savings.

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Additional Benefits and Costs

None cited.

Feasibility Issues

Characterization and generalization will almost certainly be needed due to the widespread lack of building-specific baseline data for 2002.

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

RCI-3. Regulatory (PSC) Changes to Remove Disincentives and Encourage Energy Efficiency Investments by Investor-Owned Utilities (IOUs)

Policy Description

Economic regulation of investor-owned utility rates by the Michigan Public Service Commission (MPSC) limits the company's earnings potential by determining an authorized level of earnings and by establishing the allowed earnings as a percentage of the utility rate base – meaning the value of assets (e.g. power plants and distribution networks) used in the business. In designing the rates charged to customers to recover the utility's "revenue requirement" (expenses plus return on the rate base), the regulator typically assigns most of the revenue requirement to a predicted level of sales of units of gas or electricity. This method creates financial incentives for the utility to increase, not decrease, its unit sales and make investments in the physical assets of the business.

Successful energy conservation and efficiency programs will reduce unit sales and could cut into the utility's recovery of revenues associated with the costs of doing business, including a reasonable return. If the program costs are expensed, there can be no incremental earnings on the program investment no matter how successful it is. Thus there is limited "upside" potential and a significant risk of harming profitability associated with an energy efficiency program. Cooperative and municipal systems may run the risk of diminished cash flow from reduced sales, even absent the same earnings model as the investor-owned utilities. The financial incentives are to maximize unit sales, consistent with existing production capability, not reduce them.

The natural financial disincentive can be offset by: (1) providing a possible incentive financial benefit for a successful efficiency program; (2) changing the rate method so that expenses and earnings are recovered by a fixed rate charge developed based on the number of customers rather than units sold; (3) allow updating of the sales figure in between rate cases; and (4) utilize a system benefits charge applicable to all distribution service customers for the efficiency program. Items (2) and (3) are alternatives sometimes referred to as "decoupling" of the revenue requirement from a projected sales level determined in the rate case. Item (4) ensures that all customers receiving deliveries from the local distribution utility contribute to the program costs, since the benefits are societal.

Decoupling utility unit sales from profits in rate setting while providing the opportunity to earn profits from successful program outcomes can realign incentives to encourage effective utility investment in DSM, energy efficiency and conservation and reduce the incentive to maximize unit sales.

A public benefits charge (sometimes call systems benefits charge) is a fee attributed to utility customers for the purpose of accomplishing a public good, such as reducing emissions. The fee is a non-by passable charge on electric or natural gas utility bills and may be set on a per-meter, per month or volumetric (per kWh) basis. The funds collected are used to provide energy efficiency, conservation and peak demand reduction programming. This programming can be operated by the distribution utilities or by a commission-supervised third party.

Policy Design

Goals: This policy option is not quantifiable at this time. However, the MPSC should undertake and complete as soon as possible a comprehensive study identifying disincentives to energy efficiency investments by utilities and ways to remove them, as well as opportunities to encourage additional energy efficiency investment by utilities. MPSC should implement the recommendations of this study by December 2010. This should be done in close coordination with the MCAC's Energy Supply recommendations, and in keeping with the provisions of Public Act 295 of 2008, Michigan's newly adopted energy legislation.

Timing: As noted above.

Parties Involved: MPSC, investor-owned utilities, and others as the study's recommendations may indicate.

Implementation Mechanisms

- To have the Commission issue an order on its own motion to address guidelines on decoupling mechanisms by the 1st quarter of 2009, providing opportunity for comments with a staff report due by the end of the 3rd quarter of 2009 and a commission order out the 1st quarter of 2010. Utilities will have the opportunity to file a rate case on decoupling mechanisms that correspond with the guidelines issued by the commission.
- Other implementation mechanisms for this policy option will derive from the conclusions and recommendations of the identified study.

Related Policies/Programs in Place

Newly adopted Public Act 295 of 2008 allows utilities to contribute to a centrally administered program at a level of 2% of revenue, creating an attractive option for utilities lacking staff to administer their own programs.

Type(s) of GHG Reductions

Not applicable.

Estimated GHG Reductions and Costs or Cost Savings

Not applicable; this policy option was not quantified.

Key Uncertainties

None cited.

Additional Benefits and Costs

None cited.

Feasibility Issues

None cited.

Status of Group Approval

Approved

Deleted: Pending

Level of Group Support

Unanimous consent

Deleted: TBD

Barriers to Consensus

None

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RCI-4. Adopt More Stringent Building Codes for Energy Efficiency

Policy Description

Newly constructed buildings today become the energy-consuming building stock of tomorrow. In an effort to reduce the largest operations and maintenance cost for newly constructed buildings (energy costs), a higher energy standard should be required in Michigan. Stronger building energy codes can be an effective way to eliminate the least efficient energy approaches in new or renovated buildings. The "2030 Challenge" is a global initiative that targets all new buildings and major renovations to reduce their fossil-fuel GHG-emitting consumption by 50% by 2010, incrementally increasing the reduction for new buildings to carbon neutral by 2030. The 2030 challenge has been adopted by the U.S. Conference of Mayors, National Association of Counties, American Institute of Architects, U.S. Green Building Council, International Council for Local Environmental Initiatives, Congress for the New Urbanism, states of Illinois, Minnesota, California & New Mexico, numerous counties and cities, and supported by the American Society of Heating, Refrigerating & Air-Conditioning Engineers (ASHRAE). New building standards that meet the 2030 Challenge are currently being developed. To meet or exceed the 2030 Challenge for a 50% GHG reduction by 2010, it would require Michigan to achieve a 30% improvement beyond the requirements of the IECC 2006 Code.

Policy Design

Goals:

- Strengthen the Michigan energy building codes for residential, commercial, institutional, municipal, and covered industrial construction to match those of the 2030 Challenge.
- To meet the initial 2030 Challenge goal of 50% GHG reduction by 2010, Michigan should adopt an energy code that requires 30% energy performance improvement beyond the requirements of the IECC 2006 Code.
- Implement mandatory thermal envelope inspections for all new building construction to assure that "as designed" thermal envelope details match "as implemented" thermal envelope details. This will assure that energy efficiency performance objectives are met in the completed structures.
- Energy savings can be measured by using the current Michigan Uniform Energy Code (MUEC), the IECC 2006, and ASHRAE 90.1 2004 standards as baseline references to the requirements of the 2030 Challenge. Assuming that the earliest new codes could be implemented would be 2009, the baseline year for energy saving comparisons should be 2008.
- Implementing the 2030 Challenge standards will result in reductions in electrical consumption far exceeding the 25% reduction achievable by meeting the 2006 IECC or ASHRAE 90.1 2004 standard
- Adhere to periodic upgrades of the national standards for new residential, commercial, institutional, municipal, and industrial buildings, and review and upgrade existing state and local building codes accordingly.

Timing: The above provisions should take effect immediately in order to effectively meet the requirement of a 50% GHG reduction by 2010, and a carbon neutral goal by 2030.

Parties Involved: All parties involved in designing, constructing, owning and occupying new residential, commercial, institutional, municipal, or industrial facilities.

Implementation Mechanisms

The full implementation of the 2030 Challenge in Michigan would require legislation that repeals the Stille-Derossette-Hale Single State Construction Act, allowing a revised energy code to be established.

