

EXECUTIVE SUMMARY

Background

The Delaware Climate Change Action Plan (DCCAP) was prepared with funding from the Delaware State Energy Office and the U.S. Environmental Protection Agency's State and Local Climate Change Program. The Center for Energy and Environmental Policy of the University of Delaware researched and wrote the Action Plan with the guidance and advice of the Delaware Climate Change Consortium (DCCC), comprised of representatives from government, business, labor, environment and community-based organizations. The Consortium includes individuals with knowledge about industry, transport, commerce, energy utilities, wastes and sinks, federal, state and local policy, and community concerns, awareness and goals. Throughout the two-year period of its development, the DCCAP was prepared as a consensus activity of the DCCC. The Action Plan includes the diverse ideas of the Consortium, but it does not necessarily reflect those of any individual, organization, or corporation which Consortium members represent.

The DCCC adopted a greenhouse emissions¹ reduction target for Delaware of 7% below the state's 1990 emissions by the year 2010. In this Action Plan, the DCCC has developed a set of policy options that can reduce Delaware's greenhouse gas emissions by 7% below the 1990 level. This amounts to a decrease of almost 25% in State emissions by 2010.

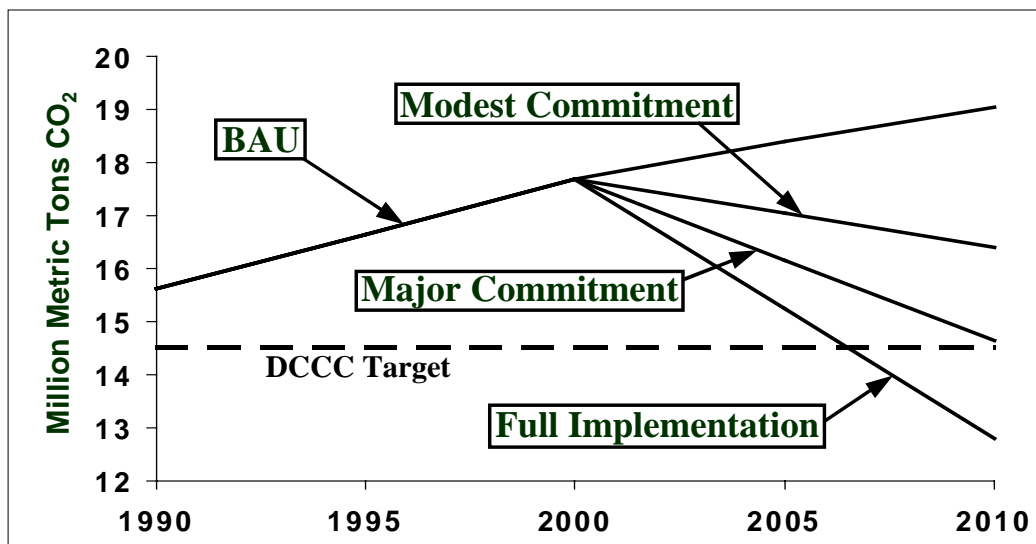
Three levels of implementation were devised: a *Full Implementation scenario* involving the adoption of all measures (i.e. 100%); a *Major Commitment scenario* which seeks to realize 65% of the reductions identified in the DCCAP through aggressive state policies and supporting federal strategies; and a *Modest Commitment scenario* with 35%

¹ The principal greenhouse gases (GHGs) are: carbon dioxide (CO₂), methane (CH₄), ozone (CO₃), nitrous oxide (N₂O), sulfur dioxide (SO₂) and chlorofluorocarbons (CFCs). Carbon dioxide is the most important GHG from a policy standpoint. Scientific research (IPCC 1996) suggests that this gas accounts for 66% of the warming effect. Common human activities that lead to carbon dioxide emissions include: coal burned for electricity generation; gasoline consumed for automobile and truck travel; and oil used for home heating.

of the DCCAP's reductions targeted for state action and supporting federal initiatives. The three scenarios used in the DCCAP parallel a recent national study by the Interlaboratory Working Group (1997). The scenario approach provides insight into the relative emissions savings that can be expected from different levels of policy implementation.

