Report of the Illinois Climate Change Advisory Group

Submitted to
Governor Rod R. Blagojevich

GRAPHICS 2008

Cover Photos: (top, left to right) methane power generation at central Illinois landfill; Chicago expressway; central Illinois wind energy farm (bottom, left to right) methane digester at dairy farm in northern Illinois; power plant in central Illinois; compact fluorescent bulbs on sale in Illinois hardware store.

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SECTION I. EXECUTIVE SUMMARY

Background

On October 5, 2006, Governor Blagojevich launched his Global Warming Initiative by signing an Executive Order (EO) that created the Illinois Climate Change Advisory Group (ICCAG). See Appendix A for a copy of the EO. The Advisory Group was chaired by Doug Scott, Director of the Illinois Environmental Protection Agency (Illinois EPA), and included 39 other members representing local government; labor unions; public transit; scientists; environmental, consumers, and faith-based groups; and the following industries: agriculture, utilities, power generators, auto manufacturing, farm and construction equipment, oil, insurance, and waste management. Three vice chairs were also appointed to help guide the process: Michael Carrigan, AFL-CIO; Arthur Gibson, Baxter Healthcare; and Howard Learner, Environmental Law and Policy Center.

The Governor charged the ICCAG with recommending state-level strategies to meet his statewide greenhouse gas (GHG) reduction goals, which are similar to goals set by other states and those proposed in Congress: (a) 1990 levels by 2020, and (b) 60 percent below 1990 levels by 2050.

See Appendix B for more information on the Governor's goals. Scientists believe that GHG reductions of this magnitude are needed to avoid significant consequences due to climate change.

Key Findings

ICCAG members voted on 24 strategies to reduce greenhouse gas emissions in Illinois. ICF International (ICFI), a global energy and environmental consulting firm, was retained to model the emissions and economic impacts of different policy scenarios. ICFI's modeling found that implementing the 24 strategies voted on by ICCAG members would meet the Governor's goal for reducing greenhouse gas emissions to 1990 levels by 2020.

In addition, ICFI's modeling found that executing all 24 strategies to reduce greenhouse gases would benefit the Illinois economy compared to taking no action to address climate change. According to ICFI, these economic benefits include cutting average electricity costs by more than 3 billion dollars per year in 2020 as well as boosting the gross state product (GSP) and personal disposable income by billions of dollars while creating tens of thousands of new jobs (see Section VI for detailed economic estimates).

At its July 10 meeting, ICCAG members voted to support nineteen strategies with no dissent and at least one abstention. At the September 6 meeting, a majority of voting ICCAG members voted to support an additional five strategies, with eight to ten members dissenting and several members abstaining. These strategies are listed below in Tables 1 and 2:

Table 1. Nineteen Strategies Supported by ICCAG Members with No Dissent

Brief Description of Strategy	Subgroup
Implement smart growth initiatives and expansion of mass transit	Transport
Incentives for fuel efficient vehicles	Transport
Low-carbon fuels standard	Transport
Fuel efficiency and/or low carbon fuel requirements for all government vehicles	Transport
Passenger and freight rail upgrades	Transport
Small renewable distributed generation: rules, legislation, incentives	Power/Energy
Energy efficiency standards for appliances and equipment	Power/Energy
Establish residential and commercial energy efficiency construction codes beyond international standards; includes government buildings.	Power/Energy
Phase-in of energy efficiency standards for light bulbs	Power/Energy
Energy conservation and efficiency programs for existing state facilities	Power/Energy
Enhanced renewable portfolio standard of 25 percent by 2025	Power/Energy
Enhanced energy efficiency: two percent demand reduction by 2015. No revenue cap.	Power/Energy
Programs to encourage forest management, reforestation, tree- and grass-planting	Commercial, Industrial, Agriculture (CIA)
Energy efficiency incentives, assistance and standards for commercial/industrial generators and boilers	CIA
Expand use of no-till farming	CIA
Encourage methane capture from coal mines, landfills, livestock farms and wastewater treatment plants.	CIA
Increase traditional recycling diversion rate with municipal goals and by stimulating demand for recycled materials	CIA
Land use development offset requirement	CIA
Encourage or require reductions in emissions of high GWP gases (N2O, HFCs, PFCs, SF6)	CIA

Table 2. Five Strategies Supported by a Majority of Voting ICCAG Members

Brief Description of Strategy/Vote	Subgroup
GHG emissions standards for automobiles *In favor: 20 Opposed: 8 Abstaining: 5*	Transport
CO_2 emissions performance standards for electricity generation or purchases electricity (new generation only) *In favor: 20 Opposed: 8 Abstaining: 2*	Power/Energy
Carbon capture & storage (from the outset) portfolio standard of 5 percent. Utilities must buy if available. *In favor: 20 Opposed: 8 Abstaining: 2*	Power/Energy
20 percent carbon offset requirements for new fossil fuel power plants *In favor: 19 Opposed: 8 Abstaining: 3*	Cap and Trade
Cap and trade program for power generators and relatively large industrial sources; preference to link with other states *In favor: 21 Opposed: 10 Abstaining: 3*	Cap and Trade

Summaries of the ICCAG strategies are provided in Section VII, and complete descriptions are included in Appendix F. Written comments from ICCAG members and the public are in Volume 2 of the Appendices.

Potential economic impacts were discussed extensively by the ICCAG, and ICFI modeling indicated macro-level economic benefits from implementing the 24 strategies compared to taking no additional steps to reduce GHG emissions. However, some members voted against these five strategies largely due to concerns about potential negative economic and employment impacts in specific sectors (i.e., conventional coal-fired electric generation). These dissenting members also argued that these strategies should only be implemented at the national level.

Description of the ICCAG Process

The ICCAG process was designed to be transparent, inclusive, and collaborative. ICCAG meetings and conference calls were open to other stakeholders and the general public, and anyone who participated was given the opportunity to raise questions, concerns, and other issues. All major decisions regarding policy proposals were vetted through ICCAG subgroups and the full ICCAG. All information prepared in support of the process, and any written comments from members and non-members, were posted on the Web at *www.ilclimatechange.org*.

ICFI was retained to model the emissions and economic impacts of different policy scenarios. ICFI is a global energy and environmental consulting firm based in Washington, D.C., with a staff of over 1,500 consultants in 20 offices. The firm's clients include the Canadian government, the US federal and state governments, the EU, and several oil and gas producing nations.

The World Resources Institute (WRI) was retained to assist in the facilitation of ICCAG meetings and to provide technical expertise. WRI is a Washington D.C.-based environmental research and policy organization, and their climate change experience includes co-authoring the standard for measuring and reporting GHG that is used by companies throughout the world. They have provided similar assistance to northeastern states, western states, and Wisconsin. WRI prepared an inventory of Illinois GHG emissions (1990-2003) and projections for future emissions through 2020 to help guide the ICCAG's development and assessment of policy options to meet the Governor's goal (see Appendix C). A variety of other background documents were also prepared throughout the process to better inform ICCAG members.

WRI developed an initial list of 88 policy options for reducing GHG emissions (see Appendix D) that was narrowed down by ICCAG members to 25 through an anonymous, on-line voting process (see Appendix E). These 25 policy options were assigned to four subgroups to formulate policy proposals that could be modeled for their emissions and economic effects. A fifth subgroup was created to oversee the modeling process. The subgroups were chaired by the ICCAG chair and vice chairs:

- Power and Energy: Chair, Howard Learner, Environmental Law and Policy Center
- Transportation: Chair, Michael Carrigan, AFL-CIO
- Cap and Trade: Chair, Doug Scott, Illinois EPA
- Commercial, Industrial, and Agricultural: Chair, Arthur Gibson, Baxter Healthcare
- Modeling: Chair, Doug Scott, Illinois EPA

Illinois EPA and other state agencies such as the Illinois Department of Commerce and Economic Opportunity (DCEO) helped staff the ICCAG process.

Table 3. Illinois Climate Change Advisory Group Timeline

Event	Location	Date	Subjects
Meeting 1	Chicago	February 22, 2007	• Review ICCAG's mission • Process overview; ground rules • IL GHG inventory and forecast • Overview of Governor's energy plan • Introduction of policy options • Discussion of modeling strategy
Meeting 2	Springfield & Chicago via video conference	April 3, 2007	• Updates to IL GHG inventory and forecast • Results of policy option voting • Formation of subgroups and tasks • Update on selection of modeling contractor
Meeting 3	Chicago & Springfield via video conference	May 23, 2007	• Presentation on the ENERGY 2020 model by ICF International • Subgroup recommendations for policies to be modeled • Discussion and action on subgroup recommendations • Modeling assumptions and the Modeling Subgroup's role
Meeting 4	Chicago & Springfield via video conference	July 10, 2007	• Review of modeling results and input by the Modeling Subgroup • Reference case modeling results • Preliminary policy scenario modeling results • Discussion of modeled policies • 19 strategies supported by ICCAG members with no dissent

Meeting 5	Chicago & Springfield via video conference	September 6, 2007	• Emissions inventory update • Review of final reference case modeling results • Review of final policy scenario modeling results • Majority of voting ICCAG members supported five additional strategies

The subgroups were allowed to add or delete policy options under their consideration as long as ICCAG members agreed. After many conference calls and hours of discussions that were open to the public, the subgroups recommended 24 policy proposals for modeling (see Section V, Table 8). Of the 24 proposals, four were new proposals not in the top 25 list. Two proposals from the top 25 list were not recommended, and six from this list were combined into three proposals.

Among the 24 proposals was a market-based "cap and trade" program to reduce GHG emissions from fossil fuel power plants and other relatively large emitters. Under a cap and trade program, the total pool of emissions are initially limited, or capped, to a set amount that shrinks over time, and sources that stay below their allotted emissions can sell emissions "allowances," or allotments, to sources that exceed their allowable limits.

ICFI developed a detailed forecast of emissions and economic trends under "business as usual" conditions through 2020, which is called the reference case. It assumes a continuation of current economic trends and the associated GHG emissions and reflects, to the extent possible, recently enacted policies and new projects that could affect GHG emissions trends. The reference case serves as a point of comparison in analyzing the GHG reductions from strategies included in the proposed policy scenarios.

Because no single strategy alone can achieve the Governor's goals, ICFI modeled the emissions and economic effects of four policy packages (scenarios) recommended by the Modeling Subgroup:

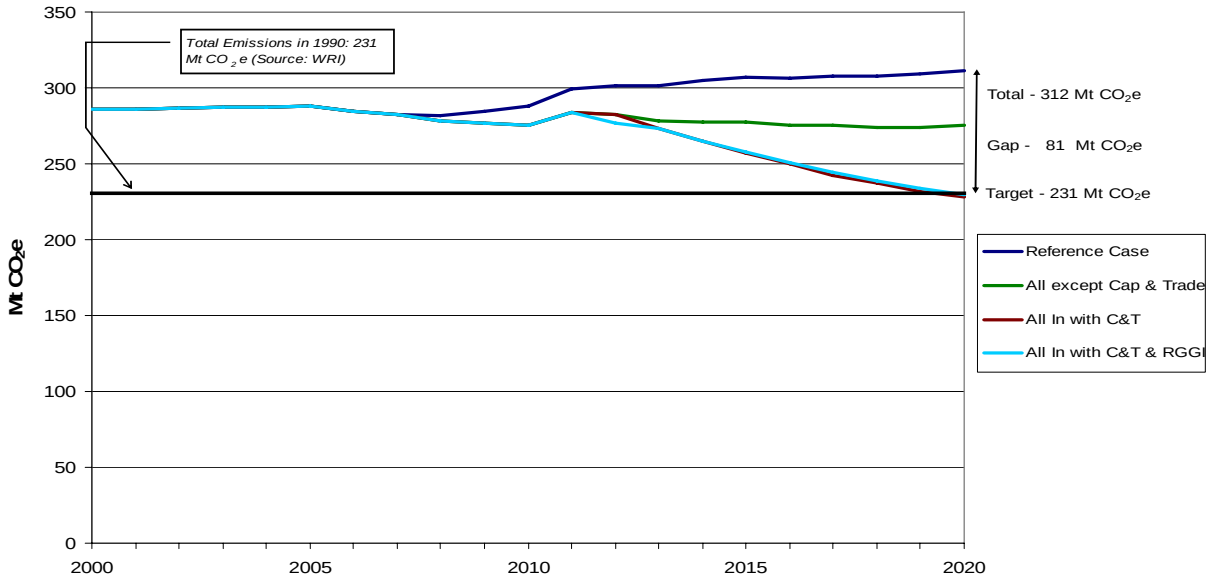
Scenario #1. All 24 strategies except for cap and trade.
Scenario #2. All the strategies including an Illinois-only cap and trade program.
Scenario #3. All the strategies including cap and trade with a link to the Northeast States' Regional Greenhouse Gas Initiative (RGGI) cap and trade program.
Scenario #4. The same as #2, but with an assumption of high oil and gas prices.

ICFI projects that Illinois GHG emissions will grow to 312 million metric tons of CO_2 equivalents* (Mt CO_2e) by 2020 under the business as usual scenario. In order to meet the Governor's goal of reducing greenhouse gas emissions to 1990 levels (231 Mt CO_2e) by 2020, emissions in 2020 would need to be 81 Mt CO_2e less (312 minus 231) than what ICFI projects for the business as usual scenario. Current annual GHG emissions in Illinois are about 276 Mt CO_2e, or 45 Mt CO_2e, above 1990 levels. Figure 1 shows the emission trajectories for the reference case and Scenarios #1, #2 and #3 compared to the goal of achieving 1990 levels by 2020.

** CO_2 equivalent provides a standardized unit of measurement to represent various greenhouse gases that have different global warming potentials relative to the global warming potential of carbon dioxide, the most prevalent greenhouse gas.*

By 2020, Illinois GHG emissions are projected to be
81 million metric tons above 1990 levels.

Figure 1. Illinois GHG Emissions: Reference Case and Three Policy Scenarios**



*** Includes reductions achieved inside Illinois (including purchased offsets that are allowed under the cap and trade proposals) plus allowances purchased outside Illinois for compliance in-state. Does not include modeled direct emissions reductions outside Illinois that would be difficult to verify.*

The modeling results (see footnote** above) indicate that Scenario #1 is not a viable option because it achieves less than half of the reductions needed to meet the Governor's 2020 reduction goal of 231 Mt CO_2e in 2020; Scenario #2 meets the goal with 2020 emissions of 227 Mt CO_2e. Scenario #3 also meets the goal, with 2020 emissions of 229 Mt CO_2e if emissions allowances purchased from sources in the RGGI states count.

ICFI's modeling found that implementing the policy scenarios to reduce greenhouse gases would reduce electricity costs and increase employment, GSP and personal disposable income compared to the business as usual reference case of not implementing new polices to reduce greenhouse gases. For policy Scenario #3, the computer modeling showed the following economic impacts:

- Average electricity costs decline for residential, industrial and commercial customers, with total savings across all sectors of approximately $1.1 billion in 2010, $2.6 billion in 2015, and $3.2 billion in 2020.
- 61,000 additional jobs per year in 2020.
- Annual gross state product $7.5 billion higher in 2020.
- Assuming that 85 percent of emissions allowances are auctioned, the cap and trade program would likely generate hundreds of millions of dollars per year.

The positive economic outcomes are largely due to policies that would replace imports of coal, oil, and natural gas with in-state investments in renewable energy and energy efficiency measures. Dollars that would otherwise be exported to out-of-state companies are instead invested in Illinois. Although electricity rates would increase modestly due to compliance costs for fossil fuel electric power plants, the amount of the rate increases is reduced over time. In addition, the rate increases are more than offset by the energy efficiency measures that would reduce overall energy costs through energy savings for homes and businesses as noted above.

The modeling process benefited from oversight by the Modeling Subgroup and significant input from ICCAG members and non-members. The ICFI modeling team responded verbally and in writing to numerous questions and comments, and they often revised their analyses in response to this input. However, some ICCAG participants felt the modeling process was inadequate and/or disagreed with some modeling assumptions and/or results. For more information about ICCAG modeling, see Section VI and Appendices H and I.

Because the ICCAG process was open and responsive to members and non-members alike, the process was revised on numerous occasions in response to suggestions. However, certain process decisions made by Illinois EPA and its advisors, such as the decision to exclude federal policy recommendations, were questioned. The Illinois EPA's response to those concerns is found in Appendix G. Written comments from ICCAG members and the public are in Volume 2 of the Appendices.

The ICCAG membership represented diverse interests and perspectives, and the process was infused with a spirit of achieving a common goal—the Governor's emissions reduction goals for the state of Illinois. Chairman Scott indicated that additional stakeholder input would be sought if the Governor directs agencies to design and implement any of these strategies. In addition, given the long-term nature of the climate change challenge, the chair is recommending to the Governor that the ICCAG continue to meet periodically.

Key Developments Since the ICCAG Made Its Recommendations

Since the ICCAG voted on its recommendations, a number of important actions have been taken at the state, regional, and federal levels to mitigate GHG emissions. Some of these actions overlap with particular ICCAG recommendations.

At the state level, the Illinois Power Agency Act (IPAA) of 2007 was signed into law by Governor Blagojevich in August of last year. The IPAA includes two provisions that are similar to two ICCAG recommendations:

- Renewable portfolio standard. Beginning in 2008, electric utilities must supply renewable energy for two percent of the electricity they provide customers, increasing to 25 percent by 2025. The requirements only apply to electricity supplied to residential and small commercial customers. The renewable energy requirement is scaled back if electricity rates increase more than 0.5 percent per year or two percent total. The ICCAG recommendation, which was approved with no dissent does not include spending caps and applies to all electricity customers.
- Energy efficiency portfolio standard. Beginning in 2008, electric utilities must achieve a 0.2 percent energy use reduction through investments in energy saving programs, increasing to two percent by 2015. The reduction goals are scaled back if electricity rates increase more than 0.5 percent per year or two percent total. The ICCAG recommendation has the same

energy reduction goals but with no spending caps, and the goals also apply to natural gas utilities. This recommendation was approved with no dissent.

At the regional level, Governor Blagojevich signed the Midwestern Greenhouse Gas Reduction Accord (the "Accord") in November 2007 along with the governors of Iowa, Kansas, Michigan, Minnesota, and Wisconsin, and the Premier of Manitoba. The Accord states that the participating states will develop (a) regional greenhouse reduction goals by the summer of 2008, and (b) a model rule for a multi-sector, market-based cap and trade program by November 2008. The Accord will largely implement the cap and trade program recommendation approved by a majority of the voting ICCAG members. The recommendation calls for links to other states, preferably nearby states, because that would create a more efficient, less costly program and would minimize the extent to which emissions "leak" from Illinois to other states rather than being eliminated.