In order to support increasing energy efficiency standards for new construction, it would be necessary to implement training for code officials as well as building trade professionals and facility managers to ensure consistent quality control and enforcement measures (see RCI-9).

Related Policies/Programs in Place

Background: Michigan is currently bound by the language of the State Construction Code Act regarding any changes to the Energy Code. Attempts to update the Residential Energy Code within the confines of the State Construction Code Act were met by litigation from the Michigan Association of Home Builders (MAHB) in February, 2005. The Circuit Court issued an injunction halting the implementation of the revised Michigan Uniform Energy Code (MUEC). This litigation is still unresolved. On June 25, 2008, however, the Michigan Supreme Court ruled that the MAHB would not be allowed to introduce new information at the Circuit Court trial that had not been developed or shared during the public rulemaking process and further clarified the State's rule making authority under the Administrative Procedures Act of Michigan State Agencies. With the Appeals Court and Supreme Court cases resolved, it is expected that the Circuit Court will now hear the case. It is expected that the State will request the injunction be lifted and the revised MUEC be implemented.

Concurrently, the Bureau of Construction Codes conducted ad hoc committee meetings through June of 2008 to discuss possible commercial and residential energy code updates. The ad hoc committee consisted of representatives from the building, manufacturing, building code, government and public sectors. The ad hoc committee's suggestions for commercial and residential energy code updates will be guided by the State Construction Code Act. The suggestions generated from the ad hoc committee have been presented to the Department of Labor and Economic Growth for consideration to update the current energy code. Any changes to the code will follow the normal notice-and-comment rulemaking process. Members of the public are encouraged to submit comments for the record addressing the proposed change to the residential energy code.

The ad hoc committee recommendations include suggestions for the commercial code to reflect the 2006 edition to the International Energy Conservation Code (IECC), and the residential code to reflect portions of the IECC as well as the International Residential Code (IRC).

In 2007, a proposed House Bill (HB 4812) recommended that the Michigan Uniform Energy Code be replaced by the 2004 supplement version of IECC. Similarly, a 2007 Senate Bill (SB 597) recommended that the Michigan Uniform Energy Code be replaced by the 2006 edition of the IECC.

There is a voluntary Michigan Greenbuilt program sponsored by the Michigan Association of Homebuilders that includes an energy performance standard for residential homes that exceeds the minimal Michigan Uniform Energy Code standard.

Numerous colleges and universities in Michigan and throughout the country have set long-term carbon neutral goals for their campuses.

Elsewhere, for example, California recently adopted "Zero net energy" building codes calling for residential coverage by 2020 and commercial buildings by 2030.

Type(s) of GHG Reductions

CO_2 and energy-related GHG equivalents.

Estimated GHG Reductions and Costs or Cost Savings

The projected GHG reductions and cost savings are as follows:

Table RCI-4 A.

RCI-4: Building Codes	2015	2025	Units
GHG emission reductions	3.55	9.82	Million tons of CO_2
Cumulative net cost savings (present value) (2009-2025)		-$2,865	Million $
Cumulative emissions reductions (2009-2025)		82	Million tons of CO_2
Cost-effectiveness		-$34.95	$/ton of CO_2

Note: Negative numbers represent costs saving.

Data Sources: Primary data sources are the US Department of Energy EIA Annual Energy Outlook, the Michigan 21st Century Energy Plan and Midwest Independent System Operator as well as the Building Codes Assistance Project.

Quantification Methods: The first step in this calculation was to determine the difference between the current Michigan codes and the most up to date national model codes. According to the Building Codes Assistance Project, the 2006 residential code is 30% more stringent (resulting in 30% lower energy use) than the existing Michigan code. The most recent commercial model code is 25% more stringent than the existing code. The second step was to determine the energy savings if a new Michigan code required savings 30% greater than these model codes. This involved using an estimate of total energy use in the residential, commercial, institutional, and municipal sectors, and estimating the amount of industrial energy use that would be covered by building codes, using an EIA breakdown of industrial energy consumption, by end use. Finally, these figures were adjusted to account for an estimate of any new residential, commercial, institutional, or municipal substantial renovations that would be covered by energy codes.

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Key Assumptions:

The key assumptions are as follows:

Table RCI-4 B.

Levelized Cost of Electricity Savings	$30.00	$/MWh
Levelized Cost of Natural Gas Savings	$2.50	$/MMBtu
Avoided Electricity Cost	$60.00	$/MWh
Avoided Natural Gas Cost	$7.70	$/MMBtu

- Per analysis provided by the Building Codes Assistance Project, the IECC 2006 energy code is assumed to result in 30% greater energy efficiency than the MUEC. The existing ASHRAE standard for commercial space is assumed to be 25% less efficient than the 2004 ASHRAE standard.

- An adjustment for inclusion of renovated residential, commercial, institutional, and municipal space of 1.3 and 1.2 respectively is included, however additional data to confirm this is requested. This adjustment means that for every 1 unit of commercial space built in Michigan an additional 0.3 units of commercial space and 0.2 units of residential space will be renovated and covered by code.

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- Enforcement and compliance with Building Codes is assumed to be at 75 percent. In other words, it is assumed that 75 percent of buildings constructed will fully comply with the relevant code. This figure is consistent with compliance rates in other jurisdictions.

- Emissions factors assumed are as follows:

	tCO_2e/billion BTU
LPG - RCI	61.978
Coal - RCI	93.103
Natural Gas - RCI	52.909
Biomass - RCI	2.500
Oil - RCI	68.171
Landfill Gas - RCI	0.260
Biogas - RCI	5.000

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Key Uncertainties

The key uncertainties in this area are (1) inclusion of renovated space under code and (2) enforcement and compliance with the energy codes.

Additional Benefits and Costs

None cited.

Feasibility Issues

None cited.

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

RCI-5. Michigan Climate Challenge and Related Consumer Education Programs

Policy Description

Each and every local government official, small business owner and citizen plays an integral part in recognizing climate change risks and committing to specific actions to reverse those changes. Together these individual actions will reduce the risks to the environment now and in the future. The Michigan Climate Challenge (MCC) provides the opportunity and resources for communities, organizations, businesses, and individuals to make those commitments allowing Michigan to move forward in addressing climate change.

Policy Design

The state should lead by example (i.e., walk the talk) regarding education and outreach. Implementation of the Michigan Climate Challenge will be one of the key elements of the state's effort in this area. A summary of this program follows:

Establish the MCC to encourage Michigan businesses, institutions, local and regional governments, and the general public to make a voluntary public commitment to undertake actions to reduce GHG emissions in their communities. The Department of Environmental Quality, working in conjunction and consultation with other state agencies, will develop and launch the MCC and include a web-based "Online Pledge" to encourage voluntary GHG reductions throughout Michigan.

The MCC will provide web-based resources and information in the form of a "Climate Action Toolkit" for individuals and organizations to consider implementing as part of their voluntary pledge to reduce GHG emissions. The "Climate Action Toolkit" will contain specific recommendations for reducing GHG emissions and will also identify measures that can be undertaken to minimize the impacts of climate change so Michigan can be better prepared to adapt to its effects.

