

# Chapter 4

## Residential, Commercial, and Industrial Sectors

### Overview of Greenhouse Gas Emissions

Activities in the residential, commercial, and industrial (RCI) sectors produce GHG emissions when fuels are combusted to provide space heating, process heating, and other applications. In 2005, combustion of oil, natural gas, coal, and wood in the RCI sectors contributed about 18% (about 15 million metric tons of carbon dioxide equivalent [MMtCO<sub>2</sub>e]) of Arkansas' gross greenhouse gas (GHG) emissions. This sector is the third largest source of GHG emissions in the state.<sup>1</sup> Industrial Process emissions are rising primarily due to the increasing use of hydrofluorocarbons (HFCs) as substitutes for ozone-depleting chlorofluorocarbons (CFCs). The production of nitric acid results in nitrous oxide (N<sub>2</sub>O) emissions. In addition, sulfur hexafluoride (SF<sub>6</sub>) is released in the use of electric power transmission and distribution (T&D) equipment. Together, industrial process emissions, including cement production and chemical manufacturing, account for an additional 4.7% of Arkansas's gross GHG emissions (4.03 MMtCO<sub>2</sub>e).

Considering only the direct emissions that occur within buildings and industries, however, ignores the fact that nearly all electricity sold in the state is consumed as the result of RCI activities. If the emissions from all three subsectors of RCI are included (i.e., direct fuel use, emissions associated electricity consumption, and industrial processes), they total about 47% 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 these sectors.

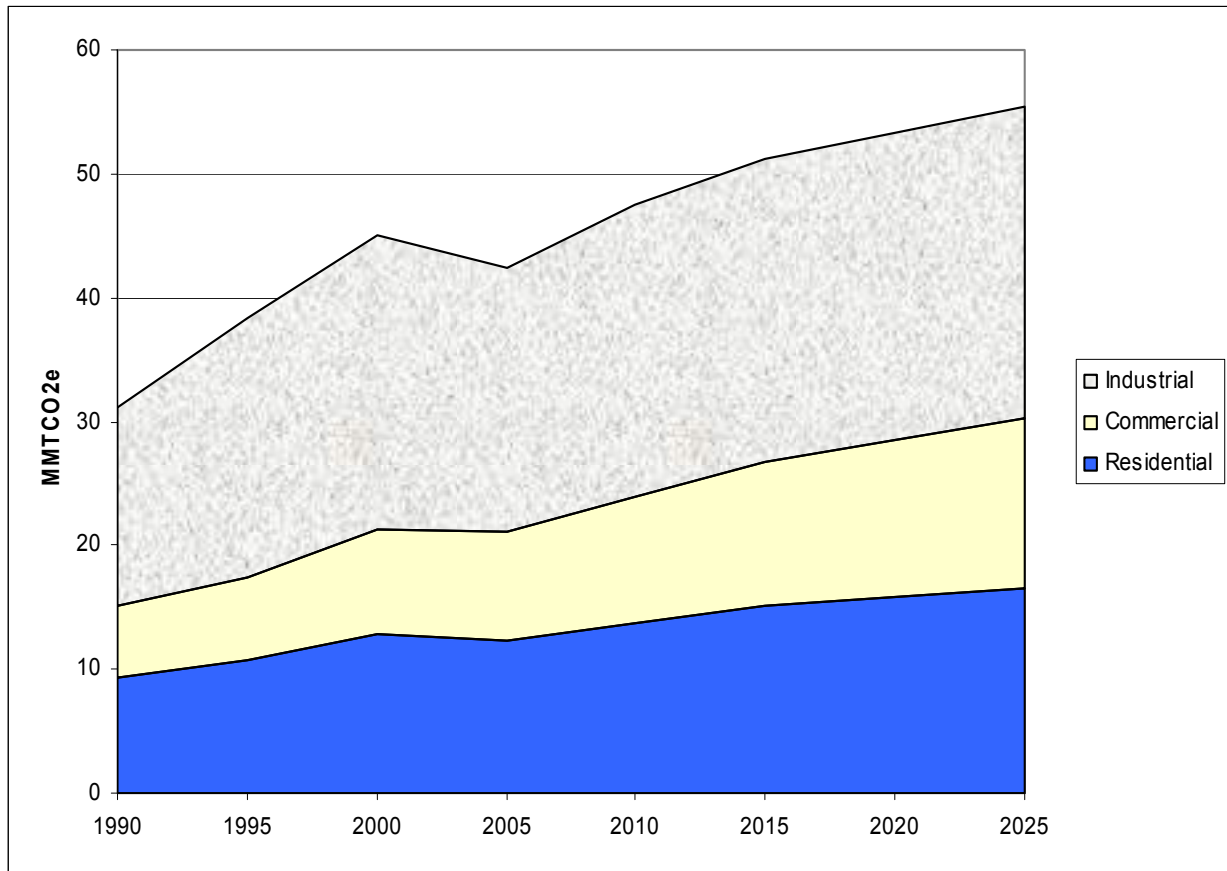
Figure 4-1 shows the growth in GHG emissions by sector through 2025, including electricity use. For the 20-year period, the fastest growth in GHG emissions is the commercial sector, which is forecasted to grow at a 2.7% annual rate. GHG emissions in the residential sector are expected to grow at 1.7%, and the industrial sector has the slowest growth in emissions, at slightly less than 1% a year. The net result of these differential growth rates is that industrial GHG emissions decline from about 50% of Arkansas' total emissions to about 45% by 2025, and emissions from the commercial sector grows by over 50%, from nearly 9 MMtCO<sub>2</sub>e to over 13 MMtCO<sub>2</sub>e by 2025.

