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# **Kentucky Climate Action Plan Council (KCAPC)**

## **Interim Report**

**on**

## **Development of a Climate Action Plan**

**for the**

## **Commonwealth of Kentucky**

**July 2010**

**Draft- July 26, 2010**

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## **Introduction**

The Kentucky Climate Action Plan process was convened in January 2010 by Dr. Len Peters, Secretary of the Kentucky Energy and Environment Cabinet (KEEC). The Kentucky Department of Energy Development and Independence (KDEDI) is the state agency within KEEC charged with managing the project. The project was divided into two phases. This Interim Report concludes Phase 1 and Phase 2 has now commenced.

There is a web site for the project that can be found at [www.kyclimatestrategies.us](http://www.kyclimatestrategies.us) . All materials developed as part of the process can be found on this website.

## **Background**

In November 2008 Governor Beshear issued a report entitled “Intelligent Energy Choices for Kentucky’s Future, Kentucky’s 7-Point Strategy for Energy Independence”. One of the provisions of the 7-Point Energy Strategy is to mitigate carbon dioxide emissions and to reduce our carbon footprint. Development of the Climate Action Plan for Kentucky is aimed at furthering this objective to reduce Kentucky’s carbon footprint. The Climate Action Plan will build upon selected provisions of the Kentucky Energy Strategy. It will also focus attention on creating opportunities to build on Kentucky’s progress to date to become more energy efficient, to reduce dependence on foreign oil, to enhance the nation’s energy security, to promote new energy related technologies and to enhance economic opportunities in Kentucky.

The Center for Climate Strategies (CCS) was contracted with to provide technical and facilitation support to the KEEC in formulating the Kentucky Climate Action Plan. CCS has extensive experience assisting states in the formulation of state climate action plans, preparation of GHG Inventories and Forecasts and in numerous related technical and economic studies associated with climate change.

Secretary Peters established the Kentucky Climate Action Plan Council (KCAPC) to assist in development of the KY Climate Action Plan. The Council consists of a broad coalition of 31 members, including stakeholders from the business, academic, government, non-profit and environmental sectors as well as individual citizens. Members of the Council are listed in Appendix A.

## **The KCAPC Process**

The KCAPC is using an open, systematic and step-wise decision-making process to develop the plan for Kentucky. The process is spelled out in detail in a Process Memo and Work Plan that can be found on the project web site.

The Council was convened for their first meeting in January 2010 and has held two additional meetings in March and June since then. The Council serves as the decision-making body on all products formulated in the process. The 4<sup>th</sup> meeting of the Council will be on August 4, 2010 and the 5<sup>th</sup> and 6<sup>th</sup> meetings are tentatively scheduled for

September 29 and November 17<sup>th</sup>, respectively. The final report from the Council is planned for delivery by the end of 2010.

In addition to the KCAPC, five Technical Work Groups (TWGs) were established to advise the Council in their respective sectors. Members of the TWGs were named by the Secretary and include members of the KCAPC plus additional technical experts and interested citizens. Members of the TWGs are also presented in Appendix B. The five TWGs are:

- Agriculture Forestry and Waste Management (AFW) TWG
- Energy Supply (ES)TWG
- Residential, Commercial and Industrial (RCI)TWG
- Transportation and Land Use (TLU) TWG
- Cross Cutting Issues (CCI) TWG

The individual TWGs meet typically two or more times between each of the KCAPC meetings. Each TWG meeting takes place via conference call with some TWGs holding in-person meetings for those that can attend in person. The public is invited to participate at all KCACP and TWG meetings either in person or via conference call. All meeting agendas and associated work products for both the KCAPC and the TWGs are available on the project web site. Each meeting agenda includes an opportunity for public comment.

### **Key Milestones**

The KCAPC has produced the following key products thus far:

1. Selection of approximately 50 Priority Policy Options for Further Detailed Analysis. They are the result of a vetting process undertaken by each of the five TWGs to develop a set of recommended priorities for consideration by the KCAPC. At their last meeting the KCAPC selected these 50 policy options for further detailed analysis in the second phase of the project. These KCAPC Selected Priority Policy Options for Further Analysis are included in Appendix C.
2. The Kentucky Greenhouse Gas (GHG) Inventory –Forecast Report. A few highlights of the KY I-F Report are summarized below and the full report can be found on the KCAPC web site, [www.kyclimatestrategies.us](http://www.kyclimatestrategies.us)
3. Five Catalogs of Potential State Policy Actions containing approximately 380 potential climate policy actions for review. These Catalogs are broken down by the five Technical Work Groups (TWGs). They were derived from policy options being utilized in other states and from additional actions proposed by KCAPC and TWG members for consideration in Kentucky. The Catalogs are included in Appendix D.