Information and education should include training and education programs – and certification – for state officials, building planners, builders and contractors, energy managers and operators, and local code enforcement officials on certification that buildings and building subsystems have met program requirements. It should also include programs for consumer education and public education at the elementary and secondary levels.

Goals: Establish and implement the Michigan Climate Challenge.

Timing: The MCC website is currently under development. A demonstration of the website is scheduled for the November MCAC meeting. The website is scheduled to be fully implemented by December 31, 2009.

Parties Involved: Individual citizens, organizations, cities, townships, counties, metropolitan districts, regional metro councils, school districts, and other jurisdictions as appropriate.

Implementation Mechanisms

Prior to the MCC website going live, a marketing plan must be developed to ensure broad notice and participation. A mechanism to track participation in the MCC with the ability to register progress as part of the website design is being explored.

Related Policies/Programs in Place

The policies recommended by the Michigan Climate Action Council can be integrated into the Michigan Climate Challenge or stand alone as complementary actions to increase awareness and reduce emissions.

Mayors Climate Protection Agreement

As of August 2008, at least 23 Michigan cities have become signatories to the Mayors Climate Protection Agreement. These municipalities include Ann Arbor, Battle Creek, Berkley, Dearborn Heights, East Lansing, Ferndale, Grand Rapids, Holland, Kalamazoo, Lansing, Marquette, Meridian Township, Pittsfield Charter Township, Portage, Royal Oak, Saline, Southfield, Southgate, Sturgis, Sutton Bay, Taylor, Traverse City, and Warren.

Type(s) of GHG Reductions

Not applicable.

Estimated GHG Reductions and Costs or Cost Savings

Not applicable; this policy option was not quantified.

Key Uncertainties

None cited.

Additional Benefits and Costs

None cited.

Feasibility Issues

None cited.

Status of Group Approval

Approved

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Note: The RCI TWG recognized that this policy option is parallel with and nearly identical to the policy option CCI-5. RCI-5 is retained here to reinforce the importance of public and professional education and outreach, specifically training, education, and certification programs for professionals as well as programs for consumer education and public education.

Level of Group Support

Unanimous consent

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Barriers to Consensus

None

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RCI-6. Incentives to Promote Renewable Energy Systems Implementation

Policy Description

Customer-sited distributed generation powered by renewable energy sources provides electricity system benefits such as avoided capital investment and avoided transmission and distribution losses, while also displacing fossil-fueled generation and thus reducing greenhouse gas emissions. Increasing the use of renewable distributed generation in Michigan can be achieved through a combination of regulatory changes and incentives.

Distributed generation technologies exist across the spectrum of residential, commercial and industrial facilities. Customer-sited renewable distributed generation can include solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, and systems fueled by biomass wastes or biomass collected or grown as fuel. Policies to encourage and accelerate the implementation of customer-sited renewable distributed generation can include direct incentives or requirements for power purchases, market incentives related to the pricing of electricity output by renewable distributed generation, state goals or directives, and favorable rules for interconnecting renewable generation systems with the electricity grid. Incentives for non-electric renewable energy applications should also be included.

Other potential technologies or elements that could be encouraged under this policy option include:

- Solar roofs (roofing materials with built-in solar photovoltaic cells, or solar PV panels erected on roofs).
- Solar water heating and solar space heating systems.
- Wind powered systems, particularly for rural areas.
- Biomass-fired generation, space, or water heating systems.
- Programs targeted at specific customer sectors (e.g., residential, commercial, industrial), or specific markets within sectors.
- Tax credits, and/or utility or other incentives to lower the initial cost of distributed energy systems to users.

Potential supporting measures for this option include training and certification of installers and contractors, net metering and other pricing arrangements, interconnection standards, and the creation or support of markets for biomass fuels. Through an educational campaign (see policy options RCI-5 and CCI-5), individuals and businesses can also gain a better understanding of renewable energy options and of the requirements of the program ultimately adopted in Michigan.

Policy Design

The TWG recommends that Michigan set as a minimum target the addition of small-scale (e.g., less than 10 MW) customer-sited distributed renewable generation consistent with its overall annual goals for renewable generation. Renewable generation in Michigan at this time is recognized to be ~3-4%, but most of this is large-scale, centralized renewable generation.

Goals: Increase total annual electrical generation from small-scale customer-sited distributed renewable sources in Michigan to 1% of total annual MWh by 2010, then increasing to 5% by 2025. This policy option is designed to be accomplished as part of and within the broader renewable portfolio standard recommended in MCAC Policy Option ES-1. The Energy Supply Technical Working Group proposed a small-scale distributed generation goal that was smaller than the goal proposed in this policy option. This RCI goal is expressed in terms of the additional greenhouse gas emissions savings and additional costs that result from a more ambitious goal

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Timing: As noted above.

Parties Involved: MPSC, utilities, small-scale renewable generators, and others depending on implementation mechanisms selected.

Implementation Mechanisms

- One approach that has proven effective in encouraging renewable generation is renewable energy payments such as "feed-in-tariffs" (FITs), also known as "Fixed-Rate" or "Advanced" tariffs. Renewable energy payments typically obligate utilities to pay an incrementally higher (above market) price to distributed generators reflecting the cost disadvantages of investing in renewable resources. There could be a single renewable energy payment for a set of renewable sources, or a series of renewable energy payments for specified types of renewable resources. Utilities typically purchase renewable energy from an independent generator at a fixed price over a long-term period. The price is set so the independent generator can earn a return sufficient to cover capital costs and a reasonable profit. Prices vary by technology type (e.g., solar photovoltaic generators typically receive a higher price than utility-scale wind generators) and by location (e.g., wind turbines in regions with lower wind resources may receive a higher price than wind turbines in higher wind resource areas). Renewable energy payments are reviewed on an on-going basis with the goal of reducing the power purchase price as markets for renewable energy generation mature. The widespread use of solar photovoltaics and other renewables in Germany is widely attributed to that country's adoption of a renewable energy payments policies.

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- Information and education: Would include training and education programs and certification for building planners, builders/contractors, energy managers and operators, renewable energy contractors, and state and local officials on the incorporation of distributed renewable generation and solar space/water heat in building projects. Would also include programs for consumer and elementary/secondary education.
- Technical assistance: Assistance in siting, designing, planning renewable systems.

- Funding mechanisms and or incentives: These might include low-interest loan programs, rebates on capital costs, tax incentives, attractive rates for power purchases/net metering, and other incentives.
- Voluntary and or negotiated agreements
- Codes and standards: Common interconnection rules and standards are needed. A national IEEE standard, IEEE #1547, has been adopted to facilitate distributed generation (DG) installations.
- Market based mechanisms: Net metering for some renewable distributed generation systems, and possibly avoided-cost pricing rules for others.
- Pilots and demonstration projects, such as renewable systems in government buildings
- Research and development: Support for development of distributed renewable generation systems research.
- Regulatory: Complete Environmental Portfolio Standard (EPS) process at the State level and complete Sustainable Energy process for the State.
- The Governor's Energy Office could set up an audit program (with audits to be outsourced). Wisconsin's performance-based system could serve as a model for implementation of this policy.