Much of the growth in GHG emissions over the period can be attributed an average 1.4% annual growth in electricity demand over the 2005–2025 period for the RCI sectors. However, electricity-related GHG emissions grow by 1.8% per year due to the addition of fossil fuel-based generation resources. Residential GHG emissions from electricity grow by 2% per year, commercial emissions grow by 3% per year, and industrial emissions grow by 0.9% per year.

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<sup>1</sup> Emissions associated with the electricity supply sector (discussed in Chapter 5) have been allocated to each of the RCI sectors for comparison of those emissions to the emissions associated with direct fuel consumption. Note that this comparison is provided for information purposes, and that emissions estimated for the electricity supply sector are not double counted in the total emissions for the state.

**Figure 4-1. Historical and projected residential, commercial, and industrial greenhouse gas emissions by sector in Arkansas: 1990–2025\***

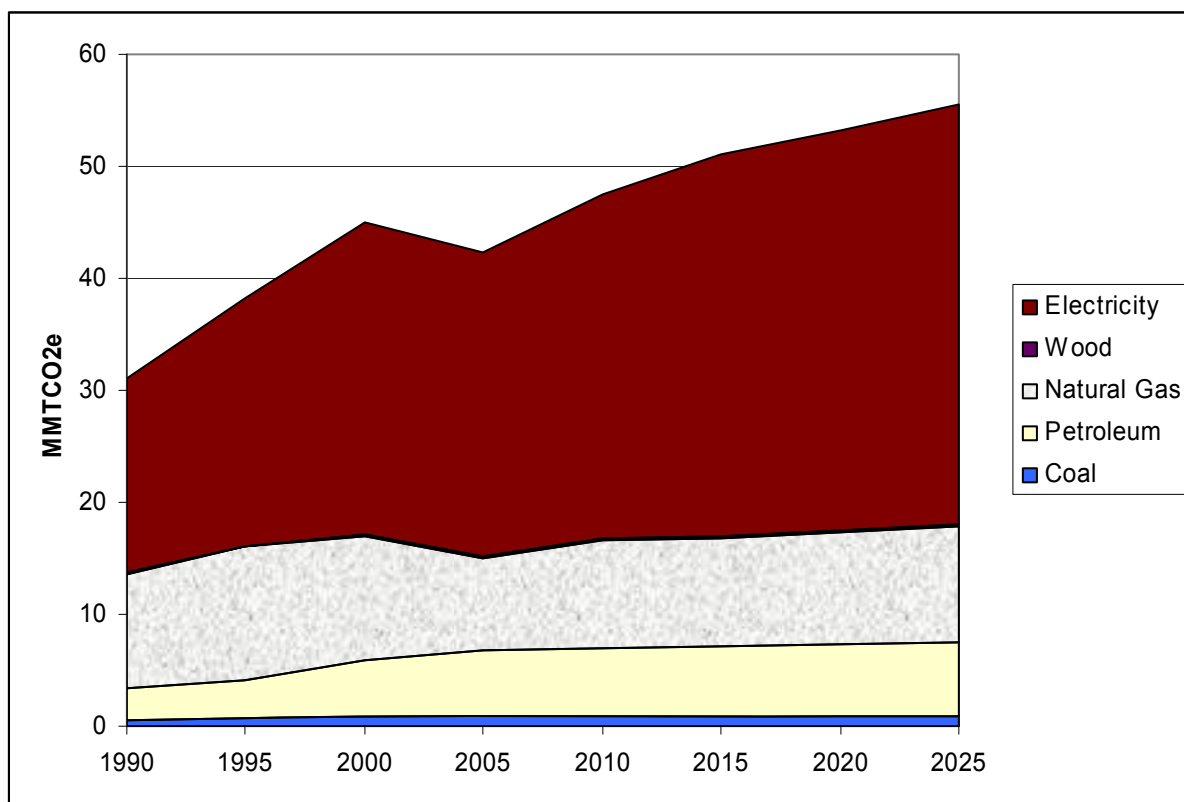


MMtCO<sub>2</sub>e - million metric tons of carbon dioxide equivalent

\* Emissions associated with the direct use of natural gas, petroleum, coal, and wood and the consumption of electricity. Source: Tables 3a, 4a, and 5a in the Consolidated Arkansas Inventory and Forecast.

Figure 4-2 shows the growth in GHG emissions by fuel type through 2025. For the 20-year period, emissions in the sector are dominated by electricity supply, and rise by 37% from 27 MMtCO<sub>2</sub>e in 2005 to 37 MMtCO<sub>2</sub>e in 2025. Direct emissions from coal are forecasted to be essentially unchanged (not including coal use for electricity generation), and emissions from natural gas and petroleum increase by 1.3% and 0.6% per year, respectively. The emissions data from natural gas mask large differences in the growth of the use of this fuel. Residential natural gas consumption is expected to stay constant from 2005 to 2025, while commercial and industrial gas use increases at 1.9% and 1.6% per year, respectively.

**Figure 4-2. Historical and projected residential, commercial, and industrial GHG emissions by type of fuel in Arkansas, 1990–2025\***



MMtCO<sub>2e</sub> - million metric tons of carbon dioxide equivalent

\* Emissions associated with the direct use of natural gas, petroleum, coal, and wood and the consumption of electricity. Wood-related GHG emissions are too small to be distinguished. Source: Tables 3a, 4a, and 5a in Consolidated Arkansas Inventory and Forecast.

