

**Table x.**  
**Cross Cutting Issues Technical Work Group**  
**Summary List of Mitigation Options**

#	Mitigation Option Name	Priority for Consideration	Feasibility Considerations
CC-1	GHG Inventories and Forecasts		
CC-2	GHG Reporting		
CC-3	GHG Registry		
CC-4	Public Education and Outreach		
CC-5	Adaptation		
CC-6	Options for Goals or Targets (for CAPAG in support of LCGCC)		

## CC-1 GHG Inventories and Forecasts

### Mitigation Option Description

Greenhouse gas (GHG) emissions inventories and forecasts are essential to understanding the magnitude of all emission sources and sinks (both anthropogenic and natural), the relative contribution of various types of emission sources and sinks to total emissions, and the factors that affect trends over time. The initial use for inventories and forecasts will be to inform state leaders and the public on statewide trends, opportunities for mitigating emissions or enhancing sinks, and verifying GHG reductions associated with implementation of North Carolina's Climate Action Plan. However, it is expected that other uses of the data will be identified as the program evolves. The responsibility for preparing GHG inventories and sinks should reside with the Division of Air Quality which has the expertise needed to systematically compile information on GHG sources and sinks using established methods and data sources. Other state agencies as well as private facilities (sources) will need to provide data to DAQ on a periodic basis. This program should be integrated with existing DAQ inventory and forecast functions as seamlessly as possible as committed to by DAQ in the September 2005 Report under the Clean Smokestacks Act. The inventory and forecast will be an on-going effort that will be improved over time based on improvements to the accuracy and completeness of data needed to support this effort.

### Design

- **Goals:**
  - Develop a periodic, consistent, and complete inventory of emission sources and sinks on a continuing basis with forecasts to reasonable and realistic future years (5 and 10 years), to and including 2020 (and eventually beyond).
  - Inventory of all natural and man-made emissions generated within the boundaries of the state (i.e., production-based inventory approach) as well as emissions associated with energy imported and consumed in the state (i.e., consumption-based inventory approach).
  - Provide a projection of the emissions from the same source categories and on the same basis into the future for a realistic forecast of what the emissions will be in future years reflecting expected growth and application of scheduled and expected mitigation options.
  - Provide a basis for documenting reductions and credits “by difference” from year to year.
- **Timing:** The program should be implemented as soon as possible as allowed by funding. Reporting by major (Title V) point sources holding an air permit will begin for calendar year 2008. The process for these and other sources should repeat as often as necessary to

track significant reductions or increases, beginning with every year for major point sources and every third year for other sources to be in agreement with routine EPA air emissions reporting requirements and regulations for other regulated air pollutants.

- **Coverage of parties:** All emission sources and sinks (both anthropogenic and natural) should be included.
- **Other:** The state has already initiated efforts for making the 2008 point source data collection for permitted point sources a reality.

### **Implementation Mechanisms**

North Carolina currently requires major point sources of criteria air pollutants to report their emissions to the state, and DAQ reviews the emissions for accuracy annually. An unofficial “difference” report should be issued annually for major point sources and include updates as available for other categories that are on an every-third-year rotation. The state would develop inventories and forecasts for area sources, small point sources and mobile emissions. Individual facilities could optionally secure outside certification for any emissions they wish to register for potential sale/credit.

### **Related Policies/Programs in Place**

The DAQ already has a computer system for other air pollutants from these source categories. The major (Title V) facilities already report annually, and the GHG data have been added to the computer system pollutant tables.

### **Types(s) of GHG Reductions**

Establishing a GHG inventory and forecasting function within state government is an enabling policy to encourage tracking, management, and ultimately reduction of GHG emissions. It does not reduce GHG emissions itself per se. Public disclosure of GHG emissions may encourage sources to reduce emissions.

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

This option could be considered an administrative and enabling function of the Climate Action Plan (including enabling any future cap and trade options) and will incur overhead costs but not directly reduce emissions per se except where these data motivate reductions for public relations by individual companies or sources.

- **Data Sources:** Many.
- **Quantification Methods:** Several – will be designed to follow standard, comparative and accepted approaches that allow exchange/sale of emission credits should this become a need in this state.
- **Key Assumptions:**

### **Key Uncertainties**

- Adequacy of on-going funding for a statewide GHG inventory and forecasting function.

### **Additional Benefits and Costs**

TBD

**Feasibility Issues**

TBD

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD



Cross Cutting Issues Technical Working Group  
*Draft* GHG Inventories and Forecasts Design Characteristics Matrix

**Purpose and Goals of Inventories and Forecasts:**

1. Tracking GHG emissions trends
2. Identifying opportunities and areas for action
3. Others?

#	Design Element	Options	Design Considerations	Preliminary Recommendation
1.	<b>Responsibility for Preparing Periodic Inventories and Forecasts</b>	<ul style="list-style-type: none"> <li>• Sole responsibility with NC DENR Department of Air Quality (DAQ)</li> <li>• Shared responsibility between DAQ and other state agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Purpose is to develop consistent, systematic inventories and forecasts from one year to the next.</li> <li>• Subject matter expertise is evolving rapidly.</li> </ul>	<ul style="list-style-type: none"> <li>• DAQ has substantial emissions inventory responsibility now, so recommend locating responsibility and authority for this function at DAQ as well.</li> <li>• Inventories and forecasts should include all sectors/sources.</li> <li>• Responsibility of other agencies to provide DAQ with related data and assistance (e.g., VMT) must be explicit.</li> </ul>
2.	<b>Inventory Frequency</b>	<ul style="list-style-type: none"> <li>• Annual</li> <li>• Other</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory reflects historical emissions.</li> <li>• Different sized sources currently required to report emissions on different schedules (e.g., major sources annually; minor sources every 5 years).</li> <li>• Must be consistent with any NC GHG Reporting Program, and should strive for consistency with other inventory and forecasting programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare comprehensive, thorough recalculation every 5 years.</li> <li>• Publish inventory update annually based on readily available data (e.g., emissions filings from major sources; periodic filings of minor sources; etc.) for calendar year.</li> <li>• Starting year: Use CAPAG inventory and forecast for past data and 2005; prepare comprehensive revisions in 2010, 2015, 2020, etc.</li> <li>• Dovetail to the extent possible with existing CSA requirements.</li> <li>• DAQ to receive public input and comment before finalizing.</li> </ul>

#	Design Element	Options	Design Considerations	Preliminary Recommendation
3.	<b>Forecast Frequency and Periods</b>	<ul style="list-style-type: none"> <li>• Annual</li> <li>• Intervals</li> <li>• Other</li> </ul>	<ul style="list-style-type: none"> <li>• Forecasts reflect estimates of future emissions.</li> <li>• Define future years for which emissions inventory is prepared (i.e., frequency and overall forecast period).</li> <li>• Define intervals for future year forecasts (e.g., annual, 5-year intervals relative to a base historical year).</li> <li>• Limitations exist on availability of activity data for projecting emissions (e.g., current Energy Information Administration (EIA) projections of fuel consumption only go to 2025).</li> <li>• Should strive for consistency with other inventory and forecasting programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare comprehensive, thorough recalculation every 5 years, alongside inventory.</li> <li>• Publish forecast update annually based on readily available data (e.g., emissions filings from major sources; periodic filings of minor sources; etc.) for calendar year.</li> <li>• Project as far into the future as reasonably possible (e.g., 5, 10, 15, 20, 25, and 50 years)</li> <li>• Dovetail to the extent possible with existing CSA requirements.</li> <li>• DAQ to receive public input and comment before finalizing.</li> </ul>
4.	<b>Greenhouse Gases Included</b>	<ul style="list-style-type: none"> <li>• Six “Kyoto gases” (CO<sub>2</sub>, HFCs, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, SF<sub>6</sub>)</li> <li>• Black Carbon</li> </ul>	<ul style="list-style-type: none"> <li>• Must be consistent with any NC GHG Reporting Program, and should strive for consistency with other inventory and forecasting programs.</li> <li>• Broader array promotes inventory building, public information, identification of GHG strategies, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Include mass emissions of the six “Kyoto gases” and black carbon.</li> <li>• Calculate CO<sub>2</sub>-equivalence to the extent possible.</li> </ul>

#	Design Element	Options	Design Considerations	Preliminary Recommendation
5.	<b>Basis for Calculating and Reporting Emissions</b>	<ul style="list-style-type: none"> <li>• Production based</li> <li>• Consumption based</li> </ul>	<ul style="list-style-type: none"> <li>• Production refers to emissions generated by sources in-state (e.g., emissions from power generated in-state whether consumed in-state or exported).</li> <li>• Consumption refers to “Production” based emissions plus imports and minus exports, at least for the energy sector.</li> </ul>	<ul style="list-style-type: none"> <li>• Recommend calculating emissions on both production and consumption bases to the extent reasonably practicable.</li> </ul>
6.	<b>Emissions Quantification</b>	<ul style="list-style-type: none"> <li>• Calculation methods &amp; tools</li> <li>• Federal 1605(b) program details quantification of black carbon emissions.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply current best practice methods (e.g., <i>GHG Protocol</i> and calculation tools).</li> <li>• Strive for consistency with other reporting and quantification programs.</li> <li>• Some “other” or “home grown” approaches may be necessary (e.g., Flashing emissions; IPIECA<sup>1</sup>, API’s<sup>2</sup> SANGEA™ GHG Emissions Software).</li> </ul>	<ul style="list-style-type: none"> <li>• Recommend quantifying emissions on the basis of best available practices, minding the importance of consistency with other programs, and transparently noting any necessary departures or changes.</li> </ul>
7.	<b>Public Access &amp; Reports</b>	<ul style="list-style-type: none"> <li>• Internet access and/or Online reports</li> <li>• Paper reports</li> <li>• Both</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Recommend DAQ make inventories and forecasts readily available to policymakers, interested parties, and the general public via the Internet.</li> </ul>

<sup>1</sup> IPIECA is the International Petroleum Industry Environmental Conservation Association.