Related Policies/Programs in Place

- A voluntary statewide net-metering policy is in effect (MPSC Case No. U-14346). A commission is currently looking at net-metering, fossil fuel plant efficiencies (generation), and fuel sources, and additional legislation is currently pending (SB 1246).
- Voluntary green energy programs through municipal and major utilities. According to MPSC, there are eight utilities in Michigan that offer green pricing programs.

Type(s) of GHG Reductions

- CO2 reduction from avoided fossil-fueled electricity production.
- Modest reduction in emissions of CH4 from avoided fuel combustion in electricity generation and avoided natural gas pipeline leakage. Likely small reductions in N2O and Black Carbon emissions from avoided fuel combustion in electricity generation.

Estimated GHG Reductions and Costs or Cost Savings

Table RCI-6-A shows the greenhouse gas emissions and costs resulting from this policy option.

Table RCI-6 A: RCI-6 RPS Carve Out Results

RCI-6: Incentives to Promote Renewable Energy Systems Implementation	2015	2025	Units

GHG emission reductions	4.8	14.6	Million tons of CO_2
Cumulative net costs (present value) (2009-2025)		$11,773	Million $
Cumulative emissions reductions (2009-2025)		135.2	Million tons of CO_2
Cost-effectiveness		$84.11	$/ton of CO_2

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The capacity for distributed and non-distributed renewable energy capacity under this RCI scenario are as follows in Table RCI-6-B.

Table RCI-6-B: RCI-6 RPS Carve Out Capacity

	2010	2015	2025
Distributed Generation as % of total electricity sales	1%	2.3%	5%
Total capacity of distributed generation (MW)		1,373	3,360
Total capacity of non-distributed renewables (MW)		1,792	8,297

The Energy Supply Technical Working Group proposed a smaller distributed generation carve out of 0.5% of energy in 2015 and 1.1% of energy in 2025. This smaller carve out results in lower overall costs, as shown in Table RCI-6-D.

Table RCI-6-C: RPS Results Using Smaller ES TWG Carve Out Goals

RCI-6 Incentives to Promote Renewable Energy Systems Implementation	2015	2025	Units
GHG emission reductions	5.0	14.6	Million tons of CO_2
Cumulative net costs (present value) (2009-2025)		$7,018	Million $
Cumulative emissions reductions (2009-2025)		137.5	Million tons of CO_2
Cost-effectiveness		$51.03	$/ton of CO_2

The capacity for distributed and non-distributed renewable energy capacity under this Energy Supply scenario were as follows in Table RCI-6-D.

Table RCI-6-D RPS Capacity Results Using Smaller ES TWG Carve Out Goals

	2010	2015	2025
Distributed Generation as % of total electricity sales	No target	0.4%	1.1%
Total capacity of distributed generation (MW)		240	715
Total capacity of non-distributed renewables (MW)		2,356	9,915

The difference between the RCI-6 and the Energy Supply goal results are shown in Table RCI-6-E. The RCI-6 goals result in higher total net present value costs and a cost effectiveness that is $36.08 lower than would result from the smaller ES goal.

Table RCI-6-E:Difference Between RCI-6 and ES Goals (Positive Number Indicates Higher Cost/Emissions Reduction from RCI-6 Goal)

RPS with DG Carve Carve Out	2015	2025	Units
GHG emission reductions	-0.2	0	Million tons of CO_2
Additional Cumulative net costs (present value) (2009-2025)		$4,755	Million $
Cumulative emissions reductions (2009-2025)		-2.3	Million tons of CO_2
Cost-effectiveness		$36.08	$/ton of CO_2

Data Sources:

- EIA Annual Energy Outlook
- http://www.windpoweringamerica.gov/pdfs/economic_development/2008/mi_wind_benefits_factsheet.pdf
- Conversation with Recovered Energy Inc. (for plasma gasification)

Quantification Methods: New renewables were assumed to displace primarily coal-fired power, as reflected in the inventory and forecast. The values presented above reflect the minimum amounts specified in the recent RPS legislation.

In order to quantify this option, the first step was to identify the phase-in dates and percentages for the RPS. The second step identified the allocation among specific technologies that would fulfill the RPS obligation. These are presented below under Key Assumptions. The next step identified capacity factors and total energy generation from each of these renewable generation sources in order meet the RPS goals. Transmission and Distribution losses were taken into account at this stage for central station generation. In order to estimate costs, capital, Operation and Maintenance as well as fuel costs where relevant were incorporated into the model. These elements combined to produce the estimate of costs for meeting the RPS.

For the 'carve-out' portion of this option, the TWG first determined the magnitude of the carve-out, as a percent of total electrical energy consumption in the state, set at 5% in 2025, phased in from a level of 1% in 2010. This quantity of energy generated by distributed sources was spread across wind, solar PV and biogas based on the assumptions shown above. Based on the capacity factors determined by the TWG, the total required capacity was calculated. Costs are based on levelized cost of electricity from the various sources. The avoided cost of electricity is consistent with all other options. The 5% carve out goal was then compared to the smaller Energy Supply carve out goal.

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Key Assumptions:

- The following portfolio of new renewables was used, based on input from the TWG.

Table RCI-6 B

Type of electricity generation	2015	2025	Units
Wind	80%	75%	of RPS
Biomass	19%	20%	of RPS
Solar PV	1%	3%	of RPS
Plasma gasification	0%	2%	of RPS

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- 5% of new renewable generation must come from distributed sources (smaller than 10 MW). Sensitivities of +/- 2%, i.e., 3% and 7% will also be evaluated.
- The following assumptions were used for each type of generation:

Table RCI-6 C.

	2015	2025
Wind		
Capital cost ($/kW)	$1,650	$2,000
Transmission cost ($/kW)	$120	$120
Capacity factor	25%	25%
Solar Thermal		
Capital cost ($/kW)	$3,004	$2,524
Transmission cost ($/kW)	$80	$80
Capacity factor	25%	25%
Biomass		
Capital cost ($/kW)	$2,800	$2,500
Transmission cost ($/kW)	$80	$80
Capacity factor	90%	90%
Solar PV		
Capital cost ($/kW)	$4,915	$4,331
Transmission cost ($/kW)	$80	$80
Capacity factor	15%	15%
Geothermal		
Capital cost ($/kW)	$1,126	$3,231
Transmission cost ($/kW)	$80	$80
Capacity factor	85%	85%
Plasma Gasification		
Capital cost ($/kW)	$9,601	$9,000
Transmission cost ($/kW)	$80	$80
Capacity factor	85%	85%

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A second set assumptions applies to the distributed generation "carve out." This analysis assumes that 5 percent of the total generation is supplied by small scale distributed generation by the year 2025. This goal is phased in beginning at 1% of total sales beginning in 2010. The analysis assumes that three technologies will fill these goals as follows:

Table RCI-6 D

Technology	Proportion of Goal
Wind	40%
Solar PV	25%
Biogas	35%

These results rely on additional assumptions for capacity factors as follows:

Table RCI-6 E

Technology	Capacity Factor
Wind	18%
SolarPV	15%
Biogas	65%
Geothermal	85%

Finally, capital costs are based on the following assumptions:

Table RCI-6 F

Technology	Proportion of Total
Wind	$5,000
Solar PV	$9,000
Biogas	$3,250

Key Uncertainties

It is unclear at this time how many customers would be interested in installing customer-sited, distributed renewable energy generation.

