Chapter 5
Residential, Commercial, and Industrial Sectors

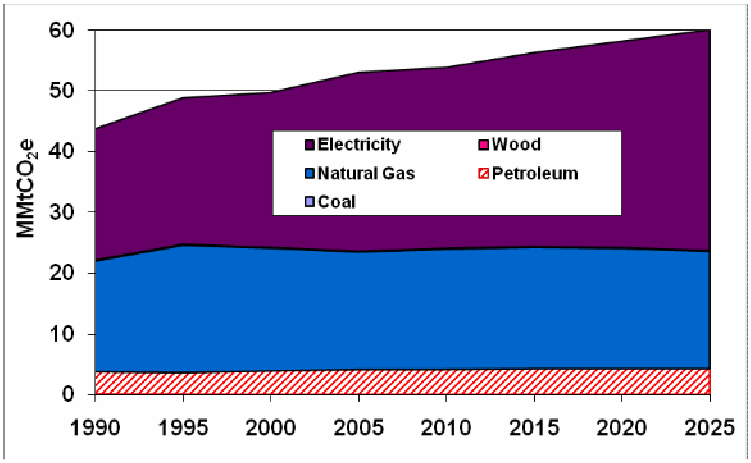
Overview of Greenhouse Gas Emissions

Activities in the residential, commercial, and industrial (RCI) sectors produce greenhouse gas (GHG) emissions when fuels are combusted to provide space heating, process heating, and other applications. In 2005, combustion of oil, natural gas, and coal in the RCI sectors contributed about 60 million metric tons of carbon dioxide equivalent ($MMtCO_2e$) to Michigan's gross GHG emissions. These sectors contributed 24% of the 248 MMt of GHG that the state emitted overall, slightly higher than the national average of 22% for these sectors. Residential sector emissions make up approximately 40% of RCI GHG emissions; commercial sector emissions, approximately 18%;, and industrial sector emissions, approximately 42%.

Considering only the direct emissions that occur within buildings and industries, however, ignores the fact that nearly all electricity sold in Michigan is consumed for RCI activities. If the emissions from all three subsectors of RCI are included (i.e., direct fuel use, emissions associated with electricity consumption, and industrial processes), they total about 68% of the state's gross GHG emissions in 2005. Therefore, the state's future GHG emissions will depend heavily on future trends in the consumption of electricity and other fuels in the RCI sectors.

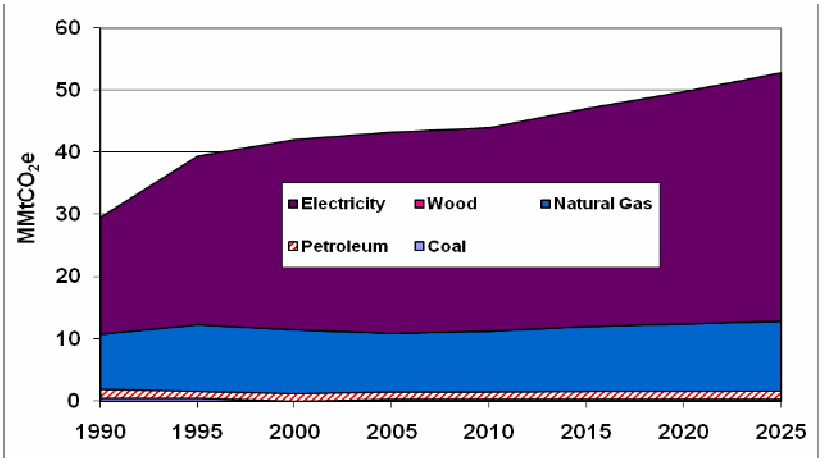
Figures 4-1 through 4-3 show the trend in GHG emissions from the RCI sectors through 2025. The figures also show the relative shares of GHG emissions, by fuel. Overall, emissions for the RCI sectors (excluding those associated with electricity consumption) are expected to increase by 4.1% between 2005 and 2025. For the 20-year period beginning in 2005 and ending in 2025, the fastest growth in GHG emissions is in the commercial sector, which is forecast to grow by 1.0% annually. GHG emissions in the residential and industrial sectors are expected to grow by 0.6% per year during this period.