<sup>2</sup> API is the American Petroleum Association.

#	Design Element	Options	Design Considerations	Preliminary Recommendation
8.	<b>Funding</b>	<ul style="list-style-type: none"> <li>• State-funded.</li> <li>• Emission-based fees (would require legislative approval).</li> <li>• Some combination?</li> <li>• Other?</li> </ul>	<ul style="list-style-type: none"> <li>• Inventories and forecasts can only be accomplished if adequate DAQ resources exist, so creative funding sources should be investigated (e.g., transaction fees, GHG credit sales, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• DAQ should publish the initial annual update based on CAPAG inventory and forecast.</li> <li>• Simultaneously, DAQ should consult with interested parties to identify, weigh, and select among creative funding approaches.</li> </ul>
9.	<b>Periodic Reassessment of Inventory and Forecast Approach</b>	<ul style="list-style-type: none"> <li>• Authority</li> <li>• Purpose</li> <li>• Frequency</li> </ul>	<ul style="list-style-type: none"> <li>• DAQ and involved agencies should have the ability to periodically reassess and revise (if necessary) designs element of the inventory and forecasting program</li> <li>• Sample reassessment considerations:               <ul style="list-style-type: none"> <li>- Relative impact of sources or groups on overall emissions totals vs. costs of calculating their emissions.</li> <li>- Benefits to NC air, taxpayers, businesses?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• DAQ should review at five-year intervals following implementation of the GHG inventory and forecast program.</li> <li>• DAQ's review should identify any revisions necessary and appropriate next steps and/or research questions.</li> </ul>
10.	<b>Other?</b>	•	•	•

## CC-2 State Greenhouse Gas Reporting

### Policy Description

GHG reporting reflects the measurement and reporting of GHG emissions at a statewide, sector, or sub-sector level to support tracking and management of emissions. GHG reporting can help sources identify emission reduction opportunities and reduce risks associated with possible future GHG mandates by moving “up the learning curve.” Tracking and reporting of GHG emissions would also help in the construction of periodic state GHG inventories. GHG reporting is typically a precursor for sources to participate in GHG reduction programs, opportunities for recognition, a GHG emission reduction registry, and to secure “baseline protection.” Further, developing a GHG reporting program could enable the state to influence the development of GHG reporting practices throughout the region and nation and build consistency with other state or regional GHG reporting programs.

### Policy Design

- **Goals:**
  - Subject to consistently rigorous quantification, GHG reporting should not be constrained to particular sectors, sources, or approaches, in order to encourage GHG mitigation activities from all quarters.
  - GHG reporting should be phased in by sectors as rigorous, standardized quantification protocols, base data, and tools become available, and as responsible parties become clear. All entities (including the state, municipalities, and other jurisdictions) should be allowed to report GHG emissions associated with their own activities and any programs they may implement to reduce GHG emissions.
  - GHG reporting should be applicable to all sources (e.g., combustion, processes, vehicles, etc.) but applied with common sense regarding de minimis emissions.
  - The goal should be reporting of “organization-wide emissions within North Carolina” but with greatest possible “granularity” in order to facilitate baseline protection.
  - Reporting should occur annually on a calendar-year basis for all six traditional GHGs and, to the extent possible, for black carbon.
  - GHG emissions reports should be verified through self-certification and NC DENR spot-checks. To qualify for future registry purposes, reports should undergo third-party verification.
  - Every effort should be made to maximize consistency with federal, regional, and other states’ GHG reporting programs and quantification protocols.

- Reporting of direct emissions<sup>3</sup> should be required; reporting of emissions associated with purchased power and heat<sup>4</sup> should be phased in, and reporting of other indirect emissions<sup>5</sup> should be allowed.
- Project-based emissions reporting should be allowed, when properly identified as such and quantified with equally rigorous consistency.
- The reporting program should provide for appropriate public transparency of reported emissions.
- **Timing:** A GHG reporting program should be implemented as soon as possible.
- **Coverage of parties:** All entities that can verify ownership of GHG emissions.

### Implementation Mechanisms

North Carolina currently requires major point sources of criteria air pollutants to report their emissions to the state, and DAQ reviews the emissions for accuracy annually. An unofficial “difference” report should be issued annually for major point sources and include updates as available for other categories that are on an every-third-year rotation. The state would develop inventories and forecasts for area sources, small point sources and mobile emissions. Individual facilities could optionally secure outside certification for any emissions they wish to register for potential sale/credit.

### Related Policies/Programs in Place

- Many sources in North Carolina report criteria pollutant emissions in order to comply with various federal and state regulatory programs. Most electric generating units are also required to report CO<sub>2</sub> emissions to the Energy Information Administration (EIA). Some sources may report GHG emissions on a voluntary basis to federal, state, or privately-run programs. Otherwise, there is no broad, statewide GHG reporting program in North Carolina.
- The DAQ will be collecting GHG emissions from permitted stationary sources beginning in calendar year 2008 to fulfill a commitment under the Clean Smokestacks Act.

### Types(s) of GHG Reductions

GHG reporting is an enabling mitigation option to encourage management, and ultimately reduction, of GHG emissions. GHG reporting does not reduce GHG emissions itself per se.

### Estimated GHG Savings and Costs per MTCO<sub>2e</sub>

The reporting and registry components of this mitigation option would help position sources for participating in an emissions trading program, should one develop in the future, leading to cost savings. Although establishment of a credible reporting and registry program is essential for participating in a trading program, these elements do not reduce GHG emissions themselves.

### Key Uncertainties

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<sup>3</sup> Defined as “Scope 1” emissions in the *GHG Protocol*; see [www.ghgprotocol.org](http://www.ghgprotocol.org).

<sup>4</sup> Defined as “Scope 2” emissions in the *GHG Protocol*; see [www.ghgprotocol.org](http://www.ghgprotocol.org).

<sup>5</sup> Defined as “Scope 3” emissions in the *GHG Protocol*; see [www.ghgprotocol.org](http://www.ghgprotocol.org).

Uncertainties exist with respect to quantification of some GHG emissions from some sources, but standard quantification protocols are rapidly being developed and accepted widely. There remain significant uncertainties with respect to how various state, regional, and/or federal GHG reporting programs may develop, but the best way to affect these outcomes toward North Carolina's benefit may be engagement in these processes by the state now.

**Additional Benefits and Costs**

TBD

**Feasibility Issues**

TBD

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD



Cross Cutting Issues Technical Working Group  
*Draft* GHG Reporting Design Characteristics Matrix

**WRI/WBCSD GHG Protocol's**

**Principles for GHG accounting and reporting:**

1. Relevance
2. Completeness
3. Consistency
4. Transparency
5. Accuracy
6. Enable other goals

5. Reducing risks (e.g., start learning curve)
6. Tracking GHG emissions, assisting the state in constructing annual inventories
7. Participating in voluntary programs
8. Participating in – or preparing for – mandatory programs
9. Precursor for registry participation
10. Opportunities for recognition
11. Public reporting
12. Consistency with other programs
13. Others?