Additional Benefits and Costs

- Reducing dependence on imported fuel sources
- Reducing energy price increases and volatility
- Reducing peak demand and improving the utilization of the electricity system
- Reducing the risk of power shortages

- Supporting local businesses and stimulating economic development
- Enabling avoidance of energy supply projects
- Reducing water consumption by power plants
- Reducing pollutant emissions by power plants and improving public health
- Increased flexibility of electricity supply for consumers hosting generation.
- Central-station power plant cooling water savings
- Potential local air quality impacts (may be positive or negative, depending on technology)
- Saving consumers and businesses money on their energy bills (and/or offering a new income stream)
- Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes
- Where waste biomass fuels are used, possible reduction in disposal cost, reduction in environmental impacts related to disposal
- Electricity (grid) system benefits, including reduced peak demand, reduced capital and operating costs, improved utilization and performance of the electricity system, reduced pollutant emissions from power plants and related health improvements
- Supporting local businesses (related to renewable system sales, installation, and service, and possibly biomass fuel supply) and stimulating economic development.

Feasibility Issues

- Costs could be very high for monitoring and verification.
- This effort is contingent upon state approval and appropriation of funding and/or funding mechanisms.

Status of Group Approval

Pending

Note: The RCI TWG recognized that this policy option is parallel with and has substantial overlap with policy option ES-1. RCI and ES TWGs are in believed it appropriate to consolidate RCI-6 and ES-1 by considering the RCI emphasis on small-scale, customer-cited distributed generation as a "carve out" within the broader overall goal of ES-1.

Level of Group Support

TBD

Barriers to Consensus

TBD

RCI-7. Promotion and Incentives for Improved Design and Construction in the Private Sector

Policy Description

Revolving loan funds are proven and effective tools for promoting energy efficiency in state and local government facilities. This tool should be utilized in the private sector. This policy would facilitate investment in energy efficiency improvements by providing zero interest loans to local governments that provide the program to private entities. Utility cost savings for the private sector would provide cash flow for repaying principle, with the cost of program for the local government limited to interest payments and loan administration.

Policy Design

Incentives, such as permitting and fee advantages, tax credits, financing incentives (such as "green mortgages"), or other inducements should be used to encourage retrofit of existing residential, commercial, institutional, municipal, and industrial buildings or for the development of non-traditional off-grid low- carbon and carbon-neutral energy sources. The state can work with financial institutions to develop loan tools for these programs. Eligibility for the loans would be factored upon the selection of standards.

Michigan jurisdictions that have adopted enforceable standards will be eligible for managing the loans. The IECC, or alternative standard, must be enforced.

This policy assumes a gradually increasing energy efficiency code for new construction, backed up by strong, consistent enforcement measures.

- Providing incentives, such as permitting and fee advantages, tax credits, financing incentives (such as "green mortgages"), or other inducements to encourage retrofit of existing residential, commercial, institutional, municipal, and industrial buildings or for the development of non-traditional off-grid low and carbon neutral energy sources. The state can work with financial institutions to develop loan tools for these programs.
- Targeting existing buildings for efficiency improvements during both major and minor renovation, through application and enforcement of building codes and/or with tax rebates or other incentives. It may also be appropriate to target existing buildings through time-of-sale and/or change-of-occupancy energy efficiency audits. Such audits can be implemented on a voluntary or mandatory basis, and can be applied toward several purposes (e.g., as a threshold to qualify for incentives, as a screening tool for utility DSM investments, or simply for disclosure in buyer-seller transactions).
- Energy-reduction targets should be periodically reassessed. Potential measures supporting this policy can include outreach and public education, public recognition programs, improved enforcement of building codes, encouraging or providing incentives for energy tracking and benchmarking, performance contracting/shared savings arrangements, technical support resources for implementation, development of a clearinghouse for information on and access

to software tools to calculate the impact of energy efficiency and solar technologies on building energy performance.

- An important piece of any incentive structure for energy efficiency improvements is to include property tax abatements to help offset the immediate raises in property value likely to occur. Examples of proposed tax abatements for USGBC LEED-certified projects are shown in the table below.

Table RCI-7 A.

Real Property Tax Abatement				
LEED	Certified	Silver	Gold	Platinum
Abatement Amount	20%	30%	40%	50%
Personal Property Tax Abatement				
LEED	Certified	Silver	Gold	Platinum
Abatement Amount	20%	30%	40%	50%

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Deleted: New Construction (NC)
Deleted: Core & Shell (CS) ... [2]

Source: DeLong & Bazzani.

- Adhere to periodic upgrades of the national standards applicable to retrofits of residential, commercial, and industrial buildings that are subject to building energy codes; review and upgrade existing state and local building codes accordingly.

Goals: Encouraged by the incentives offered, all residential, commercial, institutional, municipal, and industrial buildings will achieve 15% better energy efficiency than that required by IECC 2006 by 2015 and 30% better efficiency than that required by IECC 2006 by 2025.

Timing: As noted above.

Parties Involved: All parties involved with residential, commercial, institutional, municipal, and industrial buildings.

Implementation Mechanisms

- Technical assistance: Assistance to building planners, engineers, and others in energy-efficient design and in building energy efficiency analysis, possibly including reference materials, performance/design guidelines, and assistance with energy performance analysis software.

- Funding mechanisms and or incentives: Tax credits and/or incentives related to the rate of amortization of expenses related to buildings or renovation. State grants to help cover additional costs of energy performance enhancements for municipal government buildings.

- Voluntary and or negotiated agreements: Agreements by municipal governments, builders to meet higher energy performance standards in exchange for special certification and/or financial incentives.

- Codes and standards: For state-owned or state-leased space, requirements to exceed codes in force (as noted in RCI-4).

- Pilots and demos: Applications of building energy performance improvements (possibly including demonstration of construction of buildings and renovations leading to LEED or other relevant standards) and urban landscaping for government buildings.

Related Policies/Programs in Place

None cited.

Type(s) of GHG Reductions

CO_2 and other energy-related GHGs.

Estimated GHG Reductions and Costs or Cost Savings

The estimated GHG reductions and cost savings are show in the table below

Table RCI-7 B.

RCI-7 Summary: Promotion and Incentives for Improved Design and Construction in the Private Sector	**2015**	**2025**	**Units**
GHG emission reductions	15.63	47.57	Million tons of CO_2
Cumulative net cost savings (present value) (2009-2025)		-$11,693	Million $
Cumulative emissions reductions (2009-2025)		379.9	Million tons of CO_2
Cost-effectiveness		-$30.8	$/ton of CO_2

Note: Negative numbers represent costs savings in all tables.

The RCI-7 is made up of two components, one reflecting a change in building codes to affect new construction and the second affecting renovations to existing buildings. The separate results for these two portions of RCI-7 are laid out in the two tables below.

Table RCI-7 C.

RCI-7: Building Code Portion:	**2015**	**2025**	**Units**
GHG emission reductions	0.45	7.1	Million tons of CO_2
Cumulative net cost savings (present value) (2009-2025)		-$1,389	Million $
Cumulative emissions reductions (2009-2025)		35.9	Million tons of CO_2
Cost-effectiveness		-$38.7	$/ton of CO_2

Table RCI-7 D.