Figure 4-1. Historical and projected residential greenhouse gas emissions in Michigan: 1990–2025*



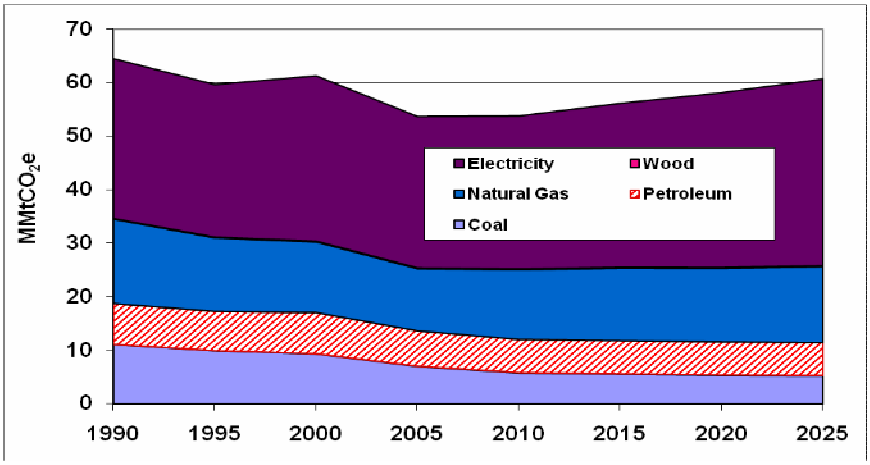
* Emissions associated with the direct use of natural gas, petroleum, coal, and wood and the consumption of electricity. Source: Consolidated Michigan Inventory and Forecast.

Figure 4-2. Historical and projected commercial sector greenhouse gas emissions in Michigan: 1990–2025*



* Emissions associated with the direct use of natural gas, petroleum, coal, and wood and the consumption of electricity. Source: Consolidated Michigan Inventory and Forecast.

Figure 4-3. Historical and projected industrial greenhouse gas emissions in Michigan: 1990–2025*



* Emissions associated with the direct use of natural gas, petroleum, coal, and wood and the consumption of electricity. Source: Consolidated Michigan Inventory and Forecast.

The projections for the period beginning in 2005 show almost no change in the overall shares of emissions that the different sectors produce. The residential sector produces 35% of total RCI GHG emissions in both 2005 and 2025; the commercial sector, produces 29% in 2005 and 30% in 2025; and the industrial sector, 36% in 2005 and 35% in 2025.

Much of the growth in GHG emissions over the period can be attributed to an average 0.94% annual growth in electricity demand over the 2005–2025 period for the RCI sectors. GHG emissions from electricity for each of the three sectors are projected to grow by 1.1% per year between 2005 and 2025.

Emissions associated with the generation of electricity to meet RCI demand account for about 55% of the emissions for the residential sector, 72% of the emissions for the commercial sector, and 52% of the emissions for the industrial sector, on average, over the 1990–2025 period. From 1990 to 2025, natural gas consumption is the next-highest source of emissions for the residential and commercial sectors, accounting, on average, for about 38% and 24% of total emissions, respectively. For the industrial sector, emissions associated with the combustion of coal, natural gas, and petroleum account for about 13%, 23%, and 12%, respectively, on average, from 1990 to 2025.

Key Challenges and Opportunities

The principal means to reduce RCI emissions include improving energy efficiency, substituting electricity and natural gas with lower-emission energy resources (such as biomass and wind), and various strategies to decrease the emissions associated with electricity production (see Chapter 3, Energy Supply Sectors). The state's limited pursuit of energy efficiency until recent years offers abundant opportunities to reduce emissions through programs and initiatives to improve the efficiency of buildings, appliances, and industrial practices. The advantages of having "low-hanging fruit" in the form of low-cost energy efficiency opportunities in the RCI sectors are countered by an underdeveloped private sector that will likely be responsible for scoping, implementing, and evaluating energy efficiency projects. These "green collar" jobs require special training and equipment that will take time for firms within the state to acquire.

Michigan has recently embarked on statewide energy efficiency programs in response to concerns about energy costs and carbon emissions. Public Act (P.A.) 295, enacted in 2008, adopted a requirement that electric utilities reduce their retail sales by 1% and natural gas utilities reduce their sales by 0.75% by 2015. The Michigan Public Service Commission is now developing rules to implement these programs.