Using the Delaware Econometric Model (which is maintained by the University of Delaware), an energy demand forecast was developed for the DCCAP. This forecast projects the state's greenhouse gas emissions to 2010 under "business-as-usual" (BAU) conditions. By 2010, the BAU estimate is for Delaware's emissions to increase to about 18.8 mmtCO₂. To meet the DCCC target for Delaware of 14.5 mmtCO₂, a 23% reduction from BAU levels will be required. The forecasted total increase in emissions divided on a sector basis is as follows: transport (29.6%), utility (29.6%), industrial (21.5%), residential (9.9%), and commercial (9.5%). The majority of emissions result from fossil fuel combustion to supply a wide range of energy services.

Figure ES-1
Policy Options for Reducing Delaware's
Future Greenhouse Gas Emissions



Findings

- The Delaware Climate Change Consortium finds that Delaware can reduce its greenhouse gas (GHG) emissions by 15-25% over the next 12 years by implementing the measures identified in this Action Plan. However, successful implementation of the Action Plan will require a **major policy commitment** by the State of Delaware to remove barriers to the adoption of cost-effective measures to improve energy efficiency throughout the State's economy (Overall results of the three implementation scenarios are shown in Figure ES-1).
- Two of the scenarios analyzed for the DCCAP - Full Implementation and Major Commitment (equal to 65% of the Full Implementation case) - would reverse the State's current trend of increasing emissions and satisfy DCCC's emission reduction target of 7% below 1990 emissions by the year 2010. But, implementing either scenario would require significant effort on the part of government and industry that has not been evident to date. Even implementation of the Modest Commitment scenario will need statewide efforts to overcome major barriers.
- Implementation of the Action Plan will require adoption of a policy agenda that encourages the state's government, industries, and citizen organizations to participate actively in a wide range of implementation activities. Such cooperation would involve legislative initiatives, community input and support, and education and outreach. Specific policy needs to support the Action Plan are described in detail in Chapter 9. The Policy Priorities identified by the DCCC appear at the conclusion of the Executive Summary.
- Achievement of the projected effects of any of the three implementation strategies analyzed for the DCCAP will be **difficult**. Still, the Consortium believes that it is worthwhile for Delawareans to undertake the challenges set forth in this Action Plan as part of the nationwide and international commitment to avert the prospect of climate change.