RCI-7: Existing Facility Portion	2015	2025	Units
GHG emission reductions	15.18	40.48	Million tons of CO_2
Cumulative net cost savings (present value) (2009-2025)		-$10,304	Million $
Cumulative emissions reductions (2009-2025)		344	Million tons of CO_2
Cost-effectiveness		-$29.9	$/ton of CO_2

Data Sources: As laid out in quantification memo. Primary data sources are US Department of Energy price and fuel projections as well as data on residential, commercial, institutional, municipal, and industrial energy use, the Michigan 21st Century Energy Plan and Midwest Independent System Operator. In addition, the cost of energy efficiency measures for electricity and natural gas is derived from the American Council for an Energy Efficient Economy. US Census Bureau data is used for projections of population growth in Michigan.

Quantification Methods: This quantification took place in two steps in order to accommodate the goals laid out in this option. These goals require a percentage reduction in energy use for all buildings, for both existing and new buildings. This quantification approach, therefore, examined a scenario for an overall reduction in building energy use in the existing building sector and also examined an overall reduction in energy use (based on an increment above the newest model residential and commercial energy codes) for new buildings. We approached these two scenarios as follows:

For existing buildings: The first step in the quantification was to use EIA data to project industrial, commercial and residential energy consumption over the period through 2025. The second step was to calculate a percentage reduction in energy use for each year, based on the phase in of the 20% and 50% energy use reduction goal for industrial and residential/commercial energy use respectively. Growth factors for residential and commercial floor space came from the EIA and from the Michigan 21st Century Energy Plan, and the next step was to calculate the reduction in energy use for residential and commercial sectors on a per square foot basis. Industrial energy use reductions were calculated for each of the major industrial fuels – fuel oil, natural gas, electricity, LPG and coal. Finally, based on these annual reductions in energy use, the cost, per year, of these reductions was calculated. The net present value of these figures is shown in the summary chart above, along with cumulative greenhouse gas emissions as well as emissions reductions in 2015 and 2025.

For new buildings: The first step in this calculation was to determine the difference between the current Michigan codes and the most up to date national model codes. According to the Building Codes Assistance Project, the 2006 residential code is 30% more stringent (resulting in 30% lower energy use) than the existing Michigan code. The most recent commercial model code is 25% more stringent than the existing code. The second step was to determine the energy savings if a new Michigan code required savings 15% and then 30% greater than these model codes. This involved using an estimate of total energy use in the residential and commercial sectors, and estimating the amount of industrial energy use that would be covered by building codes, using an EIA breakdown of industrial energy consumption, by end use. Finally, these figures were

adjusted to account for an estimate of any new commercial or residential substantial renovations that would be covered by energy codes.

Key Assumptions: The key assumptions for this analysis are as follows:

Table RCI-7 E.

Levelized Cost of Electricity Savings	$30.00	$/MWh
Levelized Cost of Natural Gas Savings	$2.50	$/MMBtu
Avoided Electricity Cost	$60.00	$/MWh
Avoided Natural Gas Cost	$7.70	$/MMBtu

Emissions factors assumed are as follows:

	tCO_2e/billion BTU
LPG - RCI	**61.978**
Coal - RCI	**93.103**
Natural Gas - RCI	**52.909**
Biomass - RCI	**2.500**
Oil - RCI	**68.171**
Landfill Gas - RCI	**0.260**
Biogas - RCI	**5.000**

The quantification model is also based on assumed growth rates for housing that take into account growth in Michigan population as projected by the U.S. Census Bureau. For example, population growth is projected to be 1.02% for 2008-2009. Based on the 21st Century Energy Plan, commercial floor space is expected to grow by 40 million square feet per year.

The following key assumptions related to building codes are as follows:

- Per analysis provided by the Building Codes Assistance Project, the IECC 2006 energy code is assumed to result in 30% greater energy efficiency than the MUEC. The existing ASHRAE standard for commercial space is assumed to be 25% less efficient than the 2004 ASHRAE standard.

- An adjustment for inclusion of renovated commercial and residential space of 1.3 and 1.2 respectively is included, however additional data to confirm this is requested – meaning that for every 1 unit of commercial space built in Michigan and additional 0.3 units of commercial space and 0.2 units of residential space will be renovated and covered by code.

- Enforcement and compliance with Building Codes is assumed to be at 75 percent – in other words, it is assumed that 75 percent of buildings constructed will comply with the relevant code. This figure is consistent with compliance rates in other jurisdictions.

Data Sources: As laid out in quantification memo. Primary data sources are US Department of Energy, the Michigan 21st Century Energy Plan and Midwest Independent System Operator as well as Building Codes Assistance Project.

Quantification Methods: This quantification approach is set out in two parts: (1) an assumption that building codes for new and substantially renovated commercial and residential space (as well as affected industrial space) are made more stringent compared to IECC 2006 by 15% by 2015 and 30% by 2025; and (2) that there is an overall, phased-in reduction in electricity and gas use in existing buildings of 15% by 2015 and 30% by 2025. The overall reduction from these two sets of measures are summed to produce a reduction for the full measure. Phase in of goals is assumed to happen on a straight line basis according to the timeline laid out in the goals and timing section.

Key Assumptions: As in RCI-4 and per analysis provided by the Building Codes Assistance Project, the IECC 2006 energy code is assumed to result in 30% greater energy efficiency than the MUEC. The existing ASHRAE standard for commercial space is assumed to be 25 less efficient than the 2004 ASHRAE standard. As noted above, an adjustment for inclusion of renovated commercial and residential space of 1.3 and 1.2 respectively is included.

Key Uncertainties

None cited.

Additional Benefits and Costs

None cited.

Feasibility Issues

None cited.

Status of Group Approval

Pending

Level of Group Support

TBD

Barriers to Consensus

TBD

RCI-8. Net Metering For Distributed Generation

Policy Description

Net metering in a broad sense refers to policies that provide the opportunity for individuals or businesses to obtain financial benefits from small electricity generators installed at their home or business location. A basic form of net metering allows the consumer to deliver any excess generation from its small generator to the utility through the standard energy meter, which runs both forward and backward during the billing period. The customer is charged by the utility only for the net amount of energy taken from the utility during the period, which provides a financial benefit at the utility's retail charge for all electricity produced by the customer generator (i.e., the displaced utility kWh's plus credit on future bills for power beyond the customer's usage delivered to the grid). Variations on the basic form of net metering include: (i) limiting the benefit to the value of grid power offset by customer generation during the billing period (no carryover); (ii) a net purchase and sale method that measures flow separately in each direction, with customers paying the utility retail rate and receiving a wholesale rate for the excess generation; and (iii) one or more methods combined with a separate charge to maintain the customer's contribution for distribution and any transmission related costs.

Whatever form it takes, the purpose of a net metering arrangement is to provide financial benefits to the customer which can offset part of the cost of the small generator.

Distributed generation (DG) refers to small electric generation sources dispersed throughout the grid on the premises of utility customers. It is sometimes referred to as on-site, dispersed or decentralized generation. Benefits of DG can include reduced transmission losses because the power is generated near the point of use, a reduction in the size of distribution power lines, and environmental benefits where renewable or cleaner fuel sources are used. Examples include rooftop solar panels, small wind turbines, natural gas fueled micro-turbines, or micro-hydroelectric generators.