## 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 5, Energy Supply). 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 take time for firms within the state to acquire.

Arkansas has recently embarked on statewide energy efficiency programs in response to concerns about energy costs. Ark. Code Ann. §§23-3-401 *et seq.* authorizes the Arkansas Public Service Commission (APSC) to develop energy efficiency and conservation programs to address high energy costs. In January 2007, APSC issued its energy efficiency and conservation plan

rules. The electric and gas utilities proposed a series of programs in July 2007, and the APSC approved several energy efficiency and conservation programs. The total cost of the initial quick-start programs is approximately \$18,530,924 for the initial 2-year period ending December 31, 2009. Municipal and cooperative electric utilities are also currently pursuing energy efficiency programs.

The Arkansas Governor's Commission on Global Warming (GCGW) has identified significant opportunities for reducing GHG emissions growth attributable to the RCI sectors in Arkansas. These include expanding or launching energy efficiency programs for electricity, natural gas, and other direct-use fuels; regularly updating building codes; requiring state and local governments to implement beyond-code building practices and green power purchase/generation; and actively promoting adoption of combined heat and power in the state. The GCGW has also identified significant opportunities to reduce GHG emissions through policies addressing electricity production, such as tapping into the state's biomass potential (detailed in Chapter 5).

## **Overview of Policy Recommendations and Estimated Impacts**

The GCGW recommends, with varying levels of support, a set of 13 policies for the RCI sectors that 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 11 of these policies were quantified. The quantified policy recommendations could lead to emission savings from reference case projections of:

- 9.2 MMtCO<sub>2</sub>e per year by 2025, and a cumulative savings of 70 MMtCO<sub>2</sub>e from 2009 to 2025, and
- Net cost savings of over \$1.3 billion through 2025 on a net present value basis.<sup>2</sup> The weighted-average costs of these policies are a net savings of nearly \$19/MMtCO<sub>2</sub>e.

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. RCI-5 increases the human capital component of energy efficiency by providing education and training for energy users across the state. RCI-2b is the most general recommended policy that deploys electric energy efficiency across all types of energy use: space conditioning, windows, appliances, and water heating and other end uses and technologies. Efficiency improvements occur through improvements in building shells (RCI-1, RCI-3, RCI-4) and weatherization (RCI-6), or enhancing the efficiency of energy-consuming equipment within the buildings (RCI-2b, RCI-10). RCI-9 is unique because it targets both building- and transportation-related emissions. It decreases total GHG emissions by reducing sprawl, encouraging high-performance buildings, and promoting alternative work schedules, such as telecommuting and 4-day work weeks for government employees.

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<sup>2</sup> 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.

**Table 4-1. Summary List of Policy Recommendations**

No.	Policy Recommendation	GHG Reductions (MMtCO <sub>2</sub> e)			Net Present Value 2009–2025 (Million \$)	Cost-Effectiveness (\$/tCO <sub>2</sub> e)	Level of Support
		2015	2025	Total 2009–2025			
RCI-1*	Improved Building Codes	0.2	0.6	5.3	–\$118	–\$22	Super Majority (1 objection)
RCI-2a*	Utility and Non-Utility DSM for Peak Use Electricity	0.01	0.02	0.21	–\$11	–\$52	Super Majority (1 objection)
RCI-2b*	Utility and Non-Utility DSM and Energy Efficiency for Electricity	1.1	4.1	30.5	–\$1,450	–\$48	Majority (7 objections)
RCI-3a*	Reduced Energy Use in New and Retrofitted State-Owned Buildings	0.1	0.6	4.3	–\$42	–\$10	Super Majority (1 objection)
RCI-3b*	Reduced Energy Use in State-Owned Buildings	0.2	0.4	4.2	–\$46	–\$11	Super Majority (1 objection)
RCI-4a*	Promotion and Incentives for Improved New Building Design and Construction	0.2	1.1	7.0	–\$160	–\$23	Super Majority (1 objection)
RCI-4b*	Promotion and Incentives for Improved Existing Buildings	0.0	0.3	1.7	–\$39	–\$23	Super Majority (1 objection)
RCI-5*	Education for Consumers, Industry Trades, and Professions	<i>Not Quantified</i>					Unanimous
RCI-6 <sup>†</sup>	Incentives and Funds To Promote Renewable Energy and Energy Efficiency	0.2	0.8	5.1	–\$118	–\$23	Super Majority (1 objection)
RCI-7*	Green Power Purchasing for Consumers	0.2	0.6	4.7	\$61	\$13	Unanimous
RCI-8*	Nonresidential Energy Efficiency	0.4	1.0	8.6	\$583	\$68	Unanimous
RCI-9 <sup>†</sup>	Support for Energy-Efficient Communities, Including Smart Growth	<i>Not Quantified</i>					Unanimous
RCI-10 <sup>†</sup>	Energy-Savings Sales Tax	0.0	0.1	0.7	–\$33	–\$47	Super Majority (1 objection)
	<b>Sector Total After Adjusting for Overlaps</b>	<b>2.55</b>	<b>9.24</b>	<b>69.77</b>	<b>–\$1,313.37</b>	<b>–\$18.82</b>	
	<b>Reductions From Recent Actions (ESIA Title II requirements for new appliances and lighting)</b>	<b>0.34</b>	<b>0.89</b>	<b>8.02</b>	<b><i>Not Quantified</i></b>		
	<b>Sector Total Plus Recent Actions</b>	<b>2.89</b>	<b>10.13</b>	<b>77.79</b>	<b>–\$1,313.37</b>	<b>–\$18.82</b>	

DSM = demand-side management; EISA = Energy Independence and Security Act of 2007; GHG = greenhouse gas; MMtCO<sub>2</sub>e = million metric tons of carbon dioxide equivalent; \$/tCO<sub>2</sub>e = 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.