- Projected greenhouse gas emission savings for each sector of the Delaware economy are as follows:
 - ◆ Industrial Sector: Full implementation of the 170 identified efficiency measures in boiler and steam systems, heat recovery and containment, space conditioning, air compressors, motors, and lighting will lower emissions to 3.1 mmtCO₂ in 2010, compared to the BAU forecast of 4.2 mmtCO₂. Emissions under the Major Commitment scenario would be 3.5 mmtCO₂ and 3.8 mmtCO₂ under the Modest Commitment scenario.
 - ◆ Residential Sector: Full implementation of the identified efficiency measures (related to space and water heating, electric appliances, gas cooking, and lighting upgrades) will result in emissions of 1.4 mmtCO₂ in 2010; the BAU forecast is approximately 2.0 mmtCO₂ in 2010. For the Major Commitment scenario, emissions would be 1.6 mmtCO₂; and 1.8 mmtCO₂ for the Modest Commitment case.
 - ◆ Commercial Sector: Full implementation of efficiency measures in commercial lighting, refrigeration, space conditioning, fuel switching and building-integrated photovoltaics will lower this sector's greenhouse gas emissions to 1.4 mmtCO₂ in 2010. By comparison, the BAU projects this sector's 2010 emissions to be 1.9 mmtCO₂. Emissions under the Major Commitment scenario would be nearly 1.6 mmtCO₂; and over 1.7 mmtCO₂ under the Modest Commitment scenario.
 - ◆ Transportation Sector: Full implementation of measures to upgrade the energy efficiency of passenger and light-duty vehicles, to spur the use of alternative fuel vehicles, and to implement transportation conservation measures will reduce emissions to 3.1 mmtCO₂ in 2010. Under the BAU, emissions are projected to climb to 4.9 mmtCO₂ in 2010. For the Major Commitment scenario, emission would be 3.7 mmtCO₂; and nearly 4.4 mmtCO₂ for the Modest Commitment case.
 - ◆ Electric Utility Sector: Utilizing a renewable energy portfolio standard, switching fuels used for generation, and incorporating the savings identified for the residential, commercial and industrial sectors, will lower emissions in 2010 to 4.4 mmtCO₂. The BAU forecast emissions from this sector to climb to 5.8 mmtCO₂ in 2010. Emissions under the Major Commitment scenario would be 4.9 mmtCO₂; and 5.3 mmtCO₂ under the Modest Commitment scenario.
 - ◆ Wastes Sector: Through a full-potential recycling scenario, the sector's emissions from landfill operations are estimated to be approximately 0.18 mmtCO₂(e) in comparison with the BAU forecast of almost 0.25 mmtCO₂(e) at 2010 (see Chapter 7 for details of additional scenarios).
 - ◆ Forests Sector: The BAU forecast for this sector indicates that the State is likely to lose nearly 260,000 mt of carbon storage as a result of land use changes. Pursuit of the full potential of

the carbon sink restoration opportunities identified in the Action Plan would result in a loss of only 120,000 mt of carbon storage, less than half that of the BAU. The DCCC considers the strategies in the Action Plan to be a necessary near term response. It favors a long-term strategy to reverse the decline of the State's forest cover (see Chapter 7 for details of additional scenarios).

- A detailed emissions reduction policy strategy is included in the DCCAP (see Chapter 9) and is based on detailed analyses of a wide range of policy measures applicable to each sector of energy use. To ensure applicability to Delaware, the final selection of options was determined on the basis of cost-effectiveness. The Policy Strategy by sector emphasizes the following reforms:
 - ◆ Residential and Commercial – through the adoption of efficiency-based building codes, the use of market incentives to increase energy efficiency, and the development of programs to promote fuel switching to lower carbon fuels, Delaware can realize cost-effective reductions in GHG emissions from the state's buildings.
 - ◆ Transportation – through market incentives designed to increase consumer adoption of higher efficiency vehicles and alternatively fueled vehicles, and through incentive programs to promote transportation conservation measures, such as ridesharing, vehicle miles traveled in Delaware can be cost-effectively reduced.
 - ◆ Industrial – through the use of market incentives and greater participation in voluntary federal programs, more energy-efficient equipment and better operation and maintenance practices will be embraced by Delaware's manufacturers, increasing the State's economic competitiveness.
 - ◆ Utility – through the adoption of a renewable portfolio standard and a fuel switching strategy to low-carbon fuels, overall greenhouse gas emissions can be lowered and the State can become an attractive location for the emerging "green" energy market.
 - ◆ Waste Reduction – through a policy menu that includes volume-based fees, recycling/container deposit programs, and greater participation in voluntary federal programs, the volume of waste materials can be reduced along with the State's demand for raw materials. Greenhouse gas emissions from landfills would thereby decline.
 - ◆ Sinks – through urban growth management, afforestation, and rural land and forest preservation policies, Delaware's carbon sink can be protected and enhanced, while offsetting a portion of Delaware's greenhouse gas emissions.