4. Brief Description documents that accompany the five TWG Catalogs. The Brief Description documents are included in Appendix E.

### **Next Steps**

Phase 2 of the project is now underway. During Phase 2 the following key steps will occur:

- The TWGs will develop Straw Policy Option Proposals for each of the 50 options and will present the proposed policy descriptions and policy designs to the KCAPC at their 4<sup>th</sup> Meeting. The Council will review and accept or adjust the proposed Straw Policy Option proposals and charge the TWGs with finishing development of the full Policy Option Template for each policy.
- The KCAPC will review and approve a Quantification Process Memo at their 4<sup>th</sup> meeting to help guide the quantification of selected options to follow.
- The TWGs and CCS will work together to quantify the options that are quantifiable and will bring those projections back to the Council for consideration. Quantifications will include projections of the potential GHG reductions between now and 2020 and 2030 and the associated costs / cost savings of the options during the same time period.
- The Council will review, modify and approve or reject each of the 50 policy options for potential inclusion in the Kentucky Climate Action Plan.
- Formulation of proposed GHG reduction and energy efficiency and energy intensity goals for Kentucky for 2020 and 2030 to include in the KY Climate Action Plan.
- Development of a Final Report that embodies the Climate Action Plan.

### **GHG Inventory and Forecast**

The Center for Climate Strategies (CCS) prepared this report for the Kentucky Energy and Environment Cabinet (KEEC). The report presents an assessment of the State’s greenhouse gas (GHG) emissions and anthropogenic sinks (carbon storage) from 1990 to 2030. The preliminary draft inventory and forecast served as a starting point to assist the State, as well as the Kentucky Climate Action Plan Council (KCAPC) and Technical Work Groups (TWGs), with an initial comprehensive understanding of Kentucky’s current and possible future GHG emissions, and thereby informed the identification and analysis of policy options for mitigating GHG emissions.<sup>1</sup> The KCAPC and TWGs have reviewed, discussed, and evaluated the draft inventory and methodologies as well as alternative data and approaches for improving the draft GHG inventory and forecast. The inventory and forecast as well as this report have been revised to address the comments provided and approved by the KCAPC. The Report can also be found on the KCAPC web page at [www.kyclimatestrategies.us](http://www.kyclimatestrategies.us). Table 1 presents a summary of the historic and projected GHG emissions in Million Metric Tons of Carbon Dioxide Equivalent (MMtCO<sub>2</sub>e) by sector in Kentucky from 1990 to 2030.

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<sup>1</sup> “Draft Kentucky Greenhouse Gas Inventory and Reference Case Projections, 1990-2030,” prepared by the Center for Climate Strategies for the Kentucky Energy and Environment Cabinet, January 2010.