\* The GCGW approved this option at Meeting #9 (September 9, 2008); 18 members present and voting (one by phone).

† The GCGW approved this option at Meeting #10 (September 25, 2008); 21 members present and voting (none by phone).

The policy recommendations also differ among the customer classes they target. RCI-3 requires government to lead the rest of the state by example by requiring that new construction and retrofits of existing building stock meet high-performance building requirements. RCI-6 targets low-income residential customers who tend to use energy inefficiently, but are typically hard to reach for utility energy efficiency programs. This policy recommendation also provides incentives for the purchase of new energy-efficient ENERGY STAR-manufactured homes through 2025.

Several of the policy recommendations address the characteristics of “upstream” generation that supplies electricity to the RCI sectors. RCI-8 pursues opportunities to capture waste heat from commercial and industrial processes to generate electricity using combined heat and power projects. RCI-7 incentivizes residential consumers to switch to renewable sources of power, such as hydropower and biomass for their electricity needs.

The policy recommendations developed by the GCGW were designed to minimize overlap between policy recommendations. Government high-performance building standards (RCI-3a and RCI-3b) have little overlap with utility efficiency programs. The private-sector building standards policy recommendations (RCI-4a and RCI-4b) go above and beyond what is required under the building code policy recommendation (RCI-1). The energy efficiency equipment deployed under RCI-10 is additional to utility-funded programs (RCI-2b), as it is being funded by a state tax holiday for certain equipment.

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 energy supply (ES) sectors. RCI-6 provides additional energy efficiency funding and implementation mechanisms for low-income residential customers. Well-designed utility and non-utility energy efficiency/demand-side management programs will target these populations, but not at the level identified under this policy recommendation so RCI-6 is assumed to overlap with RCI-2b.

There are two primary interactions between the RCI and ES sector policies, both concerning the clean energy portfolio components in policy recommendation ES-3a (Renewable Portfolio Standard). Most of the RCI policies (especially RCI-2b) decrease overall electricity demand. As the renewable energy portfolio requirements are based on meeting a percentage of load with specific renewable energy or nuclear resources, the costs of ES-3a would be reduced by reducing energy demand through these RCI policies. Finally, an additional feedback is that certain ES policies (including ES-3a) 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 is small and has not been reflected in the analysis.

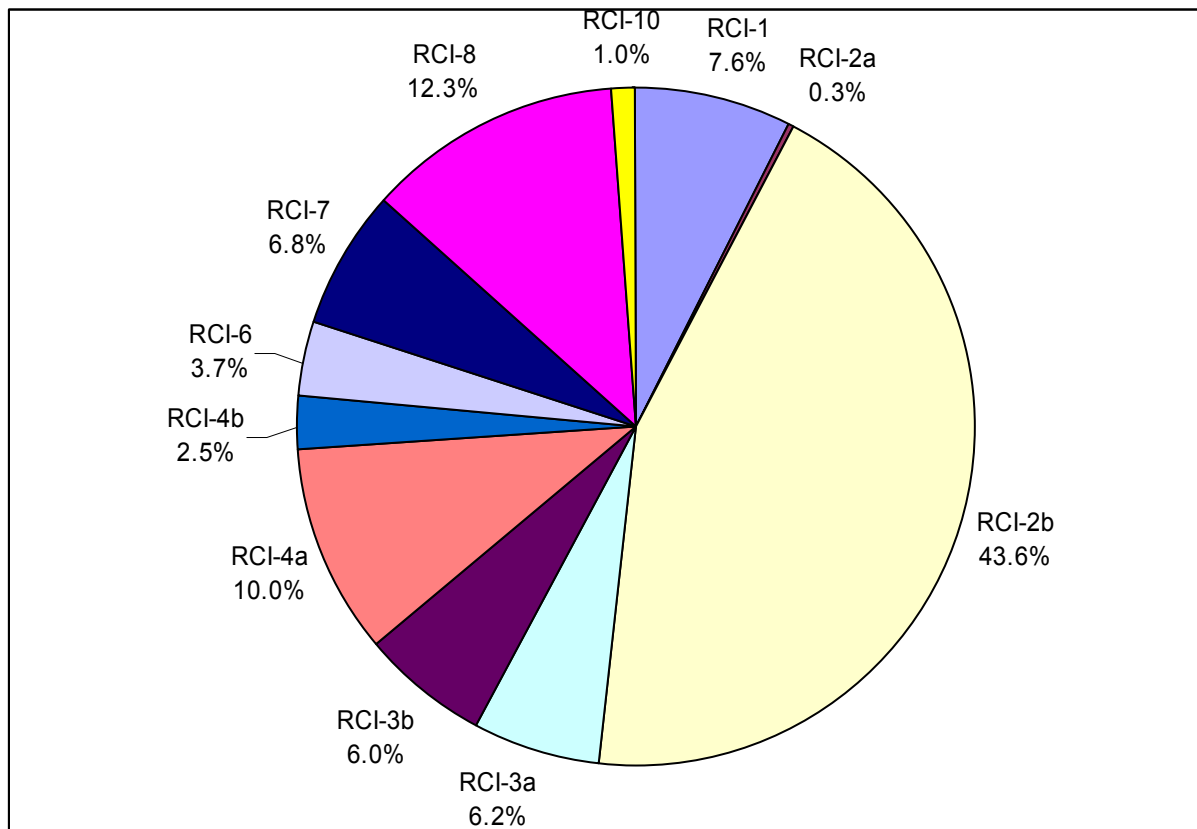
The policy recommendations for the RCI sectors are affected by both state and federal policies that incentivize or mandate more efficient use of energy. The federal Energy Independence and Security Act (EISA) of 2007 was signed into law in December 2007. This law contains several requirements that will reduce GHG emissions as they are implemented over the next few years. During the GCGW process, sufficient information was identified (e.g., implementation schedules) to estimate GHG emission reductions associated with implementing energy efficiency requirements for new appliances and lighting in Arkansas under Title III of the EISA.