Sector analysis results for greenhouse gas emissions reduction are summarized in Table ES-1, ES-2 and ES-3. Estimations of the potential emissions reductions possible from the wastes sector and possible increases in the State's carbon sequestration capacity are summarized in Table ES-4, ES-5 and ES-6. After

reporting Action Plan savings in physical units (Tables ES-1 and ES-4), these tables measure impacts from two benchmarks. Table ES-2 and ES-5 report DCCAP impacts from forecast emissions for 2010. This benchmark enables us to understand the likely level of future effort. However, since emissions in 2010 are forecasted (and, therefore, include estimation error), Action Plan impacts are also reported in terms of 1990 State levels. This benchmark has the advantage of communicating the level of effort needed against recent experience. Additionally, it points to the savings commitment needed to reverse trends in CO₂ emissions and, thereby, contribute to a climate-stable future.

Table ES-1
Summary of CO₂ Emission Reductions (mmt) for Energy Using Sectors
by Policy Implementation Scenario

	1990 Baseline	BAU at 2010	Modest Commitment at 2010	Major Commitment at 2010	Full Implementation at 2010
Industry	3.2	4.2	3.8	3.5	3.1
Residential	1.8	2.0	1.8	1.6	1.4
Commercial	1.2	1.9	1.7	1.5	1.4
Transportation	4.0	4.9	4.4	3.7	3.1
Utilities	5.4	5.8	4.8	4.4	3.8
TOTAL	15.6	18.8	16.5	14.7	12.8

Table ES-2
Percent Reduction in CO₂ Emissions by Energy Using Sector
Based on Forecast Emissions for 2010

DCCC Target Reduction for Delaware in 2010 = 23%

	Modest Commitment	Major Commitment	Full Implementation
Industry	9%	18%	27%
Residential	10%	18%	28%
Commercial	9%	18%	27%
Transportation	10%	24%	36%
Utilities	17%	24%	40%
TOTAL	12%	22%	32%

Table ES-3
Percent Change in CO₂ Emissions by Energy Using Sector
Based on 1990 Levels

DCCC Target Reduction for Delaware Measured from 1990 Levels = 7%

	Modest Commitment	Major Commitment	Full Implementation
Industry	+18%	+9%	-3%
Residential	0%	-11%	-22%
Commercial	+41%	+25%	+16%
Transportation	+10%	-8%	-22%
Utilities	-11%	-19%	-30%
TOTAL	+6%	-6%	-18%

Table ES-4
Summary of CO₂ Emission Reductions (mt) for the Wastes
Sector and Carbon Sequestration for the Forest Sector
by Policy Implementation Scenario

	1995 Baseline	BAU at 2010	Modest Commitment at 2010	Major Commitment at 2010	Full Implementation at 2010
Wastes (CO ₂ equivalent released)	156,720	249,840	234,570	210,159	181,362
Forests (CO ₂ sequestered)	1,420,000	1,161,242	1,212,207	1,255,478	1,299,842

Table ES-5
Reduction in CO₂ Equivalent Releases for the Wastes Sector and
Change in CO₂ Sequestered in the Forests Sector by Policy
Implementation Scenario Based on Forecasts on 2010

No DCCC Target set for these Sectors

	Modest Commitment	Major Commitment	Full Potential
Wastes (CO ₂ equivalent released)	6%	16%	27%
Forests (CO ₂ sequestered)	4%	8%	12%

Table ES-6
Percent Change in CO₂ Emissions in the Wastes Sector and CO₂
Sequestered in the Forests Sector Based on 1995 Levels

No DCCC Target set for these Sectors

	Modest Commitment	Major Commitment	Full Potential
Wastes (CO ₂ equivalent released)	+50%	+34%	+16%
Forests (CO ₂ sequestered)	-15%	-11%	-8%

References

Intergovernmental Panel on Climate Change (IPCC). (1996). *Climate Change 1995: The Science of Climate Change*. Cambridge, UK: Cambridge University Press.

Interlaboratory Working Group on Energy-Efficient and Low Carbon Technologies (IWG). (1997). *Scenarios of U.S. Carbon Reductions: Potential Impacts of Energy Efficient and Low-Carbon Technologies by 2010 and Beyond*. Washington, DC: National Technical Information Service.