In December 2007, the federal Energy Independence and Security Act (EISA) of 2007 was signed into law. The EISA includes four provisions that are similar to four ICCAG recommendations:

- Energy efficiency standards for light bulbs. The new EISA standards are virtually identical to the ICCAG recommendation that was approved without dissent, although the ICCAG approved mercury content standards that are not included in EISA.
- Energy efficiency standards for appliances and equipment. The new EISA standards are very similar to the ICCAG recommendation that was approved with no dissent.
- Increased Corporate Average Fuel Efficiency requirements. Increased Corporate Average Fuel Efficiency requirements will be phased in, starting in 2010. More fuel efficient vehicles emit fewer GHG emissions because they consume less fuel. A majority of voting ICCAG members recommended that Illinois adopt and implement state-level GHG emissions limits for passenger vehicles based on the California vehicle emissions standards. Under the federal Clean Air Act, California is allowed to adopt more stringent vehicle emissions requirements with approval from the U.S. Environmental Protection Agency (USEPA), and states must choose either the California standards or the federal standards established by USEPA. Eleven other states have chosen the California standards. California has more stringent vehicle emissions standards for non-methane organic gases (NMOGs, similar to volatile organic compounds or VOCs), nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), and hazardous air pollutants.

  Neither California nor USEPA currently regulate GHGs from motor vehicles, but California had asked for USEPA's approval to do so. USEPA denied that request late last year. California and other states, including Illinois, have challenged USEPA's decision in court. Compared to the new CAFE standards in the EISA, the California standards would reduce global warming gases and improve fuel economy three to four years faster and approximately 13.1 percent more in the year 2020. (Based on data from: *California Air Resources Board Addendum to February 25 Technical Assessment, May 8, 2008: Comparison of Greenhouse Gas Reductions for the United States and Canada under ARB GHG Regulations and Proposed Federal 2011-2015 Model Year Fuel Economy Standards.*)

- Low carbon fuels standard. Under EISA, lifecycle carbon emissions for new renewable fuels production facilities must be 20 percent below a baseline level. The ICCAG recommended, with no dissent, a broader "low carbon fuels standard" that would require transportation fuel producers, importers, refiners and blenders to ensure that all transportation fuels sold in Illinois have lifecycle carbon emissions that are 10 percent less than current levels by 2020.

SECTION II: GOVERNOR BLAGOJEVICH'S GLOBAL WARMING INITIATIVE

Formation of the Illinois Climate Change Advisory Group

On October 5, 2006, Governor Blagojevich launched his Global Warming Initiative by signing an EO that created the ICCAG. (See Appendix A for a copy of the EO.) The ICCAG was directed to consider the full range of policies and strategies to reduce GHG emissions in Illinois and to make recommendations to the Governor. The EO said the ICCAG should have broad representation and be chaired by the Director of the Illinois EPA, Doug Scott.

In addition to the chair, 39 members were selected representing: local government; labor unions; public transit; academia; environmental, consumer and faith-based groups. The following industries were also represented: agriculture; utilities; power generators; auto manufacturing; farm and construction equipment; oil; insurance; and waste management. (See Appendix A for the ICCAG membership list.) Three vice chairs were also appointed to help guide the process: Michael Carrigan, AFL-CIO; Arthur Gibson, Baxter Healthcare; and Howard Learner, Environmental Law and Policy Center.

Governor's Greenhouse Gas Reduction Goals

Before the first ICCAG meeting, Governor Blagojevich announced a statewide goal to reduce GHG emissions to 1990 levels by 2020 and 60 percent below 1990 levels by 2050. The Governor charged the ICCAG with recommending strategies to meet these GHG reduction goals, which are similar to goals set by other states and those proposed in legislation before Congress. Scientists believe that global reductions of this magnitude are needed to avoid significant, adverse consequences due to climate change.

Other Elements of the Governor's Global Warming Initiative

The Governor has already launched a number of strategies for reducing GHG emissions in order to protect the environment and public health, including:

- In the summer of 2006, Governor Blagojevich announced an Energy Independence Plan to meet the state's energy needs by investing in wind power and cleaner burning renewable fuels that will cut greenhouse gas emissions. The plan also included a proposed pipeline to help capture carbon dioxide emissions from new coal gasification plants.
- Recently, the Governor signed into law the IPAA that implements elements of his energy plan. For example, the new law requires Illinois utilities to generate or obtain a certain percentage of their electricity from renewable energy sources (renewable portfolio standard, or RPS). The IPAA also requires utilities to invest more in energy efficiency and demand response to meet specific energy saving goals.
- In February 2007, the Governor joined California Governor Arnold Schwarzenegger and executives from BP to launch the Energy Biosciences Institute to be based at the University of Illinois Urbana/Champaign and the University of California, Berkeley. The $500 million effort funded by BP will invest in research on next-generation homegrown biofuels made from crops that will cut GHG emissions, boost America's energy independence, and create new markets for Illinois farmers.
- In January 2007, Illinois adopted rules that the Governor introduced to dramatically improve air quality and protect public health by slashing mercury, sulfur dioxide, and nitrogen oxide

emissions from the three largest coal-fired power plant companies in Illinois—Midwest Generation, Ameren, and Dynegy. The agreements include commitments to shut down three of the oldest, least efficient boiler units, leading to a reduction of 2.1 million tons of CO_2 annually.

- Illinois has become only the second state in the nation to join the Chicago Climate Exchange (CCX). As a CCX member, the state makes a voluntary, but legally binding, commitment to reduce GHG emissions from state buildings and vehicle fleets.
- In July 2006, the Governor announced the State of Illinois would power 141 Springfield-based facilities under his control with clean renewable wind energy purchased from the Springfield's municipal utility company, City Water Light and Power. This is one of the largest wind power purchases by any state or local government in the U.S.
- The first two utility-scale wind farms in Illinois became operational during the Blagojevich administration, and fifteen more are proposed.
- Illinois played a pivotal role in the creation of The Climate Registry, a collaboration among 39 states to develop and manage a common greenhouse gas emissions reporting system. Illinois EPA Director Doug Scott is Vice Chair of The Climate Registry.
- In early 2006, Illinois launched the Illinois Conservation Climate Initiative (ICCI) in partnership with the CCX and the Delta Institute. ICCI offers farmers and other landowners the opportunity to earn and sell greenhouse gas emission reduction credits through CCX when they use conservation tillage and plant grasses and trees. These practices keep carbon in the soil and plants instead of being released as carbon dioxide. Illinois is the first state to sponsor such a program. More than 650 landowners have enrolled 127,000 acres.
- The state has taken numerous steps to reduce GHG emissions from its vehicle fleet, including reducing the overall number of state vehicles by 11 percent, from 13,635 in 2003 to 12,100 in 2007; increasing the number of flex fuel vehicles in the state fleet from 1,339 in 2000 (10 percent of fleet), to 1,944 now (16 percent of fleet); and increasing the use of renewable and cleaner burning ethanol and biodiesel in the state fleet. More than one million gallons of biofuels have been consumed by state vehicles since April 2004.
- The Governor has approved incentives and programs that helped make Illinois the number one consumer of biodiesel in the nation and the state with the second largest number of retail gasoline stations that offer 85 percent ethanol fuel (E85). Biodiesel and E85 reduce CO_2 emissions compared to diesel and gasoline.
- In 2006, the Governor signed legislation to limit idling by diesel vehicles in the state's air quality nonattainment areas (metropolitan Chicago and E. St. Louis). This reduces fuel consumption and greenhouse gas emissions.
- In 2005, the Governor signed into law energy-efficiency commercial building code standards, which reduce electricity demand and the corresponding GHG emissions from power plants.
- The Governor introduced open road tolling on the Illinois Toll Highway System, which reduces congestion, idling, fuel use, and greenhouse gas emissions.
- The Governor has recently signed three others pieces of legislation that will reduce GHG emissions through energy efficiency and renewable energy generation:
    - HB 1384 (P.A. 95-559) State buildings to reduce energy use by 10 percent in 10 years.
    - HB 1460 (P.A. 95-104) State-owned and -leased buildings to have Energy Star lights.
    - SB 680 (P.A. 95-420) Net metering for distributed renewable energy.

SECTION III: OVERVIEW OF THE ICCAG PROCESS

Description of ICCAG Membership and Staffing

As noted above, the ICCAG was chaired by Doug Scott, Director of the Illinois EPA, and included 39 other individuals from private sector businesses, environmental groups, non-profit organizations, academia, agriculture, local government, and labor unions. Members represented diverse stakeholders and interests from throughout the state of Illinois. Members who were not able to attend group meetings frequently sent another representative for their organization or business.

Illinois EPA retained the services of the World Resources Institute (WRI)—a Washington D.C.-based environmental research and policy organization—to assist in the facilitation of ICCAG meetings and provide technical expertise and general guidance in the formation of policy proposals. They have provided similar assistance to northeastern states, western states, and Wisconsin. Dr. Jonathan Pershing, Director of WRI's Climate, Energy, and Pollution program, headed the WRI team and facilitated each of the ICCAG's five general meetings, along with Director Scott. Staff from Illinois EPA and other state agencies such as DCEO were also asked to support the stakeholder process, providing analytical and logistical support as needed.

With the input and assistance of WRI, the ICCAG retained the services of the consulting firm ICFI to assess the recommended policy packages using the ENERGY 2020 model, a multi-sector energy and emissions analytical computer model used in conjunction with the macroeconomic REMI model, managed by DCEO staff. This enabled a full-economy assessment of state GHG trends as well as the commensurate impacts on the economy (e.g., gross domestic product, personal income, and jobs) resulting from the implementation of the proposed suite of climate policies through the year 2020. The ENERGY 2020 model was chosen in large part because the ICCAG members expressed a preference for a multi-sector model that accounts for the interaction of policies within and between sectors. Section VI describes the modeling process.

Description of the ICCAG Process and Timeline

The ICCAG process was designed to be transparent, inclusive, and collaborative. ICCAG meetings and conference calls were open to other stakeholders and the general public; moreover, anyone who participated was given the opportunity to raise questions, concerns, and other issues. All major decisions regarding policy proposals were vetted through ICCAG subgroups and the full ICCAG. All information prepared in support of the process, and any written comments from member and non-members, were posted on the Web at *www.ilclimatechange.org*.

At the first ICCAG meeting on February 22, 2007, Chairman Scott presented some ground rules to help the ICCAG meet its goal of recommending strategies to achieve the Governor's GHG reduction goals. In particular, some subjects were designated as outside the scope of the process and the discussions intended for the meetings, such as the following:

- Quality of climate change science. The Governor's EO on climate change states that "the scientific consensus is that increasing emissions of greenhouse gases are causing global temperatures to rise at rates that could cause worldwide economic disruption, environmental damage and public health crises." Therefore, the ICCAG process did not assess nor debate climate science.

- Recommendations for national and international policies. While the Governor supports national strategies to reduce GHG emissions, he and other governors around the country are taking action to fill the void due to inaction at the federal level. The Governor's leadership on climate change is positioning Illinois to adjust to, and take advantage of, the low carbon economy that is on the horizon. Moreover, by pursuing GHG abatement strategies that work well in Illinois, the state is better positioned to help shape national strategies that may be adopted in the future. Therefore, the process focused on measures that can be implemented in Illinois.
- Policies related to vulnerability and adaptation. The Illinois EPA is participating in the Chicago Climate Change Task Force, which includes an analysis of vulnerabilities and adaptation strategies for the city of Chicago. This analysis has some applicability to the state as a whole, and these important issues may be further considered at the state level in another forum.
- Research and development. The long-term solutions to climate change will require extensive research and development efforts at all levels of government. While such efforts are important, the advisory group focused on recommending policy options with predictable emissions reduction benefits.

It was also decided that the ICCAG would focus on strategies to meet the Governor's 2020 goal, and that this is the first step towards meeting the 2050 goal. Chairman Scott indicated that he would recommend that the ICCAG, or a successor entity, should continue to meet periodically to both assess progress toward meeting the Governor's 2020 GHG reduction goal, and to discuss additional strategies that will be needed to meet the Governor's 2050 goal.

At the outset of the process, WRI created several documents for the ICCAG to facilitate the assessment and selection of policy measures to reduce statewide GHG emissions. These documents included an inventory of Illinois GHG emissions based on WRI data (see Section IV and Appendix C), along with supplementary analysis regarding the emission profiles of other Midwest states and states considered to be major exporters of electricity (like Illinois), as well as a detailed analysis of key economic sectors within Illinois.

Table 4 below shows the ICCAG timeline, from the first meeting in February to the last meeting in September. The ICCAG started with a list of 88 policy options (see Appendix D) that was winnowed down to 25 for further analysis through an anonymous, online voting process for ICCAG members designed by WRI. Four subgroups were created to assess these 25 policy options and to ultimately recommend policy proposals to the full ICCAG to be modeled for their emissions and economic effects. A fifth subgroup was created to oversee the modeling process. ICCAG members and non-members alike were allowed to participate in the subgroups' calls.

The ICCAG chair and vice chairs chaired the five subgroups, which were:

- Power and Energy: Chair, Howard Learner, Environmental Law and Policy Center
- Transportation: Chair, Michael Carrigan, AFL-CIO
- Cap and Trade: Chair, Doug Scott, Illinois EPA
- Commercial, Industrial, and Agricultural: Chair, Arthur Gibson, Baxter Healthcare
- Modeling: Chair, Doug Scott, Illinois EPA

The subgroups recommended 24 proposals to be modeled, including a market-based cap and trade strategy to control emissions from fossil fuel power plants and relatively large commercial and industrial sources of GHG emissions. Under a cap and trade program, the total pool of emissions is

initially capped to a set amount that shrinks over time, and sources that stay below their allotted emissions can sell emissions allowances, or allotments, to sources that exceed their allowable limits. See Section V, Table 8 for a summary of the subgroup modeling recommendations.

Table 4: Illinois Climate Change Advisory Group Timeline

Event	Location	Date	Agenda
Meeting 1	Chicago	February 22, 2007	• Review ICCAG's mission • Process overview; ground rules • IL GHG inventory and forecast • Overview of Governor's energy plan • Introduction of policy options • Discussion of modeling strategy
Meeting 2	Springfield & Chicago via video conference	April 3, 2007	• Updates to IL GHG inventory and forecast • Results of policy option voting • Formation of subgroups and tasks • Update on selection of modeling contractor
Meeting 3	Chicago & Springfield via video conference	May 23, 2007	• Presentation on the Energy 2020 model by ICF International • Subgroup recommendations for policies to be modeled • Discussion and action on subgroup recommendations • Modeling assumptions and the Modeling Subgroup's role
Meeting 4	Chicago & Springfield via video conference	July 10, 2007	• Review of modeling results and input by the Modeling Subgroup • Reference case modeling results • Preliminary policy scenario modeling results • Discussion of modeled policies • 19 strategies supported by ICCAG members with no dissent
Meeting 5	Chicago & Springfield via video conference	September 6, 2007	• Emissions inventory update • Review of final reference case modeling results • Review of final policy scenario modeling results • Majority of voting ICCAG members supported five additional strategies

With input from the Modeling Subgroup, ICFI developed a forecast of emissions and economic trends under "business as usual" conditions through 2020, which is called the reference case. It assumes a continuation of current economic trends and the associated GHG emissions and reflects, to the extent possible, recently enacted policies and new projects that could affect GHG emissions trends. The reference case serves as a point of comparison in analyzing the GHG reductions from strategies included in the proposed policy scenarios developed by the ICCAG. A first iteration of the reference case was presented to the full ICCAG at the fourth general meeting on July 10, 2007.

Four policy scenarios were modeled during the ICCAG process using the ENERGY 2020 and REMI models to assess how close each scenario came to meeting the 2020 emissions reduction goal, and to assess the economic impacts of each scenario. These policy scenarios included:

Scenario #1. All 24 strategies *except* for cap and trade.
Scenario #2. All the strategies *including* an Illinois-only cap and trade program.
Scenario #3. All the strategies *including* cap and trade *with* a link to the Northeast States' Regional Greenhouse Gas Initiative (RGGI)—a regional cap and trade program.
Scenario #4. An additional model 'sensitivity' run on #2 above was performed that assumes higher oil and gas prices (i.e., higher than those suggested by national government agencies).

NOTE: Scenario #3 assumed a link to RGGI, rather than another cap and trade program, because it is the only mandatory cap and trade program in the U.S. that is completed and can be modeled.

Preliminary modeling results for the policy scenarios were presented to the full ICCAG membership at the July 10, 2007, meeting, and the final results were presented at the last meeting on September 6, 2007. These results indicated that Scenarios #2, #3, and #4 would meet the Governor's 2020 GHG reduction goal, and Scenario #1 would not. Compared to the reference case with no new policies to address climate change, the modeling found that all four scenarios would increase employment and GSP while decreasing electricity costs. See Section VI for more information about the modeling results.

At its July 10 meeting, ICCAG members voted to support 19 strategies with no dissent and at least one abstention. At the September 6 meeting, a majority of voting ICCAG members voted to support an additional five strategies with eight to ten members dissenting and several members abstaining. Summaries of the strategies supported by ICCAG members are provided in Section VII. Complete descriptions of the strategies are included in Appendix F, and written comments from ICCAG members and the public are in Volume 2 of the Appendices.

Because the ICCAG process was open and responsive to members and non-members alike, the process was revised on numerous occasions in response to suggestions. However, certain process decisions made by Illinois EPA and its advisors, such as the decision to exclude federal policy recommendations, were questioned. The Illinois EPA's response to those concerns is found in Appendix G. Written comments from ICCAG members and the public are in Volume 2 of the Appendices.

SECTION IV. ILLINOIS GREENHOUSE GAS INVENTORY AND PROJECTIONS TO 2020

To provide the ICCAG with background and baseline data from which to base policy recommendations, WRI developed an inventory of GHG emissions in Illinois (1990-2003) and projections for future emissions through 2020. The inventory included each of the six major GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and those referred to as the "F-Gases" – hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexalfuoride (SF_6). For the purposes of compilation and comparison, emissions were described in terms of CO_2e (CO_2 equivalent*), referring to their global warming potential (GWP) relative to CO_2.

All data for 1990-2003, unless otherwise noted, were derived from the U.S. module of WRI's Climate Analysis Indicators Tool (CAIT-US), and projections through 2020 were based on historical trends and regional energy consumption growth rates developed by the U.S. Department of Energy.

The inventory and projections document prepared by WRI was originally presented to the full ICCAG in February 2007. At that meeting there were several technical comments and questions from the group reflecting a desire to have more detailed GHG data in each major sector; to see how GHG emissions in Illinois compare with other states; and to better understand how much electricity Illinois exports and how this compares to others states. As a result, WRI prepared three addenda to the emissions inventory that were presented at the April ICCAG meeting. The original inventory document and the three addenda are found in Appendix C.

Since that time, revised and updated data have been incorporated into CAIT-US. To provide the Governor with the most accurate and complete data available, this report presents emissions data from CAIT-US version 2.0 (released in June 2007). The following is an overview of the original document, incorporating the latest emissions data available. For additional information on the emissions inventory, see Appendix C.

GHG Emissions in Illinois in 2003

In 2003, the most recent year for which data were available, Illinois produced an estimated 269 million metric tons of GHGs on a CO_2 equivalent basis ($MtCO_2e$), ranking it 7th compared to other states, only slightly behind Florida and Indiana. Illinois generated 4.0 percent of total U.S. emissions in 2003. For international context, if Illinois were its own country, it would rank as the 26th largest emitter in the world, slightly ahead of Thailand. See Table 5 below.