The Michigan Climate Action Council (MCAC) has identified significant opportunities for reducing GHG emissions growth attributable to the RCI sectors in the state. These include expanding or launching utility demand-side management programs for electricity and natural gas and removing disincentives to efficiency investments by utilities; adopting incentives, assistance, and updated building codes to increase energy efficiency in buildings; adopting incentives and net metering for renewable energy systems implementation; enhancing consumer education and professional training and certification programs; and devoting greater attention to the energy requirements associated with water use and management in the state. The MCAC has also identified significant opportunities to reduce GHG emissions through policies addressing electricity production; these are detailed in Chapter 3.

Overview of Policy Recommendations and Estimated Impacts

The MCAC unanimously recommends a set of 10 policies for the RCI sectors, several of them in close concert with parallel policies in the energy supply (ES) sector. These policies offer significant, cost-effective GHG emissions reductions within the state. These recommendations and results are summarized in Table 4.1. The GHG emission reductions and costs per ton of GHG reductions for five of these policies were quantified. The quantified policy recommendations could lead to emission savings from reference case projections of:

- 64.9 $MMtCO_2e$ per year by 2025, and a cumulative savings of 523.9 $MMtCO_2e$ from 2009 to 2025, and
- Net cost savings of over $13 billion through 2025 on a net present value basis.[1] The weighted-average costs of these policies are a net savings of nearly $25/$tCO_2e$.

Because most energy use occurs in buildings, the recommended policies center on improving energy efficiency in buildings. There is overlap among the policies as to the types of activities and equipment they cover, but the text following Table 4-1 provides general guidance on how the policies complement each other. In brief, however, the policies focus on the following:

- RCI-1 provides for utility-operated incentives for energy efficiency that will reduce energy use.
- RCI-2 and RCI-7 lay out a set of policies to reduce overall, statewide energy use in buildings.
- RCI-3 focuses on setting regulatory policies that will establish rate structures to incentivize utilities to invest in energy efficiency, or remove disincentives that are inherent in existing utility rate structures for utilities to invest in energy efficiency.
- RCI-4 focuses on making building energy codes more stringent.
- RCI-5 and RCI-9 increase the human capital component of energy efficiency by providing education and training for energy users and energy professionals across the state.
- RCI 6 and RCI-8 focus on encouraging small-scale renewable energy capacity and generation in the state.
- RCI-10 focuses on reducing energy use among water utilities in the state.

Table 4-1. Summary list of policy recommendations

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/$tCO_2e$)	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	Unanimous
RCI-2	Existing Buildings Energy Efficiency Incentives, Assistance, Certification, and Financing	17.6	53.8	428.6	–$12,107	–$28	Unanimous
RCI-3	Regulatory (PSC) Changes To Remove Disincentives and Encourage Energy Efficiency Investments by Investor Owned Utilities (IOUs)	*Not Quantifiable*					Unanimous
RCI-4	Adopt More Stringent Building Codes for Energy Efficiency	3.6	9.8	82	–$2,865	–$35	Unanimous
RCI-5	Michigan Climate Challenge and Related Consumer Education Programs	*Not Quantifiable*					Unanimous

[1] The net cost savings, shown in constant 2005 dollars, are based on fuel expenditures; operations, maintenance, and administrative costs; and amortized, incremental equipment costs. All net present value analyses here use a 5% real discount rate.

Policy No.	Policy Recommendation	GHG Reductions ($MMtCO_2e$)			Net Present Value 2009–2025 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2015	2025	Total 2009–2025			
RCI-6	Incentives To Promote Renewable Energy Systems Implementation	0.7	1.5	14.0	$1,958	$140	Unanimous
RCI-7	Promotion and Incentives for Improved Design and Construction in the Private Sector	15.6	47.6	380	–$11,693	–$31	Unanimous
RCI-8	Net Metering for Distributed Generation	*Fully incorporated into RCI-6*					Unanimous
RCI-9	Training and Education for Building Design, Construction, and Operation	*Not Quantifiable*					Unanimous
RCI-10	Water Use and Management	*Not Quantifiable*					Unanimous
	Sector Total After Adjusting for Overlaps*	**21.8**	**64.9**	**523.9**	**–13,014**	**–24.8**	
	Reductions From Recent Actions	**Figures adjusted include recent actions**					
	Sector Total Plus Recent Actions	**21.8**	**64.9**	**523.9**	**–13,014**	**–24.8**	

PSC = Public Service Commission; IOUs = Investor Owned Utilities; GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/tCO_2e$ = dollars per metric ton of carbon dioxide equivalent.