The net effect of these reductions was estimated at 1,900 gigawatt-hours (GWh) of electricity and 1,200 billion British thermal units (BBtu) of natural gas savings in Arkansas by 2025. The associated GHG reductions for these savings are project to be 0.9 MMtCO<sub>2</sub>e for the year 2025 using the RCI TWG CO<sub>2</sub> methodology. Note, however, that GHG emission reductions associated with the Title IV (Energy Savings in Buildings and Industry) and Title V (Energy Savings in Government and Public Institutions) requirements of the federal Energy Independence and Security Act of 2007 have not been quantified because of the uncertainties in how they will be implemented. It is expected that the Title IV and Title V requirements will overlap with some of the RCI policy recommendations, especially RCI-2b, RCI-3a, RCI-3b, RCI-4a, and RCI-4b.

Arkansas has also started energy efficiency programs to reduction energy consumption within the state. The Arkansas Public Service Commission has authorized quick-start programs of approximately \$18,530,924 for the initial 2-year period ending December 31, 2009. Municipal and cooperative electric utilities are also currently pursuing energy efficiency programs. These actions are expected to reduce Arkansas GHG emissions by 0.20 MMtCO<sub>2</sub>e in 2009 using the RCI TWG CO<sub>2</sub> methodology. The Annex to the RCI Appendix details the assumptions and approach used to estimate reductions from existing actions in Arkansas and from EISA (2007).

Figure 4-3 shows the cumulative emission reductions from the eight policy recommendations that have been quantified for the entire planning period for 2009–2025. There is a great deal of variation in the emissions reductions from the policy recommendations. Public-sector operations in the state (including schools and local government buildings) are significant GHG emitters. Together, the aggressive government building policy recommendations (RCI-3a and RCI-3b) contribute about 12% of total GHG reductions. Combined, the private-sector high-performance building recommendations (RCI-4a and RCI-4b) provide only about 12.5% of the total reductions, because of assumptions about the new building construction rate and the rate of “down to the studs” building retrofits. RCI-2b will also contribute to building-related GHG reductions, as minor retrofits and equipment upgrades deploy energy-efficient equipment under this policy recommendation. The two energy supply policy recommendations (RCI-7 and RCI-8) contribute almost 20% of the total GHG reductions.

**Figure 4-3. Aggregate GHG emission reductions, 2009–2025\***



\* These are the reductions from the policy recommendations, net of overlaps between recommendations.

The policy recommendations described briefly below, and in more detail in Appendix G, 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 green collar employment expansion and economic development.

For the RCI policies recommended by the GCGW 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 Arkansas’ environment and consumers, 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 Improved Building Codes

By a super majority vote, the GCGW recommends that Arkansas take action to improve the state's building codes. Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing a major renovation. Almost half of all U.S. GHG emissions annually are associated with the operation of RCI buildings, along with the embodied energy of building materials.<sup>3</sup> Given the long lifetime of most buildings, improving the energy efficiency of buildings in the state—for example, by strengthening building energy codes—will have a considerable immediate and ongoing impact on reducing building-sector GHG emissions. Although Arkansas law currently requires statewide use of relatively up-to-date building codes as defined by the International Energy Conservation Code, updates to the codes need to be made regularly, and code enforcement in the state needs to be strengthened. Also, the state can improve codes that are not limited to heating, ventilation, and air conditioning (HVAC) systems, including daylighting design to reduce lighting needs, electric lighting design, building envelope design, and integrated building design strategies.

The GCGW recommends that the state take the following actions to improve building codes: expand statewide adoption and enforcement of existing building codes, follow national codes without amendments in Arkansas, and update Arkansas codes in concert with the timing of the national codes. Also, the GCGW targets include a 10% improvement in energy efficiency through educational programs for builders, building inspectors, and other building industry professionals to ensure that the existing codes are implemented and enforced.

### RCI-2a Utility and Non-Utility DSM for Peak-Use Electricity

By a super majority vote, the GCGW recommends that Arkansas take action to reduce GHG emissions from peak-use electricity. Peak-use electricity serves consumers when demand is highest during the daytime on weekdays and weekends. Demand-side management (DSM) programs can mitigate the need to install new peak-use generation resources by reducing the amount of electricity sold during peak periods, and in turn reducing GHG emissions. These reductions can be achieved in two ways: (1) install energy-efficient equipment, such as high-efficiency air conditioners, lighting, and chillers (types of equipment deployed under RCI-2b); and (2) reduce GHG emissions by reducing absolute levels of energy use by consumers due to higher prices.