**CO_2 equivalent provides a standardized unit of measurement to represent various greenhouse gases that have different global warming potentials relative to the global warming potential of carbon dioxide, the most prevalent greenhouse gas.*

Table 5. Top 10 GHG Emitting States

		$MtCO_2e$	% of US
1	Texas	782	11.6%
2	California	453	6.7%
3	Pennsylvania	301	4.5%
4	Ohio	299	4.4%
5	Florida	271	4.0%
6	Indiana	269	4.0%
7	**Illinois**	**268**	**4.0%**
8	New York	244	3.6%
9	Michigan	212	3.1%
10	Louisiana	209	3.1%

Table 6 provides a breakout of emissions data by gas and sector, further illustrated in Figures 2 and 3.

Table 6. Illinois GHG Emissions by Gas and Sector – 2003

1,000 Tons CO_2e	**CO_2**	**CH_4**	**N_2O**	**F-Gases**	**Total**
Electricity Generation	86,365	21	410		86,796
Residential	26,363	155	37		26,556
Commercial	12,641	42	14		12,698
Industrial	39,334	60	95		39,489
Transport	64,677	94	1,414		66,185
Fugitive Emissions		1,878			1,878
Industrial Processes	8,331			5,103	13,434
Agriculture		2,861	11,773		14,634
Waste		6,085	732		6,817
Total	**237,711**	**11,196**	**14,477**	**4,852**	**268,487**

CO_2 = carbon dioxide
CH_4 = methane
N_2O = nitrous oxide
HFC = hydrofluorocarbons
PFCs = perfluorocarbons
SF_6 = sulfur hexafluoride

Figure 2. Illinois GHG Emissions by Gas

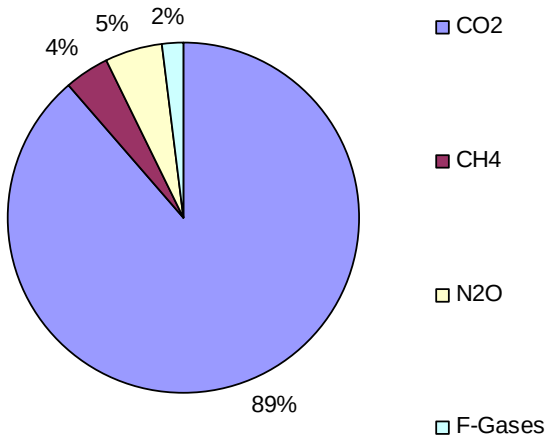
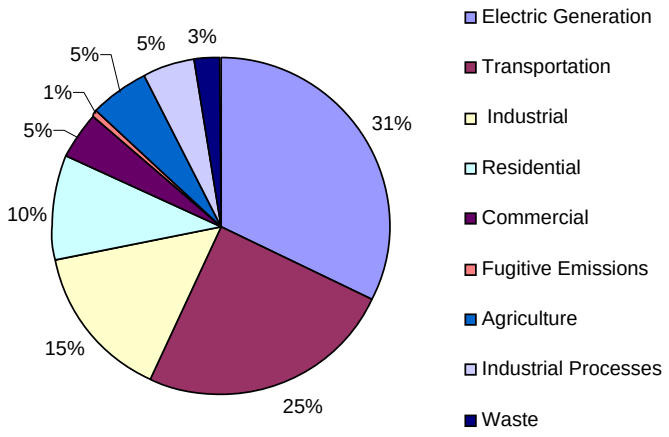


Figure 3. Illinois GHG Emissions by Economic Sector



Broken out by gas, CO_2 comprises the largest share of Illinois GHG emissions at 89 percent, equivalent to the proportion at the national level. It is also worth noting that N_2O comprises a larger share of GHG emissions in Illinois than does CH_4 owing to the greater prevalence of cultivated crops and fertilizer use in Illinois. By sector, electricity generation and transportation account for more than half the state's emissions. Energy-related emissions (electricity generation, transportation, industrial, residential, commercial, and fugitive emissions) account for over 85 percent of Illinois GHG emissions.

GHG Emissions Trends in Illinois (1990-2003)

Total GHG emissions in Illinois increased between 1990 and 2003, as they did in all other states. In Illinois, GHG emissions increased, in aggregate, by 16.1 percent. By comparison, the national rate was 13.9 percent. However, an analysis of trends at the sector level reveals significant differences between emissions growth in Illinois and the country as a whole. Table 7 presents emission trends in Illinois and the U.S., and Figure 4 presents the annual trends in Illinois emissions by sector between 1990 and 2003.

Table 7. Emissions Growth in Illinois vs. U.S.

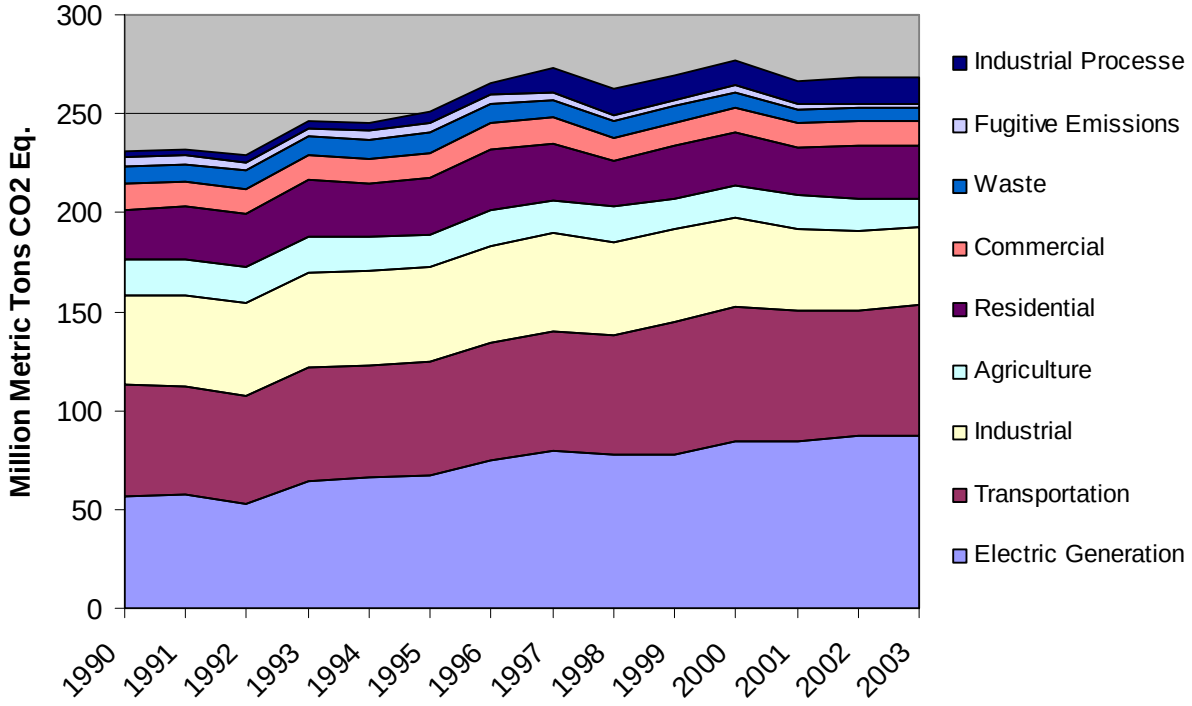
Illinois	1990	2003	Growth	Annual Rate
Total ($MtCO_2Eq$)	**231.3**	**268.5**	**16.1%**	**1.2%**
Electricity Generation	56.9	86.8	52.5%	3.3%
Residential	25.7	26.6	3.3%	0.2%
Commercial	12.6	12.7	1.1%	0.1%
Industrial	45.7	39.5	-13.6%	-1.1%
Transportation	55.9	66.2	18.5%	1.3%
Fugitive Emissions	4.2	1.9	-55.6%	-6.1%
Industrial Processes [1]	3.6	13.4	275.8%	10.7%
Agriculture	17.5	14.6	-16.6%	-1.4%
Waste	9.2	6.8	-25.9%	-2.3%
U.S. [2]	**1990**	**2003**	**Growth**	**Annual Rate**
Total ($MtCO_2Eq$)	**6,108.9**	**6,959.1**	**13.9%**	**1.0%**
Electricity Generation	1,803.6	2,272.2	26.0%	1.8%
Residential	338.0	378.8	12.1%	0.9%
Commercial	222.6	235.8	5.9%	0.4%
Industrial	1,082.2	1,065.4	-1.6%	-0.1%
Transport	1,460.0	1,818.4	24.6%	1.7%
Fugitive Emissions	254.9	217.4	-14.7%	-1.2%
Industrial Processes	301.1	304.1	1.0%	0.1%
Agriculture	439.6	439.1	-0.1%	0.0%
Waste	210.0	194.8	-7.2%	-0.6%

[1] According to WRI, there is a discontinuity in data availability for state level emissions in the Industrial Processes sector between 1996 and 1997. As this sector is the major source of F-gases it remains in this inventory; however, trends in this category from 1990-2003 are hindered by an artificial growth in emissions, and trend values are therefore likely lower than those presented here.

[2] U.S. data are sourced from EPA's Inventory of U.S. Greenhouse Gas Sources and Sinks: 1990-2004. Because of differences in sector definitions and methods for assigning GHG emissions to economic sectors, emissions trends for the Residential, Commercial and Industrial sectors are illustrative, but not directly comparable to those presented for Illinois. Only CO_2 emissions from direct fossil fuel combustion are displayed for the Residential, Commercial and Industrial sectors, thus the sum of U.S. sector data does not match the actual total shown in Table 7.

Illinois emissions increased steadily between 1990 and 2003, although there were three notable periods when emissions declined. Between 1991-1992 and 2001-2002, the U.S. experienced mild economic recessions resulting in lower economic output and GHG emissions. Emissions in 2002 and 2003 did not increased significantly primarily due to a lack of continued growth in electric generation emissions in these years. The other instance of a decrease in Illinois emissions occurred in 1998, coinciding with a significantly warmer than normal winter that resulted in lower than average emissions from the residential and commercial sectors due to a reduced demand for heating fuels.

Figure 4. Illinois GHG Emission Trends by Sector: 1990-2003



Between 1990 and 2003, electricity generation from nuclear power and coal increased by approximately 30 percent and 65 percent, respectively, with total electricity generation increasing 46 percent over the same time period compared to 28 percent for the U.S. as a whole. See Figure 5 below. The significant increase in coal-fired generation contributed to the 52.5 percent increase in GHG emissions from the electricity sector shown in Table 7 above.

Electricity generation increased even though no new coal or nuclear capacity was installed over this time span; instead, existing nuclear and coal plants increased their generation of electricity. The significant growth in electricity generation coincided with Illinois' adoption of utility deregulation in 1997 and the subsequent expansion of Illinois electricity exports. See Figure 6 below. Electricity exports have steadily increased, more than doubling since 1990, with the exception of a clear decrease in 1997-1998. During this time, a portion of Illinois' nuclear generation capacity was temporarily off-line. This reduced total state electricity generation as well as net electricity exports, but not GHG emissions since some of the lost, zero-emitting nuclear generation was made up by increased coal generation.

Figure 5. Illinois Electric Generation by Fuel 1990-2005

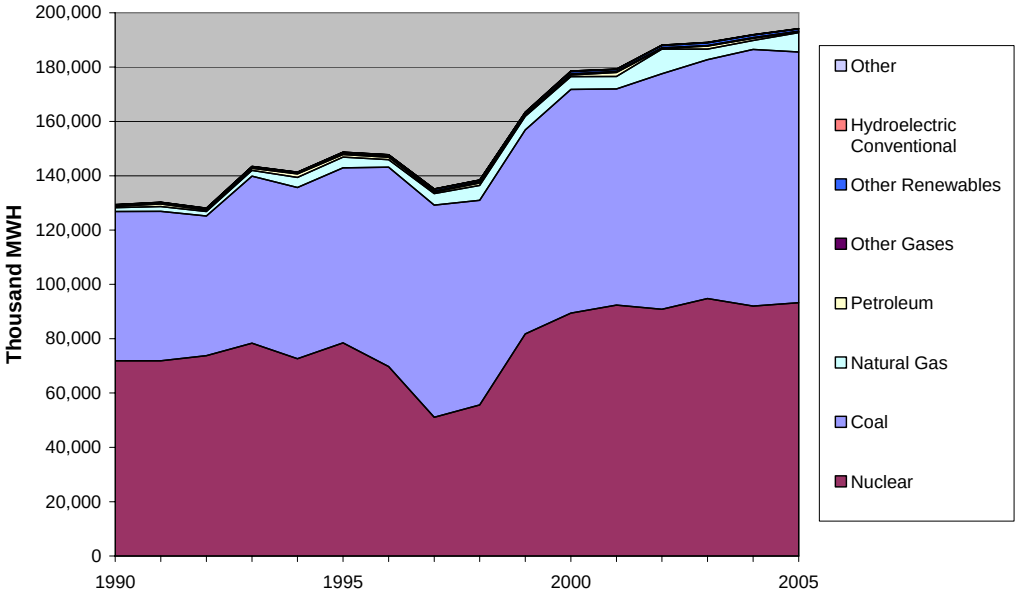
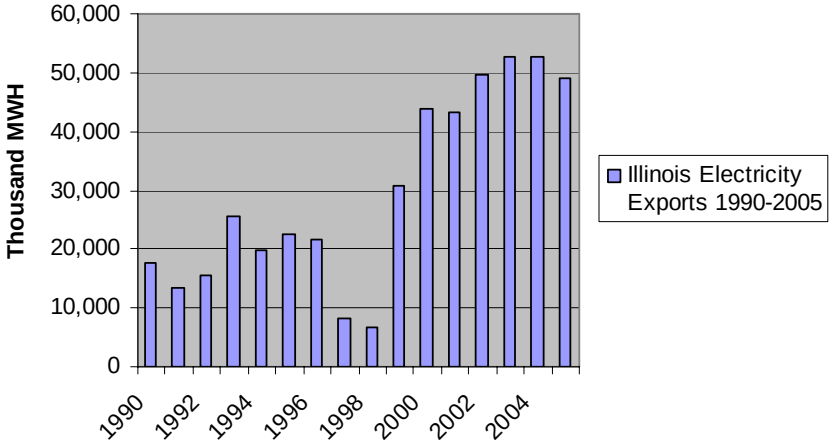


Figure 6. Illinois Electricity Exports 1990-2005



Source for Figures 5 and 6: Energy Information Administration, Electric Power Annual 2005 http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html; WRI calculations

Emissions from transportation also increased significantly (nearly 19 percent), as vehicle miles traveled (VMT) in Illinois increased by 28 percent in the aggregate and 17 percent per capita between 1990 and 2003 (an increase in emissions and VMT slightly less than the national trend).

The decline in industrial emissions was due primarily to fuel switching away from coal and towards natural gas as well as increased efficiency as energy use in the sector remained stable through this period. Meanwhile, emissions from the agriculture sector decreased 17 percent in Illinois between 1990 and 2003, compared to an essentially flat rate nationally, due in part to lower methane

emissions with decreased numbers of livestock, especially cattle and swine.

It is difficult to attribute the trends in several of the other sectors, such as residential and commercial sectors due to seasonal and annual variations in temperature, or the waste sector due to population-based emissions estimates.

Projections of Illinois GHG Emissions (2003-2020)

To provide a range of possible future emissions trends, WRI presented three emissions forecasts through 2020, referred to by WRI as “low,” “best guess,” and “high,” at the first ICCAG meeting in February. The projections were based on regional growth rates for energy consumption developed by the Energy Information Administration (EIA) (published in the Annual Energy Outlook 2006) and historic emission trends for electric power, waste, agriculture, and industrial processes. See Appendix C. Some members asked why the emissions forecasts did not extend to 2050 to be consistent with the Governor’s 2050 goal. WRI explained that due to difficulties and uncertainties around 2050 projections, 2020 projections are more reliable.

WRI also provided preliminary estimates of emissions reductions from implementing Governor Blagojevich’s Energy Independence Plan (EIP). Some ICCAG members thought WRI’s EIP estimates were overly optimistic, and they asked for a range of emissions projections based on different assumptions around the effectiveness of cellulosic ethanol and integrated gasification combined cycle power plants using carbon capture and sequestration (CCS) to reduce emissions. This information was provided at the next meeting in April.

WRI’s projections were simply an early stage range of estimates to give ICCAG members a relative sense of Illinois’s future GHG emissions in advance of the modeling by ICFI. The ICFI modeling produced a far more detailed and robust forecast of emissions that was ultimately used for decision making (see Section VI). At the same time, the information that was assembled at this earlier stage of the process ultimately helped inform the modeling by ICFI. See Appendix C for further discussion of WRI’s emissions projections.

SECTION V: EVALUATION OF GREENHOUSE GAS REDUCTION STRATEGIES

Developing a List of Policy Options

Illinois EPA asked WRI to develop a list of state policy options for consideration by the ICCAG (see Appendix D). This initial set of options, generated in collaboration with Illinois EPA and other Illinois agency staff, included possible GHG reduction strategies for all economic sectors (e.g., electric generation, transportation, industry, agriculture). The list included a total of 88 policy options, and was informed by several factors, including:

- State and national policy trends.
- Illinois state-level policy considerations.
- Potential impact on GHG emissions.
- Balance among sectors/emissions sources.
- Implementation costs and revenue implications.
- Environmental co-benefits.
- Inclusion in the Illinois EIP.

WRI's list of policy options was discussed at the first meeting in February. The options were presented as brief descriptions, and Chairman Scott decided to narrow the list down to a smaller number of priority options that would be fleshed out in greater detail by the subgroups. The chair indicated that the group didn't need to address the strategies that the Governor had already endorsed in his EIP. However, the group could recommend additional measures that go beyond the Governor's plan.

Selecting Priority Policy Options for Further Analysis

Before beginning to winnow the list down, some ICCAG members thought it was important to get additional information about the policy options. WRI and state agency staff compiled qualitative and quantitative information regarding the expected GHG emissions reductions and administrative costs of the 88 policy options. These data were largely drawn from previously published sources and WRI expertise. Although not exhaustive, the initial policy options list provided a foundation for the ICCAG to begin policy analysis and formulation.

Between the first meeting on February 22 and the second meeting on April 3, this information was distributed electronically to ICCAG members. The ICCAG then narrowed down this initial list through an anonymous, online voting process for ICCAG members designed by WRI. ICCAG members were given approximately one week to select 30 strategies for further analysis, and the final results were then tabulated by WRI. A presentation and discussion of the voting results occurred at the full ICCAG meeting on April 3, 2007. The top 25 policy options that received at least 15 votes were selected for further analysis (see Appendix E for the voting results).

Although there was general satisfaction with the voting procedure, there was an acknowledgment by Director Scott that the voting process did not indefinitely remove any particular option from further consideration by the group; rather, it was a means to focus the group's attention on certain policy options deemed by the group to be most relevant to meeting the Governor's goals. Other measures could be revisited at any point during the ICCAG process.

Subgroup Formation

At the April 3 meeting, the ICCAG decided that in the next phase of the process, the top 25 policy options would be further developed and analyzed by five independent subgroups: power and energy; transportation; commercial, industrial, and agriculture (CIA); cap and trade; and modeling.