Negative values in the Net Present Value and the Cost-Effectiveness columns represent net cost savings.

The numbering used to denote the above policy recommendations is for reference purposes only; it does not reflect prioritization among these important policy recommendations.

There is overlap in the expected emission reductions and costs among some of the policies within the RCI sectors, as well as between policies in the RCI and ES sectors. The goals laid out in RCI-2 for a 50% decrease in residential and commercial energy use and a 20% decrease in overall industrial energy use are more ambitious than similar, but smaller, goals laid out in RCI-1 and RCI-7. As a result, there is overlap among these three goals, and the most ambitious goals that are laid out in RCI-2 overlap completely with those in RCI-1 and RCI-7. The final accounting for emission reductions avoids double counting by subtracting emission reductions from RCI-1 and RCI-7 from the total. RCI-1 also overlaps with ES-3, but to avoid double counting, the emission reductions produced by ES-3 are subtracted from the total.

RCI-4, focusing on new building energy codes rather than financial incentives, does not overlap with other policies.

RCI-6, focusing on the effect of a renewable energy generation requirement from small-scale renewable energy resources, does not overlap with other policies.

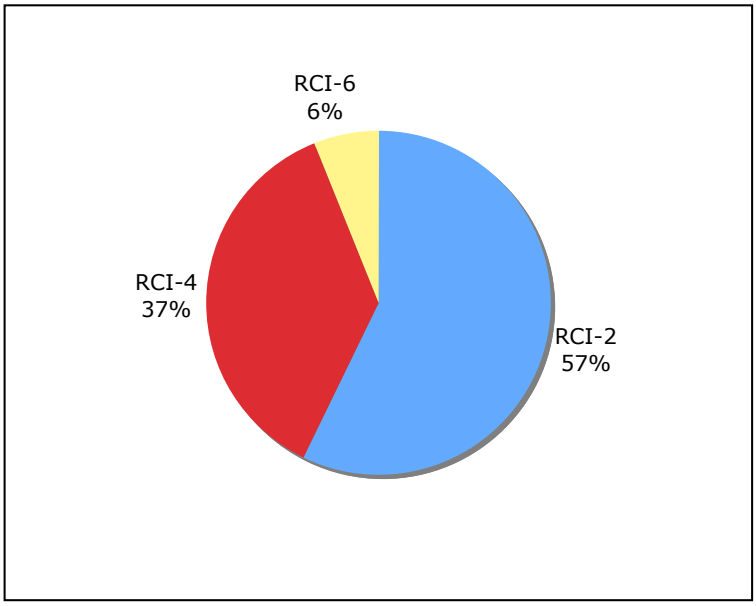
There are two primary interactions between the RCI and ES sector policies, both concerning the clean energy portfolio components in policy recommendation ES-1 (Renewable Portfolio Standard). Most of the RCI policies (especially RCI-2) decrease overall electricity demand. As the renewable energy portfolio requirements are based on meeting a percentage of load with specific renewable energy, co-firing, or nuclear resources, the costs of ES-1 would be reduced by decreasing energy demand through these RCI policies. Also, an additional feedback is that certain ES policies (including ES-1) will have the effect of reducing the GHG emissions associated with energy production, so that RCI policies that target electricity use will have a reduced impact on overall emissions. However, this impact has not been reflected in the analysis.

The policy recommendations for the RCI sectors are affected by both state and federal policies that incentivize or mandate more efficient use of energy. The federal Energy Independence and Security Act of 2007 was signed into law in December 2007. This law contains several requirements that will reduce GHG emissions as it is implemented over the next few years. These reductions were factored into the MCAC's quantification of GHG emission reductions and costs or savings.