This policy recommendation deploys equipment, such as real-time pricing and smart metering, that gives consumers information about their energy use and enables them to better rationalize

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<sup>3</sup> U.S. Department of Energy, Energy Information Administration. "U.S. Energy Consumption by Sector." Available at: [http://www.architecture2030.org/building\\_sector/index.html](http://www.architecture2030.org/building_sector/index.html).

their use. These schemes reflect rational pricing that results in price increases during peak periods, leading consumer to make energy-saving choices. For example, instead of using an electric clothes dryer, higher prices give customers rewards for using line drying or other low-energy-consuming practices.

The goal of this policy is for Arkansas to implement energy efficiency programs and DSM to reduce growth in electricity peak demand by 5% per year by 2010 and by 10% per year by 2015. These activities are expected to be additional to load curtailment programs that already exist or are being planned by utilities throughout the state.

#### **RCI-2b Utility and Non-Utility DSM and Energy Efficiency for Electricity**

With a majority vote, the GCGW recommends that Arkansas increase the efficiency of electricity use in the state through a goal of meeting all new electric load growth in Arkansas through energy efficiency and DSM. This policy involves implementing new or expanding existing electric utility energy efficiency programs for all sectors, including the RCI and agricultural sectors. To encourage the utilities to offer and promote these programs, the APSC should adopt rate designs and cost recovery mechanisms that are necessary and in the public interest, to decouple the recovery of the utilities' revenues from the amount of electricity or natural gas sold. Further, the APSC should identify appropriate incentives that are necessary and in the public interest, to further encourage the utilities to offer energy efficiency, conservation, and DSM programs.

The efficiency with which electricity is used today can be improved in countless applications across all sectors and throughout the state. These efficiency improvements can lead to increased productivity for a fixed amount of electricity input, or can produce the same results using less electricity. Arkansas' efforts to date offer substantial room for improvement. As a result, the state has low-cost opportunities compared to states with well-established energy efficiency programs. National studies suggest that Arkansas has substantial potential to improve the efficiency of its energy use. To investigate the potential for energy efficiency specifically for Arkansas, this policy recommends undertaking a comprehensive study of supplies in the state.

The goal of this policy is for Arkansas to implement energy efficiency programs and DSM to eliminate electric utility demand growth over a realistic phase-in period. Statewide electricity demand growth is projected to be 1.4% through 2030. Therefore, energy efficiency and DSM programs that deliver demand reductions of 1.4% of total sales (based on a prior 3-year running average) would be phased in through 2015. Interim targets are to be linear reductions of projected load growth: 16% of new load growth will be met with efficiency and DSM in 2010, 32% in 2011, 48% in 2012, 64% in 2013, 80% in 2014, and 100% in 2015. Thereafter, energy efficiency and DSM programs delivering demand reductions equal to 1.4% of total electricity sales would be continued, unless a comprehensive assessment of potential efficiency gains in Arkansas and best practices nationwide indicates that greater gains are possible.

**RCI-3a Reduced Energy Use in New and Retrofitted State-Owned Buildings: Government “Lead by Example”**

With a super majority vote, the GCGW recommends government “lead by example” initiatives and requirements that both help state and local governments achieve substantial energy cost savings and promote the adoption of clean energy technologies for significant GHG emission reductions in new state and local government buildings. The policy would apply to state government agencies, local governments, schools, and universities.

This policy recommendation sets energy efficiency goals for new construction and major renovations, and provides energy efficiency targets that are much higher than code standards. It achieves GHG reductions by setting a goal to reduce fossil fuel consumption by state and local facilities, which are then certified by a third party for compliance. Other elements include developing life-cycle GHG accounting protocols and a minimum of ENERGY STAR-rated appliances for all government procurement. The policy recommends allowing state agencies to retain funds saved by improving energy efficiency for funding additional energy efficiency investments.

The goals of this policy require that by 2009 all new state buildings (buildings that utilize a minimum of 20% of state funds), developments, and major renovations be designed to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 50% less energy use than the ASHRAE 90.1-2004 energy standard. This standard is increased to a 60% reduction in 2012, 70% in 2017, 80% in 2020, and 90% in 2025, with the goal of the buildings becoming carbon-neutral in 2030 (using no GHG-emitting energy to operate). The higher-level GHG reduction targets may be met through the purchase of renewable energy by governments. The policy also requires that all new or retrofitted buildings meet stringent green building third-party verification requirements.

**RCI-3b Reduced Energy Use in Existing State-Owned Buildings: Government “Lead by Example”**

With a super majority vote, the GCGW recommends government “lead by example” initiatives to help state and local governments achieve substantial energy cost savings, while promoting the adoption of clean energy technologies for significant GHG emission reductions in existing state and local government buildings. The proposed policy provides energy efficiency targets for existing buildings that are much higher than code standards.

The Arkansas state government is a significant consumer of energy. The state owns or leases approximately 29.45 million square feet of building space, and pre-K through 12 schools account for an additional 85 million square feet. Additional local government buildings, such as courthouses, city halls, and other facilities, are not included in this inventory. Arkansas’ public school buildings are in need of approximately \$1.6 trillion of repairs and improvements that

“Impact Functioning of School, i.e., Mechanical, Electrical, HVAC.” These needs are opportunities for installing more energy-efficient equipment.<sup>4</sup>

The goal of this policy requires a 30% reduction in electricity consumed by existing state and local facilities, schools, and universities by 2020. The program gets implemented so that in 2009 20% of government facilities receive the energy efficiency investments, rising to 40% of square footage in 2014, 60% in 2016, and 80% in 2018. By 2020, the entire state existing building stock will have received efficiency investments to reach the 30% improvement target. The policy also requires that a third-party-verified green building certification system for commercial buildings be used for compliance. Also included is a program to audit state activities and facilities, with a goal of at least 20% of all buildings being audited annually, and a requirement for state and local governments to submit annual energy plans to the state. Additionally the recommendation includes a statewide goal that by 2025, a minimum of 15% of energy consumed by state and local government buildings will come from renewable in-state energy sources.

