

**Energy Supply (ES) Technical Work Group
Catalog of State Climate Mitigation Options**

Prepared for the ES Technical Working Group (TWG) Call #3, June 1, 2006, 9:00-11:00 AM

**Key to Rankings of Options in the Table that Follows:
Revision: June 26, 2006**

| Potential Emission Reductions <u>1/</u> | Potential Cost or Cost Savings <u>1/ 2/</u> |
|--|---|
| High (H): At least 1 Million Metric Tons (MMT) carbon dioxide equivalent (CO ₂ e) per year by 2020 (~1% of current NC emissions) | High (H): \$50 per Metric Ton CO ₂ e (MTCO ₂ e) or above |
| Medium (M): From 0.1 to 1 MMT CO ₂ e per year by 2020 | Medium (M): \$5-50/MTCO ₂ e |
| Low (L): Less than 0.1 MMT CO ₂ e per year by 2020, or 1 MMT CO ₂ e by 2050 | Low (L): Less than \$5/MTCO ₂ e |
| Uncertain (U): Not able to estimate at this time | Uncertain (U): Not able to estimate at this time |
| <u>1/</u> Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures. | |
| <u>2/</u> Costs are denoted by a positive number. Cost savings (i.e., “negative costs”) are denoted by a negative number. | |

Definition of “Priorities for Analysis”:

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low:** Low priority options will be analyzed last, time and resources permitting.

Notation of Options:

* Options marked with an asterisk (*) indicate options that are at least partially “base case” policies, i.e., that have been considered or undertaken at some level in North Carolina.

** Options marked with a double asterisk (**) indicate options that are included as recommendations in the September 1, 2005 NC DENR Report under the Clean Smokestacks Act of 2002.

Table 2 - Energy Supply (ES) - DRAFT

| CAST VOTE HERE | Option No. | Climate Mitigation Option | Priority for Analysis | Potential | Potential | Ancillary Impacts, Feasibility Considerations | Notes |
|-------------------------------|-------------------|--|--------------------------------------|--|-------------------------------------|--|--|
| | | | | GHG Emissions Reduction | Cost or Cost Savings | | |
| | ES-1 | RENEWABLE ENERGY | | | | | |
| | 1.1 | Environmental Portfolio Standard (renewables and energy efficiency) with renewable energy credit trading** | Tentatively as “H” | H | L-H | | Potentially attractive measure; let’s keep this in consideration; need to learn more about ongoing commissioned study |
| | 1.2 | NC Greenpower renewable resources program * | | L | H | | In effect since 2003; subscription rate currently quite low; voluntary customer demand-driven measure; effect on statewide GHG reductions appears to be negligible (about 0.1% of overall emissions); cost of measure is high (about \$2/100 kWh). CAPACG: make sure to incorporate all elements of voided 1.3 into 1.2 |

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| | | | | GHG Emissions Reduction | Cost or Cost Savings | | |
| | 1.3 | State purchase of electricity through the NC Greenpower renewable resources program** | | H | L-H | | This measure has been eliminated as it overlaps with measure 1.2 |
| | 1.4 | Public Benefit Charge on electricity bills for funding efficiency activities** | | H | H (savings) | | Need to also consider tax credits or rebates for buyers of new, low-GHG emitting technologies |
| | 1.5 | Renewable Energy Incentives (biomass, wind, solar, geothermal)* | | Hi | Lo-Hi | | CAPAG: address opening up of Ridge law, decrease barriers to wind, subsidies for wind development |
| | 1.6 | Green Power Purchases and Marketing* | | ? | ? | | |
| | 1.7 | Renewable energy development issues (zoning, siting, etc.) | | ? | ? | | |
| | 1.8 | Research and Development (R&D) for renewable technologies | | U | U | | |
| | 1.9 | Landfill Gas Recovery (see also Waste) | | U | U | | |
| | 1.10 | Waste to Energy (see also Waste) ** | | Hi | L-H | | |
| | ES-2 | DISTRIBUTED GENERATION (DG) | | | | | |
| | 2.1 | Incentives for combined heat and power (CHP) and clean DG** | | M-H | L | | CAPAG: decrease regulatory barriers for local siting |