**Potential Goals of GHG Reporting:**

4. Identifying reduction opportunities

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
1.	<b>Type of Program</b>	<ul style="list-style-type: none"> <li>• Voluntary</li> <li>• Mandatory</li> </ul>	<ul style="list-style-type: none"> <li>• May need or want to constrain mandatory applicability to certain sectors and/or sources pending availability of accepted quantification protocols.</li> <li>• Mandatory reporting is in place in some states for permitted sources (ME, CT, etc.); anticipated soon for several others in Northeast and far West.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
2.	<b>Sectors</b>	<ul style="list-style-type: none"> <li>• All sectors eligible</li> <li>• Limited to certain sectors</li> </ul>	<ul style="list-style-type: none"> <li>• Participation may be limited by availability of quantification methods; may need to “stage” sector participation.</li> <li>• WRI calculation protocols: Stationary combustion, mobile, electric power, cement, iron &amp; steel, aluminum, pulp &amp; paper, wood products, lime, ammonia, purchased heat or power, others.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
3.	<b>Sources</b>	<ul style="list-style-type: none"> <li>• All</li> <li>• Stationary combustion emissions</li> <li>• Mobile combustion emissions</li> <li>• Process emissions</li> <li>• Fugitive emissions</li> </ul>	<ul style="list-style-type: none"> <li>• Could limit sources even within sectors, (e.g., via types, size thresholds, etc.).</li> <li>• Broader array promotes inventory building, public information, identification of GHG strategies, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• From catalog 2.5: Require mandatory GHG reporting for permitted sources</li> </ul>

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
4.	<b>Organizational Boundary</b>	<ul style="list-style-type: none"> <li>• Entity-wide (e.g., corporation-wide)</li> <li>• Facility</li> <li>• Emissions unit or source point</li> <li>• Other (?)</li> </ul>	<ul style="list-style-type: none"> <li>• Clear definitions needed to avoid double counting where shared ownership exists.</li> <li>• Should strive to have design be consistent with possible future directions (e.g., mandatory reporting would not be enforceable above the facility level).</li> <li>• Combinations are possible (e.g., finer resolution aggregated to a greater whole).</li> </ul>	<ul style="list-style-type: none"> <li>• From catalog 2.2: Report NC emissions from state facilities &amp; vehicles to public &amp; 1605(b)</li> </ul>
5.	<b>Reporting Period</b>	<ul style="list-style-type: none"> <li>• Annual <ul style="list-style-type: none"> <li>- Calendar</li> <li>- Fiscal</li> </ul> </li> <li>• Other</li> </ul>	<ul style="list-style-type: none"> <li>• Should strive for consistency with other reporting programs.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
6.	<b>Greenhouse Gases Included</b>	<ul style="list-style-type: none"> <li>• Six “Kyoto gases” (CO<sub>2</sub>, HFCs, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, SF<sub>6</sub>)</li> <li>• Black Carbon</li> <li>• Other</li> </ul>	<ul style="list-style-type: none"> <li>• Should strive for consistency with other reporting programs.</li> <li>• Broader array promotes inventory building, public information, identification of GHG strategies, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• From catalog 2.3: Include non-CO<sub>2</sub> GHGs</li> </ul>

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
7.	<b>Scope of Emissions Covered</b>	<ul style="list-style-type: none"> <li>• Direct               <ul style="list-style-type: none"> <li>- “Scope 1”</li> </ul> </li> <li>• Indirect               <ul style="list-style-type: none"> <li>- “Scope 2” - Indirect from purchased Heat &amp; Electricity</li> <li>- “Scope 3” - other indirect (e.g., outsourced activities, employee travel, etc.)</li> </ul> </li> <li>• Both</li> </ul>	<ul style="list-style-type: none"> <li>• May need or want to “stage” coverage (e.g., start small &amp; expand).</li> <li>• Direct emissions most like current reporting requirements, but may omit GHG reduction opportunities or encourage direct-indirect trade-offs.</li> <li>• For many entities, most GHG emissions are from indirect emissions sources.</li> </ul>	•
8.	<b>Emissions Quantification &amp; Monitoring</b>	<ul style="list-style-type: none"> <li>• Calculation methods &amp; tools</li> <li>• Direct measurement (e.g., CEMs, Stack Testing)</li> </ul>	<ul style="list-style-type: none"> <li>• Should strive to use current best practice methods, such as <i>GHG Protocol</i> calculation tools, and to have consistency with other reporting programs.</li> <li>• Some “other” or “home grown” approaches may be necessary (e.g., Flashing emissions; IPIECA<sup>6</sup>, API’s<sup>7</sup> SANGEA™ GHG Emissions Software).</li> </ul>	•
9.	<b>Verification</b>	<ul style="list-style-type: none"> <li>• State verification</li> <li>• 3<sup>rd</sup> party verification</li> <li>• Self-certification</li> </ul>	<ul style="list-style-type: none"> <li>• If mandatory, the state may be able to use current verification procedures for criteria pollutants.</li> <li>• DAQ does 3<sup>rd</sup> party verification.</li> </ul>	•

<sup>6</sup> IPIECA is the International Petroleum Industry Environmental Conservation Association.

<sup>7</sup> API is the American Petroleum Association.

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
10.	<b>Public Access &amp; Reports</b>	<ul style="list-style-type: none"> <li>• Internet access and/or Online reports</li> <li>• Paper reports</li> <li>• Both</li> </ul>	<ul style="list-style-type: none"> <li>• “Confidential Business Information” (CBI) concerns</li> </ul>	•
11.	<b>Project Level Reporting or “Offsets”</b>	<ul style="list-style-type: none"> <li>• Yes/No</li> <li>• Constrain</li> </ul>	<ul style="list-style-type: none"> <li>• WRI: Raises quantification, baseline, “additionality,” secondary effects, reversibility, and double-counting issues.</li> <li>• Location of co-benefits achieved.</li> <li>• May be most useful when there is an externally-imposed constraint (e.g., a “Cap”).</li> </ul>	
12.	<b>Funding</b>	<ul style="list-style-type: none"> <li>• State-funded</li> <li>• Mandated requirement</li> <li>• Emission-based fees (would require legislative approval).</li> <li>• Other? A combination?</li> </ul>	<ul style="list-style-type: none"> <li>• Reporting is a necessary cornerstone for a GHG registry, so it may be appropriate to have registry participants share support costs.</li> </ul>	•
13.	<b>Others?</b>	•	•	•

## CC-3 State Greenhouse Gas Registry

### Policy Description

A GHG registry enables measurement and recording of GHG emissions reductions at a macro- or micro-scale level in a central repository with a “transaction ledger” capacity to support tracking, management, and “ownership” of emission reductions as well as to encourage GHG reductions, to enable potential recognition, baseline protection, and/or the crediting of actions by implementing programs and parties in relation to possible emissions reduction goals, and to provide a mechanism for regional, multi-state, and cross-border cooperation. Subject to appropriately rigorous quantification, participation in a GHG registry should not be constrained to particular sectors, sources, or approaches so as to encourage GHG mitigation activities from all quarters. In particular, a GHG registry should be able to incorporate activities associated with all of the options that the CAPAG approves, whether reflective of reductions in emissions of GHGs or increases in biological or geological sequestration of carbon.

### Policy Design

- **Goals:** The TWG recommends that North Carolina actively engage with other states in developing a regional or national GHG registry that will comprehensively meet the state’s needs. If no regional or national multi-state registry option will fully meet North Carolina’s needs, the state should still join and participate to the greatest extent possible, and develop whatever supplemental registry capacity is required to meet the remaining specific needs of North Carolina sources (e.g., registration of carbon sinks associated with reforestation). Together, these approaches should incorporate the activities associated with all options the CAPAG recommends, provide adequate quality verification, and allow project-level reporting. Costs should be borne primarily by participants. Recommendations for key registry design characteristics build off the GHG Reporting mitigation option (CC-2). Key elements include:
  - Geographic applicability at least at the statewide level and as broadly (i.e., regionally or nationally) as possible.
  - Allowing sources to start as far back chronologically as good data exists, as affirmed by third-party verification, and allowing registration of project-based reductions or “offsets” that are equally rigorously quantified.
  - Incorporating adequate safeguards to ensure that reductions aren’t double-counted by multiple registry participants, and providing appropriate transparency.
  - Striving for maximum consistency with other state, regional, and/or national efforts; greatest flexibility as GHG mitigation approaches evolve; and providing guidance to assist participants.
  - Allowing the state to be a valid participant for reductions associated with its programs, direct activities, or efforts, including ownership of emission reductions associated with

the properties (stationary and mobile) it owns or leases. The state should also be allowed to register emission reductions and participate in emission trading. The revenue associated with the sale of emission reduction credits generated by the state could be used to support the GHG emission inventory, forecasting, and reporting functions within state government.

- **Timing:** As soon as possible after a GHG reporting program is operating.
- **Coverage of parties:** Coverage should include all entities that can verify ownership of GHG emission reductions.

### **Implementation Mechanisms**

The program should probably be overseen by NC DENR; costs should be shared by participants benefiting from the registry.