The top 25 policy options were assigned to the first four subgroups listed above to formulate one to three page policy proposals that could be modeled for their emissions and economic effects. The subgroups were allowed to add or delete policy options under their consideration, but only if there were no objections from ICCAG members. This restrictive ground rule was intended to protect the integrity of the voting process. The fifth subgroup, Modeling, was created to review the work of the modeling contractors.

Between the April 3 and May 23 general meetings of the ICCAG, each subgroup convened three times via teleconference at approximately two-week intervals. The calls were open to the public and other observers. Calls were moderated by each of the workgroup chairs. At least one representative from WRI participated on all workgroup calls to provide technical guidance and research support. Calls typically lasted two to three hours.

Subgroup Recommendations for Modeling Policy Options

Initially, WRI, Illinois EPA, and DCEO staff developed a series of preliminary policy proposals for each of the 25 policy options. These proposals included a fuller description of each policy option and well-documented estimates regarding the expected GHG emission reductions from the implementation of a particular policy in isolation. The proposals also identified expected policy timetables, duration, and stringencies, and remarked on potential barriers (economic or legal) to implementation. These were not intended to be detailed legislative, regulatory or programmatic proposals. The objective was to provide a policy framework that could be analyzed by ICFI with the ENERGY 2020 model.

The proposals were iteratively revised as subgroup members offered verbal and written comments, provided additional information or data, or made general suggestions for policy design improvements during and following each conference call. At the May 23 meeting, the subgroups recommended 24 policy proposals for modeling, and these recommendations were approved by the full ICCAG. At this point, the ICCAG was not making final decisions to approve strategies. However, the modeling results would help inform which strategies were ultimately approved.

Of the 24 proposals to be modeled, the following four were new proposals added by the subgroups that were not among the 25 policy options that received the most votes:

- Increase traditional recycling diversion rate with municipal goals and by stimulating demand for recycled materials.
- Land use development offset requirement.
- Enhanced renewable portfolio standard.
- Enhanced energy efficiency program.

The recycling and land use strategies arose during subgroup discussions. The renewable energy and energy efficiency proposals were not part of the initial vote because the Governor had already supported similar strategies as part of his energy plan; however, the ICCAG voted to model more aggressive versions of these strategies.

Two proposals from the top 25 list were not recommended, and six from this list were combined into three proposals. Among the 24 proposals to be modeled was a market-based "cap and trade" program to reduce GHG emissions from fossil fuel power plants and other relatively large emitters. Under a cap and trade program, the total pool of emissions are initially limited, or capped, to a set amount that shrinks over time, and sources that stay below their allotted emissions can sell emissions "allowances," or allotments, to sources that exceed their allowable limits. See Table 8 below for a summary of the approved subgroup modeling recommendations.

Table 8. Summary of Approved Subgroup Recommendations for Policy Options to be Modeled

Policy Proposal	Survey Votes	Sector	Subgroup	Recommended for Modeling?
Implement smart growth initiatives and expansion of mass transit	27	Transportation, Developers,Local Govt.	Transport	Yes
GHG emission standards for automobiles (California standards)	25	Auto Manufacturers, Dealers	Transport	Yes
Incentives for fuel efficient vehicles	23	Auto Manufacturers, Dealers	Transport	Yes
Renewable fuels standard (RFS) and/or low-carbon fuels standard	27	Transportation Fuels	Transport	Yes
Fuel efficiency and/or low carbon fuel requirements for all government vehicles	15	Government	Transport	Yes
Passenger and freight rail upgrades	15	Rail Transport	Transport	Yes
CO_2 emission performance standards for new electricity generation; emissions portfolio standard for LSEs.	25	Electric	Power/ Energy	Yes
Small renewable distributed generation: rules, legislation, incentives	20	Electric	Power/ Energy	Yes
Energy efficiency standards for appliances and equipment	30	Electric	Power/ Energy	Yes
Carbon capture and storage (from the outset) portfolio standard	15	Electric	Power/ Energy	Yes
Establish residential and commercial energy efficiency construction codes beyond international standards; Energy efficiency building codes/standards for government buildings.	24	Multi-sector	Power/ Energy	Yes
Phase-in of energy efficiency standards for light bulbs	15	Multi-Sector	Power/ Energy	Yes

Table 8 (cont'd). Summary of Approved Subgroup Recommendations for Policy Options to be Modeled

Policy Proposal	Survey Votes	Sector	Subgroup	Recommended for Modeling?
Expand transmission capacity for wind power	23	Electric	Power/ Energy	No
Energy conservation and efficiency programs for existing state facilities	19	Government	Power/ Energy	Yes
Enhanced Renewable portfolio standard of 25 percent by 2025	N/A	Electric	Power/ Energy	Yes
Enhanced energy efficiency programs	N/A	Multi-sector	Power/ Energy	Yes
Carbon offset requirements for new fossil fuel generation	16	Electric	Cap and Trade	Yes
State-level cap and trade program	18	Multi-sector	Cap and Trade	Yes
Incentives to reduce nitrogen application in crop fertilization	16	Agriculture	CIA	No
Programs to encourage forest management, reforestation, tree- and grass-planting	21	Agriculture Forestry	CIA	Yes
Encourage or require reductions in emissions of high GWP gases (N2O, HFCs, PFCs, SF6)	16	Commercial Industrial	CIA	Yes
Energy efficiency incentives, assistance and/or standards for commercial/industrial generators and boilers	22	Commercial Industrial	CIA	Yes
Expand use of no-till farming	15	Agriculture	CIA	Yes
Encourage methane capture from coal mines, landfills, livestock farms and wastewater treatment plants.	22	Multi-sector	CIA	Yes
Increase Traditional Recycling Diversion Rate with Municipal Goals and by Stimulating Demand for Recycled Materials	N/A	Multi-sector	CIA	Yes
Land Use Development Offset Requirement	N/A	Multi-sector	CIA	Yes

SECTION VI. EMISSIONS AND ECONOMIC IMPACT MODELING

Early in the ICCAG process, WRI and the state agencies provided estimates of GHG reductions for each of the individual proposals implemented in isolation. These estimates were used solely to inform the subgroups and the ICCAG as it considered which policies should be included in the modeling exercise. Since these estimates do not account for interactions between policies, adding the reductions for each policy together would substantially overestimate the emissions reductions from implementing them in combination.

An economic and emissions modeling exercise was conducted in order to provide the greatest amount of understanding and insight as to the emissions and economic impacts of the policy proposals under consideration. WRI and Illinois staff reviewed several options and recommended that the ICCAG retain the use of the ENERGY 2020 model owned by Systematic Solutions and offered in partnership with ICF International. The ICCAG had expressed a desire to use a model, such as ENERGY 2020, that could represent the entire economy of Illinois as opposed to one or two important sectors (e.g., electric generation).

Some ICCAG members wanted analytical modeling results for individual strategies. However, WRI and ICFI recommended that the ICCAG process model packages of strategies (scenarios), but not individual strategies. This was because the emissions reductions from any single measure implemented by itself will vary significantly compared to the reductions from that same strategy implemented in combination with other strategies. Moreover, the order in which strategies are implemented will affect the emission reductions of a single strategy. Thus, the results from modeling the stand-alone impacts of a single strategy would not be meaningful. While it is possible to tease out the impacts of a single strategy implemented in combination with other strategies, this would require a level of modeling that is far beyond the scope of the project at this time. The emissions projections constructed through the ICF modeling exercise provided a sophisticated and robust forecast of GHG emissions against which all policy scenarios were compared.

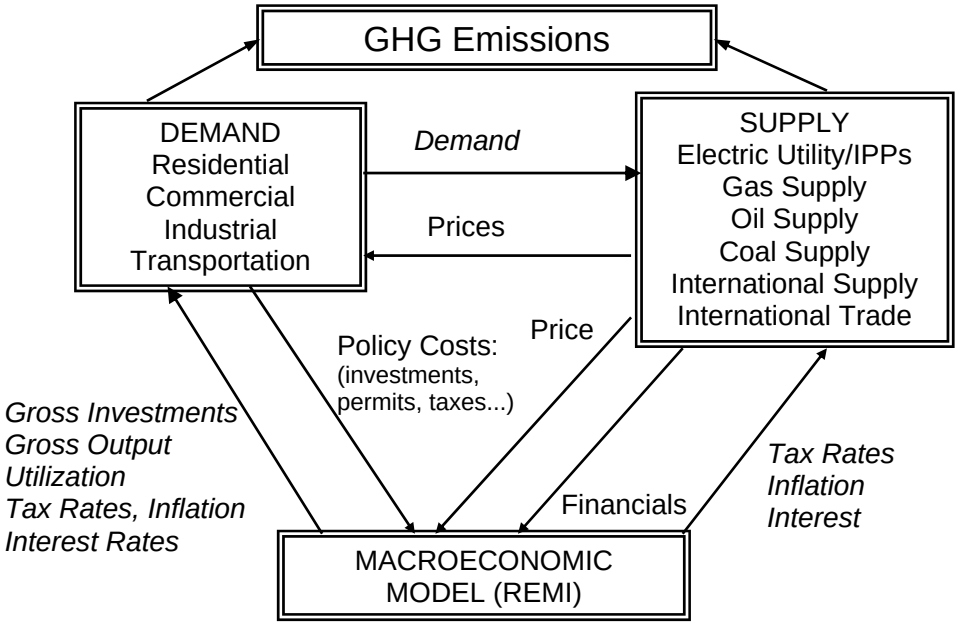
About ENERGY 2020

ENERGY 2020 is an integrated, multi-sector, multi-region energy model that provides complete and detailed, all-fuel demand and supply sector simulations. These simulations can additionally include macroeconomic interactions to determine the benefits or costs to the local economy of new facilities or changing energy prices. The economic inputs for ENERGY 2020 and the subsequent macroeconomic modeling used the REMI macroeconomic model as provided by DCEO.

ENERGY 2020 is a causal and descriptive model, which dynamically describes the behavior of both energy suppliers and consumers for all fuels and for all end-uses. It simulates the physical and economic flows of energy users and suppliers. It simulates how they make decisions and how those decisions causally translate to energy-use and emissions (see Figure 7).

The model uniquely captures the feedback among energy consumers, energy suppliers, and the economy. For example, a change in price affects demand that then affects future supply and price. Increased economic activity increases demand; increased demand increases the investment in new supplies. The new investment affects the economy and energy prices. The energy prices also affect the economy.

Figure 7. Structure of ENERGY 2020 model and sectoral relationships



Reference Case ("Business as Usual")

In order to accurately analyze policy portfolios, a reference case was constructed to forecast economic and emissions trends through 2020. It assumes a continuation of current economic trends and the associated GHG emissions and reflects, to the extent possible, recently enacted policies and new projects that could affect GHG emissions trends. The reference case is a "business as usual" scenario, which means policies that might affect emissions and economic trends are assumed to be unchanged through 2020. For example, under the reference case, federal fuel economy standards for motor vehicles do not change. The reference case is the point of comparison for the modeled policy scenarios.

For modeling purposes, state or federal legislation or regulations were not included in the reference case if they had not yet been enacted at the time that the modeling was completed. For example, the Governor recently signed into law the Illinois Power Agency Act that implements elements of his energy plan, including a RPS and an energy efficiency portfolio standard (EEPS). The RPS and EEPS were not included in the reference case because they had not been approved before the modeling was completed. However, policies recommended by the ICCAG, and included in the modeling analysis, meet or exceed the law's requirements for renewable energy and energy efficiency (see Section IX).

Macroeconomic data for the reference case, such as forecasts for population, employment and GSP growth, were provided by DCEO from a control forecast of its REMI model. In addition, fuel cost data, technology performance and cost data, and other key inputs were derived from state and federal sources and were approved for use by the ICCAG modeling subgroup. A complete accounting of all input data and assumptions used in the modeling exercise can be found in the "Assumptions Book" compiled by ICFI and presented in Appendix H.

Under the reference case, population growth is forecast to be moderate (<1 percent annually) while personal income in real terms is expected to grow more rapidly, resulting in rising income per capita. See Table 9.

Table 9. Historic and Projected Growth in Illinois Population and Disposable Income

Population and Income	1990	2005	2020	Average Annual Growth	
				1990-2005	2005-2020
Population (thousands)	10,825	12,770	13,816	1.1%	0.5%
Disposable Personal Income (billions 2000 $)	306	385	498	1.5%	1.7%
Disposable Income per Capita (2000 $)	28,306	30,149	36,066	0.4%	1.2%

The mix of housing types is expected to continue to show a gradual intensification as an increasing proportion of the population moves into multiple unit buildings such as row housing, apartments and condominiums. The pattern of employment has changed significantly over the past 15 years, as growth in the service economy has offset decreases in employment in industry and agriculture. This pattern is expected to continue over the forecast period. See Table 10 for employment data.

Table 10. Illinois Historical and Projected Employment by Major Economic Sector

Employment (thousands)	1990	2005	2020	Average Annual Growth
Industrial	1,335	1,169	1,130	-0.3%
Commercial	4,824	5,173	5,893	0.6%
Government	670	735	776	0.5%
Agriculture & Forestry	123	103	93	-0.9%
Total	***6,951***	***7,181***	***7,892***	***0.4%***

In addition to macroeconomic input data, the following sources were used for fuel price data:

- Oil, coal, and natural gas prices in the model are based on U.S. Department of Energy's Annual Energy Outlook (AEO) for 2007 to 2030.

- Historic electricity prices used in the ENERGY 2020 were derived from utility financial statements obtained from the Energy Information Administration Federal Electricity Regulatory Commission (FERC) Form 1.
- Power prices were calculated by the ENERGY 2020 model based on generation costs and dispatch. The model calculated retail electricity prices; however, actual consumer prices were calibrated to reflect the particular regulatory and market circumstances in Illinois under deregulation.
- The wellhead price of natural gas in the model is based on the U.S. Energy Information Administration's AEO, 2007 through 2030.

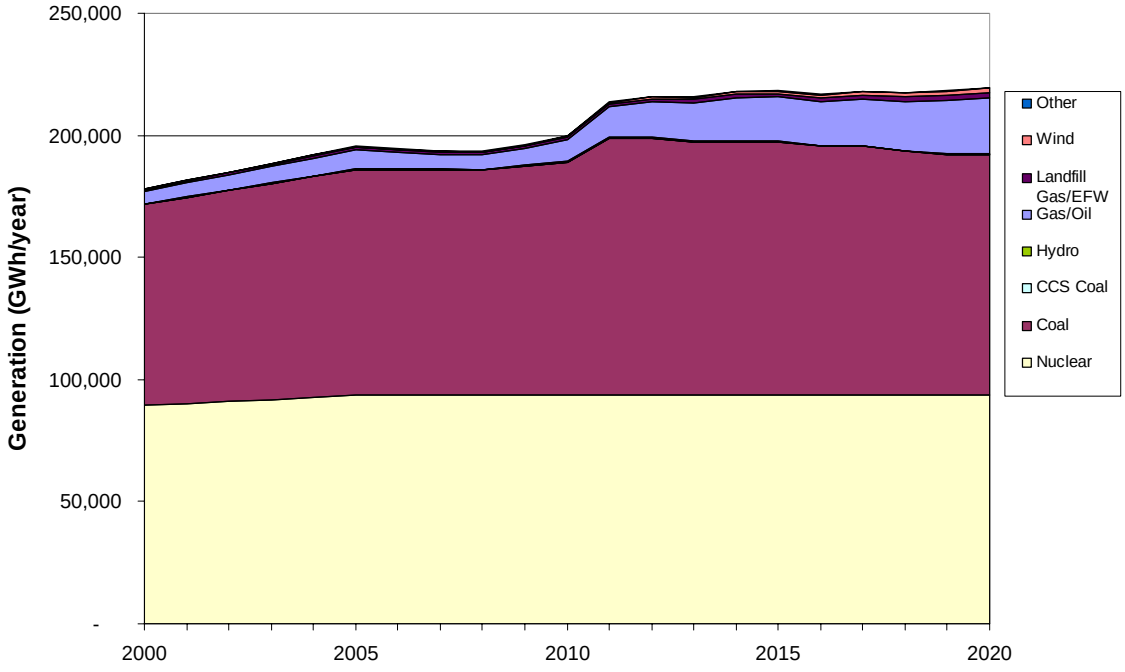
Some regulations affecting the power sector have been enacted but have not yet come into effect. Such regulations, including more stringent emission requirements for mercury, SOx, NOx and particulate matter, will affect the operating costs for certain generating plants. While the scope of this analysis did not include modeling criteria air contaminants (CACs), compliance costs for these regulations were incorporated in the model so that they were reflected in dispatch decisions. The costs of compliance were based on prior modeling carried out for the Lake Michigan Air Directors' Consortium and the Illinois EPA.

When considering the results for both the reference and policy cases, it is important to note that any projection of the future contains a substantial amount of uncertainty. These results should not be considered precise answers to policy questions but instead provide directional information of plausible outcomes based on the best available data and assumptions as approved by the ICCAG.

Reference Case Results

Growth in Illinois electricity sales is projected to be robust as the state's economy and population expand. In addition, electric generation is expected to increase as well, with a modest amount of growth in coal generation as aging plants are retired and substantial growth in generation from natural gas. Nuclear generation remains static in the reference case with no new plants or shutdowns expected through 2020 (although Illinois' plants are scheduled for decommissioning after 2020). Figure 8 presents a reference case forecast for electric generation by fuel. Overall, Illinois is projected to maintain and expand its status as a leading electricity exporter in the reference case.

Figure 8. Projected Illinois Electricity Generation by Fuel Under the Reference Case



In the transportation sector, energy demand is expected to increase substantially under the reference case. Air travel energy demand is expected to double while passenger transport surges at a faster rate than was experienced between 1990 and 2005. The average fuel economy of passenger and freight vehicle fleets in Illinois is not projected to change from current averages over the forecast period. See Figure 9 and Table 11 below.