The GHG reductions for these savings are projected to be 73.7 $MMtCO_2e$, for 2025 using the RCI Technical Work Group's (TWG's) CO_2 methodology. In addition, through P.A. 295 of 2008, Michigan enacted energy efficiency programs that will reduce GHG emissions by 3.3 $MMtCO_2e$ in 2015 using the RCI TWG CO_2 methodology and 24.6 $MMtCO_2e$ in 2025. The GHG emission reductions reported here are *net of and additional to* these existing actions. Appendix I details the assumptions and approach used to estimate reductions from these existing actions in Michigan.

Figure 4-4 shows the cumulative emission reductions from the five policy recommendations that have been quantified for the entire planning period for 2009–2025, after accounting for overlaps among these policies. There is a great deal of variation in the emission reductions from the policy recommendations. RCI-2, with its ambitious targets for energy efficiency, will have by far the greatest effect. RCI-4 will be important, but because it applies only to new construction, will be limited in its overall effect. RCI-6 is focused most heavily on new, but small-scale, generation.

Figure 4-4. Aggregate cumulative GHG emission reductions from recommended MCAC Residential Commercial and Industrial (RCI) policies: 2009–2025*



* These are the reductions from the policy recommendations, net of overlaps between recommendations. Note, options not shown in this chart were either unquantifiable or were not counted because of overlap.

The policy recommendations described briefly below, and in more detail in Appendix I, not only result in significant emission reductions and costs savings, but offer a host of additional benefits as well. These benefits include savings to consumers and businesses on energy bills, which can

have macroeconomic benefits; reduction in spending on energy by low-income households; reduced peak demand, electricity system capital and operating costs, risk of power shortages, energy price increases, and price volatility; improved public health as a result of reduced pollutant and particulate emissions by power plants; reduced dependence on imported fuel sources and correspondingly greater energy security; and green collar employment expansion and economic development.

For the RCI policies recommended by the MCAC to yield the levels of savings described here, they must be implemented in a timely, aggressive, and thorough manner. This means, for example, not only putting the policies themselves in place, but also attending to the development of supporting policies that are needed to help make the recommended policies effective. While the adoption of the recommended policies can result in considerable benefits to Michigan's environment and citizens, careful, comprehensive, and detailed planning and implementation, as well as consistent support, of these policies will be required if these benefits are to be achieved.

Residential, Commercial, and Industrial Sectors Policy Descriptions

RCI-1. Utility Demand-Side Management for Electricity and Natural Gas

By unanimous consent, the MCAC recommends increasing investment in electricity and natural gas demand-side management (DSM) programs through programs run by investor owned, municipal, and co-operative utilities, as well as energy service companies, large customers, or others. Decreasing consumption will have immediate impacts on GHG 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 such DSM efforts as energy efficiency, energy conservation, and peak demand reduction actions. Energy efficiency and conservation are the lowest-cost resources for reductions in electricity and natural gas use by the RCI sectors and thus for reduction of GHGs. There is a long track record of cost-effective energy efficiency initiatives at the local, state, and regional levels 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—P.A. 295 of 2008—was adopted as the MCAC was concluding its efforts.

This policy recommendation considers energy-saving goals for electricity and natural gas, and the policy, program, and funding mechanisms that might be used to achieve these goals. It is intended to work in tandem with other RCI and ES policies recommended by the MCAC; in particular, it echoes ES-3, the Energy Optimization Standard.

The goal of this policy is to bring the *total overall* demand reduction of existing actions, recent actions (including notably newly adopted P.A. 295), 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 3-year, weather-normalized, business-as-usual forecast that does not incorporate these goals. The policy would be implemented in three phases between 2009 and 2015, followed by a fourth, long-term phase. 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.

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

By unanimous consent, the MCAC recommends improving the energy efficiency of existing buildings in Michigan. 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 would reduce energy use 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 GHG 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.

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

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

The MCAC unanimously recommends that regulatory changes be implemented to remove disincentives and encourage energy efficiency investments by investor-owned utilities (IOUs). Economic regulation of IOUs by the Michigan Public Service Commission (MPSC) limits their earnings potential by determining an authorized level of earnings and by establishing the allowed earnings as a percentage of the utility rate base (i.e., the value of assets, such as 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 investment return on the rate base), regulators typically assign most of the revenue requirement to predicted unit sales of gas or electricity. This method creates financial incentives for the utility to increase—not decrease—its unit sales and to make investments in the traditional physical assets of the business.