Policy Design

A voluntary, statewide net metering program was adopted by the MPSC in March, 2005 (Case No. U-14346) limited to renewable energy facilities with capacity under 30 kW and capped at the greater of 100 kW or 0.1% of a utility's peak load. Qualifying facilities must be sized no larger than necessary to meet the customer's needs. Several billing configurations are permitted at the option of the utility starting with the basic net metering form, with credits for excess generation being for allowed up to 1 year. Any excess credits after one year go to the utility to offset program costs. All regulated investor-owned and cooperative electric utilities are participating.

The Federal Energy Policy Act of 2005 requires the state to consider adopting a new standard whereby all public utilities would have to offer net metering service to their customers. The MPSC is considering whether to adopt this standard and is also considering possible changes to the voluntary program described above.

The Michigan Legislature is considering measures that would establish a statewide program requirement with larger size limits on the facilities and total program, a mandate to use the basic net metering format, and related measures on interconnection of facilities.

Goals: Secure 2.3% of statewide summer peak electrical demand (~1,373 MW[1]) through net metered distributed generation sources by 2015, increasing to (~3,360 MW) by 2025.

Timing: As noted above.

Parties Involved: MPSC, utilities, distributed generation sources.

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Implementation Mechanisms

Not applicable.

Related Policies/Programs in Place

- Newly passed legislation (Public Act 295 of 2008) requires a statewide net metering program to be developed and implemented. Specifically, the legislation includes the following provisions: (1) MPSC order and rule promulgation in 180 days; program applies to regulated electric utilities and AESs; all classes eligible; 10 year minimum program life; capacity limited to customer need; (2) program limit at 1% of in-state peak load for prior year; allocated 50% to systems < 20 kW, 25% to systems from 20 kW-150 kW and 25% above 150 kW; notify MPSC when program reaches limit; (3) select eligibility in the order applications are received (where eligibility means renewable energy systems < 150 kW or methane digesters < 550 kW); (4) no retaliatory electric service denials; (5) program to include uniform interconnection, code compliance (e.g. IEEE 1547), uniform application, true net metering for systems ≤ 20 kW (single meter), modified net metering above 20 kW (power supply component of retail rate); (6) records maintained by utility/AES.

- Michigan 21st Century Energy Plan

- A voluntary, statewide net metering program was adopted by the MPSC in March, 2005 (Case No. U-14346) as noted above.

Note: With the August 6, 2008 MPSC order in U-15316, the discussion might shift to unspecified maximum net metering potential up to the total amount of utility generation. (Net metering is defined as available to all customers to offset up to 100% of utility supplied energy during a billing period.) The uncertainty lies with what level of subsidy is needed to have customers will be willing to incur the capital costs and other duties of operating their own generation. This order may end discussion around currently pending legislation SB 1246. Net metering could be considered as available, with further decisions/filings coming by the end of 2009.

[1] According to Michigan's *21st Century Plan,* 2% of statewide summer peak electricity demand in 2006 of 23,756 MW equates to approximately 475 MW.

Type(s) of GHG Reductions

Carbon dioxide (CO_2)

Estimated GHG Reductions and Costs or Cost Savings

The estimated GHG reductions and costs are show in the table below.

Table RCI-8 A.

RCI-8: Distributed Generation	2015	2025	Units
GHG emission reductions	0.69	1.52	Million tons of CO_2
Cumulative net costs (present value) (2009-2025)		$1,145	Million $
Cumulative emissions reductions (2009-2025)		14	Million tons of CO_2
Cost-effectiveness		$82	$/ton of CO_2

Data Sources:

- EIA Annual Energy Outlook
- Data provided by Michigan Public Service Commission

Quantification Methods: Distributed generation would displace primarily coal-fired electricity. Solar hot water and geothermal energy would displace 50% natural gas heating and 50% electricity heating.

Key Assumptions:

The following portfolio of new distributed generation was used, based on input from the TWG:

Table RCI-8 B.

Type of electricity generation	2015	2025	Units
Wind	40%	40%	of new distributed generation
Solar PV	25%	25%	of new distributed generation
Biogas	35%	35%	of new distributed generation

- Solar hot water installations: 7,875 homes by 2015; 45,000 by 2025
- Geothermal installations: 7,875 homes by 2015; 45,000 by 2025
- The following assumptions were used capital costs for each type of generation

Table RCI-8 C.

Capital Costs	2015	2025	Units
Solar hot water	$4,459	$5,203	$/installation
Geothermal	$16,000	$16,000	$/installation
Wind (distributed)	$6,000	$5,000	$/kW
Solar PV (distributed)	$10,000	$10,000	$/kW
Biogas	$2,500	$2,500	$/kW

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- Biogas heat rate: 10,000 Btu/kWh

Key Uncertainties

- Future capital costs

Status of Group Approval

Pending

Note: The RCI TWG recognized that this policy option has substantial overlap with policy option ES-12. The RCI and ES TWGs believed it appropriate to consolidate RCI-8 as part of ES-12.

Level of Group Support

TBD

Barriers to Consensus

TBD

RCI-9. Training and Education for Building Design, Operation, and Construction

Policy Description

Policy option RCI-4 addresses the establishment of more stringent energy codes for energy efficiency in new construction. However, pro-active education programs for building trade professionals are a necessary component to successfully improving energy efficient construction practices. Improved construction standards resulting in energy efficient buildings can only be accomplished if building code officials and building trade contractors, sub-contractors and facility operators are properly educated in building envelope and mechanical performance building and maintenance techniques. Properly trained building code officials, building trade professionals and facility operators will help assure consistent quality control and enforcement of Michigan's enhanced building codes and market-based building performance practices.

Training programs are also needed to respond to periodic upgrades of the national standards, as well as to changes in state and local building codes. Training should cover new residential, commercial, and industrial buildings plus retrofits that are subject to building energy codes.

Policy Design

Goals: Provide up-to-date building performance, code compliance, and mechanical equipment training to building code officials, homebuilders, commercial construction contractors, heating/ventilation & air conditioning contractors, electricians, plumbers, carpenters, remodelers, other construction trade professionals, and facility operators.

Training programs should focus on (1) Proper construction and maintenance practices with building envelope and mechanical performance standards as established in revised Michigan building energy codes (see RCI-4 and RCI-7); (2) Proper construction and maintenance practices with building envelope and mechanical performance standards as identified in "beyond code" building programs.

Develop a certification program for code officials, builders, and contractors and facility operators who successfully complete energy efficiency and related "green building" training programs

Timing: Begin funding in 2009, with initial training to begin in 2009.

Parties Involved: Building code officials, homebuilders, commercial construction contractors, heating/ventilation & air conditioning contractors, electricians, plumbers, carpenters, remodelers, other construction trade professionals, and facility operators, as well as representatives of colleges, vocational/technical colleges, professional societies, and training providers and professionals.

Implementation Mechanisms

- Establish training and education programs for code officials. Training will cover compliance methods for Michigan energy codes. Code official training should be made available in all

areas of the State for maximum coverage of code officials. Provide certification for successful completion of code compliance training.