Figure 9. Historical and Projected Transportation Energy Demand by Mode

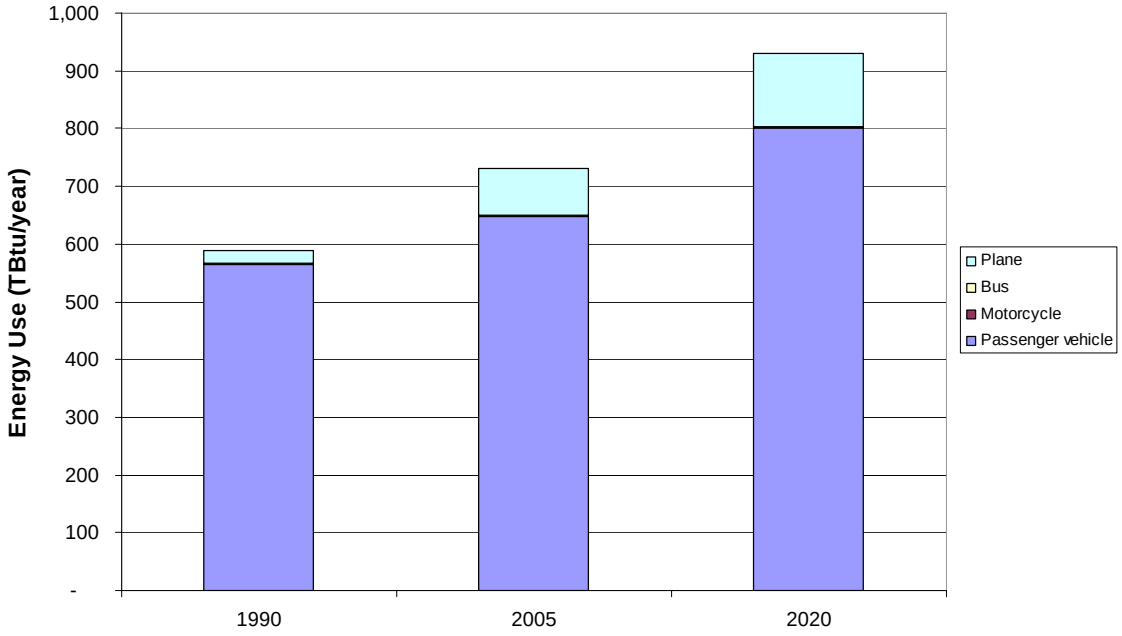


Table 11. Projected Vehicle Efficiency by Vehicle Type

Passenger Vehicle Efficiency (miles/gallon)			
	2000	**2010**	**2020**
Small Gasoline	31.6	32.9	31.6
Medium Gasoline	26.8	29.3	28.6
Large Gasoline	20.8	21.4	21.0
Large Diesel	20.8	21.7	21.4
Freight Vehicle Efficiency (miles/gallon)			
	2000	**2010**	**2020**
Medium Gasoline	6.8	7.2	7.1
Heavy Diesel	5.8	6.0	6.1

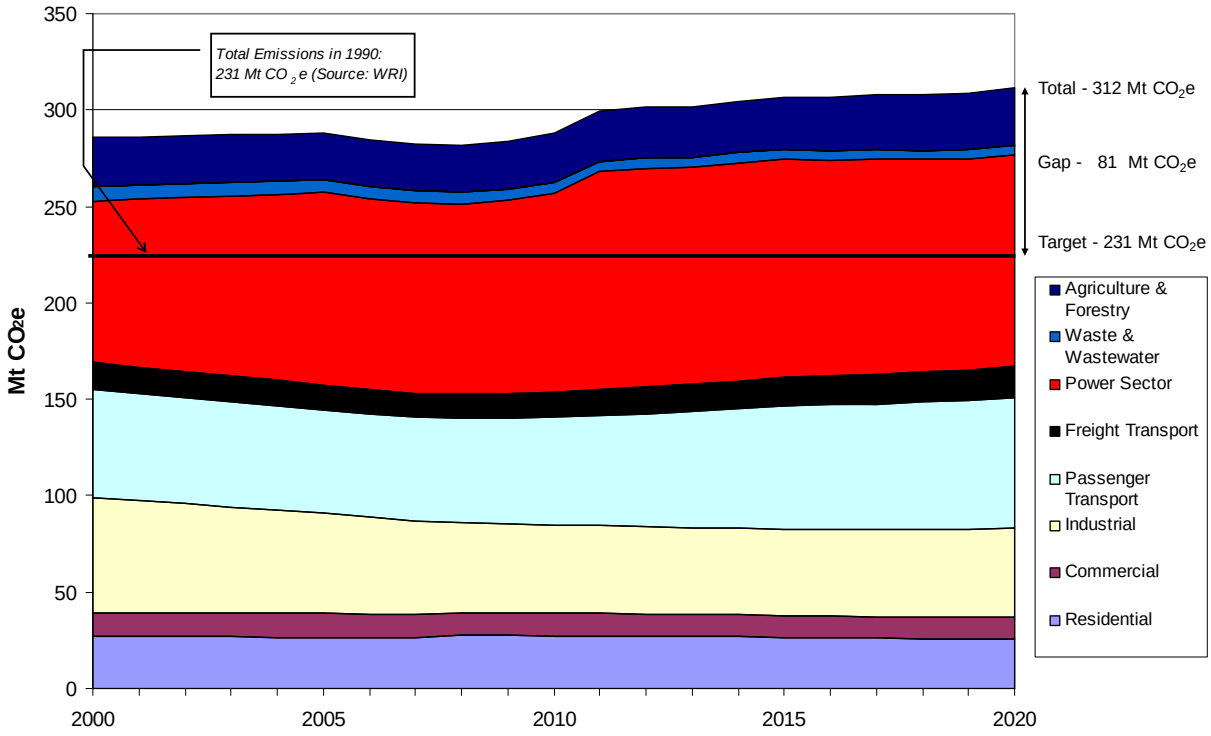
With the exception of electric generation and transportation, emissions from all other sectors of the economy experience very little change in the forecast period. The two exceptions are waste and the industrial sector. Methane capture and destruction in the waste sector for use in electricity generation and industrial facilities results in a modest decline in emissions from this sector. For the industrial sector, increases in efficiency and automation and an overall decline in energy intensive industries result in substantial declines in emissions from this sector.

2020 Emissions Projections Compared to 1990 Levels

The ICFI modeling projects that Illinois GHG emissions will grow to 312 Mt CO_2e by 2020 under the business as usual scenario. In order to meet the Governor's goal of reducing greenhouse gas emissions to 1990 levels (231 Mt CO_2e) by 2020, emissions in 2020 need to be 81 Mt CO_2e less (312 minus 231) than what ICFI projects for the business as usual scenario. Current annual GHG emissions in Illinois are about 276 Mt CO_2e, or 45 Mt CO_2e, above 1990 levels. Figure 10 shows the emission trajectories for the reference case.

By 2020, Illinois GHG emissions are projected to be 81 million metric tons above 1990 levels.

Figure 10. Illinois Reference Case GHG Emissions by Sector and Governor's 2020 Goal



Modeling of Policy Scenarios

As noted above, the ICCAG modeling subgroup agreed that the policy strategies* should be packaged into four different modeling scenarios to help inform the group's decisions. These scenarios are as follows:

Scenario #1. *All in without cap and trade* – includes all policy strategies advanced by the ICCAG except the "state-level cap and trade program."

Scenario #2. *All in with an Illinois-only cap and trade* – includes all policy strategies advanced by the ICCAG and the "state-level cap and trade program."

Scenario #3. *All in with cap and trade and RGGI link* – includes all policy strategies advanced by the ICCAG the "state-level cap and trade program," as well as a link to the emissions market created by the RGGI among states in the northeast.

Scenario #4. The same as #2 above, but with an assumption of high oil and gas prices. This scenario was recommended by some ICCAG participants who thought the oil and gas price assumptions in the other scenarios might be too low.

** The policy strategies were modeled as approved by the ICCAG and described in Section VII and Appendices H and I.*

In the reference case, electricity sales are projected to continue a steady rate of increase, but each of the policy scenarios substantially reduces this rate of growth. The reduction in sales is driven largely by lower commercial sector sales and lower sales growth in other sectors as a result of energy savings induced by the policy package, though how much of the decrease is difficult to attribute to any specific policy measure. Under all policy scenarios, sales within state decrease significantly until 2011-2012 and then begin to grow again.

For Scenario #1, electricity generation increases beyond the reference case as more clean coal and renewable power sources come online due to the CCS and RPS policy measures. Conversely, with Scenario #2, all strategies plus the cap and trade program, electricity generation is projected to decrease compared to the reference case due to the cost of controlling GHG emissions. With cap and trade and a link to RGGI, generation increases, but not as much as with the policy package without cap and trade. Illinois remains a net exporter of electricity in all policy scenarios.

Policy Scenario Results: Emissions Impacts

Within the modeling results there are two initial types of emission reductions presented—those that take place inside Illinois and those that take place outside of Illinois. Furthermore, there are three types of reductions that could take place inside or outside of Illinois:

- Direct emissions reductions from the implementation of policies.
- Offsets purchased for compliance with a given policy, such as cap and trade. GHG offsets can be created when an entity that is not required to reduce GHG emissions voluntarily chooses to do so. The emissions reductions from these projects can be used to offset the emissions from the regulated sources. In the modeling exercise, offsets are assumed to take place inside Illinois and are above and beyond the direct emission reductions achieved by a policy package.
- Emissions allowances purchased by Illinois sources from sources in the RGGI that are used for compliance with the cap and trade program under Scenario #3. Under a cap and trade program, sources that stay below their allotted emissions can sell emissions allowances to sources that exceed their allowable limits. The ICFI modeling indicated that Illinois sources would buy allowances from sources in the RGGI states. The emissions reductions tied to these allowances are considered to be above and beyond direct reductions achieved outside of Illinois.

The model predicts direct reductions outside of Illinois due to policies that reduce electricity demand and create new electricity generation in-state, that in-turn displaces fossil-fuel generation out-of-state. While a model can predict this, WRI stated that in the real world it is very difficult to demonstrate whether emissions reductions in another state resulted from policies implemented in Illinois. In-state reductions, on the other hand, can be measured simply by tracking changes to in-state emissions and verifying purchased offsets and allowances.

Some ICCAG members argued that the state should take credit for out-of-state emissions reductions resulting from its policies, even if those reductions may be difficult to verify. From this perspective, Scenario #1 without cap and trade is almost as good as Scenario #2 with an Illinois-only cap and trade (see Table 12 below). For example, see the AFL-CIO's comments in Appendix 2. Out-of-state emissions reductions are significantly lower under Scenario #2 compared to Scenario #1 because of leakage.

However, as described above, WRI and ICFI explained that it is very difficult to show whether emissions reductions in some other state resulted from policies implemented in Illinois. When considering the Governor's GHG reduction goal of 1990 levels by 2020 (an 81 million ton reduction from what is projected in 2020 under a business as usual reference scenario), WRI and ICFI advised the ICCAG to include only reductions achieved inside Illinois (including purchased offsets that are allowed under the cap and trade proposals) plus allowances purchased outside Illinois for compliance in-state.

This is why Table 12 presents estimates for direct out-of-state emissions reductions, including 44 Mt CO_2e under Scenario #1, but does not count them towards the Governor's goal. In addition, Chairman Scott said the Governor has established an in-state reduction goal, and that other states also need to take steps in order to minimize leakage and combat global warming. Therefore, the ICCAG focused on in-state GHG reductions while acknowledging that leakage is an important issue that should be brought to the Governor's attention.

Table 12. GHG Reductions Achieved under ICCAG Policy Packages (Million Metric Tons CO_2e)

Total in –state reductions required to meet 2020 goal = 81Mt CO_2e						
Scenario	**Description**	**GHG Reductions vs. Reference Case**				
		Inside Illinois		**Outside Illinois**	**Total Toward Goal/Meets Gov's Goal?**	**Outside Illinois, Direct Reductions**
		Direct Reductions	**Purchased Offsets**	**Purchased Allowances**		**Don't Count Toward Goal, Difficult to Verify**
#1	"All in" with out cap and trade	36	0	0	**36/No**	44
#2	"All in" with Illinois-only cap and trade	79	5	0	**84/Yes**	3
#3	"All in" with cap and trade and link to RGGI	44	5	33	**82/Yes**	37

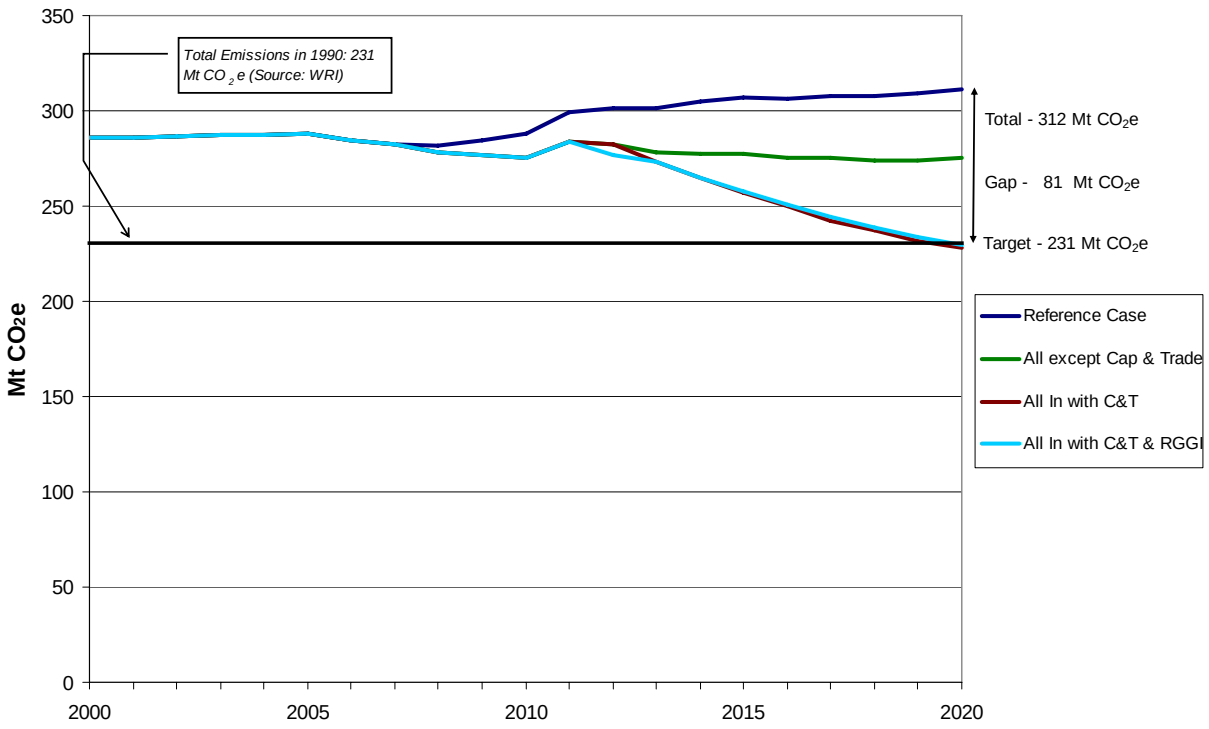
The policy package scenarios provide three possible emission reduction pathways based on what policy recommendations are pursued. Figure 11 graphically presents these emission trajectories. The key emission reduction results are as follows:

Scenario #1: "All in without cap and trade" achieves estimated in-state emissions reductions of 36 million tons by 2020 as compared to the reference case. This scenario does not meet the Governor's goal.

Scenario #2: "All in with Illinois-only cap and trade" does meet the Governor's goal. This scenario achieves total in-state GHG reductions of 84 million tons when purchased offsets from within the state are counted.

Scenario #3: The "all in with cap and trade plus link to RGGI" case could also meet the goal when allowances purchased outside Illinois are counted toward the goal, for a total reduction of 82 million tons.

Figure 11. Illinois GHG Emissions Under Three Policy Package Scenarios*



**Includes reductions achieved inside Illinois (including purchased offsets that are allowed under the cap and trade proposals) plus allowances purchased outside Illinois for compliance in-state. Does not include modeled direct emissions reductions outside Illinois that are difficult to verify.*

Under Scenario #2, the model predicts that allowance prices in the cap and trade program start out at modest levels but steadily increase as the cap becomes more stringent. Allowance prices reach a high of just over $18/ton in 2020. Modeling the allowance price with a link to RGGI was beyond the scope of this analysis. Therefore, in Scenario #3 with a link to RGGI, ICFI assumed that allowance prices would not exceed $10/ton. WRI thought this was a conservative assumption (on the high side) because RGGI modeling indicates that allowance prices will stay well below $10, and if prices do reach $10/ton, more generous offset policies are triggered that would help stabilize costs. It is important to note that the major emissions reductions for the cap and trade packages are achieved by reductions in the power sector.

GHG emission reductions outside Illinois as a result of the policy scenarios also varied. Substantial out-of-state reductions (>30 $MMTCO_2e$) are projected with the "all in without cap and trade" and the "all in with cap and trade and RGGI link" packages. However, only 3 $MMTCO_2e$ of out-of-state reductions are projected with the "all in with Illinois-only cap and trade" scenario.

The modeling results indicate that emissions leakage from Illinois to other states is mitigated with a link to RGGI compared to an Illinois-only program. Emissions leakage arises when emissions of greenhouse gases in one jurisdiction or sector not subject to carbon constraints (e.g., states that do not cap emissions) increase due to mandated GHG reductions in another jurisdiction or sector (in this case, Illinois). Though the concept of emissions leakage can apply to activities in any sector of

the economy, it has often been of greatest concern where economic activity is subject to substantial interstate trade and competition such as the electric generation market. In such a case, as mandatory reductions are undertaken (and production costs consequently rise), lower cost competition outside the region (not faced with similar constraints) increases to meet demand within the carbon constrained jurisdiction. In short, natural gas and coal power generation and the corresponding carbon emissions could shift from Illinois to other states under an Illinois-only cap and trade program. Some members argued that leakage could also increase emissions of other air pollutants such as sulfur dioxide and nitrogen oxides.

Table 13 below summarizes ICFI modeling results indicating that some coal-fired power generation would shift from Illinois to other states (leakage) under Scenario #2, with more out-of-state coal generation and less in-state coal generation compared to the reference case and in absolute terms. Table 11 also shows that in-state coal generation would grow in absolute terms, and compared to the reference case, under Scenarios #1 and #3, between 2005 and 2020. Therefore, Scenarios #1 and #3 do not cause a net shift in coal power generation out-of-state.

The ICFI results indicate that coal-powered electricity generation would increase the most under Scenario #1, although as noted above this is not a viable scenario because it does not meet the Governor's GHG reduction target. Total electricity generation under all three scenarios would grow in absolute terms, and Illinois would continue to be a net exporter of electricity through 2020 under each of these scenarios. Illinois currently exports nearly 30 percent of the electricity it generates to other states.

Table 13. Change in Electricity Generation 2005-2020 (GWh)

		In-State		Out-of-State	
Scenario	**Description**	**Coal (incl. CCS*)**	**Total Generation**	**Coal (incl. CCS*)**	**Total Generation**
	Reference Case	6,108	23,955	78,086	224,008
#1 **	"All In" Except C & T	19,542	46,846	63,473	201,000
#2	"All In" With C & T	(15,728)	3,473	85,031	227,298
#3	"All In" With C & T + RGGI	16,773	37,441	65,008	206,279

* CCS = carbon capture and sequestration
** Not a viable scenario because it does not meet the Governor's GHG reduction target.

Leakage was discussed at length during the ICCAG process. There was agreement that, while leakage cannot be completely eliminated, it should be minimized because it undermines the effectiveness of GHG reduction strategies on a national and global scale. For example, linking with other states with comparable cap and trade requirements can minimize leakage as shown above with Scenario #3. It was noted that the cap and trade proposal called for the creation of a separate stakeholder process to address leakage.

Some ICCAG members noted that the RGGI program also has leakage issues that could undermine the effectiveness of an Illinois program linked to RGGI; the RGGI states are evaluating new strategies to address leakage. Scenario #3 assumed a link to RGGI, rather than another cap and trade program, because it is the only mandatory cap and trade program in the U.S. that is completed and

can be modeled. ICCAG members encouraged Illinois to carefully assess the quality and integrity of emissions markets in other states, if and when the state explores linkages to other states.