#### **RCI-4a Promotion and Incentives for Improved New Building Design and Construction**

With a super majority vote, the GCGW recommends this policy, which provides incentives and targets to induce the owners and developers of new buildings to improve the efficiency of those buildings' use of energy and other resources. It also contains provisions for raising targets periodically and providing resources to building industry professionals to help achieve the desired building performance.

This policy includes elements to encourage both the improvement and review of energy use goals over time, and flexibility in contracting arrangements to facilitate integrated energy- and resource-efficient design, construction, and renovation. Incentives could include low-cost loans for investments in energy efficiency, tax credits, and feebates.

The goal of this policy is beginning in 2011 to voluntarily increase new building performance by using tiered incentives for energy efficiency in new residential and commercial buildings that achieve at least a 20% reduction in energy use relative to existing codes. The incentives are scaled so that higher-efficiency buildings receive higher incentives. The minimum efficiency improvement that is eligible for the incentive increases to 25% in 2016, 30% in 2018, and 35% in 2020. Performance is measured through a stringent, third-party-verified green building certification system reduces the requirement for significant oversight and enforcement by state organizations.

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<sup>4</sup> Task Force to Joint Committee on Educational Facilities. *Arkansas Statewide Educational Facilities Assessment—2004. Final Report to the Joint Committee on Educational Facilities*. November 30, 2004, p. 20. Available at: <http://www.arkleg.state.ar.us/data/education/statereport.pdf>.

#### **RCI-4b Promotion and Incentives for Improved Existing Building Design and Construction**

With a super majority vote, the GCGW recommends this policy, which provides incentives and targets to induce the owners and developers of existing buildings to improve the efficiency of those buildings' use of energy and other resources. It also contains provisions for raising targets periodically and providing resources to building industry professionals to help achieve the desired building performance. Existing buildings can exhibit poor energy use indicators because of degraded equipment performance, nonintegrated design, or outdated (not the best available) equipment.

This policy recommendation includes elements to encourage both the improvement and review of energy use goals over time, and flexibility in contracting arrangements so as to facilitate integrated energy- and resource-efficient design, construction, and renovation. Incentives could include low-cost loans for investments in energy efficiency, tax credits, and feebates.

The goal of this policy is beginning in 2011 to voluntarily increase building performance by using tiered incentives for energy efficiency in new residential and commercial buildings that achieve at least a 15% reduction in energy use relative to regional average use for comparable buildings. The incentives are scaled so that higher-efficiency buildings receive higher incentives. The minimum efficiency improvement that is eligible for the incentive increases to 20% in 2014, 25% in 2016, 30% in 2018, and 35% in 2020. Performance is measured through a stringent, third-party-verified green building certification system, which reduces the requirement for significant oversight and enforcement by state organizations.

#### **RCI-5 Education for Consumers, Industry Trades, and Professions**

With a unanimous vote, the GCGW recommends a broad climate change and GHG reduction education program. The ultimate effectiveness of emission reduction activities in many cases depends on providing information and education to consumers regarding the energy and GHG emission implications of their choices. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions in their personal and professional lives.

This policy has two goals. The first is by 2010 to implement consumer awareness education on energy consumption and how consumers can reduce GHG emissions. Consumers typically consider energy issues "below the radar" when energy costs are a small part of disposable income and are not the subject of extensive media coverage. The education program can link energy consumption to the costs of climate change and the benefits from GHG reductions, such as green collar jobs and reduced energy expenditures for their household.

The second goal of this recommendation is technical education for builders and contractors on the specific methods they can incorporate to reduce GHG emissions at every stage of construction beginning in 2010. This policy recommendation also addresses education and outreach programs for building professionals to encourage incorporation of energy efficiency and GHG emission reduction considerations, such as programs to train builders and contractors.

Education and training should also be made available to builders and contractors and others for retrofitting existing buildings.

#### **RCI-6 Incentives and Funds To Promote Renewable Energy and Energy Efficiency**

By a super majority vote, the GCGW recommends RCI-6 to improve the energy efficiency of target markets. At least 33% of Arkansans have an income of less than \$30,000/year, of which they spend 20%–30% on utility bills. There are currently not enough weatherization or energy conservation programs in place to reduce the economic burden on this population or to have a scalable impact on mitigating the GHG emissions produced by these homes. Providing traditional financing options for low-income homeowners will not meet their needs or achieve any meaningful scale. The need exists for identifying these homeowners; educating them about the benefits of, and the opportunity for having, energy audits; and financing the implementation of energy-efficient measures.

In addition, manufactured (mobile) homes account for approximately 27% of residential structures in Arkansas. Yet, mobile homes are exempt from compliance with the Arkansas Energy Code and fall under U.S. Department of Housing and Urban Development regulation. These homes are factory-made and can more easily implement efficiency improvements.

The goal of this program is to increase the energy efficiency in low-income and manufactured residences. The low-income retrofit portion of this policy targets the weatherization of 10,000 homes annually by 2015 with energy efficiency improvements of 33% per upgraded residence. The long-term goal is retrofitting 90% of the total low-income homeowner population. This program also expands available funding per residence from the current level (approximately \$2,800) to be able to upgrade major appliances, such as furnaces.