### **Related Policies/Programs in Place**

TBD

### **Types(s) of GHG Reductions**

TBD

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

TBD

### **Key Uncertainties**

There remain significant uncertainties with respect to how various state, regional, and/or federal GHG registry programs may develop. Involvement in early registry implementation – as issues are deliberated among states – will advantage North Carolina in their ultimate outcome.

### **Additional Benefits and Costs**

TBD

### **Feasibility Issues**

TBD

### **Status of Group Approval**

TBD

### **Level of Group Support**

TBD

### **Barriers to Consensus**

TBD



[WWW.NCCLIMATECHANGE.US](http://WWW.NCCLIMATECHANGE.US)

Cross Cutting Issues Technical Working Group  
*Draft* GHG Registry Design Characteristics Matrix

**Notes:**

- **Builds upon GHG Reporting Design Characteristics Matrix**
- **Some Reporting preferences could be outweighed by Registry preferences (e.g., if a regional registry has different specs).**

**Potential Goals of GHG Registry:**

1. Recording of GHG reductions (vs. emissions)
2. A central, independent repository for credible info about emissions activities
3. A “transaction ledger” – providing data management & accounting critical for trading (with or without a cap)
4. “baseline protection” – enabling early action current or future credit for trading
5. An incentive to track & manage emissions, seek productivity and energy efficiency gains, accelerate learning curve regarding competitiveness & carbon markets
6. Enhance public recognition and demonstrate corporate citizenship
7. Possible vehicle for regional, multi-state, & cross-border cooperation
8. Others

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
<b>1.</b>	<b>Key Design Criteria (beyond <i>GHG Reporting Design Characteristics Matrix</i>)</b>			
1.1.	Define geographical boundaries	<ul style="list-style-type: none"> <li>• North Carolina</li> <li>• Regional (or broader)</li> </ul>	<ul style="list-style-type: none"> <li>• Span of control</li> <li>• Cost, economies of scale, &amp; broader = better?</li> </ul>	•
1.2.	Verification	<ul style="list-style-type: none"> <li>• State verification</li> <li>• Third-party verification</li> </ul>	<ul style="list-style-type: none"> <li>• See GHG Reporting Design Characteristics Matrix</li> </ul>	•
1.3.	Base Year	<ul style="list-style-type: none"> <li>• Single specified year</li> <li>• Single entity-chosen year</li> <li>• Average of multiple years</li> <li>• Adjustment rules?</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility vs. Simplicity</li> <li>• Must have good data for Base Year.</li> </ul>	•
1.4.	Project-level submittals	<ul style="list-style-type: none"> <li>• Yes / No / Constrain</li> </ul>	<ul style="list-style-type: none"> <li>• Against what baseline?</li> <li>• Additionality issues (what would have happened anyway)?</li> </ul>	•
1.5.	“Offsets”	<ul style="list-style-type: none"> <li>• Yes / Some / No</li> </ul>	<ul style="list-style-type: none"> <li>• Co-benefits location?</li> <li>• Nature / character?</li> </ul>	•
1.6.	Start Date	•	<ul style="list-style-type: none"> <li>• Establish a “to be in operation” date?</li> </ul>	•
1.7.	Ownership	•	<ul style="list-style-type: none"> <li>• Risk of double-counting</li> </ul>	•
1.8.	Transparency	•	•	•

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
1.9.	Others?	•	•	•
<b>2.</b>	<b>Technical Issues</b>			
2.1.	Treatment of minority ownership	•	• <i>GHG Protocol</i>	•
2.2.	Merger & acquisition issues	•	• <i>GHG Protocol</i>	•
2.3.	Quality Assurance; Uncertainty Analysis	•	• <i>GHG Protocol</i>	•
2.4.	Regulatory guidance (Protocols, guidance documents, etc.)	•	•	•
2.5.	Data flow; filing methods, etc.	•	• Confidential business information (CBI), legal authority, etc.	•
2.6.	Others?	•	•	•
<b>3.</b>	<b>Ancillary, Administrative, &amp; Operational Issues</b>			
3.1.	Location (Agency)	<ul style="list-style-type: none"> <li>• NCDENR</li> <li>• Other?</li> </ul>	• Regional potential	•
3.2.	Software; Web Interface, etc.	<ul style="list-style-type: none"> <li>• North Carolina-specific</li> <li>• CCAR, RGGR, CCX, ERT, EATS?</li> <li>• Other?</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple needs (emissions inventory, allowances, mandatory, voluntary, etc.)</li> <li>• Rapidly changing “state of the art”</li> </ul>	•

#	Design Element	Characteristics	Design Considerations	Preliminary Recommendation
3.3.	Cost	<ul style="list-style-type: none"> <li>• Transaction fee</li> <li>• Publicly supported?</li> <li>• Other?</li> </ul>	<ul style="list-style-type: none"> <li>• Development costs</li> <li>• Ongoing operating costs</li> </ul>	•
3.4.	Oversight & Management	<ul style="list-style-type: none"> <li>• NCDENR</li> <li>• Publicly appointed board</li> <li>• Other?</li> </ul>	•	•
3.5.	Reporting of Results; Recognition	•	•	•
3.6.	Others?	•	•	•

## CC-4 State Climate Public Education and Outreach

### Policy Description

Public education and outreach can support GHG emissions reduction efforts at the macro- or micro-scale level in relation to emissions reduction programs, policies, or goals. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions. Public education and outreach efforts should integrate with and build upon existing outreach efforts involving climate change and related issues in the state. Ultimately, public education and outreach will be the foundation for the long-term success of all the mitigation actions proposed by the CAPAG as well as those which may evolve in the future.

### Policy Design

- **Goals:** The TWG recommends that the state lead by example in its own education and outreach activities by establishing a pro-active public education and outreach capability, and using it to target education and outreach activities to five specific audiences:
  - Policymakers and managers (legislators, regulators, executive branch, agencies) – because implementation of climate actions hinges on policymakers' approval and manager implementation;
  - Educators and Students – by integrating climate change into primary and secondary educational curricula, post-secondary degree programs, and professional licensing programs;
  - Community Leaders and Community-Based Organizations (e.g., institutions, municipalities, service clubs, social & affinity groups, non-governmental organizations, etc.) – in order to recognize leadership; share success stories and role models; and expand climate involvement and participation within civic society;
  - General Public – to increase awareness and engage citizens in climate actions in their personal and professional lives; and
  - Industrial and Economic Sectors – in order to recognize leadership; share success stories and role models; and expand climate involvement and participation within the business community.
- **Timing:** Public education and outreach efforts should commence as rapidly as possible.
- **Coverage of parties:** A statewide public education and outreach effort should probably be overseen largely by NC DENR, but would necessarily involve many other key parties.

### Implementation Mechanisms

Public education and outreach.

**Related Policies/Programs in Place**

DENR efforts and standard course study

**Types(s) of GHG Reductions**

Not applicable

**Estimated GHG Savings and Costs per MTCO<sub>2</sub>e**

Not applicable

**Key Uncertainties**

- a. Timing and degree of federal and private sector recognition and support through awareness, acknowledgement, and quantification of climate change risk
- b. Availability of sustained funding for education and outreach

**Additional Benefits and Costs**

- a. Costs: Office establishment, travel for training programs, program materials.
- b. Benefits: Reduced landfill inputs, improved air/water quality, enhanced business opportunities, reduced congestion and highway infrastructure costs, etc.

**Feasibility Issues**

Logistics for coordination between agencies and the public; funding for education and outreach.

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD



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## Cross Cutting Issues Technical Working Group *Draft* Education Design Characteristics Matrix

The recommendations and options in this matrix originate in large part as a result of “Recommendation A-7” in the September 1, 2005 Clean Smokestacks Act report and State Energy Plan (SEP).

### **Goals of Public Education & Outreach:**

1. Overarching goal: Promote awareness among citizens about the impacts of climate change, solutions, and co-benefits of action.
2. Education provides a foundation essential for all climate action.
3. Others?

### **General Approach:**

1. Target the key general audiences and efforts below:
  - a. “Walking the Talk” in terms of the state’s own efforts and outreach activities
  - b. Policymakers (legislators, executive, agencies, regulators, etc.)
  - c. Future Generations
  - d. Community Leaders and Organizations
  - e. Business and Industry
  - f. The General Public
2. Ensure long-term sustenance of education and outreach efforts regarding climate change.