Policy Scenario Results: Economic Impacts

ICFI modeling results found that adopting various strategies to address climate change by reducing GHG emissions is more beneficial to the Illinois economy than taking no action to limit GHGs. Compared to the reference case with no new policies to address climate change, the modeling found that policy Scenarios #1, #2 and #3 would increase employment, GSP, and personal disposable income (see Figures 12, 13 and 14) while decreasing electricity costs (see Tables 14 and 15). The economic benefits are slightly higher under Scenario #1 compared to #2 and #3; however, as shown above in Table 13, Scenario #1 is not a viable option because it achieves less than half of the GHG reductions needed to meet the Governor's GHG reduction goal.

Under Scenario #3 with a link to RGGI, employment increases 0.75 percent, or about 61,000 additional jobs per year in 2020. GSP also increases 0.75 percent, or $7.5 billion per year in 2020. Personal disposable income increases 0.81 percent, or slightly more than $4 billion per year in 2020. Due to modeling uncertainty, the benefits could be higher or lower.

The ICFI modeling shows a positive economic outcome from meeting the carbon reduction goals, largely due to policies that increase energy and fuel efficiency. The savings from reducing energy use are reinvested to generate more economic growth. Another reason the modeling shows positive economic impacts is because Illinois imports large amounts of oil, natural gas, and coal that would be replaced with in-state investments in renewable energy and energy efficiency measures as well as greater use of Illinois coal in new coal gasification plants. These investments will create new jobs in industries and sectors that have both direct and indirect economic benefits.

The employment results indicate some job losses in the conventional coal-fired electric generation sector across all scenarios, and this was a point of concern for some ICCAG participants. However, the modeling results also indicate that these losses are more than offset by job gains in the commercial and construction sectors and through renewable energy and energy efficiency investments.

Figure 12. Illinois Employment in the Year 2020

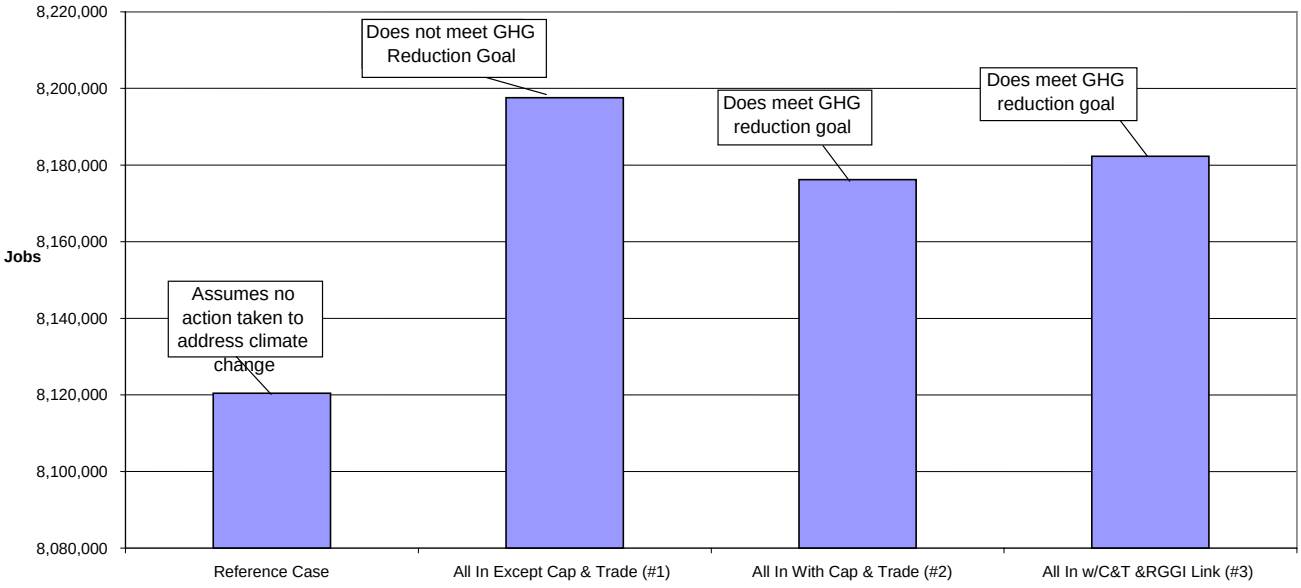


Figure 13. Illinois Gross State Product in the Year 2020

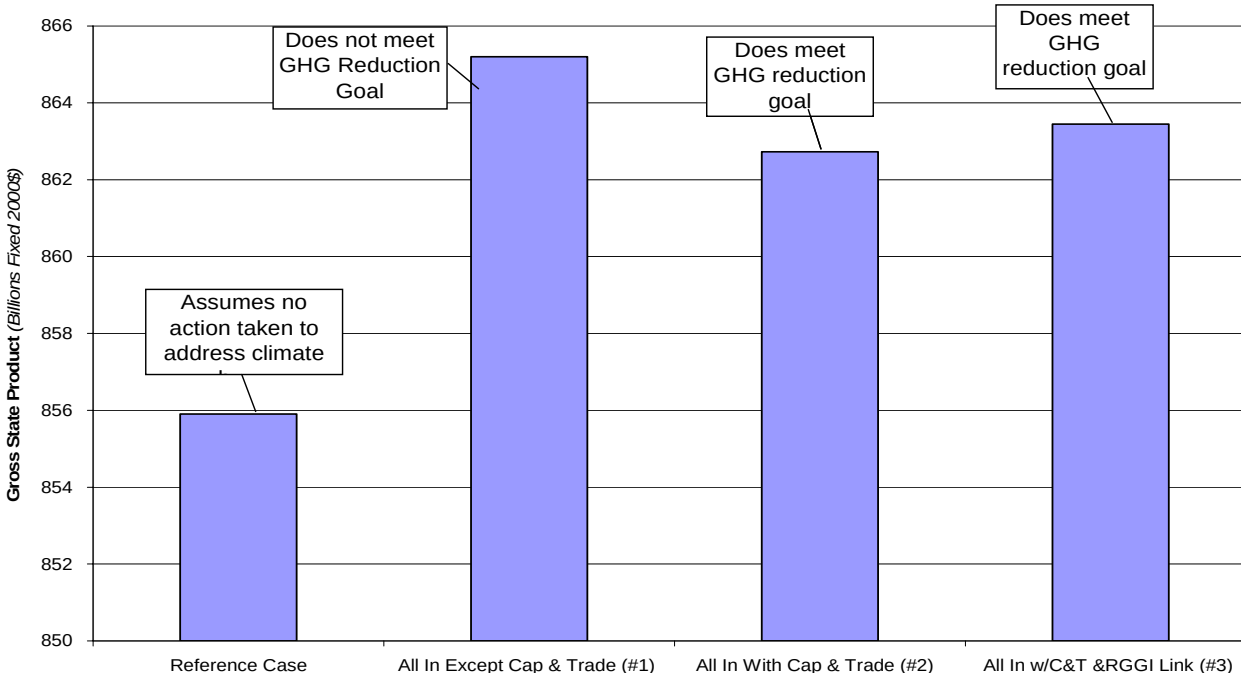
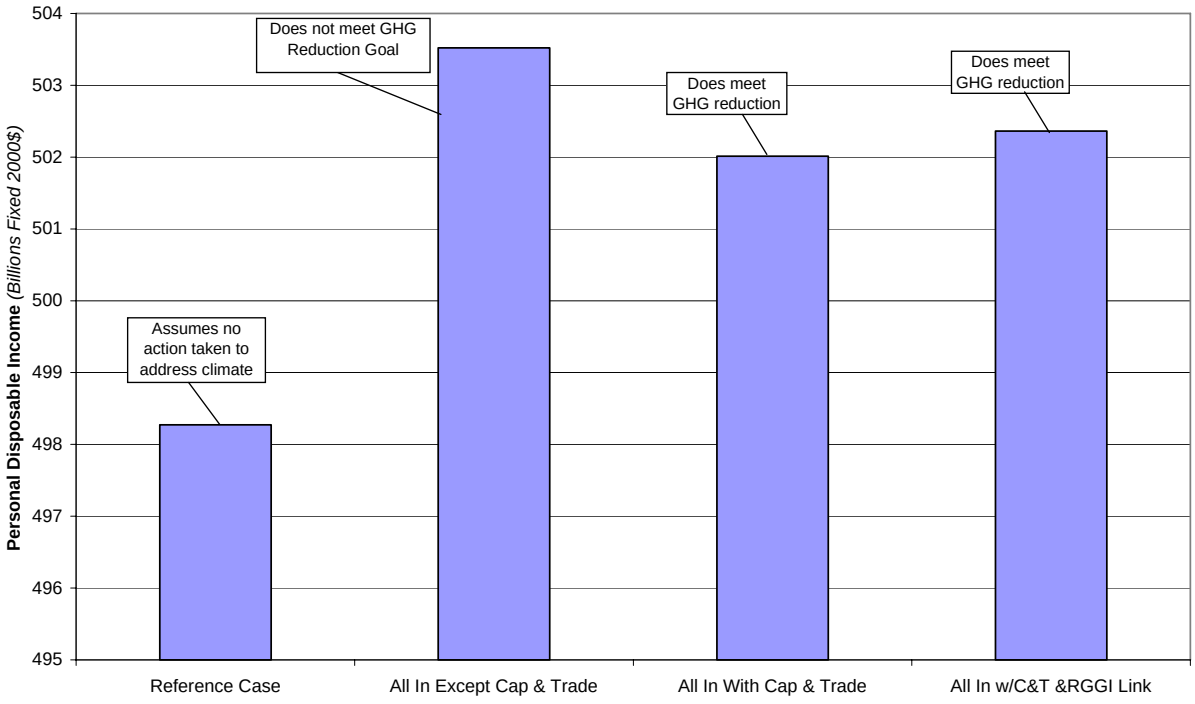


Figure 14. Total Disposable Income in Illinois: Year 2020



ICFI projects that electricity rates would increase modestly for all scenarios as compared to the reference case, but the magnitude of the increases is reduced over time. The rate impacts across scenarios differ by approximately one percentage point. The rate impacts are also mitigated with a RGGI link. Average household electricity bills, however, decrease by roughly 20 percent compared to the reference case due to greater household energy efficiency levels. These savings are also apparent in the industrial and commercial sectors. Total savings across all sectors are approximately $1.1 billion in 2010, $2.6 billion in 2015, and $3.2 billion in 2020. See Tables 14 and 15 for a comparison of changes in rates and electricity costs across the three policy scenarios. It should be emphasized that these are average results. Changes in electricity rates and annual costs savings would vary based on actual energy usage and other factors.

Reduced energy costs are largely responsible for the positive impacts on Illinois employment, GSP, and personal disposable income.

Table 14. Change in Electricity Rates Relative to Reference Case by Policy Scenario

Scenario	Description	2010	2015	2020
#1	"All in" without C & T	5.2%	2.9%	2.9%
#2	"All in" with C & T	5.2%	4.0%	3.7%
#3	"All in" with C & T + RGGI	5.2%	3.8%	3.5%

Table 15. Estimated Sectoral Annual Electricity Cost Savings in 2020 Relative to Reference Case by Policy Scenario (in $ millions)

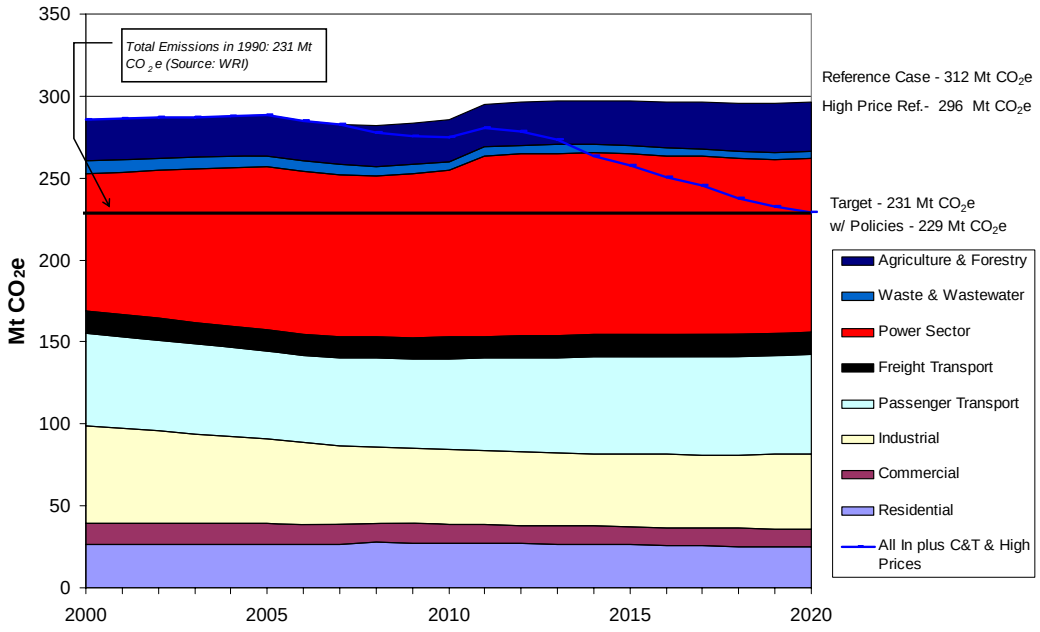
Scenario	Description	Residential	Commercial	Industrial
#1	"All in" without C & T	$1,138	$1,346	$826
#2	"All in" with C & T	$1,114	$1,318	$756
#3	"All in" with C & T + RGGI	$1,122	$1,326	$778

High Price Scenario

One sensitivity run (Scenario #4) was conducted in the modeling exercise to understand how Illinois GHG emissions may be affected by high energy prices. The "high price scenario" included high oil and natural gas prices while holding all other assumptions and input data constant (see Appendices H and I for details on the assumptions included in this scenario). The results of these high prices are that emissions under the "business-as-usual" reference case would be approximately 16 million tons lower in 2020 than the primary reference case. This is largely due to lower natural gas generation and lower transportation energy demand due to high gasoline prices.

Since high prices cause emissions to be lower than in the reference case, the gap between the Governor's goal and projected GHG emissions is smaller—65 million tons as compared with 81 million tons. One policy scenario, "all in with Illinois-only cap and trade," was run against this high price case. The results are presented in Figure 15. The modeling results show that if Illinois were to experience high fossil fuel prices in the future, the Governor's goal is still attainable. The modeling results also show increases in employment, GSP, and personal disposable income at levels slightly less than under Scenario #3.

Figure 15. Illinois GHG Emissions Under High Energy Prices and Emissions Trajectory with "all in with Illinois-only cap and trade"



The modeling process benefited from oversight by the Modeling Subgroup and significant input from ICCAG members and non-members. The ICFI modeling team responded verbally and in writing to numerous questions and comments, and they often revised their analysis in response to this input. Some ICCAG participants felt the modeling process was inadequate and/or disagreed with the results, such as ICFI's projected decrease in energy costs and increase in jobs and GSP from implementing the policy scenarios. Instead, some members argued that electricity costs would increase and the state's economy would suffer. They also wanted to see costs and savings separately in the modeling results, as opposed to net costs/savings.

Some members wanted to model individual strategies for reducing GHGs instead of, or in addition to, packages of strategies. WRI indicated that it is very difficult to accurately isolate the impacts of a single strategy implemented in combination with other strategies, and trying to do so will likely substantially overestimate the emissions reductions from a combination of strategies. However, the relative significance of specific policies is provided by the estimates in the straw proposals, and the modeling results suggest that these estimates are reasonable.

Although individual strategies were not modeled, WRI and Illinois EPA staff noted the obvious overlap between certain strategies. For example, the emissions cap on power plants under a cap and trade program would largely duplicate the reductions expected by requiring new power plants to offset a portion of their emissions. This is because emissions from new power plants would already be capped under the cap and trade program.

Written comments from ICCAG members and the public are in Volume 2 of the Appendices.

SECTION VII. STRATEGIES RECOMMENDED BY THE ADVISORY GROUP

Tables 16 and 17 provide a list of the 24 strategies supported by the ICCAG members, and this is followed by brief summaries of each. At its July 10 meeting, ICCAG members voted to support nineteen strategies with no dissent and at least one abstention. At the September 6 meeting, a majority of voting ICCAG members voted to support an additional five strategies with eight to ten members dissenting and several members abstaining. The strategies supported by ICCAG members are listed below. For the five strategies supported with some dissent, the general thoughts of those who agreed or disagreed with the strategies are captured in addition to the vote tallies and a description of each strategy. ICCAG members also noted that additional input should be sought from stakeholders—particularly stakeholders that may have been under-represented during the ICCAG process—if and when the state moves toward implementing the strategies. The order in which these strategies are presented should not be taken to imply any priority or rank. They should be considered as a package of strategies. For a full description of the final ICCAG-approved strategies, please see Appendix F.

Table 16. Nineteen Strategies Supported by ICCAG Members with No Dissent

Brief Description of Strategy	Subgroup
Implement smart growth initiatives and expansion of mass transit	Transport
Incentives for fuel efficient vehicles	Transport
Low-carbon fuels standard	Transport
Fuel efficiency and/or low carbon fuel requirements for all government vehicles	Transport
Passenger and freight rail upgrades	Transport
Small renewable distributed generation: rules, legislation, incentives	Power/Energy
Energy efficiency standards for appliances and equipment	Power/Energy
Establish residential and commercial energy efficiency construction codes beyond international standards; includes government buildings.	Power/Energy
Phase-in of energy efficiency standards for light bulbs	Power/Energy
Energy conservation and efficiency programs for existing state facilities	Power/Energy
Enhanced renewable portfolio standard of 25 percent by 2025	Power/Energy
Enhanced energy efficiency: two percent demand reduction by 2015. No revenue cap.	Power/Energy
Programs to encourage forest management, reforestation, tree- and grass-planting	Commercial, Industrial, Agriculture (CIA)

Table 16 (cont'd.). Nineteen Strategies Supported by ICCAG Members with No Dissent

Energy efficiency incentives, assistance and standards for commercial/industrial generators and boilers	CIA
Expand use of no-till farming	CIA
Encourage methane capture from coal mines, landfills, livestock farms and wastewater treatment plants.	CIA
Increase traditional recycling diversion rate with municipal goals and by stimulating demand for recycled materials	CIA
Land use development offset requirement	CIA
Encourage or require reductions in emissions of high GWP gases (N2O, HFCs, PFCs, SF6)	CIA

Table 17. Five Strategies Supported by a Majority of Voting ICCAG Members

Brief Description of Strategy	Subgroup
GHG emissions standards for automobiles	Transport
CO_2 emissions performance standards for electricity generation or purchases electricity (new generation only)	Power/Energy
Carbon capture & storage (from the outset) portfolio standard of 5 percent. Utilities must buy if available.	Power/Energy
20 percent carbon offset requirements for new fossil fuel power plants	Cap and Trade
Cap and trade program for power generators and relatively large industrial sources; preference to link with other states	Cap and Trade

Strategies Supported by ICCAG Members with No Dissent: Power and Energy Subgroup

Enhanced energy efficiency programs. This strategy calls for both gas and electric utilities in Illinois to achieve incremental annual energy savings of two percent (double that of the currently enacted requirement) with no cap on spending. The requirement would be phased in beginning in 2008 at 0.2 percent then increasing by 0.2 – 0.4 percent per year until the two percent goal is reached in 2016. The requirement would then remain at two percent from 2016 onward.