Successful energy conservation and efficiency programs reduce unit sales and could thus reduce utility revenues. If program costs are expensed, there can be no incremental earnings on the program investment, no matter how successful it is. Thus, an energy efficiency program offers limited "upside" potential to utilities and poses a significant risk of harming profitability.

Cooperative and municipal systems apply a different earnings model, but may risk diminished cash flow from reduced sales. Utilities' financial incentives are to maximize unit sales, not reduce them.

This 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 based on the number of customers, rather than units sold; (3) allowing sales figures to be updated between rate cases; and (4) applying a system benefits charge to all distribution service customers to pay for the efficiency program. Items (2) and (3) are examples of "decoupling" revenue requirements from a projected unit sales level. Decoupling utility unit sales from profits in rate setting and/or 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. Item (4) ensures that all customers receiving deliveries from the local distribution utility contribute to the program costs, since the benefits are societal.

This policy is not quantifiable at this time. Its goal is to have the MPSC undertake and complete as soon as possible, but no later than December 2010, 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. This should be conducted in close coordination with the MCAC's ES policy recommendations, and in keeping with the provisions of P.A. 295.

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

The MCAC unanimously recommends that a higher energy standard should be required for newly constructed buildings in the state in order to reduce energy costs—the largest operations and maintenance expense. Newly constructed buildings today become the energy-consuming building stock of tomorrow. Strong building energy codes can be an effective way to eliminate the use of "least-efficient" energy practices 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 consumption by 50% by 2010 and incrementally increase this standard for new buildings to "carbon neutrality" in 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, and New Mexico; and numerous counties and cities. Also, the 2030 Challenge is supported by the American Society of Heating, Refrigerating & Air-Conditioning Engineers. 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 would require Michigan to achieve a 30% improvement beyond the requirements of the 2006 International Energy Conservation Code (IECC).

The goal of this policy is to strengthen Michigan's 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 2006 IECC. In addition, thermal envelope inspections should be mandatory for all new building construction to ensure that they are built as designed and energy efficiency performance objectives are met in the completed structures. Michigan's current codes and standards can be used as baseline references; the baseline year for energy-saving comparisons should be 2008. Michigan should also 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.

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

The MCAC unanimously recommends that the state lead by example regarding education and outreach by fully implementing the Michigan Climate Challenge (MCC) as one of its key efforts in this area. Doing so would 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 Michigan 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. The toolkit will contain specific recommendations for reducing GHG emissions and identify measures that can minimize the impacts of climate change, so as to be better prepared to adapt to its effects.

Each local government official, small business owner, and citizen plays an integral part in this effort. Together, these individual actions will reduce the risks to the environment now and in the future. The MCC will provide the opportunity and resources for communities, organizations, businesses, and individuals to recognize climate change risks and commit to specific actions to reverse those changes, enabling Michigan to move forward in addressing climate change.

RCI-6. Incentives To Promote Renewable Energy Systems Implementation

By a unanimous vote, the MCAC recommends that Michigan set as a minimum target the addition of small-scale, customer-sited, renewable distributed generation (DG) consistent with its overall annual goals for renewable generation. Customer-sited DG powered by renewable energy sources provides electricity system benefits, such as avoided capital investment and avoided transmission and distribution losses, while also displacing fossil-fuel generation and thus reducing GHG emissions. Increasing the use of renewable DG in Michigan can be achieved through a combination of regulatory changes and incentives.

DG technologies exist across the spectrum of RCI facilities. Customer-sited renewable DG 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 DG can include direct incentives or requirements for power purchases, market

incentives related to the pricing of electricity output by renewable DG, 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.

Supporting measures for this policy 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 recommendations RCI-5 and Cross-Cutting Issues [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.

The goal of this recommendation is to increase total annual electrical generation from small-scale, customer-sited distributed renewable sources in Michigan by 2% by 2025. This recommendation is designed to be accomplished in parallel with and as an addition to the 25% Renewable Portfolio Standard goal set out in policy recommendation ES-1. Total energy supply as a result of these two policies would be 27% from renewable sources.