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| | | | | GHG Emissions Reduction | Cost or Cost Savings | | |
| | 2.2 | Removing barriers to CHP and clean DG (including utility rate and interconnection barriers, financing, information, etc.)** | | M-H | L | | |
| | 2.3 | Interconnection Rules for clean, distributed generation*,** | | L | L | | |
| | 2.4 | Net Metering*,** | | U | U | | |
| | 2.5 | Pricing strategies | | ? | ? | | |
| | 2.6 | Portfolio Standards for Power Retailers | | U | U | | Envisioned to focus on distribution company standards |
| | ES-3 | ADVANCED FOSSIL FUEL | | | | | |
| | 3.1 | Incentives for advanced coal, including IGCC and carbon capture and storage (CCS) | | H | M/H | | Need to consider advanced pulverized coal technologies (input from 11 April meeting). Also need to consider Production subsidies or tax credits to firms bringing new technologies to market |
| | 3.2 | Incentives for CO2 pipelines for CCS | | H | H | | |
| | 3.3 | Fuel Cell Development Incentives | | U | U | | |

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| | | | | | | | |
| | 3.4 | Combined H2/electricity production | | Hi | H | | |
| | 3.5 | Research and Development (R&D) for advanced fossil fuel technologies. | | U | U | | Direct Government funding of R&D, though perhaps more appropriate at federal level, could affect NC through R&D contracts with private firms, R&D grants and contracts with NC universities, Intramural R&D conducted at government labs, R&D contracts with consortia (2 or more of the above), and R&D tax credits |
| | 3.6 | Technology Standards for CO2 Sources | | U | U | | |
| | ES-4 | NUCLEAR | | | | | |
| | 4.1 | New Nuclear Capacity and Licensing | | L/H | M/H | | CA[AG: address possibility of hydrogen production from nuclear electricity generation |
| | 4.2 | Nuclear Plant Relicensing | | Zero? | | | |
| | 4.3 | Nuclear Plant Upgrading | | Zero? | | | |
| | ES-5 | OTHER ELECTRICITY MEASURES | | | | | |
| | 5.1 | Efficiency Improvements and Repowering Existing Plants | | U | U | | CAPAG: will be important to capture fuel cycle impacts/benefits |

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| | | | | | | | |
| | 5.2 | Transmission System Upgrading | | U | U | | |
| | 5.3 | Reduce Transmission and Distribution Line Loss | | | | | |
| | 5.4 | Collaboration with other Southeast states | | U | U | | |
| | ES-6 | EMISSIONS POLICIES | | | | | |
| | 6.1 | CO2 Tax | | H | L/H | | May need to be expanded to include emissions of other forms of carbon. CAPAG: require utilities to include a shadow price for CO2 in electric capacity planning |
| | 6.2 | GHG Cap and Trade | | H | L/H | | |
| | 6.3 | Generation Performance Standards | | H | L/H | | Will need to be clarified as to whether generation-only sources are envisioned |
| | 6.4 | GHG Offset/mitigation requirements for new power plants | | M/H | L/H | | |
| | 6.5 | GHG Offset/mitigation requirements for existing power plants | | H | L/H | | |
| | 6.6 | Voluntary Utility CO2 Targets | | L/M | L | | |
| | 6.7 | Rate restructuring | | | | | Added based on input from 11 April meeting |

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| | | | | | | | |
| | ES-7 | EDUCATION/AWARENESS | | | | | |
| | 7.1 | Brownfield Re-development | | U | U | | |
| | 7.2 | Environmental (emissions) Disclosure | | U | U | | May need to be edited or expanded and linked with emissions policies explored |
| | 7.3 | Public Education | | U | U | | CAPAG: address the need for a broad education program that includes lifecycle costs/emissions |
| | 7.4 | Codification and transfer of knowledge | | U | U | | |
| | 7.5 | Technology and/or industrial extension services | | U | U | | |
| | ES-8 | INSITUTIONAL AND RD&D | | | | | |
| | 8.1 | Center for low-carbon technology development | | U | U | | |
| | 8.2 | Demonstration projects for reducing GHGs | | U | U | | |
| | 8.3 | Legislative changes requiring the NC Utility Commission to consider environmental and other factors. | | | | | |