Implement energy conservation and efficiency programs for existing state facilities. This policy would adopt a goal of a 20 percent reduction in energy use from existing state facilities by 2020. HB 1384 (P.A. 95-559) recently signed by the Governor sets a goal of a 10 percent reduction from state buildings within ten years. The 20 percent goal would result in even greater energy savings. This goal could be achieved through a combination of the state's capital program and energy performance contracts of 10-20 years in length. This proposal should reduce costs and save taxpayers money. While there are no technological barriers to achieving a 20 percent reduction in

energy use in state buildings, there are some financial and legal barriers. The potential operating cost savings are significant, but the up front capital requirements could be high, if energy performance contracting (EPC) is not used to achieve a significant portion of the energy savings. Currently, universities and colleges can enter into performance contracts up to 20 years in length, while state agencies and local governments are limited to 10-year contracts. The statute should be changed to allow 20 years for all units of state and local government to facilitate EPC.

Phase-in of energy efficiency standards for light bulbs. This policy would establish regulations that prohibit the sale of lamps that fail to meet specific efficiency standards. In addition, it is recommended that mercury standards for these lamps be adopted as well as new state and private recycling and programs to encourage consumer participation in CFL recycling programs. A process would be established to ensure that appropriate exemptions are allowed. For example, exclusions may be needed for special lamp types and uses. Finally, to address affordability, the state may need to offer subsidies or rebates, in particular for low income households. While efficient lighting will make their electric bills more affordable, low income households may not be in a position to afford the initial cost of switching to CFLs or other efficient lamps. Subsidies or rebates could be funded through the enhanced energy efficiency programs described above. The standard would apply starting in 2012, with stricter standards for years 2016 and 2020. Barriers to implementation include the various deficiencies of CFLs (i.e., “warm up” period in the cold, the need to be recycled, and affordability).

Adopt rules, legislation and incentives for small renewable distributed generation. This policy would encourage adoption of small-scale renewable distributed generation (DG) by implementing a menu of policies, including all of the following: ICC adopts federal standards for interconnection; require utilities to offer net metering and real-time pricing (RTP) programs; exempt such systems from state and local sales taxes; increase/expand the scope of state incentives for such systems; require utilities to assign 15 year RPS credit value in first year/provide this amount as payment to system owner upon installation; and set binding goal for percentage of power that should come from small renewables by 2020 (one percent to two percent of sales). SB 680 (P.A. 95-420), which was recently enacted, requires utilities to offer net metering by April 2008. The interconnection and net metering rules would be in place by April 2008 under this strategy. The major barrier to the incentives and to an RPS set-aside for small DG would be the costs.

Adopt energy efficiency standards for appliances and equipment. This policy, to be implemented in 2008, would create mandatory efficiency standards for appliances not covered by federal rules and increase the standards for other appliances. Examples of appliances to be covered include: DVD players, bottle-type water dispensers, liquid-immersed distribution transformers, lamp fixtures, walk-in refrigerators, and hot tubs. Commercial boilers, pool heaters, and residential furnaces and boilers are covered by federal standards, but the standards would be made stricter after petitioning the U.S. Department of Energy for a waiver from federal preemption. The policy is a zero net cost to consumers and the main barrier to implementation will be the administrative burden of adopting the various standards.

Establish residential and commercial energy efficiency construction codes beyond International Code Council model standards (includes government buildings). This policy, to be implemented in 2010, would create mandatory residential, commercial and state building energy codes for new construction. The residential code will be equivalent to the current Energy Star Homes standard (Energy Star currently is a 15 percent reduction from the International Energy Conservation Code) and the commercial code will be capable of reducing energy consumption by 25 percent from the

current code. The stricter building code will also apply to state buildings. These standards will also be improved over time to reflect technological advances. The policy would save consumers money, and the main barrier to implementation will be the slight increase in upfront capital costs (one to three percent), although amortized monthly energy cost savings would exceed the additional costs.

Adopt a RPS. This strategy requires the Agency to procure a portion of the electricity it purchases for utilities from renewable energy sources like wind, solar, and landfill gas. The RPS ramps up from three percent of retail sales in 2008, 10 percent of sales by 2015, 17.5 percent in 2020 and 25 percent in 2025. The Agency however only procures power for the 'non competitive" customer class sectors in Illinois (generally, residential and small commercial) reducing the impact on total electricity sales by about half. This strategy would expand the RPS to all customer class segments so that the nominal 25 percent by 2025 standard would actually be met. The major barrier, currently, to rapid implementation of an RPS is the shortage of wind power equipment.

Strategies Supported by ICCAG Members with No Dissent: Transportation Subgroup

Adopt a low carbon fuel standard. This policy, to be implemented January 1, 2010, would create a low carbon fuel standard based on California's proposal, requiring a 10 percent reduction in the carbon content of all passenger vehicle fuels. This policy would be measured on a lifecycle basis, thereby including the $C0_2$ emitted during both consumption and production of the fuels. Fuel "providers" (such as refiners, blenders, distributors) will decide how they reduce emissions; for example, providers may purchase and blend more low-carbon ethanol into gasoline products, or purchase and blend relatively more diesel and biodiesel than gasoline, or purchase credits from electric utilities supplying low-carbon electrons to electric passenger vehicles, diversify into low-carbon hydrogen as a product and more, including new strategies yet to be developed. The two barriers to implementation will be the difficulty in tracking and calculating carbon intensity and reductions, and the cost of additional staff and funds for state agencies.

Implement incentives for fuel efficient vehicles. This policy would create financial incentives to encourage the purchase of more fuel-efficient vehicles. The annual registration fee for vehicles weighing between 6,001 and 8,000 pounds would increase by $50, with possible exclusions for work vehicles such as farm trucks. Currently all cars and trucks under 8,000 pounds that are registered in Illinois—from the smallest compact cars to the largest SUVs—pay the same $78/year state registration fee. Commercial trucks with a gross vehicle weight (GVW) between 8,001-12,000 pounds pay an annual registration fee of $414. The heaviest trucks pay increasingly higher fees based on GVW, up to $7,995 per year.

The revenue from these fees would be used to provide a $750 rebate for the purchase of the most fuel-efficient vehicles available. Eligible vehicles would have a U.S. Environmental Protection Agency (U.S. EPA) average fuel efficiency rating of at least 35 mpg or would use advanced technologies (e.g., hybrid electric) that increase fuel economy by at least 30 percent compared to the comparable internal combustion engine model. The mpg criterion should be designed to increase as CAFE increases. The fees would increase in 2009 and the revenue could be used in 2010.

This strategy has been partially implemented by the Illinois Treasurer through a new program that offers $1,000 rebates to Illinois residents who purchase a hybrid, electric, fuel cell or CNG vehicle. The Treasurer has pledged $2 million for rebates. In comparison, the ICCAG recommendation

would generate approximately $22.5 million per year. The Treasurer's program is funded by depositing money at local banks and credit unions at a below-market interest rate. The money that those institutions save in interest is passed to consumers in the form of $1,000 rebates at the time of purchase. To take advantage of the program, buyers must secure a car loan from a participating bank or credit union for an eligible vehicle.

Improve passenger and freight rail service and infrastructure. This policy would fully fund and implement both passenger rail upgrades and service restoration throughout the state and the Chicago Region Environmental and Transportation Efficiency Program (CREATE) freight rail improvement program. Passenger rail upgrades would include: allowing for 110 mph high speed rail service between Chicago and St. Louis; increasing ridership on existing Chicago-Downstate rail lines through investments in new equipment, upgrading, and streamlining rail capacity on existing rail lines to reduce trip times between Chicago and Downstate; and restoring service from Chicago to Rockford, the Quad Cities, Decatur, and Peoria.

CREATE would add 25 new roadway overpasses or underpasses at locations where auto and pedestrian traffic currently crosses railroad tracks at grade level; add six new rail overpasses or underpasses to separate passenger and freight train tracks; create viaduct improvements; increase grade crossing safety enhancements; and extensively upgrade tracks, switches, and signal systems.

High speed rail service upgrades are to be completed between Chicago and St. Louis by January 1, 2011. All other capital improvements are to be implemented January 1, 2013. A barrier to implementation is that additional resources will be required to complete upgrades and to purchase and maintain new equipment.

Impose fuel efficiency and/or low carbon fuel requirements for government vehicles. Illinois law requires the state to purchase hybrid vehicles and flex fuel vehicles that can operate on 85 percent ethanol unless it is not feasible. This proposal would apply the same requirement to local government vehicles in Illinois as well, and hybrid vehicles must be "full" hybrids, not "mild" hybrids.

Implement smart growth initiatives and expand mass transit. This policy would expand mass transit in Northeastern Illinois and in urban centers across the state and implement planning policies to facilitate smart growth and restrain urban sprawl. In addition, new transit projects currently proposed or in the design phase would be fully implemented by 2020. These include: the CTA Circle Line connecting existing transit stations along the edge of central Chicago; expansion of existing CTA lines including the Red, Orange, and Yellow lines; new transit service on the proposed Ogden/Carroll St. transit-way extending westward from Navy Pier and connecting several existing transit stations; construction of the Suburban STAR Line connecting dozens of large suburban communities between Joliet and O'Hare International Airport; extension of several Metra commuter rail lines including the Northwest Line, BNSF Line, and Electric District; creation of a new Metra line to serve Chicago's Southeastern suburbs; and construction of two Bus Rapid Transit lines in the PACE transit network along Cermak Road and Golf Road.

The policy would also implement a state development impact fee that would be limited to certain fast growing areas, mandate a limit on the installation of impervious surfaces in certain fast growing areas, use the revenue from the development impact fee along with one percent of the hotel operators tax to fully fund and expand the existing (but currently unfunded) Illinois Local Planning Fund; and apply criteria to the Local Planning Fund application that, if met, would provide higher consideration of applications and higher maximum levels of planning grants. These criteria would

require applications to create plans that encourage smart growth and allow DCEO to issue grants to developments that are consistent with the LEED for Neighborhood Development (LEED-ND) standards of the U.S. Green Building Council.

Under this strategy, by 2008 new planning guidelines are in place, existing transit projects are completed, and new projects are in the planning phase. By 2015 and after, the majority of new development statewide is taking place in urban centers, as opposed to suburbs, and transit options are well on their way to a dramatic expansion. Barriers to implementation would be the additional resources needed to expand and maintain mass transit networks statewide and the urban planning agencies.

Strategies Supported by ICCAG Members with No Dissent: Commercial, Industrial and Agriculture Subgroup

Increase traditional recycling diversion rate and stimulate demand for recycled materials. This strategy would mandate an increase in the municipal recycling diversion goal from 25 percent to 50 percent. In addition it is recommended that the Governor also significantly increase market development incentives to encourage recycled-feedstock paper producers to locate in Illinois. By increasing recycling in Illinois and using recycled feedstocks for production within the state, Illinois can capture GHG reductions from a reduction in energy demand for processing feedstocks and reducing landfill methane. This strategy would also stimulate new industrial economic activity in the state.

Encourage or require reductions in emissions of high global warming potential gases.
This strategy would require the following:

- A 40 percent overall reduction in high global warming potential (GWP) gases between 2010 and 2020.
- Mandatory reporting for stationary sources of high GWP gases beginning January 2009.
- Emissions limits for new and existing large stationary sources beginning 2010. Reductions of other GHG gases can count towards the goal unless they are required by another law/regulation.
- Early reductions by affected sources count towards reduction goals.
- Technical assistance provided by the state.
- Affected sources must show reasonable progress by January 1, 2014, and every two years thereafter.
- Adopting state laws, where necessary, to limit commercial releases of high GWP gases, such as releasing coolants from scrapped appliances.
- Education and enforcement programs.

The reporting for stationary sources should begin in January 2009, stationary source emissions limits should begin in January 2010 and commercial education and enforcement should begin in January 2009. A barrier to implementation would be that some sources of high GWP gases are partially decentralized and difficult to measure and track.

Require land-use offsets requirements for large changes in land use. This strategy would create a land-use offset requirement, where developers/owners would be required to replace land with high carbon stocks (e.g., forests) that is lost with a comparable high carbon land use elsewhere. It would apply when land is converted from a higher to a lower carbon capacity use and where the development is above a threshold size (e.g., 10 acres), and meets other conditions (to be determined

at a later date). A 1.5 to 1.0 offset would be required (e.g., 1.5 acres for every acre lost). The major barrier to this policy is that it requires a new regulatory structure to track development and offset projects on a statewide basis.

Provide incentives for methane capture from coal mines, landfills, livestock operations, and wastewater treatment plants. This strategy would provide financial incentives in the form of project rebates and/or grants to the owners of projects that capture and combust methane from wastewater treatment plants and livestock operations (through anaerobic digestion), coal mines, and landfills. Project developers would be able to receive a subsidy for each energy unit generated (approximately 1¢/kw-hr or $2.96/MMBTU). The incentive program would be implemented in 2009, with the first projects qualifying in 2010, and projects completed, ultimately covering 50 percent of methane emissions in these sectors between 2011 and 2020. A barrier to this policy would be the need for new resources to fund and implement these incentives. Resources could potentially be derived from the Illinois EPA's CAIR NOx set-aside program, from the auctioning of allowances through a cap and trade system, or other sources.

Expand use of no-till farming. Tilling soil releases carbon to the air that forms CO_2. Continuous no-till (CNT) farming sequesters carbon in the soil and therefore reduces atmospheric CO_2 levels. Many Illinois farmers will not till the soil for one or two years as they rotate between corn and soy beans, but CNT is necessary to keep carbon sequestered. This strategy, to be implemented starting in 2009, would provide additional financial incentives for farmers to use no-till farming. Currently, available incentives are relatively small and/or limited in duration. Barriers include: Illinois farmers' preference to till(at least every few years); funding for additional incentives is necessary, and some farmers may need to purchase new equipment. CNT can be more cost-effective even if yields are slightly lower. However, high corn prices undermine this.

Expand programs to encourage forest management, reforestation, tree- and grass-planting. This policy would have the state of Illinois plant an additional 24 million trees between 2009 and 2020 by increasing the size of the Governor's recently announced state tree planting program from an additional two million to four million trees planted per year. Other policies that could increase tree planting in Illinois include: expanding the Forestry Development Cost Share Program, which provides incentives for private landowners to plant trees; increasing the number of state foresters at Illinois Department of Natural Resources to provide technical assistance; and ensure that the new CREP program for the Kaskaskia River watershed is funded. A barrier to implementation is the cost of tree plantings and additional/increased conservation incentive payments.

Energy efficiency incentives, assistance, and/or standards for commercial/industrial generators and boilers. This strategy would create mandatory commercial and industrial boiler efficiency standards for new installations, with financial incentives made available for efficiency upgrades at existing facilities. Thermal efficiency standards would be applied for commercial and industrial boilers that require a permit from Illinois EPA for operation. A commercial boiler thermal efficiency standard of 80 percent for natural gas and 83 percent for oil fired boilers would be required for all new boilers sold in Illinois. A similar thermal efficiency increase of three percent as compared to the average efficiency of currently available models would apply to industrial boilers as well. All new boilers sold in Illinois would be required to meet these standards. Existing boilers would be unaffected.

In addition, financial incentives in the form of grants and/or rebates would be made available to the owners of existing facilities to implement efficiency upgrades including the installation of combined heat and power (CHP) units. Incentives would apply to the costs of siting, safety,

equipment and installation. These incentives would be doubled if the installation is fueled exclusively by renewables (e.g., biodiesel, wood, switchgrass). New resources would need to be allocated to fund and implement these incentives and establish efficiency standards. Resources could be derived from the CAIR NOx set-aside, from the auctioning of allowances through a cap and trade system, or other sources

Strategies Supported by a Majority of ICCAG Members

State-Level Cap and Trade Program
In favor: 21 Opposed: 10 Abstaining: 3

This strategy would cap emissions from fossil fuel power plants and relatively large commercial and industrial sources of GHG emissions through a market-based cap and trade program. Under a cap and trade program, the total pool of emissions are initially limited, or capped, to a set amount that shrinks over time, and sources that stay below their allotted emissions can sell emissions allowances, or allotments, to sources that exceed their allowable limits. In addition, capped sources could buy "offset" credits on a limited basis to help them comply. Offsets are created by entities not covered by a cap when they implement projects that reduce GHG emissions (e,g., planting trees or capturing methane for energy use at a livestock facility). These emissions reductions are used to offset emissions from the capped sources. Emissions would be capped beginning in 2012 and reduced to 1990 levels by 2020.

The ICCAG's approved cap and trade strategy includes a preference for linking with other states, and in particular Midwest states, because it would create a more efficient, less costly program and would minimize the extent to which emissions leak from Illinois to other states rather than being eliminated. Scenario #3 (described above) assumed a link to RGGI, rather than another cap and trade program, because it is the only cap and trade program in the U.S. that is completed and can be modeled. Thus, the ICCAG is not explicitly recommending a link to RGGI.

The ICFI modeling indicates that the cap and trade program would generate the most GHG reductions of the 24 recommended strategies, by far, and that the Governor's goal cannot realistically be met without it. It was also the most complex and controversial approved strategy.

Recommended Design Elements

Stringency. Covered emissions would be reduced to their 1990 levels by 2020. According to WRI's emissions inventory for Illinois, estimated 1990 emissions from covered sources in the Industrial, Commercial and Electric Generation sectors were approximately 72.6 million metric tons. In order to insure that the Governor's reduction goals are met, there would be no cap on the price of allowances.

Schedule. In 2012, emissions would be capped at 2011 levels and then reduced gradually to meet the 1990 level goal in 2020.

Covered sources. Existing and new point-source, direct emitters of CO_2, specifically fossil fuel fired electric generation units with a nameplate capacity of 25MW or higher or emit 25,000 metric tons of CO_2 or more annually, as well as stationary fossil fuel fired combustion units that emit 25,000 metric tons of CO_2 or more annually, would be covered at the start of the program. Other sectors, smaller sources within covered sectors and GHGs other than CO_2 may be included over time (if technically feasible and not duplicative) in order to make the market more robust and efficient while also potentially achieving greater emission reductions at least cost.

Recognition of early action. Covered sources that have achieved GHG reductions within a certain period of time prior to implementation of the program would be rewarded for their actions. GHG reductions would need to be confirmed through verification of a source's own inventory or through the registration of emission reductions in a recognized GHG reporting program. In any event, generally accepted GHG accounting principles must be used for reporting early action reductions.

(Modeling assumption: Early action credits for reductions achieved from 2007-2011.)

Linkages with other programs outside of Illinois. The preference is for an independent cap and trade program (e.g., not joining RGGI or the emerging Western states programs) that will still be linked to other emissions markets. Efforts would be made early in the design process to harmonize an Illinois program with existing and emerging state and international systems. Linkages or regional market development would be explored with Midwest states in particular.