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
1.	<b>State Government Actions</b> The state should lead by example ( i.e., “walk the talk”) regarding education and outreach.		
1.1	Create a multi-agency Board (or Office of Climate Change Impacts and Mitigation) to oversee on-going state climate efforts, starting with the implementation of CAPAG policies adopted by the Governor; report progress to the public annually.	<ul style="list-style-type: none"> <li>Assemble annual progress reports &amp; make them publicly available.</li> </ul>	<ul style="list-style-type: none"> <li>Staff the effort adequately; should have one or more “outreach coordinators” specifically tasked with outreach and coordination among agencies and organizations.</li> </ul>
1.2	Establish an Education & Outreach Subcommittee of the body established in §1.1 to educate audiences regarding CAPAG policies, and to oversee those relating to education.	<ul style="list-style-type: none"> <li>Lead implementation of CAPAG education &amp; outreach measures.</li> <li>First task: Identify already existing resources &amp; programs.</li> <li>Identify additional needs and potential funding sources.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
1.3	Include state public education and higher education officials in the bodies established in §1.1 & §1.2.	<ul style="list-style-type: none"> <li>NC Department of Public Instruction develop teacher training and curriculum</li> </ul>	<ul style="list-style-type: none"> <li>A “two-way street”: education officials bring research &amp; info to the body, act as outreach arm for reaching students and others.</li> <li>Post resources online that include hands-on activities such as reducing carbon footprints</li> </ul>
1.4	Educate state employees across-the-board, and assign “point persons” to do so on an on-going basis.	<ul style="list-style-type: none"> <li>Identify agency liaisons for the multi-agency Board or Office of Climate Change Impacts and Mitigation</li> </ul>	<ul style="list-style-type: none"> <li>One possibility: Add climate change outreach as a natural extension to the existing role of Agency Energy Managers.</li> </ul>

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
1.5	Disaggregate the state's GHG emissions to the agency level and require annual agency-specific reports on GHG reduction progress.	•	• Make agency-specific reports public as part of the report in §1.1.
2.	<b>Target Audience: Policymakers (legislators, regulators, executive branch, agencies)</b> Implementation of climate actions hinges on policymakers' understanding and approval.		
2.1	Educate policy makers on climate change & CAPAG policies in order to promote acceptance and implementation.	<ul style="list-style-type: none"> <li>• Conduct regular legislative briefings.</li> <li>• Identify &amp; offer agency-specific info on climate issues &amp; opportunities.</li> </ul>	• Use input derived from policy maker interactions to develop new mitigation measures going forward.
2.2	Provide continuing outreach & assistance to Governor's office, legislature, and implementing agencies on a regular basis.	<ul style="list-style-type: none"> <li>• Educate press liaisons from agencies, etc.</li> <li>• Provide regular press releases or updates on reductions, events, etc.</li> </ul>	•
3.	<b>Target Audience: Future Generations</b> Integrate climate change into educational curricula, post-secondary degree programs, and professional licensing.		
3.1	Organize groups of educators to identify, assemble, and employ climate change curricula appropriate to age groups.	• Work with the Department of Public Instruction for guidance	• Check out British Petroleum's <a href="http://www.aplusforenergy.org">www.aplusforenergy.org</a>

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
3.2	Public Education Department: include climate change in science and social studies performance standards; identify (a) gaps in climate change education, and (b) curriculum to fill any gaps.	<ul style="list-style-type: none"> <li>• Include concepts of locally grown food, global population impacts, etc.,</li> <li>• Incorporate renewable energy and energy efficiency technology into physics curriculum</li> <li>• Create “climate backpacks” to be used as teacher tools</li> <li>• Link current environmental curriculum to climate change (carbon reduction benefits of recycling, conservation, tree planting, etc.)</li> </ul>	•
3.3	Integrate “best practices” into public school design & construction to educate student (and parent’s) first-hand in their communities & colleges (i.e., walk the talk).	<ul style="list-style-type: none"> <li>• Investigate whether North Carolina could provide bonding for school districts to fund energy efficient construction.</li> <li>• Include in-building signage &amp; displays to explicitly point out efficiency aspects built in to public buildings.</li> </ul>	•
3.4	Promote research into climate change and solutions at state universities.	<ul style="list-style-type: none"> <li>• Provide funding for climate change research, award scholarships</li> </ul>	• Include research money for social justice implications of climate change (not just science)
3.5	Integrate climate change into existing and/or new educational competition programs (e.g., Envirothon, science fairs, etc.).	•	•

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
3.6	Work with science centers, zoos, and museums to include a climate science focus appropriate to their core mission.	<ul style="list-style-type: none"> <li>• A key area for an Outreach Coordinator to focus on</li> </ul>	<ul style="list-style-type: none"> <li>• Examples exist in other regions (e.g., Clean Air-Cool Planet science center initiative)</li> <li>• Could provide speaking opportunities for teachers; have college professors host forums for high school students on weekend, etc.</li> </ul>
3.7	Introduce core competencies on climate change into professional licensing programs (e.g., energy efficiency in building design and construction, use of recycled materials, etc.)	<ul style="list-style-type: none"> <li>• Promote the calculation of carbon footprints and creating a carbon reduction plan</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
4.	<p><b>Target Audience: Community Leaders &amp; Community-Based Organizations</b> (Institutions, municipalities, service clubs, social &amp; affinity groups, NGOs, etc.) Recognize leadership; share success stories &amp; role models; expand involvement and participation; within civic society.</p>		
4.1	Identify individual community leaders who are acting effectively on climate change; showcase and share their successes.	<ul style="list-style-type: none"> <li>• Enlist/encourage them to be a de facto “speakers’ Bureau.”</li> <li>• Host discussion forums featuring them.</li> </ul>	<ul style="list-style-type: none"> <li>• Include all walks of work &amp; life (retail, services, manufacturing, healthcare, auto, facilities, etc.)</li> <li>• Put examples, guidance, links, contacts, etc. up on the web clearinghouse.</li> </ul>
4.2	Identify “late bloomer” individuals and target a special effort to include, educate, and prod them to act.	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
4.3	Engage associations and participate in their meetings periodically to educate them about climate change and sector-specific mitigation actions.	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
4.4	Develop statewide recognition program(s) for community leaders and entities.	•	•
4.5	Organize & host outreach events that focus on leading by example, sharing how-to, co-benefits, illuminating financial risks and opportunities, etc.	•	•
4.6	Identify, assist, and leverage community-based organizations with expertise or interest in climate-related issues	<ul style="list-style-type: none"> <li>• Faith community</li> <li>• Service clubs; sportsmen; recreational/hobbyist groups</li> <li>• Metropolitan planning organizations</li> <li>• environmental, social, &amp; civic advocacy organizations</li> </ul>	•
4.7	Work with community-based organizations to identify & build upon climate issues related to their core mission	<ul style="list-style-type: none"> <li>• Public health vs. new disease vectors?</li> <li>• Low-income vs. additional stressors?</li> </ul>	•
4.8	Support and facilitate outreach and education within community-based organization regarding climate change issues and actions	<ul style="list-style-type: none"> <li>• Provide content for websites, newsletters, List Servs?</li> <li>• Coach &amp; assist community Outreach coordinators?</li> </ul>	•
4.9	Develop & coordinate a network of community-based organizations acting on climate change so they can link up, organize joint events, etc.	<ul style="list-style-type: none"> <li>• Community Outreach coordinators?</li> <li>• Assistance in organizing</li> </ul>	•

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
4.10	Encourage cities to join ICLEI's <sup>8</sup> Cities for Climate Protection program	•	• (Formerly 4.14 on CC Catalog).
4.11	Encourage cities to join the U.S. Mayors Climate Protection Agreement <sup>9</sup>	•	• (Formerly 4.15 on CC Catalog).
5.	<b>Target Audience: Business and Industry</b> Promote best practices, recognize leadership; share success stories & role models; expand involvement and participation.		
5.1	Extend training programs for RCI building and facility operators	•	• (Formerly 4.5 on CC Catalog). • From "Recommendation A-1" and "Recommendation LT-1" in the 9/1/05 CSA report.
5.2	Promote energy-tech economic development	•	• (Formerly 4.3 on CC Catalog).
5.3	Promote R&D & demo projects for economic development	•	• (Formerly 4.4 on CC Catalog).
5.4	Promote combined heat and power (CHP) in order expand its use and technological penetration	•	• (Formerly 4.8 on CC Catalog). • From "Recommendation A-1" in the 9/1/05 CSA report.
5.5	Inform sources of the advantages of registering GHG emission reductions	•	• (Formerly 4.13 on CC Catalog). • From "Recommendation A-4" in the 9/1/05 CSA report.

<sup>8</sup> See [www.iclei.org](http://www.iclei.org).

<sup>9</sup> See <http://www.ci.seattle.wa.us/mayor/climate/>.