- Establish training and education programs for building professionals including but not limited to homebuilders, commercial construction contractors, heating/ventilation & air conditioning contractors, electricians, plumbers, carpenters, remodelers, other construction trade professionals. Training will cover compliance methods for Michigan energy codes. Building trade training should be made available in all areas of the State for maximum coverage of building professionals. Provide certification for successful completion of code compliance training.

- Establish training and education programs for facility operators. Training will cover compliance methods for Michigan energy codes. Facility operator training should be made available in all areas of the State for maximum coverage. Provide certification for successful completion of code compliance training.

- Establish "beyond code" training and education programs for building professionals including but not limited to homebuilders, commercial construction contractors, heating/ventilation & air conditioning contractors, electricians, plumbers, carpenters, remodelers, other construction trade professionals. This training should be made available in all areas of the State for maximum coverage of building professionals. Provide certification for successful completion of "beyond code" compliance training. "Beyond code" programs could include but are not limited to Energy Star, Leadership in Energy and Environmental Design (LEED), Environments for Living, SystemVision and GreenBuilt.

- Refer to RCI-5 for recommendations addressing related consumer education programs.

- If not covered under RCI-5, consider establishing training and education for municipal, county and regional planning officials. Training will cover general compliance methods for Michigan energy codes as well as general "beyond code" principles. Investigate implementing such programs by developing sections in to MSU's online "Citizen Planner" online training used across the state.

- Funding sources for all training and education programs could originate from utility sponsored demand side management programs, legislatively designated funding programs (system benefit charges), and future Department of Energy funds as allocated though the State Energy Office.

Related Policies/Programs in Place

- Limited code official and building trades training has been offered in the past in Michigan. Some of location specific programs have been funded by the Department of Energy through the State Energy Office. This includes "Rebuild Michigan" training offered through DOE grants sand facilitated through MI Energy Office.

- The Michigan Association of Home Builders' "GreenBuilt" program is available for a fee to homebuilders desiring to build beyond code and incorporate green building principles.

- Various "beyond code" performance seminars have been offered by the Energy and Environmental Building Association (EEBA) for a fee to participants.

- None of these past programs have comprehensively addressed the education and training needed to transform the practices of building code officials, building trade professionals, and facility operators resulting in considerable energy savings with residential, commercial and industrial buildings.

Type(s) of GHG Reductions

Not applicable.

Estimated GHG Reductions and Costs or Cost Savings

Not applicable; this policy option was not quantified.

Key Uncertainties

None cited.

Additional Benefits and Costs

None cited.

Feasibility Issues

- Funding must be adequate to provide training at all levels: building code officials, building construction professionals, facility operators, etc.

Status of Group Approval

Approved

Deleted: Pending

Level of Group Support

Unanimous consent

Deleted: TBD

Barriers to Consensus

None

Deleted: TBD

RCI-10. Water Use and Management

Policy Description

A considerable amount of energy is used to pump, treat, and deliver water across the state. This policy options aims to reduce energy consumption by reducing overall water use and improving the efficiency and management of the State water supply and water management facilities (i.e. wastewater treatment, potable water, irrigation, etc.).

Policy Design

The State's primary users of water are currently agricultural consumers, municipal consumers, and industrial users. Significant amounts of energy are used to pump this water from underground aquifers and open water sources to users, and to treat it in wastewater facilities after it is used. Improved water use and handling efficiencies will reduce the amount of electricity used for water distribution. A reduction in electricity use will reduce energy costs for users and associated GHG emissions from power plants.

Five specific recommendations are provided:

1. Accelerate investment in water use efficiency: Implement best management practices and efficient water management practices, and provide incentives for implementation of water management improvement measures. Coordinate with the investments in energy efficiency methods of water handling. Start in the areas of the state with most energy-intensive water use cycles. Consider developing a statewide water and wastewater savings plan, based on a thorough assessment of water and wastewater options in all water using sectors.

2. Increase the energy efficiency of all water and wastewater treatment operations. Develop long-term programs to better mesh with the long-term investments in water and wastewater infrastructure. For example, for water pumping, in particular, two specific options are worth considering:

    - Pump Testing Program. A large amount of energy is likely expended by a small number of older well pumps that are often run until they failure, many years after it would be economic to replace them. Incentives combined with the provision of energy efficiency information through the existing pump testing program could lead to significant energy savings.
    - Encouraging Pump Design/Planning/Maintenance Best Practices Study in Rapidly Growing Areas. Many municipalities, especially small but rapidly growing cities, lack the experience or resources to optimize the specifications of new pumps to reduce energy consumption. An effort to benchmark effective pump specification, management, and maintenance procedures across municipalities and to share best practices with emerging cities could yield large savings.

3. Increase energy production by water and wastewater agencies from renewable sources such as in-conduit hydropower and biogas. Add generation from solar and wind resources to water and wastewater projects where applicable.

4. Encourage and create incentives for technologies with the capability to reduce water use associated with power generation. Included would be zero or low-water-use technologies and renewable energy technologies, as well as energy efficiency technologies that reduce electricity consumption.

5. Ensure that power plants use the best management practices and economically feasible technology available to conserve water (via siting, evaluation, permitting or other processes).

Goals:

- Require that water utilities track and report energy usage, and conduct a comprehensive study of potential improvements in energy efficiency by water utilities.
- Improve the average energy efficiency of water utilities in the state (in terms of kWh used per gallon pumped) by 20% over the course of three years.
- Achieve a 10% overall water savings by 2025.

Timing: Implement program in 2010, complete in 2013.

Parties Involved: Water systems and utilities, MDEQ and other state officials.

Implementation Mechanisms

- Specific implementation strategies are to be determined based on the completion of a thorough assessment of water and wastewater options in all water-using sectors.

Related Policies/Programs in Place

- The MDEQ Water Bureau maintains a number of water management programs and policies.

Type(s) of GHG Reductions

GHG reductions (primarily CO_2) would result from avoided fuel and electricity consumption for pumping, treating, and delivering water.

Estimated GHG Reductions and Costs or Cost Savings

The RCI TWG was unable to quantify this option due to an absence of data, and accordingly recommended the tracking and reporting requirement incorporated into the policy design goals. Assuming implementation of this recommendation, or that water utilities' energy use data is otherwise made available, the link between water conservation and utility energy savings – and associated GHG reductions – can then be assessed.

Key Uncertainties

None cited beyond data availability.

Additional Benefits and Costs

- All ancillary benefits and costs associated with other energy efficiency options.
- Reduced cost of electricity for water pumping and displaced fuels costs for users of gas captured from waste treatment facilities.
- Central station power plant cooling water savings
- Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes

Feasibility Issues

None cited.

Status of Group Approval

Approved

Deleted: Pending

Level of Group Support

Unanimous consent

Deleted: TBD

Barriers to Consensus

None

Deleted: TBD

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Core & Shell (CS)	20%	30%	40%	50%
Commercial Interior (CI)	0	0	0	0
Existing Building (EB)	20%	30%	40%	50%

Page 37: [2] Deleted **Kenneth Colburn** **12/12/2008 5:34:00 PM**

Core & Shell (CS)	0	0	0	0
Commercial Interior (CI)	20%	30%	40%	50%
Existing Building (EB)	20%	30%	40%	50%