(Modeling assumptions: The "all-in with cap and trade" modeling run will not include linkages to other states; a sensitivity run will be done that includes linkages to RGGI. Under the RGGI linkage sensitivity run, regulated entities in Illinois (and the RGGI states) could buy European Union (EU) allowances if the RGGI allowance price exceeds $10. Allowances can flow between Illinois and the RGGI states but cannot flow from Illinois and the RGGI states to the EU.)

Distribution of allowances. In order to minimize overall costs to the state economy, consumers, industry, and workers, at least 85 percent of all allowances would be auctioned. All revenue generated by the auctioning of allowances would be recycled and directed to purposes that benefit the public. Possible activities that would receive funds would include: efficiency incentives for appliances, buildings, and industrial facilities; renewable energy deployment; the deployment of commercial applications of carbon capture and storage technology; financial and professional assistance for potentially displaced workers; and energy assistance to low income households. Eligible public benefits activities and the allocation methodology for any non-auctioned allowances would be determined by a subsequent stakeholder process. The share of auctioned allowances may also be re-examined in this stakeholder process.

NOTE: The strategy supported by ICCAG indicates that 85 percent of the emissions allowances would be auctioned, but the strategy does not discuss the design elements of the auction process. Under an auction, it is expected that the state would sell groups of allowances in predetermined amounts (e.g., 100 tons) for a given year to the highest bidders. The total pool of allowances available for auction would shrink each year. The auction could be designed to auction allowances one year at a time or for multiple years at each auction (e.g., an auction held in 2010 could include allowances only for 2011 or for 2011-2013). Those bidding on allowances would likely include companies subject to an emissions cap, but the bidding could be open to others as well that meet certain qualifications. Such auctions would be held on a regular basis with consistent and predictable rules on process and participation. In addition to the auction, owners of allowances would be able to buy and sell allowances in a secondary market that would function separately from the auction.

(Modeling assumptions: Revenue from the auction of allowances is assumed to flow into general state revenues so as not to interfere with the emissions reductions of other policies in the modeling scenarios.)

Offsets. Regulated sources could use credits generated from offset projects in unregulated sectors to help meet up to 10 percent of their compliance requirements in any given year. The program should allow for a wide range of eligible offset projects, as long as the GHG reductions are real, permanent, additional, and verifiable. Though offsets generated in Illinois are preferred, eligible offset categories and the geographic source of offset credits would be determined through a subsequent stakeholder process.

(Modeling assumptions: Regulated entities can buy Clean Development Mechanism (CDM) credits under the "all-in" scenario in accordance with proposed offset rules stated above. Under the sensitivity run that links to RGGI, regulated entities in the RGGI states and Illinois can use RGGI and Illinois offsets.)

Emissions leakage. Emissions leakage (the shifting of electricity generation and associated GHG emissions out of state to avoid emissions caps and related costs) is likely to occur to some degree due to this program. Informed by the modeling results and recommendations of a subsequent stakeholder process, steps would be taken to minimize emissions leakage during program design and implementation.

Summary of ICCAG Member Comments

Many comments were made about this proposal. To review the comments in detail, see the complete record of written comments in Volume 2 of the Appendices. In brief, ICCAG members voting against the cap and trade proposal, or abstaining, argued that: a cap and trade program should only be implemented at the national level; jobs in the electric generation sector would be lost to other states; emissions decreases in Illinois would be offset by emissions increases out-of-state (leakage); energy costs would go up; electricity reliability would be undermined; the proposal applies to relatively small emitters that should not be included; sources might have to comply with both an Illinois and a national program; and emissions allowances should be given to regulated entities at no cost.

ICCAG members voting for the cap and trade proposal argued that: the modeling results demonstrate that the Governor's goal cannot be met without a cap and trade program; energy costs go down and economic impacts are positive under the scenarios with cap and trade; federal action is more likely if states—including Illinois—take action first; the economic and health impacts of not reducing GHG emissions will be substantial and outweigh any negative economic impacts; and emissions leakage can and should be minimized.

Nearly all the ICCAG members agreed that linking with other states and emissions markets is better than an Illinois-only approach because it would create a more efficient, less costly program and it would minimize emissions leakage. This issue of leakage was discussed at length during the ICCAG process. There was agreement that leakage should be minimized because it undermines the effectiveness of GHG reduction strategies on a national and global scale, and it was noted that the cap and trade proposal called for the creation of a separate stakeholder process to address leakage.

As described above, some ICCAG members argued that the state should take credit for out-of-state emissions reductions resulting from its policies, even if those reductions may be difficult to verify. From this perspective, Scenario #1 without cap and trade is almost as good as Scenario #2 with cap and trade (see Section VI, Table 12 above). Out-of-state emissions reductions are significantly lower under Scenario #2 compared to Scenario #1 because of leakage. However, WRI, ICFI and Illinois EPA explained that it is very difficult to show whether emissions reductions in some other

state resulted from policies implemented in Illinois. This is one reason why Table 12 presents estimates for direct out-of-state emissions reductions, including 44 Mt CO_2e under Scenario #1, but does not count them towards the Governor's goal. Chairman Scott indicated that leakage is an important issue that would be brought to the Governor's attention, and that additional steps would be needed to address it.

Those opposed to cap and trade primarily represented the labor community and several electric generation companies. Three members abstained who represented industrial corporations.

Require GHG Emissions Standards for Cars
In favor: 20 *Opposed: 8* *Abstaining: 5*

The federal Clean Air Act allows states to adopt ("opt-into") the California vehicle emissions standards, which apply to passenger vehicles only and are more stringent than the federal standards. If a state does not adopt California's standards, vehicle manufacturers and others are subject to the federal emissions standards established by the U.S. EPA. Eleven other states have adopted the California standards: Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington.

The California vehicle emissions standards consists of (a) the Low Emissions Vehicle II (LEV II) standards for non-methane organic gases (NMOGs, similar to volatile organic compounds or VOCs), nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), and hazardous air pollutants; and (b) the "Pavley" standards for GHG emissions. The LEV II standards took effect with model year 2004 (calendar year 2003) and will be completely phased-in with model year 2010. LEV II requires auto manufacturers to meet statewide fleet average emissions, and all vehicles must meet one of three different technology/emission classifications. The California Pavley GHG standards are scheduled to take effect model year 2009 with complete phase-in by model year 2016.

States that adopt the California vehicle emissions standards must wait at least two model years before requiring the sale of California-certified cars. If the California standards were adopted in Illinois before January 1, 2008, the first model year that could be affected is most likely 2011, which would probably be calendar year 2010.

The Pavley standards are not officially part of the California program yet because of legal challenges. In addition, U.S. EPA recently denied California's request to implement the Pavley standards. (See Section IX for more information about U.S. EPA's decision.) Some of the California opt-in states have already approved the Pavley standards in anticipation of their approval, while others have not.

The California vehicle emission standards also include the Zero Emission Vehicle (ZEV) standards, which require auto manufacturers to sell a certain percentage of zero and extra-low emissions vehicles. Unlike LEV-II, U.S. EPA has ruled that states do not have to adopt the ZEV standards as part of the California program.

Last year the Governor convened a Clean Car Working Group to provide guidance on implementing his EIP. That group considered and ultimately recommended that the state adopt the California Vehicle Emissions Standards. As part of that process, the Illinois EPA was asked to provide estimates for the costs and emissions benefits of adopting the California emissions standards. At that time, the Agency endorsed using cost and emissions estimates provided by the California Air Resources Board (CARB), and the same assumptions were used for ICCAG modeling. The

assumptions include: New cars will cost $370 more to comply with the California standards in 2010, rising to about a little over $1,000 in 2015. However, according to CARB, the savings from buying less fuel exceeds these additional costs, amounting to more than $3,000 in savings over the life of the car on average at $2.30 per gallon and even more at today's gas prices.

Summary of ICCAG Member Comments

Many comments were made about this proposal. To review the comments in detail, see the complete record of written comments in Volume 2 of the Appendices.

In brief, ICCAG members who voted against this strategy stated that: the standards would impose excessive costs on consumers; hurt domestic car manufacturers and their employees, including some auto manufacturing facilities within Illinois; and exacerbate the inefficient bifurcation of states with California vs. federal vehicle standards. They also indicated that car manufacturers could not meet the standards without compromising safety; the standards are actually fuel economy standards not emissions standards and are therefore illegal; and that they support national legislation to increase fuel economy standards.

ICCAG members voting for this strategy argued that: it would save car buyers significant amounts of money; generate the most GHG reductions of any transportation strategy; substantially reduce gasoline consumption in Illinois; increase the state's energy independence; and enhance the state's economy by keeping money in-state that would otherwise go to out-of-state or international oil companies. They also said the standards are legal and can be met by auto manufacturers, and that Illinois should approve the program now because it will take years to implement.

Members who voted against this recommendation included an auto manufacturer and those representing the labor community

<u>20 Percent Carbon Offset Requirement For New Fossil Fuel Power Plants</u>
In favor: 19 *Opposed: 8* *Abstaining: 3*

This policy, to be implemented January 1, 2010, and based on a similar policy in place in Oregon and Washington state, would require that new and expanding fossil fuel power plants offset 20 percent of their carbon dioxide emissions. Regulated entities could earn offsets by purchasing them from an organization approved by Illinois EPA or designing and implementing an offset plan approved by Illinois EPA. The types of offsets allowed, verification of offsets, and similar implementation details will be sorted out at a later date. The state would require additional resources to manage and enforce offset requirements.

Summary of ICCAG Member Comments

ICCAG members in opposition to this strategy and those who abstained were largely the same members who were in opposition to the cap and trade recommendation and for similar reasons. Opponents felt that this policy would unfairly impede the construction and expansion of fossil fuel power plants in Illinois and cause disadvantages compared to competitors in other states. Some said cap and trade would control emissions from new power plants and that it did not make sense to require both policies.

ICCAG members in favor of this strategy argued that it would at least partially offset the additional GHG emissions from new and expanded fossil fuel power plants that will make it more difficult to meet the Governor's goal. Some said the offset requirement should be more stringent.

Complete written comments can be found in Volume 2 of the Appendices.

Adopt a Carbon Capture and Storage Portfolio Standard
In favor: 20 Opposed: 8 Abstaining: 2

This policy would provide incentives to encourage the development of carbon capture at new fossil fuel power plants in Illinois as well as ensure that developers have a market for the electricity from these plants. Much like a RPS, this strategy would require Illinois electric utilities and alternative retail electric suppliers to purchase up to five percent of their peak electric load from power plants that sequester carbon, once this technology is commercially available. CCS technologies, however, are not expected to be available until at least 2015.

Summary of ICCAG Member Comments

Opposition to this strategy largely revolved around the uncertainty as to the availability and cost of CCS technology. Opponents felt they could not support a strategy that did not also include a roadmap for deployment of this technology and funding for the additional costs. While some in opposition acknowledged that CCS is a key technology for energy security and for including coal in a carbon constrained future, they felt that this strategy was not complete without more certainty that CCS technology will be commercially deployed within the next 15 to 20 years.

Those in favor of this strategy felt that: it would help accelerate the deployment of CCS technologies in Illinois; the future of coal largely depends on replacing the aging fleet of power plants with more efficient plants equipped with CCS; plants using CCS are likely to use Illinois coal; and the state can be a leader in clean coal power generation while meeting the Governor's goal.

Complete written comments can be found in Volume 2 of the Appendices.

CO_2 Emission Performance Standards For Electricity Generation And Purchased Electricity (New Generation Only)
In favor: 20 Opposed: 8 Abstaining: 2

Under this strategy, new fossil fuel power plants in Illinois would be required to meet an emissions standard for CO_2. Similarly, when utilities/load serving entities (LSEs) buy electricity from new power plants, those plants must also meet this standard.

The policy would apply to all new electric generation units built in Illinois that begin operation no less than 2 years after approval of the standard, which have a nameplate capacity of 25MW or greater and are intended to generate electricity at a unit capacity factor of at least 60 percent. Beginning on December 31, 2015, these plants and all subsequently built plants must meet a CO_2 emissions rate standard of 1,100 lbs CO_2/MWH, equal to that of a typical new natural gas combined cycle power plant. The stringency could be increased over time. Standards could be met through any combination of low-carbon fuels (such as natural gas or sustainably sourced biomass), increased efficiency, carbon capture, and storage or other technologies. In addition, beginning January 1, 2009, LSEs in Illinois that enter into power purchase contracts with newly operational power plants, regardless of where the plants are located, may only do so if the plants meet the same 1,100 lbs CO_2/MWH. The standard would not apply to day ahead and spot market power purchases. Barriers to implementation include: the Illinois EPA and ICC will require additional resources to manage and enforce new standards and legislation would be required.

Summary of ICCAG Member Comments

Opponents of this strategy felt that such an emissions standard would eliminate conventional coal as an option for new power generation in the state. This could increase the cost of electricity in the long term and could cause emissions leakage as new coal plants would instead be built in neighboring states. They also felt that the standard in general was too stringent and the limits on out-of-state generation may be too technically difficult to enforce and could interfere with interstate commerce.

Supporters of the strategy felt that the emissions standard would help prevent the lock-in of new carbon-intensive generation over the medium to long term, and they noted that Illinois already produces 28 percent more electricity than is used in-state. In addition, the constraints on purchased power could help prevent emissions leakage as it would even the playing field between in-state and out-of-state generation. In the same way, the standard for purchased power could potentially mitigate leakage due to a cap and trade program.

Complete written comments can be found in Volume 2 of the Appendices.

SECTION VIII. CONCLUDING REMARKS

Governor Blagojevich created the ICCAG to recommend strategies to meet his statewide GHG reduction goals of 1990 levels by 2020, and 60 percent below 1990 levels by 2050. The ICCAG represents diverse interests and perspectives, and a transparent, inclusive, and collaborative process was used to ensure that ICCAG members and non-members alike would have the opportunity to raise questions, concerns, and other issues. All major decisions regarding policy proposals were vetted through ICCAG subgroups and the full ICCAG. All information prepared in support of the process, and any written comments from members and non-members, were posted on the Web at *www.ilclimatechange.org*.

In addition to the expertise of the ICCAG members, WRI and ICFI assisted the ICCAG process. WRI is a Washington D.C.-based environmental research and policy organization, and their climate change experience includes co-authoring the standard for measuring and reporting GHG that is used by companies throughout the world. ICFI was retained to model the emissions and economic impacts of different policy scenarios. ICFI is a global energy and environment consulting firm based in Washington D.C. with a staff of over 1,500 consultants in 20 offices. The firm's clients include the Canadian government, U.S. federal and state governments, the EU, and several oil and gas producing nations.

After meeting five times in person and dozens of times by conference call, at its July 10 meeting ICCAG members voted to support nineteen strategies with no dissent and at least one abstention. At the September 6 meeting, a majority of voting ICCAG members voted to support an additional five strategies with eight to ten members dissenting and several members abstaining. The modeling conducted by ICFI indicates that implementing these strategies would meet the Governor's 2020 GHG reduction goal with positive economic benefits for the Illinois economy compared to doing nothing new to address climate change.

SECTION IX. KEY DEVELOPMENTS SINCE THE ICCAG MADE ITS RECOMMENDATIONS

Since the ICCAG voted on its recommendations, a number of important actions have been taken at the state, regional, and federal levels to mitigate GHG emissions. Some of these actions overlap with particular ICCAG recommendations. At the state level, the IPAA of 2007 was signed into law by Governor Blagojevich in August of last year. The IPAA includes two provisions that are similar to two ICCAG recommendations:

- Renewable portfolio standard. Beginning in 2008, electric utilities must supply renewable energy for two percent of the electricity they provide customers, increasing to 25 percent by 2025. The requirements only apply to electricity supplied to residential and small commercial customers. The renewable energy requirement is scaled back if electricity rates increase more than 0.5 percent per year or two percent total. The ICCAG recommendation, which was approved with no dissent does not include spending caps and applies to all electricity customers.
- Energy efficiency portfolio standard. Beginning in 2008, electric utilities must achieve a 0.2 percent energy use reduction through investments in energy saving programs, increasing to two percent by 2015. The reduction goals are scaled back if electricity rates increase more than 0.5 percent per year or two percent total. The ICCAG recommendation has the same energy reduction goals but with no spending caps, and the goals also apply to natural gas utilities. This recommendation was approved with no dissent.

At the regional level, Governor Blagojevich signed the Midwestern Greenhouse Gas Reduction Accord (Accord) in November 2007 along with the governors of Iowa, Kansas, Michigan, Minnesota, and Wisconsin, and the Premier of Manitoba. The Accord states that the participating states will develop (a) regional greenhouse reduction goals by the summer of 2008, and (b) a model rule for a multi-sector, market-based cap and trade program by November 2008. The Accord will largely implement the cap and trade program recommendation approved by a majority of the voting ICCAG members. The recommendation calls for links to other states, preferably nearby states, because that would create a more efficient, less costly program and would minimize the extent to which emissions leak from Illinois to other states rather than being eliminated.

In December 2007, the federal Energy Independence and Security Act (EISA) of 2007 was signed into law. The EISA includes four provisions that are similar to four ICCAG recommendations:

- Energy efficiency standards for light bulbs. The new EISA standards are virtually identical to the ICCAG recommendation that was approved without dissent, although the ICCAG approved mercury content standards that are not included in EISA.
- Energy efficiency standards for appliances and equipment. The new EISA standards are very similar to the ICCAG recommendation that was approved with no dissent.

- Increased Corporate Average Fuel Efficiency requirements. Increased Corporate Average Fuel Efficiency requirements will be phased in, starting in 2010. More fuel efficient vehicles emit fewer GHG emissions because they consume less fuel. A majority of voting ICCAG members recommended that Illinois adopt and implement state-level GHG emissions limits for passenger vehicles based on the California vehicle emissions standards. Under the federal Clean Air Act, California is allowed to adopt more stringent vehicle emissions requirements with approval from the U.S. EPA, and states must choose either the California 58 standards or the federal standards established by U.S. EPA. Eleven other states have chosen the California standards. California has more stringent vehicle emissions standards for nonmethane organic gases (NMOGs, similar to volatile organic compounds or VOCs), nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), and hazardous air pollutants.

  Neither California nor U.S. EPA currently regulates GHGs from motor vehicles, but California had asked for U.S. EPA's approval to do so. U.S. EPA denied that request late last year. California and other states, including Illinois, have challenged U.S. EPA's decision in court. Compared to the new CAFE standards in the EISA, the California standards would reduce global warming gases and improve fuel economy three to four years faster and approximately 13.1 percent more in the year 2020. (Based on data from: *California Air Resources Board Addendum to February 25 Technical Assessment, May 8, 2008: Comparison of Greenhouse Gas Reductions for the United States and Canada under ARB GHG Regulations and Proposed Federal 2011-2015 Model Year Fuel Economy Standards.)*

- Low carbon fuels standard. Under EISA, lifecycle carbon emissions for new renewable fuels production facilities must be 20 percent below a baseline level. The ICCAG recommended, with no dissent, a broader "low carbon fuels standard" that would require transportation fuel producers, importers, refiners and blenders to ensure that all transportation fuels sold in Illinois have lifecycle carbon emissions that are 10 percent less than current levels by 2020.