**Table-1. Kentucky Historical and Reference Case GHG Emissions, by Sector<sup>a</sup>**

Million Metric Tons CO <sub>2</sub> e	1990	2000	2005	2010	2015	2020	2025	2030	Explanatory Notes for Projections
<b>Energy Use (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O)</b>	<b>121.6</b>	<b>149.5</b>	<b>165.9</b>	<b>173.8</b>	<b>187.4</b>	<b>199.2</b>	<b>212.4</b>	<b>225.8</b>	
<b>Electricity Use (Consumption)</b>	<b>59.2</b>	<b>78.5</b>	<b>90.9</b>	<b>101.1</b>	<b>110.3</b>	<b>118.0</b>	<b>126.2</b>	<b>134.3</b>	
Electricity Production (in state)	68.5	89.1	98.4	105.4	115.0	123.0	131.5	140.0	
Coal	68.3	88.7	93.6	101.2	110.3	118.0	126.3	134.4	See electric sector assumptions
Natural Gas	0.016	0.31	1.64	1.89	2.07	2.23	2.28	2.39	in Appendix A.
Oil	0.090	0.13	3.12	2.32	2.53	2.70	2.87	3.07	
Biomass (CH <sub>4</sub> and N <sub>2</sub> O)	0.000	0.000	0.002	0.003	0.003	0.003	0.003	0.004	
MSW/Landfill Gas	0.000	0.000	0.036	0.057	0.062	0.066	0.071	0.076	
Other Wastes	0.000	0.000	0.008	0.007	0.008	0.009	0.009	0.010	
Net Imported/Exported Electricity	-9.27	-10.58	-7.51	-4.30	-4.69	-5.01	-5.36	-5.70	Negative values represent net exported electricity
<b>Residential/Commercial/Industrial (RCI) Fuel Use</b>	<b>26.7</b>	<b>30.4</b>	<b>31.2</b>	<b>28.3</b>	<b>29.1</b>	<b>28.8</b>	<b>28.5</b>	<b>27.7</b>	
Coal	8.54	5.77	5.88	5.28	5.61	5.56	5.40	5.04	Based on USDOE regional projections
Natural Gas	8.72	11.3	11.2	10.8	10.8	10.8	10.8	10.6	Based on USDOE regional projections
Oil	9.34	13.3	14.0	12.2	12.5	12.4	12.2	11.9	Based on USDOE regional projections
Wood (CH <sub>4</sub> and N <sub>2</sub> O)	0.11	0.06	0.10	0.10	0.10	0.11	0.11	0.11	Based on USDOE regional projections
<b>Transportation</b>	<b>27.2</b>	<b>33.2</b>	<b>37.3</b>	<b>36.8</b>	<b>40.9</b>	<b>45.5</b>	<b>50.8</b>	<b>56.9</b>	
Onroad Gasoline	16.4	19.0	19.2	20.3	22.2	24.2	26.3	28.5	Based on VMT projections from KYTC
Onroad Diesel	5.77	8.90	9.59	10.8	12.7	15.1	18.2	22.0	Based on VMT projections from KYTC
Marine Vessels	1.17	1.35	3.63	1.43	1.50	1.57	1.64	1.70	Based on historical growth
Rail, Natural Gas, LPG, other	1.49	1.28	1.48	2.12	2.13	2.13	2.13	2.13	Based on USDOE regional projections
Jet Fuel and Aviation Gasoline	2.32	2.68	3.35	2.21	2.39	2.48	2.56	2.62	Based on FAA projected operations and AEO2009 efficiency gains
<b>Fossil Fuel Industry</b>	<b>8.51</b>	<b>7.33</b>	<b>6.50</b>	<b>7.46</b>	<b>7.05</b>	<b>6.91</b>	<b>6.91</b>	<b>6.90</b>	
Natural Gas Industry	4.00	3.59	3.43	3.95	4.06	4.17	4.30	4.47	
Oil Industry	0.077	0.058	0.047	0.052	0.057	0.062	0.069	0.076	
Coal Mining (CH <sub>4</sub> )	4.43	3.68	3.03	3.46	2.93	2.67	2.53	2.35	Used AEO Central Appalachia coal production projections
<b>Industrial Processes</b>	<b>4.75</b>	<b>5.65</b>	<b>6.52</b>	<b>7.75</b>	<b>8.50</b>	<b>9.35</b>	<b>10.70</b>	<b>12.55</b>	
Cement Manufacture (CO <sub>2</sub> )	0.37	0.35	0.54	0.53	0.59	0.64	0.69	0.73	Based on Portland Cement Association's Cement Outlook 2008.
Lime Manufacture (CO <sub>2</sub> )	0.46	0.48	0.72	0.77	0.83	0.88	0.94	1.01	Based on analysis of historical growth
Limestone and Dolomite Use (CO <sub>2</sub> )	0.31	0.28	0.32	1.08	1.08	1.08	1.08	1.08	No growth assumed due to conflicting historical data
Soda Ash (CO <sub>2</sub> )	0.040	0.038	0.036	0.034	0.033	0.031	0.029	0.029	Based on employment