For the manufactured housing portion of this policy, the goal is to provide incentives for the purchase of new ENERGY STAR-manufactured homes, so that by 2025, 75% of all new manufactured homes purchased are ENERGY STAR-certified.

#### **RCI-7 Green Power Purchasing for Consumers**

By unanimous vote the GCGW recommends this policy to promote the use of renewable electricity for Arkansas' residential customers. Arkansas is endowed with renewable resources that can be used for electricity generation or substituted for direct fossil fuel use. This recommendation leverages this potential through programs and policies that encourage consumers to switch from using fossil fuels to purchasing renewable electricity for their energy use.

Green power purchasing refers to a variety of consumer-driven strategies to increase the production and delivery of low-GHG power sources beyond levels achieved through renewable portfolio standard and other mandatory programs. These sources include solar, wind, geothermal, biogas, biomass, and low-impact hydroelectric energy. Green power purchasing programs provide consumers with information about alternative green sources of energy they can select, rather than the traditional, more carbon-intensive sources.

The goal of this policy is that by 2025, this voluntary program incentivizes one of four residential customers to participate in green power purchasing programs. Those who participate in the program will purchase up to 25% of their total electricity use from renewable resources. The program will require a mechanism that strongly encourages utilities purchasing power to develop green power in Arkansas.

#### **RCI-8 Nonresidential Energy Efficiency**

Combined heat and power (CHP) refers to any system that simultaneously or sequentially generates electric energy and utilizes the thermal energy that is normally wasted, significantly increasing efficiency over separate generation of electricity and thermal energy. Many CHP systems are capable of an overall efficiency of over 80%—double that of conventional systems. Another significant advantage is the reduced transmission and distribution losses associated with centralized power generation.

Existing data suggest the existence of a very large unrealized potential for CHP in Arkansas. However, energy recycling, including CHP, is challenged by several noneconomic factors, such as regulatory and environmental permitting complexity or uncertainty, utility resistance to CHP because of potential loss of expected revenue, and increased complexity of facility design and operations. Additional installations of new CHP systems by residential, commercial, institutional, and industrial energy consumers, and continued operation or expansion of existing systems, could be encouraged through a combination of regulatory changes (starting with a review of state and regional policies on permitting, net metering, standby rates, interconnection, and other issues affecting CHP); education and information transfer; and incentive programs.

The GCGW unanimously recommends increased effort toward tapping into the unrealized potential for CHP and waste heat recovery in Arkansas. The goal is to install additional CHP and waste heat recovery technical potential on 25% of new boiler installations of a minimum size rating consistent with a reasonable payout in the state.

This GCGW also recommends that Arkansas consider adopting incentives to encourage high-efficiency electrical transformers that can efficiently handle nonlinear (variable) loads from digital equipment and lighting.

#### **RCI-9 Support for Energy-Efficient Communities, Including Smart Growth**

By unanimous vote, the GCGW adopted this policy recommendation to promote smart growth. Smart growth dictates how the state will invest its money in community development, either by regulating local land-use decisions or by providing incentives to influence those decisions. Existing building, zoning codes, and business schedules often work against smart growth development. In the context of GHG emissions, smart growth policies can serve to revitalize and reuse commercial sites and will help preserve critical natural resources and farmland.

The goals of this program are multifaceted:

- By 2009, provide resources for local jurisdictions to examine and rewrite their outdated state and local codes to accommodate for smart growth initiatives in community planning and development. Implementing smart growth policies is expected to reduce (per-unit) energy consumption, GHG emissions, infrastructure costs, and new construction by 30% by 2030. Design all new buildings, developments, and major renovations to meet the targets in RCI-4a and RCI-4b.
- Create incentives to encourage smart growth by meeting Built Green Community certification or the LEED-ND (LEED for Neighborhood Development) gold level, with minimum energy and location criteria.
- Encourage compact and transit-oriented, mixed-use development within urban growth areas that results in reduced vehicle miles traveled and GHG emissions and encourages walking and biking.
- Encourage state and local governments and private firms to adopt telework policies to reduce building and transportation-related GHG emissions.
- Commission a study on the effects of alternative work schedules similar to West Virginia House Resolution #34 and others.
- Limit sprawl by enabling transfer of development rights, revitalizing communities through developed land and building reuse incentives, and institute a variety of conservation measures for woodlands and wetlands.
- Support locally owned shops, restaurants, and farmers' markets to help local businesses and family farms remain profitable, thus strengthening the local economy and protecting rural legacy and lands.

#### **RCI-10 Energy-Savings Sales Tax**

By a super majority vote, this policy recommendation refers to a sales tax exemption for energy-efficient products, such as compact fluorescent lights, geothermal heat pumps, highly efficient heat pump systems, and ENERGY STAR-certified water heaters, refrigerators and freezers, clothes washers and dryers, and dishwashers. Establishing a market signal that rewards lower-carbon purchase decision making provides consumers an incentive to improve their energy efficiency and reduce their adverse impacts on climate.

The list of energy efficiency measures that this policy recommendation applies to contains the same measures that utility energy efficiency programs typically pursue. Utility programs assume that some portion (usually ~25%) of the capital costs of the efficiency measure is paid for by the participant. Thus, this policy recommendation reduces the purchase price (capital cost) of energy-efficient goods by consumers by the amount of the sales tax. However, these costs are then paid for by the state, rather than consumers.

The goal of this policy is to implement a state sales tax exemption for all consumers on energy-efficient equipment. The program is to be implemented by 2010 and requires point-of-sale tax exemption at retailers for the tax policy to be implemented.