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

Revolving loan funds are proven and effective tools for promoting energy efficiency in state and local government facilities. The MCAC unanimously recommends that this tool should be utilized in the private sector as well. This recommendation would facilitate investment in energy efficiency improvements by providing zero-interest loans to local governments, which, in turn, would extend the program to private entities. Energy cost savings for private-sector participants would provide cash flow for repaying the principal, with the cost of the program for the local governments limited to interest payments and loan administration.

Incentives, such as permitting and fee advantages, tax credits, and financing incentives (e.g., “green mortgages” or property tax abatements for buildings certified to Leadership in Energy and Environmental Design standards) should be used to encourage retrofit of existing residential, commercial, institutional, municipal, and industrial buildings or 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 based on the energy standards chosen. 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.

Encouraged by the incentives offered, the goal of this recommendation is to have all residential, commercial, institutional, municipal, and industrial buildings achieve 15% better energy efficiency than that required by the 2006 IECC by 2015 and 30% better efficiency than that required by the 2006 IECC by 2025.

RCI-8. Net Metering for Distributed Generation

By a unanimous vote, the MCAC recommends implementing aggressive net metering policies to encourage increased electric generation capacity from DG sources. Net metering enables individuals or businesses to obtain financial benefits from small electricity generators installed at their home or business location. It allows consumers to deliver any excess generation from their small generators to the utility through the standard energy meter, which runs both forward and backward during the billing period. The utility charges customer generators only for the net amount of energy they take from the utility during the period, recognizing at retail rates all the electricity the customer generators produce. There are several variations on this basic form of net metering that may be considered.

A voluntary, statewide net metering program was adopted by the MPSC in March 2005 (Case No. U-14346), but was limited to renewable energy facilities under 30-kilowatt (kW) capacity and was capped at 100 kW or 0.1% of a utility's peak load. Qualifying facilities could 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 one 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 other possible changes to the voluntary program described above.

The Michigan legislature is considering requiring a statewide program with larger size limits on the facilities and the total program cap, a mandate to use the basic net metering form, and related measures on interconnection of facilities. The goal of this recommendation is to have 392 megawatts (MW) of electric generation capacity from DG sources installed by 2015, increasing to 1,344 MW by 2025.

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

The MCAC unanimously recommends that Michigan provide up-to-date building performance, code compliance, and mechanical equipment training, and develop a certification program for code officials, builders, and contractors and facility operators who successfully complete energy efficiency and related green building training programs. Such training programs should be offered 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 recommendations RCI-4 and RCI-7); and (2) proper construction and maintenance practices with building envelope and mechanical performance standards, as identified in "beyond code" building programs.

Proactive education programs for building trade professionals are a necessary component for 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, subcontractors, 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 ensure 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 national standards, as well as to changes in state and local building codes. Training should cover new RCI buildings, plus retrofits that are subject to building energy codes. The goal of this recommendation is to begin initial training under such a program in 2009.

RCI-10. Water Use and Management

By unanimous vote, the MCAC recommends that water utilities be required to track and report their energy use, and that a comprehensive study be conducted to identify and adopt potential energy efficiency improvements by water utilities. A considerable amount of energy is used to pump, treat, and deliver water across the state. However, too little is currently known about water utilities' energy use and how greater efficiency could be achieved. This recommendation aims to fill those knowledge voids and reduce energy consumption by: (1) reducing overall water use, and (2) improving the efficiency and management of the water supply and management facilities (wastewater treatment, potable water, irrigation, etc.) in the state.

The state's primary users of water are currently agricultural consumers, municipal consumers, and industrial users. Energy is necessary 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, and thus reduce energy costs for users and associated GHG emissions from power plants.

Five specific recommendations are detailed in Appendix I: (1) accelerate investment in water use efficiency; (2) increase the energy efficiency of all water and wastewater treatment operations; (3) increase energy production by water and wastewater agencies from renewable sources, such as in-conduit hydropower and biogas; (4) encourage and create incentives for technologies with the capability to reduce water use associated with power generation; and (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).

The goal of this recommendation is to improve the average energy efficiency of water utilities in the state (in terms of kilowatt-hours used per gallon pumped) by 20% between 2010 and 2013, and to achieve a 10% overall water savings by 2025.