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
5.6	Develop and provide concrete information on co-benefits to entities in order to boost their climate efforts	•	•
6.	<b>Target Audience: General Public</b> Increase awareness and engage in climate actions in personal and professional lives.		
6.1	Educate broadcasters, reporters, editorial boards, etc. about climate change, the risks it imposes, and solutions	•	•
6.2	Work with state broadcasters and print media associations to develop & run climate change public service announcements; post billboards	•	•
6.3	Conduct public polling to benchmark strength and depth of climate understanding; track over time to measure progress and better tailor outreach efforts	•	•
6.4	Keep a high profile on climate change issues and actions through regular public mention by Governor and other public leaders	•	•
6.5	Develop and use a state-based “brand” on climate awareness and action	•	•

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
6.6	Develop & maintain a state climate change website for the public; establish & maintain a web-based clearinghouse for climate change information and education resources.	<ul style="list-style-type: none"> <li>• Link to scientific developments, What you can do, How you can help, What the state is doing, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Post annual progress reports on commitments, plan implementation, etc.</li> </ul>
6.7	Reinforce sources (causes) of GHG emissions, and the need to implement the State Energy Plan	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• <i>(Formerly 4.1 on CC Catalog).</i></li> <li>• From Recommendation LT -2 in the 9/1/05 CSA report.</li> </ul>
6.8	Work with existing company outreach efforts to customers (e.g., utilities) to enhance awareness of climate change issues & actions	<ul style="list-style-type: none"> <li>• Retail advertising and/or “bill stuffers”</li> <li>• Environmental disclosure of electricity fuel mix/emissions; recycled content, etc.</li> <li>• Product messages (e.g., yogurt labels)</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
6.9	Promote local farm produce	<ul style="list-style-type: none"> <li>• Advertise hours and locations of farmers’ markets</li> <li>• Encourage local grocery stores to stock local food items</li> </ul>	<ul style="list-style-type: none"> <li>• <i>(Formerly 4.10 on CC Catalog).</i></li> <li>• Appendix D – Preliminary Analysis of Selected Policy Options: Agriculture and Forestry, Support Local Farming/Buy Local</li> </ul>
6.10	Promote clean fuel technologies	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• <i>(Formerly 4.2 on CC Catalog).</i></li> </ul>
6.11	Promote green power in order to expand subscription	<ul style="list-style-type: none"> <li>• Include subscription information in every monthly utility bill</li> </ul>	<ul style="list-style-type: none"> <li>• <i>(Formerly 4.7 on CC Catalog).</i></li> <li>• From “Recommendation A-5” in the 9/1/05 CSA report.</li> </ul>

#	Measures & Strategies	Tasks & Examples	Notes & Elaborations
6.12	Require environmental disclosure on utility bills	•	<ul style="list-style-type: none"> <li>• (Formerly 4.9 on CC Catalog).</li> <li>• From Appendix C – January 2005 Revisions to the State Energy Plan (SEP), Alternative Energy Sources: Exec-10</li> </ul>
6.13	Add GHG to Air Awareness efforts	•	<ul style="list-style-type: none"> <li>• (Formerly 4.12 on CC Catalog).</li> <li>• From “Recommendation A-7” in the Sept. 1, 2005 CSA report and State Energy Plan (SEP).</li> </ul>
6.14	Host a training/informational table at Earth Day, or create a “Climate Day” event	<ul style="list-style-type: none"> <li>• Provide activities and educational materials for all age groups and expertise levels</li> </ul>	•
6.15	Develop a speaker’s bureau	<ul style="list-style-type: none"> <li>• Include experts from each sector (Agriculture, forestry, energy, waste, faith, tourism, business, education, etc.)</li> </ul>	•
6.16	Develop a carbon calculator (web-based)	<ul style="list-style-type: none"> <li>• Accommodate for calculating family homes, businesses, schools, and public buildings</li> </ul>	•
6.17	Create a tax credit website	<ul style="list-style-type: none"> <li>• Provide a one-stop resource for all available state and federal tax credits (auto, home energy, etc.) for consumers who are making global warming pollution reductions</li> </ul>	•

## CC-5 State Climate Change Adaptation Strategy

### Policy Description

Due to the existing build-up in the atmosphere of GHGs that has already occurred, North Carolina will experience some effects of climate change for years to come, even if immediate action is taken to reduce future GHG emissions. Thus, it is essential that the state develop a plan to manage the projected impacts of ongoing climate change while world-wide mitigation efforts to lower atmospheric concentrations are underway.

### Policy Design

While taking action to reduce GHG emissions in North Carolina, the state should develop, adopt, and implement a state Climate Change Adaptation Plan that includes identification of (a) potential short-term, mid-term, and long-term impacts of climate change scenarios likely to affect the state, and (b) implementation mechanisms for addressing these impacts. The state should empanel a Blue Ribbon Commission on Adaptation to Climate Change to develop a state Climate Change Adaptation Plan within one year of establishment of the Commission. The Commission should involve and coordinate with all appropriate state and local agencies, organizations, and institutions (e.g., universities) to ensure that all potential impacts are identified in the plan. The Commission should also enlist the expertise of all appropriate state and local agencies, organizations, and institutions in developing and implementing measures for mitigating these impacts. At a minimum, the Commission should address in the plan the adaptation issues that the CAPAG has identified in the table that accompanies this mitigation option.

The state Climate Change Adaptation Plan should include at least the following key elements:

- Comprehensive identification of potential short-term, mid-term, and long-term impacts associated with climate change in North Carolina.
- Recommended steps to respond to the identified impacts so as to minimize risk in North Carolina to humans, natural and economic systems, water resources, temperature-sensitive populations and systems, energy systems, transportation systems, communications systems, vital infrastructure and public facilities, and natural lands (such as coastal areas, wetlands, forests, and farmland) and all other identified and affected sectors or areas of concern throughout the state.
- Coordination of response efforts through the appropriate state, local and federal agencies, organizations, or other entities or initiatives.
- Characterization of the potential risks and costs of inaction; characterization of the potential costs, benefits, and co-benefits associated with specific policy and program actions; and establishment of time- and program-based goals.

- Use of benefit-cost analysis to guide and inform the development and implementation of the state Climate Change Adaptation Plan. The analysis should include, but not be limited to, an examination of the benefits and costs of adaptation measures or responses relative to a “status quo” or no-action approach, and the resources needed to implement adaptation measures in the plan. The results of the benefit-cost analysis should also be used to set priorities for addressing short-term, mid-term, and long-term impacts of climate change on citizens, ecosystems, and the economy of North Carolina.
- Adaptation measures that also mitigate GHG emissions should be given priority in the state Climate Change Adaptation Plan.
- Regular review and update of the Plan on a periodic basis (e.g., every 5-10 years) to expand or refine the Plan as necessary, to improve implementation of the Plan, and to incorporate new information as it becomes available.

The state Legislature should provide funding to support development and on-going revision to the state Climate Change Adaptation Plan including, but not limited to, funds to support the benefit-cost analysis needed to guide and inform the development and implementation of the Plan and to cover expenses incurred by the Commission and Commission members.

- **Goals:** Create a state-sanctioned Blue Ribbon Commission on Adaptation to Climate Change to develop a comprehensive state Climate Change Adaptation Plan identifying opportunities to address adaptation issues and risks and recommending tangible, implementable measures to ameliorate these issues and risks to North Carolina citizens. Conduct benefit-cost analyses to compare the potential costs of a “status quo” approach as opposed to implementing the recommendations proposed in the Climate Change Adaptation Plan. Prioritize recommendations in the adaptation plan based on the certainty and severity of adverse impacts to citizens, ecosystems and local economies. Development of the plan should: (a) involve all affected agencies and entities at all levels of government; (b) involve all affected sectors and interests; and (c) provide for periodic review and update concerning adaptation risks, responses, and opportunities in the state.
- **Timing:** The Commission should be established as soon as possible. The development of a state Climate Change Adaptation Plan should be completed within one year of establishing the Commission. Benefit-cost analyses of the potential costs of a “status quo” approach as compared to implementing the Plan’s recommendations should be conducted as a component of the plan. Parallel public education and outreach efforts regarding adaptation should commence immediately. “Low-hanging fruit” opportunities should be addressed as rapidly as possible (even before the Commission is established, if possible), and pro-active adaptation initiatives should commence within the next 2-3 years.
- **Coverage of parties:** The Blue Ribbon Commission on Adaptation to Climate Change should involve and coordinate with all appropriate state and local agencies, organizations, and institutions (e.g., universities) to ensure that all potential impacts are identified and to ensure the successful development and implementation of the plan.

### Implementation Mechanisms

- State Climate Change Adaptation Strategy

- Public education and outreach.
- Policy development as necessary.
- Establish financial structures and create markets that are likely to thrive under anticipated climate impacts.