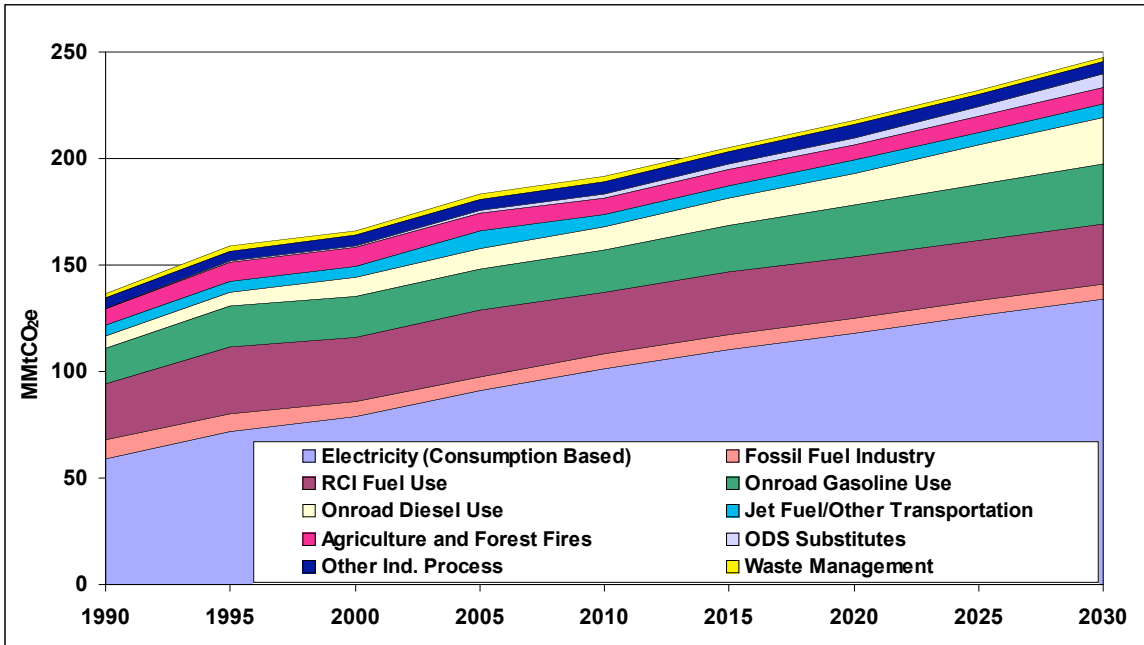
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Million Metric Tons CO <sub>2</sub> e	1990	2000	2005	2010	2015	2020	2025	2030	Explanatory Notes for Projections
									projections from Workforce KY
Iron & Steel (CO <sub>2</sub> )	2.43	2.57	2.62	2.70	2.70	2.70	2.70	2.70	No growth assumed
Ammonia and Urea (CO <sub>2</sub> )	0.011	0.010	0.007	0.008	0.008	0.008	0.008	0.008	Based on analysis of historical growth
ODS Substitutes (HFC, PFC)	0.005	1.02	1.48	1.90	2.56	3.32	4.59	6.35	Based on national projections (USEPA)
Electric Power T&D (SF <sub>6</sub> )	0.60	0.34	0.34	0.31	0.29	0.28	0.27	0.26	Based on national projections (USEPA)
Aluminum Production (PFC)	0.53	0.57	0.46	0.42	0.41	0.40	0.40	0.39	Based on national projections (USEPA)
<b>Waste Management</b>	<b>2.18</b>	<b>2.13</b>	<b>2.16</b>	<b>2.33</b>	<b>1.75</b>	<b>1.87</b>	<b>1.98</b>	<b>2.10</b>	
Waste Combustion	0.11	0.17	0.20	0.21	0.21	0.21	0.21	0.21	Used growth rate calculated for 1995-2002 emissions growth
Landfills	1.71	1.56	1.54	1.68	1.09	1.18	1.27	1.37	Based on historical KY landfill emplacement; Used landfill disposal projections from waste management profile to estimate future emissions
Wastewater Management	0.36	0.40	0.41	0.44	0.46	0.48	0.50	0.52	Used growth rate calculated for 1990-2005 emissions growth
<b>Agriculture</b>	<b>7.89</b>	<b>6.96</b>	<b>7.88</b>	<b>7.05</b>	<b>6.81</b>	<b>6.65</b>	<b>6.56</b>	<b>6.59</b>	
Enteric Fermentation	3.25	2.91	3.12	3.14	3.06	3.02	3.04	3.16	Based on projected livestock population
Manure Management	0.48	0.48	0.53	0.45	0.42	0.40	0.40	0.41	Based on projected livestock population
Agricultural Soils	3.67	3.31	4.08	3.35	3.26	3.17	3.07	2.98	Used historical growth rate
Agricultural Burning	0.014	0.017	0.018	0.019	0.020	0.021	0.022	0.023	Used historical growth rate
Agricultural Liming	0.48	0.24	0.13	0.088	0.057	0.037	0.024	0.016	Based on historical agricultural liming estimate
<b>Forest Wildfires (N<sub>2</sub>O and CH<sub>4</sub>)</b>	<b>0.29</b>	<b>1.72</b>	<b>0.66</b>	<b>0.68</b>	<b>0.68</b>	<b>0.68</b>	<b>0.68</b>	<b>0.68</b>	Based on average of historical emissions
<b>Total Gross Emissions (Consumption Basis, Excludes Sinks)</b>	<b>136.7</b>	<b>165.9</b>	<b>183.1</b>	<b>191.6</b>	<b>205.1</b>	<b>217.7</b>	<b>232.3</b>	<b>247.7</b>	
<i>increase relative to 1990</i>		21%	34%	40%	50%	59%	70%	81%	
<b>Emissions Sinks</b>	<b>-9.94</b>	<b>-7.77</b>	<b>-7.57</b>	<b>-7.57</b>	<b>-7.57</b>	<b>-7.57</b>	<b>-7.57</b>	<b>-7.57</b>	
Forested Landscape	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	Held at 2005 levels
Urban Forestry and Land Use	-4.09	-1.92	-1.73	-1.73	-1.73	-1.73	-1.73	-1.73	Extrapolated based on historical data
Agricultural Soils (cultivation practices)	-1.14	-1.14	-1.14	-1.14	-1.14	-1.14	-1.14	-1.14	Held at 1997 levels based on most recent data available
<b>Net Emissions (Includes Sinks)</b>	<b>126.8</b>	<b>158.2</b>	<b>175.5</b>	<b>184.0</b>	<b>197.6</b>	<b>210.1</b>	<b>224.8</b>	<b>240.2</b>	
<i>increase relative to 1990</i>		25%	38%	45%	56%	66%	77%	89%	

<sup>a</sup> Totals may not equal exact sum of subtotals shown in this table due to independent rounding.

Figure 1 depicts these emissions in a graphical display.

**Figure 1. Kentucky Gross GHG Emissions by Sector, 1990-2030: Historical and Projected**

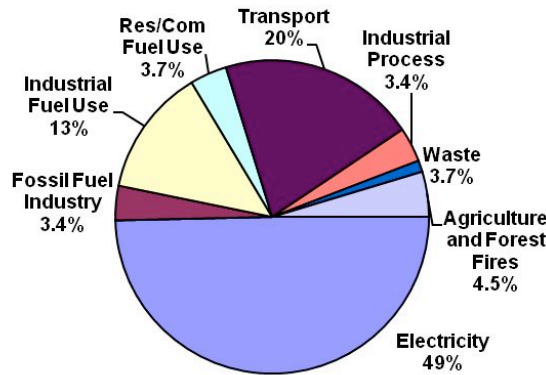


RCI – direct fuel use in residential, commercial, and industrial sectors. ODS – ozone depleting substance.

Figure 2 portrays gross GHG emissions by sector for Kentucky for the year 2005. Principal sources of Kentucky’s GHG emissions are electricity consumption; transportation; and residential, commercial, and industrial (RCI) fuel use accounting for 50%, 20%, and 17% of Kentucky’s gross GHG emissions in 2005, respectively.

**Figure 2. Kentucky Gross GHG Emissions by Sector, 2005**

**Kentucky**



Notes: Res/Com = residential and commercial fuel use sectors; emissions for the residential, commercial, and industrial fuel use sectors are associated with the direct use of fuels (natural gas, petroleum, coal, and wood) to provide space heating, water heating, process heating, cooking, and other energy end-uses. The commercial sector accounts for emissions associated with the direct use of fuels by, for example, hospitals, schools, government buildings (local, county, and state), and other commercial establishments. The industrial processes sector accounts for emissions associated with manufacturing and excludes emissions included in the industrial fuel use sector. The transportation

sector accounts for emissions associated with fuel consumption by all on-road and non-highway vehicles. Non-highway vehicles include jet aircraft, gasoline-fueled piston aircraft, railway locomotives, boats, and ships. Emissions from non-highway agricultural and construction equipment are included in the industrial sector. Electricity = electricity generation sector emissions on a consumption basis (including emissions associated with electricity imported from outside of Kentucky and excluding emissions associated with electricity exported from Kentucky to other states).

**Appendices**

1. Appendix A- Kentucky Climate Action Plan Council (KCAPC) Members List
2. Appendix B- KCAPC Technical Work Group (TWG) Members Lists
3. Appendix C- KCAPC Selected Priority Policy Options for Further Analysis
4. Appendix D- 5 Catalogs of Potential State Policy Actions by TWG Sector
5. Appendix E- 5 Brief Descriptions of the State Policy Actions