#### **Related Policies/Programs in Place**

- State and local emergency management response plans are in place which address short-term responses to natural disasters (e.g., violent storms). To the extent possible, measures recommended in the Climate Change Adaptation Plan should assist and complement these existing state and local efforts.
- Efforts are being undertaken by the North Carolina Division of Coastal Management (DCM) to require that all coastal counties address and respond to the impact of sea level rise in land use plans. DCM also requires setbacks from the oceanfront and prohibits hardened structures on the oceanfront. DCM allows hardened structures along estuarine waters and requires a 30-foot setback for all structures except those that are water dependent. Measures for responding to sea level rise proposed in the Climate Change Adaptation Plan should assist and complement these existing efforts.

#### **Types(s) of GHG Reductions**

Not applicable.

#### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

#### **Key Uncertainties**

Some impacts of climate change, such as sea level rise and inundation of low-lying coastal lands are certain, but their specific timing and magnitude remains unclear. Other impacts are less certain and may have significant variability.

#### **Additional Benefits and Costs**

- Innovative early adaptation responses to climate change impacts can be designed to:
  1. Help prevent and/or reduce costs associated with future catastrophic events and long-term climate change impacts;
  2. Direct future public and private investment more effectively; and
  3. Ensure preparedness to help avoid extensive cost implications to state, county, city and federal agencies.
- Early preparedness can raise public awareness and encourage further GHG mitigation efforts, which can drive economic opportunities for alternative fuels, agriculture, forestry, and advanced technologies.

#### **Feasibility Issues**

TBD

#### **Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD



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Cross Cutting Issues Technical Work Group  
*Draft* Adaptation Issues Matrix

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
<i>A. Coastal Resources</i>				
1.	<b>Tropical storms</b>	<ul style="list-style-type: none"> <li>Loss of barrier islands, property damage, disruption to local and regional economies and tourism, higher insurance rates.</li> </ul>	<ul style="list-style-type: none"> <li>Buyout of land in hazardous areas, upgrade building codes, state insurance pool, beach nourishment, and retreat from highest risk barrier islands and low-lying lands.</li> <li>Develop a beach and inlet management plan (underway).</li> </ul>	<ul style="list-style-type: none"> <li>The General Assembly should enact legislation to require sellers of coastal properties to disclose potential hazards to buyers. The coastal hazards disclosure should accompany all real estate transfers of properties with oceanfront, sound or creek frontage in coastal counties.</li> </ul>

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
2.	<b>Rising Sea Levels</b>	<ul style="list-style-type: none"> <li>• Loss of barrier islands, property damage, serious disruption to local and regional economies and tourism.</li> <li>• Inundation of low-lying coastal land and structures, loss of shallow near-shore habitat for fisheries in early life stages and loss of wetlands due to hardening of estuarine shoreline, saltwater intrusion to groundwater and aquifers.</li> </ul>	<ul style="list-style-type: none"> <li>• Retreat from low-lying lands, prohibit or reduce hardening of estuarine shorelines, limit construction in 100-year floodplain, and significantly increase estuarine buffers and oceanfront setbacks.</li> <li>• Enact law that authorizes the state to secure a rolling property easement as sea level rises.</li> <li>• Require that local government coastal land use plans include a strategic plan for responding to sea level rise.</li> <li>• Place the highest priority for permitting estuarine shoreline stabilization on techniques that protect fisheries habitat.</li> <li>• Establish a series of permanent monitoring stations to measure the absolute changes in sea level rise in coastal NC and characterize the dynamics of estuarine storm surges, astronomical and wide tides and water flow.</li> <li>• Inventory and map the estuarine and ocean shoreline and its bathymetry, sediments, and vegetation.</li> <li>• Develop policies concerning controversial economic and resource maintenance issues for the NC coastal zone in the face of potential and direct consequences of climate change.</li> <li>• Define a set of short-term, mid-term and long-term environmental change targets concerning what mitigation measures should be required if specific effects of climate change reach projected levels.</li> <li>• Develop and implement an environmental scorecard that would track ecosystem change.</li> </ul>	<ul style="list-style-type: none"> <li>• The General Assembly should create a Coastal Adaptation Program. The program should be funded through a surcharge on the NC Beach Plan. Funds should be targeted for the purchase of conservation easements on low-lying coastal lands; for cost share incentive with land owners the construction of ecologically beneficial erosion control structures on estuarine shorelines; and for research to provide an assessment of the physical and ecological properties of the estuarine shoreline and the potential cumulative impacts.</li> </ul>

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
<b><i>B. Agriculture and Forestry</i></b>				
3.	<b>Forestry</b>	<ul style="list-style-type: none"> <li>Warmer climate may change the types of tree species that can be grown economically.</li> </ul>	<ul style="list-style-type: none"> <li>Compile and evaluate existing research on the effects of a warmer climate on forest ecosystems and commercially grown tree species and potential impacts on the forest products and Christmas tree industries.</li> <li>Conduct research as needed to identify the potential effects of a warmer climate on forest ecosystems and potential impacts on the forest products and Christmas tree industries.</li> <li>Search for alternate economic Ventures to replace the Christmas tree industry or other fir/pine trees that do well in hotter climates. Sponsor gene manipulation work to adapt existing trees.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
4.	<b>Agriculture</b>	<ul style="list-style-type: none"> <li>Warmer climate may change the types of crops that can be grown economically.</li> </ul>	<ul style="list-style-type: none"> <li>Compile and evaluate existing research on the effects of a warmer climate on crop species to assess potential effects of a warmer climate on the agricultural industry.</li> <li>Conduct research as needed to identify the potential effects of a warmer climate on the agricultural industry.</li> <li>Search for alternate crops that respond well to hotter temperatures, consider growing conditions in controlled environments. Sponsor gene manipulation work to adapt existing crops.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
5.	<b>Pest Lifecycle Changes</b>	<ul style="list-style-type: none"> <li>• Pests may become more virulent as temperatures rise and their habitat ranges increase.</li> <li>• Crops may suffer from new, foreign pests and treating them will be more challenging especially if there is no prior experience addressing their impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Research alternative methods for addressing new pests and management techniques. Develop anticipated pest problems based on problems elsewhere.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<b><i>C. Water Quality and Quantity</i></b>				
6.	<b>Saltwater Intrusion into Aquifers</b>	<ul style="list-style-type: none"> <li>• Loss of drinking water and industrial process water sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Desalinization plants.</li> <li>• Use of new briny water for CO<sub>2</sub> sequestration.</li> <li>• Injection of fresh water into aquifers.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
7.	<b>Drought Risk</b>	<ul style="list-style-type: none"> <li>• Limits economic growth, reduces agricultural yields, reduces aquatic habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• Water reuse of wastewater from tertiary treatment plants, use of cisterns and rain barrels, water conservation techniques.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
8.	<b>Flooding</b>	<ul style="list-style-type: none"> <li>• Stronger storms will bring flooding.</li> </ul>	<ul style="list-style-type: none"> <li>• Collect flood waters to replace water supply capacity lost from aquifers.</li> <li>• Develop added flood protection schemes, including impoundments, zoning, changes, addition of public right of ways, etc.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
9.	<b>Storm Water Runoff</b>	<ul style="list-style-type: none"> <li>• Flooding, water quality degradation, scouring of stream beds and banks, loss of fisheries habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• Manage storm water onsite, utilize low-impact development techniques, or prohibit construction in the 100-year floodplain.</li> <li>• State law that requires development to capture and treat storm water onsite from the 10-year 24-hour storm.</li> <li>• Create a low-impact development unit within the Division of Water Quality to assist developers to design development projects that utilizes low-impact development techniques to protect water quality and prevent flooding by managing storm water onsite.</li> <li>• Prohibit development or redevelopment within the 100-year floodplain.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<b><i>D. Air Quality Issues</i></b>				
10.	<b>Fine Particulate Concentrations</b>	<ul style="list-style-type: none"> <li>• Premature death, lung disease, aggravation of respiratory and cardiovascular disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and irregular heart beat.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine air quality strategies necessary to compensate for increased emissions associated with increasing temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
11.	<b>Ground Level Ozone Increases</b>	<ul style="list-style-type: none"> <li>• Damage and irritation to lung tissue.</li> <li>• Reduced lung capacity</li> <li>• Aggravated asthma.</li> <li>• Increased susceptibility to respiratory illnesses like pneumonia and bronchitis.</li> <li>• Ozone in the lower layers of the atmosphere contributes to global warming</li> <li>• Damage to plants.</li> <li>• Oxidation of building materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine air quality strategies necessary to compensate for increased emissions associated with increasing temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
12.	<b>Visibility Impacts</b>	<ul style="list-style-type: none"> <li>• Degradation of scenic vistas at national parks and wilderness areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine air quality strategies necessary to compensate for increased emissions associated with increasing temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
13.	<b>Increase in Pollen/Mold Spores</b>	<ul style="list-style-type: none"> <li>• Cardiovascular disease, respiratory disorders such as asthma, emphysema and chronic bronchitis, and allergy problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Public awareness measures.</li> <li>• Public awareness measures.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
<b><i>E. Public Health</i></b>				
14.	<b>Insect, tick and rodent borne diseases</b>	<ul style="list-style-type: none"> <li>• Increase Increased risk of diseases not previously seen in the state or increases in existing vector borne diseases.</li> </ul>	<ul style="list-style-type: none"> <li>• Study how potential climate changes can create the environment for previously unseen or rare vector borne diseases to exist, i.e, malaria, dengue fever, etc.</li> <li>• Strengthen state and local public health infrastructures to include improved disease surveillance, prevention, and response capabilities.</li> </ul>	•
15.	<b>Heat-related Illness/Death</b>	<ul style="list-style-type: none"> <li>• Increase in heat related deaths and illnesses to sensitive populations during extreme heat waves.</li> </ul>	<ul style="list-style-type: none"> <li>• Study impact of extended heat waves on sensitive populations.</li> <li>• Develop possible responses for sensitive populations to minimize the impact of severe and prolonged heat waves.</li> <li>• Develop a strategy for providing and communicating heat wave behavioral adaptations such as air conditioning availability and increased fluid intake.</li> </ul>	•
16.	<b>Water and Food-Borne Illnesses</b>	<ul style="list-style-type: none"> <li>• Increased potential for water and food borne diseases due to extreme climate events.</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in building codes and zoning to prevent storm and flood damage.</li> <li>• Design of sewer and storm water systems to prevent fresh water contamination.</li> <li>• Increase public health surveillance systems to detect and quickly contain disease outbreaks.</li> </ul>	•

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
<b><i>F. Economic Issues</i></b>				
17.	<b>Loss of Ski Area Viability</b>	<ul style="list-style-type: none"> <li>Decrease in the number of ski-able areas and decrease in number of ski-able days in the year as temperatures rise.</li> </ul>	<ul style="list-style-type: none"> <li>Increase tourism advertising for non-ski related activities in spring, summer, and fall months (i.e. mountain biking, hiking, adventure racing, etc.) Develop infrastructure for multi-use nice weather mountain exploration (i.e. Gondolas).</li> </ul>	•
18.	<b>Loss of homes and community displacement</b>	<ul style="list-style-type: none"> <li>Ongoing sea-level rise and stronger storms could eventually lead to the loss of inhabitable communities on the coast. Homeowners with beach front properties may be required to relocate – costing the towns, counties, state and federal government.</li> </ul>	<ul style="list-style-type: none"> <li>Survey vulnerable current inhabited areas, develop relocation plans and contingency measures in the event of emergencies. Be clear on economic support for covering relocation costs comes from.</li> </ul>	•
19.	<b>Loss of Fishing Tourism</b>	<ul style="list-style-type: none"> <li>As waters warm in the mountains, fishing for trout decreases as a tourism opportunity.</li> </ul>	<ul style="list-style-type: none"> <li>Redirect tourism emphasis from fishing to non-climate impacted tourism industries, encourage other forms of fishing for species that are more heat-tolerant.</li> </ul>	•
<b><i>G. Other Issues</i></b>				
20.	<b>Wildlife and Fishing Impacts</b>	<ul style="list-style-type: none"> <li>Losses to commercial fishing from strong tropical storms.</li> <li>Disruption of normal fishing cycles, loss of habitat.</li> <li>Warmer fresh water decreases viable habitat for cold-water fish species like trout.</li> </ul>	<ul style="list-style-type: none"> <li>Consider emergency preparedness to stock creeks with fish post-storm and flooding instances.</li> <li>Prepare public education materials to increase awareness of species disturbance and lost habitat.</li> </ul>	•

#	Issue	Potential Effects or Impacts	All Possible Responses	Preliminary Recommendation
21.	<b>Insurance Industry</b>	<ul style="list-style-type: none"> <li>The potential effects or impacts associated with many of the issues previously listed may increase insurance rates or may cause cancellation of insurance policies leading to the possible need for public insurance.</li> </ul>	<ul style="list-style-type: none"> <li>Insurance companies are evaluating the effects or impacts of climate change on the insurance lines they offer and are evaluating how to manage risk associated with losses believed to be caused by climate change.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

## CC-6 Options for State Greenhouse Gas Goals or Targets

### Policy Description

It is widely anticipated that eventually the federal government will cap GHG emissions associated with global warming. A number of states are ahead of the federal government in establishing GHG caps. For example, the Northeastern States (including New York) have instituted a regional cap and trade program to reduce power-sector GHG emissions. California has recently signed into law an economy-wide cap.

North Carolina has successfully severed the link between increasing energy consumption and emissions of soot and smog pollution; even as energy consumption increases, sulfur dioxide and nitrogen oxide pollution are being significantly decreased.

Now North Carolina should establish voluntary goals to limit GHG emissions to prepare the state's economy for the likely caps at the national level, and begin to sever the link between increasing energy demand and GHG emissions. Even modest reductions in GHG emissions will help to align North Carolina's environmental and economic interests, and assist the state in addressing its contribution to global warming. The goal would not be mandatory, but simply sets a direction in GHG emissions, just like the NC million acre conservation goal. [Question for the group: Should the goals reflect CO<sub>2</sub> alone or other GHGs as well (as CO<sub>2e</sub>)?]

### Policy Design

- **Goals:** The voluntary goal should be set to bring emissions back to a baseline, such as year 2000.
- **Timing:** The goal should be set over a long-time horizon of 10-15 years to meet the baseline. It should be expressed as an interim goal on the longer path towards ultimate climate stabilization.
- **Coverage of parties:** This would be an overall voluntary goal for the State of North Carolina. There would be no mandates to any specific party. However, all sectors of the state's economy would have the opportunity to contribute toward meeting the state's goal.

### Implementation Mechanisms

The adoption of such a goal should first be considered by the NC Legislative Commission on Global Climate Change (LCGCC). If recommended by the LCGCC, such a goal could be established by the General Assembly or by an executive order of the Governor.

### Related Policies/Programs in Place

TBD

### Types(s) of GHG Reductions

Include all GHGs and black carbon. [Question for the group: Should this include CO<sub>2</sub> alone or other GHGs (as CO<sub>2</sub>e) and black carbon as well?]

### Estimated GHG Savings and Costs per MMTCO<sub>2</sub>e

This policy would be established in conjunction with other policies and programs. Thus, it is very difficult to estimate the GHG reduced specifically from this policy. As the goal would be voluntary, the cost per MMTCO<sub>2</sub>e is anticipated to be quite small and perhaps may create a positive economic benefit.

### Key Uncertainties

- Timing and levels of federal standards to cap GHGs.
- Emission inventory by sector of GHGs. A goal would work best in conjunction with a GHG emission reporting program.
- Availability and cost of new and improved GHG-associated technologies.

### Additional Benefits and Costs

The benefits of passing this state goal legislation are fivefold:

- **Addressing Potential Global Warming Impacts.** The direct economic toll of global warming on North Carolina may be enormous and would likely include increasing: crop loss due to drought; episodic water shortages; coastal flooding and erosion; and building cooling costs. A state goal will draw attention to regional warming trends and associated effects and help business and government prepare for the future.
- **Economic Development.** As the state plans its economic development activities, a state carbon reduction goal can help promote expansion and recruitment of renewable energy technologies that are less GHG intensive. Additionally, these activities will seek to generate jobs in North Carolina to replace the non-native coal and gas sources that currently dominate North Carolina's energy supply.
- **State leadership.** Meaningful action by the federal government on global warming is long overdue. The best way to encourage the federal government to assume its responsibility is through state leadership. By establishing a state goal, North Carolina will join the numerous states across the country that are already rising to the challenge of addresses GHG emissions associated with global warming.
- **Business Responsibility.** A state goal will be to provide the motivation and opportunity for companies to examine their options for cost-effective reductions in their GHG emissions. Many companies in North Carolina are already considering the need to reduce carbon dioxide in their long-term planning. A reduction goal will foster the broader business community to consider their ability to also reduce GHG emissions.
- **Preparing for the Emerging Carbon Marketplace.** North Carolina business can potentially sell tens or even hundreds of millions of dollars worth of carbon equivalence credits into the carbon marketplace that national climate legislation will eventually generate. A state goal would help companies that could potentially be suppliers of carbon credits in the coming national carbon marketplace to be ready to take advantage of these economic opportunities as soon as they arise.

**Feasibility Issues**

The policy is simple, straightforward and voluntary. The goal can be an expression of commitment by the state of North Carolina to address the challenge of global warming through voluntary reductions in GHG emissions.

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD