Integration of GHG Point Source Emissions into the Routine Air Emission Inventory Processes in North Carolina

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ABSTRACT

Climate change and related greenhouse gas (GHG) emissions have come to the forefront in recent months and years. Man-made emissions of carbon dioxide and other "equivalent" pollutants are believed to be making a substantial contribution to climate change and exacerbating the problem through increases in atmospheric levels of these heat-trapping pollutants. A trend seems to be developing in government to suggest that the focus and some share of the responsibility in the future for climate change inventories and registries may come to rest with the air quality and air emission inventory community. This is particularly the case with the realization that such emissions are generated largely by large fuel combustion sources and manufacturing facilities in the point source sector and that many of the larger such facilities are already reporting regularly to the bureaucracy regarding other criteria and hazardous pollutants.

This paper attempts to surface some fundamental elements and issues facing decisions regarding a climate change inventory and registry in an air quality arena and report on how North Carolina has become involved in, and addressed, such "non-traditional" concepts and potentially strongly participate in the implementation of such programs. The NC DAQ will initiate a GHG inventory effort for CY 2008 to implement a GHG inventory for point sources holding a Title V air permit as a first step in the process. However, this paper is not intended as a "how-to" document or guidance to other states or programs, but an attempt to stimulate thought and discussions to continue the process of melding efforts into a system that is compatible among users and others in similar situations.

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INTRODUCTION

Much attention has been focused over the past several years on analysis and development of issues and policies as relate to climate change and mechanisms for mitigating human contributions. These efforts began to come to the forefront at the national level in the 1980's. However, most of this attention, focus and effort in recent years has been conducted by a specialized staff in several states and national non-governmental organizations where there have been "pockets" of interest, concern, resources and political inclination to pursue the climate change phenomena, and potential

mitigation scenarios. For example, major efforts for several years, in the United States, have been focused primarily in California, the New England States and a few other places scattered about. Such efforts have matured considerably in recent years and now appear likely to be joined together in either state-initiated efforts carried out in concert, or by yet to be debated and passed national legislation. We can hope, and should expect, that there will be further solidification of direction and purpose, and decisions will be made soon on details of physical and procedural processes that must be in place before a uniform, sensible and efficient inventory or registry and climate mitigation process can become reality throughout the entire country. First, however, let me describe a bit of how NC DAQ got into the process and how our process has evolved and matured to the place that it is currently transitioning through.

NORTH CAROLINA-SPECIFIC HISTORY, EFFORTS and PROJECTED FUTURE

North Carolina Clean Smokestacks Act (CSA)

North Carolina (NC) does not currently have any statutory requirements that specifically address greenhouse gases (GHG) or CO_2, except as included in the Clean Smokestacks Act (CSA). Several bills oriented to closely connected issues such as energy efficiency and/or other energy-specific legislation (e.g. renewable portfolio standards) and more direct climate change requirements such as registries have either been introduced in earlier sessions or are potentially expected (in some form) for introduction before the end of the current session. When the CSA was passed in June of 2002, It was primarily focused on requiring the state's two major utility companies, and their 14 major coal-fired powered plants (with multiple units), to reduce their NOx and SO_2 emissions by significant amounts (76 and 79% respectively, by 2009 and 2011) .the legislation also directed the DAQ to prepare reports in September 2003, September 2004 and September 2005 to address what effects the controls of SO_2 and NOx as required under the Act would have on CO_2 emissions (and mercury).

In the process of preparing these mandated reports, several issues arose for which decisions had to be made. For example, was the specific reference to CO_2 intended as a literal definition or was it intended to mean "CO_2 equivalency," to allow or require consideration of other GHG? This will be discussed more later in this discourse. Obviously, conventional control devices for SO_2 and NOx do not remove any (or at least any significant) amounts of CO_2, so an assumption was made that the Legislature also was asking to be advised on what control technologies, methods and equipment might be available that could be used to make such reductions. The three CO_2 reports basically were designed to be responsive to 1) What is the state of the science, 2) What options and steps might be feasible, available and economically viable, etc. and 3) what were the DAQ's recommendations to address these points?

There were several recommendations in the September 2005 report, but those most germane to the purpose of this paper were that the state should prepare a climate action plan and that the DAQ would initiate a point source inventory of all facilities holding a valid NC Title V air permit would be required to quantify and report their emissions of GHG starting with Calendar Year (CY) 2008. This requirement was announced in that report and the Title V facilities have been notified of that requirement in a letter of January 2007 (and earlier to a less formal level). The Director of DAQ is given the authority through the NC Environmental Management Commission and in statutes **§143-215.65,** ***Reports required,*** and **§143-215.107,** ***Air quality standards and classifications,*** to collect information needed to protect the health

and welfare of citizens of the state. Although health effects (insects and other vectors, disease, etc.) are believed quite likely with climate change, but, the major health and welfare attributions are to sea rise, increased storms and other such physical phenomena.

Review of Existing NC Data EI Data System and Routine Reporting

As has been reported in several previous papers, North Carolina has a web-based interface called AERO (Air Emissions Reporting Online) for point sources. This system provides means for facilities to start a new inventory submittal on-line with the results of their previous year's inventory and then make updates, which are then reviewed and commented upon (or revised, with the assistance and agreement from the facility contacts) by inspectors and other DAQ persons familiar with the specific facility. Once the review process is completed, the submitted data are approved and promoted to "ED" the internal (DAQ-only access) Oracle-based emission inventory database from which various reports can be routinely run. Periodically, these reports are also promoted to web based access for use of the general public.

Title V (greater than 100/25/10 tons/year – potential - Criteria/single-HAP/total-HAP) and a few others (NOx State Implementation Plan – SIP - call, Reasonable Further Progress – RFP - tracking, etc), are required to report all pollutants (see discussion below) each calendar year; to be reported to DAQ by June 30 of the subsequent year. There are now approximately 440 such facilities permitted in North Carolina in this category. Small and Synthetic Minors are required to report each 5th year upon renewal date of their permit, and as a condition of that permit's renewal. There are about 2600 of these "smaller" facilities currently holding air permits in the state, meaning that in excess of 500 facilities report their emissions in these categories each year. Some are "just short" of being a Title V and others range as small as a 3-5 ton (potential) facility that may never be close to a problem threshold.

All identification, descriptions, etc. of the equipment at the facility and related numbers are entered into the system during the permitting process and are identical with what is in the permit. Thus, everyone who touches the system and data are using the same set of information, whether for inventory, compliance or permitting. This feature of the system requires a very rigorous agreement and cooperation between various sectors of the Division to maintain this thread and integrity. The descriptions and related information do change over time as the concepts shared by the various DAQ sections become clearer and more experienced.

Point Sources in NC

Pollutant Tables

A result of use of the common interfaces is that a standard set of pollutants exists within AERO and ED that allows the addition of other pollutants with a minimum of effort and disruption. The pollutant table lists criteria (and precursor) pollutants, federal Hazardous Air Pollutants (HAPs) and North Carolina Toxic Air Pollutants (TAPs) and a recent EPA category for "Non-VOC's, by definition, that are required to be inventoried anyway. This table is currently labeled as "Other pollutants required to be reported." This table structure makes it relatively easy to add additional pollutants, which is what has been done in the case of the greenhouse gases (GHG). Actual tonnage above a *de minimis* value is currently specified to be reported for most pollutants. GHG *de minimis* values are in the Table 1, below.

Pollutants and *de minimis*

The "standard" lists of GHG usually lists the CO_2, N_2O, methane, sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons. However, to assist the user, provide clarity and specificity, and to take advantage of the AERO/ED system capability to add pollutants for a category total, the subcategories of the hydrofluorocarbons and perfluorocarbons were further enumerated to their specific compounds and CAS #'s. Table 1 below reflects these inclusions.

NC DAQ's standardized procedures limit emission data reporting to levels above which there seems to be regulatory, health or "common sense" relevance to reduce reporting burden and to avoid collection of data and information that is likely not be useful or even well quantified. Thus, the concept of "de minimis" is incorporated that allows a reporting facility to make an analysis (facility –wide total). These values are likely to rise.

Table 1 - List of Non-HAP, Non-TAP, Non-Criteria Pollutants (i.e. non-regulated) Required in NC Emission Inventory:

Pollutant Code or CAS	Description	*de minimis*/pounds
HFC	Hydrofluorocarbons* *(mainly refrigerants)*	1
13453526	HFC-23 (Fluoromethylene)	1
354336	HFC-125 (C2HF5)	1
420462	HFC-143a (C2H3F3)	1
431890	HFC-227ea (C3HF7)	1
690391	HFC-236fa (C3H2F6)	1
75376	HFC-152a (1,1-Difluoroethane)	1
811972	HFC-134a (1,2,2,2-Tetrafluoroethane)	1
PFC	Perfluorocarbons* *(mainly solvents)*	1
355259	Perfluorobutane (C4F10)	1
355420	Perfluorohexane (C6F14)	1
75467	Trifluoromethane	1
75730	Perfluoromethane (CF4)	1
76164	Perfluoroethane (C2F6)	1
76197	Perfluoropropane (C3F8)	1
7783542	Nitrogen Trifluoride (NF3)	1
Other		
10024972	Nitrous Oxide (N2O)*	2,000
124389	Carbon Dioxide (CO2)*	10,000
2551624	Sulfur Hexafluoride (SF6)*	1
540885	Tert-Butyl Acetate	1
74828	Methane*	1,000

*Greenhouse Gases

NC Emission Inventory - Mandatory vs. Voluntary

Facility reporting to NC's emission inventory is mandatory, whether annually for Title V or each 5th year for Small or Synthetic Minors. A facility may be fined up to $10,000/day for non-compliance with reporting to the inventory. We have a history of 100% compliance with this reporting requirement, though there is an occasional "late" inventory which in some cases

may be "excused" by the Director for good reason, but which normally results in a fine of from a "few hundred" to a few thousand dollars unless there are purposeful and fraudulent reasons evident. At this point, the authors begin to draw attention to the differences between terminology and requirements that will be discussed further below. In this case, the inventory is that process/result that comes from individually collecting data from these facilities and the individual point sources (or process equipment), individually, at these facilities and information on fuels and quantities thereof. These data and reports are **required** and not voluntary. However, as we move into climate change registry/inventory terminology, this level may become referred to as a "registry." In this scenario, the state may have a **mandatory requirement** for reporting this detailed information to what is likely referred to in the air quality community as an emission inventory, but the reporting of that information to an existing "registry" may be voluntary. The needs and uses of this inventory/registry may be the determinant as to whether such a voluntary submittal is made, in addition to the format and criteria being met.

The Climate Registry (proposed and developing), discussed later in this paper provides the following discussion:

• Registries represent a bottom-up approach to emissions accounting, where companies and organizations quantify and report their emissions from various individual sources. Reporting is based on a series of quantification standards and guided by program requirements outlining the type of data and information an entity is required to report and how that data is reported; registries also provide a system with standardized formats for tracking, storing, and making information available.

• In contrast, emissions inventories provide a top-down accounting of a state's, country's, or organization's emissions based on aggregate activity data (e.g. energy consumption data). Inventories are designed to give a comprehensive view of total emissions in a state or country and reveal aggregate trends over time.

• Examples of existing U.S. emissions registries (voluntary and mandatory) include: o U.S. Acid Rain program and the OTC NOx Budget Program — emissions trading registries, o U.S. Toxic Release Inventory (TRI) — emissions reporting registry, o DOE's 1605(b) program — emissions reporting registry that supports emissions reduction projects, o California Climate Action Registry — entity-wide emissions reporting registry that also supports emissions reduction projects.

Obviously, state programs reporting to EPA's national emissions system are omitted from this list and need to be added as they fit the description of registry as opposed to this definition of an inventory. However, substantial discussions and decision making may be necessary to bring these concepts in line with the concepts of air quality management emission inventory vernacular.

Emissions Already Required in NC (e.g., EGU's) Historically

North Carolina's emission inventory efforts to date have not included GHG. As a first step in the development of a NC Climate Action Plan, a "top-down" inventory (in this case, the definition fits the one above for TCR, as well as an acceptable air quality definition) was prepared by the consultant/facilitator hired to coordinate the process and oversee the necessary prioritization and related analysis of potential mitigation options as defined by the stakeholders.

A major reporting requirement that includes GHG also already exists that covers electric generating units (EGU's), on an individual and per unit basis; that being the Acid Rain (Title

IV permit program under the Clean Air Act Amendments of 1990. This is perhaps the most important sector of the emitting inventory, both for air quality management and for GHG due to size and emissions. To date, NC has not required separate reporting of GHG by these or other facilities, though the underlying state laws and rules authorize it. This is partially because we have not yet fully initiated the GHG inventory process as committed to by DAQ in the 2005 CSA report. As stated previously this will begin with the CY 2008 inventory (or "registry").

Many do not appear to realize that the Acid Rain reporting requirements of the Clean Air Act (Title IV) already mandate partial reporting (CO_2 *only*) for these facilities. These results are routinely included in the reports from the EGU's. These data are reviewed, QA'd and then prepared quarterly and annually by the U.S. Environmental Protection Agency (EPA) through their web pages.. Though submitted to EPA with the Continuous Emission Monitoring (CEM) data for NOx , and SO_2, the estimates made for the EGU's are made by more traditional estimation methods (e.g. emission factors or by using the relationship that stochiometric combustion of 12 pounds of carbon will result in 44 pounds of CO_2). CEM's are available but not required for CO_2, but for CO_2 only, this relationship is quite accurate. These emission factors or stochiometric relationships are defined by inflexible physical and chemical relationships and tend to suggest that these estimated data have the potential to be equivalent (with a different time relationship) to data reported from CEMs. To access these data, you would likely best start at EPA's web page http://www.epa.gov/cleanenergy/egrid/index.htm.

NC Climate Action Plan and Mitigation Options

The prime purpose of development of the NC Climate Action Plan (CAP) was, and continues to be, to determine what actions can be reasonably taken in this state to change the future and do it with a positive impact upon the economy, mitigate climate change to the extent feasible and to stimulate positive actions in those directions that will leave a better state for the current and future children of the state. A stakeholder group called the Climate Acton Plan Advisory Group (CAPAG) is developing this CAP. In the process to develop these options thus far, with the assistance of an outside consultant, the CAPAG developed an initial list of over 300 options from the 40+ members of the CAPAG and underlying technical work groups.. This list was then prioritized on the basis of quantity of emissions addressed, feasibility, perceived economic benefits and other values of the assembled stakeholders representing many sectors of the NC citizenry. These options were reduced to a list of 53 that the group considered most promising and additional analysis has then been done on them.

The five sectors of the CAPAG have been supported by five technical workgroups with membership of 6 to 10 or so technical experts each from various organizations including academia, environmental, state agencies, business and other private organizations (led by a facilitator from the Center for Climate Strategies). These TWGs have cumulatively met over sixty times in person or through conference calls over the past 14 months or more to toil over the best way to analyze, the analysis, the reliability of the data, the methods and results. Substantial attention has been paid to those options that will likely have economic benefits.

One or more DAQ employees have participated in each of the calls and meetings (some have had participation and input from public representatives) and the DAQ liaison for each technical work group (TWG). The DAQ liaisons have faithfully spent many extra hours making sure that these groups, the facilitators, the public and other participants were able to work on and toward these goals. The state owes all of the TWG members and each participant

a debt of gratitude for the investment of these many hours as well as to the CAPAG members themselves who have met 6 times for all day meetings, and will have one, maybe two more meetings before concluding the input to the final report.

Energy Efficiency and Renewables

Insofar as mitigation is concerned, the greatest option to consider is energy efficiency. In short, if you don't burn things you don't produce CO_2. And if you don't produce the CO2, you don't have to develop means to sequester them and ways to achieve reductions are able to be more flexible, though probably inadequate under any scenario to make the reductions that may be necessary. Many aspects of the State Energy Plan developed by the State Energy Office under the auspices of the state's Energy Policy Council have been incorporated and reflected in the preparation of the NC CAP and the hope and intent is that they will be compatible and mutually supportive. The CAP is also coordinated with the Legislative Commission on Global Climate Change, which is debating the underlying science and effects to be able to arrive at a possible cap on NC GHG, and is expected to use the results of the CAP in their process. Results of both activities are expected to be reflected in future legislation, some of which is also already under development in the NC General Assembly as a result of both outside initiatives, ongoing actions and as influenced by early discussions of the CAPAG.

The Rest of the Country/World

This discussion thus far has focused primarily on what has been the background and case in NC and its air quality agency, DAQ. However, in the past 15 years or better, there has been a new **distinct culture** that has emerged on the "inventory" scene in somewhat of a parallel universe, both in the U.S. and around the world. That parallel universe is the one of climate change inventories and registries. Many independent decisions have been made within that culture, often varying from state to state, or region to region, and the detail of detail often may not be consistent with those made in the parallel air quality culture. Thus, simple definitions that have existed in the traditional air quality culture for years may now be inconsistent with the definitions and related decisions made in the climate culture. These differences are not "show stoppers" by any means, but must be identified and reckoned with, especially since there seems to be a major movement toward the air quality agencies in many states taking on the dual role of also inventorying and tracking GHG emissions. That is one of the major reasons for this paper, as well as to relay the manner in which NC DAQ is approaching the topic and related issues, to date. This realm continues to unfold and the expectations for this and many other states are not firm regarding participation in further "national-like" registries or what the detailed decisions are that need to be made or are already made by reference. Only a few of those will be addressed below.

What Are Other States, the U.S. and Countries Doing?

Many states have had, and some continue, programs that support the Department of Energy's 1605 (b) registry. North Carolina, as a matter of record has been the leader (with the most facilities reporting - now in excess of 50 companies) over the past two decades or so, for reporting emissions and reductions to this registry. However, 1605 (b) has had several limitations that have made it unsavory both to states and facilities. There have been several changes and improvements made to this registry in the past 2-5 years, but these have yet to initiate a ground swell of support from states or facilities for its use and adoption as a genuine single (state or) national registry. This registry is

not mandatory and thus continues to languish to a large degree and draw less and less attention. EPA also has a "registry of sorts" for some limited participants (Climate Leaders), but these two federal efforts, separately or together, have been less than comprehensive, largely unlinked and uncoordinated or consolidated. Thus states which had motivation and resources have initiated state and regional efforts to develop their own programs. Recently, the level of activity has increased, leading (along with other political events) to some anticipation national of national legislation and likely a registry may be somewhere in the "near" future.

California and the Northeastern States for Coordinated Air Use Management (NESCAUM) are probably the best known and have been the out-front leaders in state/regional efforts to develop registries and software to record the GHG emissions. I will focus primarily on the California situation for this paper, as it seems to be the backbone choice for a recent combined effort by some 30 or more states to develop a "semi-national" or multi-state registry. Also, California is perhaps more advanced in their efforts, having a working version of software and substantial experiences in this area. California companies can now voluntarily register their greenhouse gases before the state's new anti global warming law (AB 32, the **California Global Warming Solutions Act**) activates later this year. This law targets carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride as the standard mix reflecting Kyoto and Intergovernmental Panel on Climate Change (IPCC). Over 230 companies had registered their emissions with the California Climate Action Registry through January of 2007. Many of these companies are "name brands" such as Xerox, Kodak, DuPont, Hewlett Packard, Dow Chemical, Kaiser Permanente and other familiar trademarks. Companies that get a head start will likely be better able to enter debate about proposed regulations and perhaps gain a market advantage for products, such as solar panels, wind turbines or alternative fuels.

In addition, a group of states and tribes, now growing to or past the mid-30's in number, have expressed interest in joining *The Climate Registry* (***TCR***). ***TCR*** has emerged from discussions among the states and tribes represented by the California Climate Action Registry, Eastern Climate Registry/NESCAUM, Lake Michigan Air Directors' Consortium and the Western Regional Air Partnership, in addition to representatives from several southeast states. They envision a combined effort on greenhouse-gas registries either separately or through a "loosely-affiliated" confederation, striving to develop a common and viable GHG "currency." Many of those that are not actively working toward some actions appear to be "keeping an eye on the waters" for future developments.

Purposes and Definitions of Inventories and Registries

Why does one need or develop an **inventory** or **registry** at all? Here again these two names indicate different "animal." In the air quality world, an **inventory** has usually been inclusive of point sources being treated individually and with great detail. In some of the vernacular of the ***TCR*** early documentation, it appears that an **inventory** refers to an inferior top down process. The **inventory** of he air quality community is what ***TCR*** refers to as a **registry**. But to answer the question, one can look at the basic motivations.

In the traditional "SIP sense," one prepares a basic air management inventory to determine what the relative strength of the sources is and consequently what needs reduction, and by how much, to reach an acceptable air quality level. It is important and mandatory in this case to know the total from all natural and anthropogenic sources as they both emit to the same atmosphere. This seems to be a secondary need for the GHG inventory as little oratory or attention is paid to reaching a maximum level of GHG emissions globally. Let me also

interject a this point that one major difference between the traditional air quality inventories and the GHG registry is that there is little (actually "no") need to know location and localized air quality concentrations as all emissions are theoretically contributing to the global pool of these gases and there is no localized effects or concerns with ambient concentrations other than that of the globalized concentrations.

Another reason to quantify the emissions is to help establish a "currency" for emissions with sufficient credibility to allow or facilitate capping of emissions and subsequent selling or trading in some type of market. In most cases, the credibility of a currency is established by knowing the true value to achieve, the demand from the marketplace and the total amount available to be available for sale, or for removal, from the marketplace if that is the objective. Thus, the floating market can establish the value of its currency by the demand, which is similarly determined by the amount available for entry to the market. At the same time, this market is potentially influenced by other unquantifiable and less concrete attributes, such as that of inflated demand by artificially created "peer demand." Such demand can possibly be created by an intense sales effort to "juice up the market" and establish an artificial or higher demand that the demand level of the isolated market might otherwise arrive at without the artificial influences.

In a similar vein, there is a significant potential for the GHG marketplace to be influenced simply by the need or desire of a facility, company or whatever to be perceived as forward-looking, environmentally, and an "*Beyond-OK good citizen*." This characteristic can influence, their market sales and have a positive impact on the bottom line, even though it may entail a cost to pay for the reductions.

There may be many other or more sophisticated or intellectual reasons for quantifying and tracking emissions. This author would like any feedback on this topic that will help build a better motivational impetus for this discussion and subsequent results.

Ways to Estimate/Measure Emissions

In the **"real" stochiometric world** and referring only to CO_2, as stated earlier, twelve pounds of carbon (C-mw=12) combines with 32 pounds of oxygen (O-mw=16) to make 44/16 pounds of CO_2. This is an undisputable fact and has little (read "no") room for error. However, extending this relationship to estimate CO_2 from some processes and/or fuels can get a bit complicated due to their content of other substances and such things as heat content which must be taken into consideration if you approach the estimation process on an energy basis. Throw in the other GHG and it can get difficult and complex indeed. Many of these relationships (N_2O, methane, etc.) can only be determined by source (stack) testing and there are many such relationships and processes which have never been tested; at least in sufficient quantity and detail to permit reliable quantification. For example the hydrofluorocarbons are generally only released due to leaks during manufacture or use, and these releases are very difficult to measure or quantify by modeling or mass balance.

Let me dwell for a moment on another related point of difference that often seems to pop up in discussions, both written and verbal. That is that the climate community tends to refer to the estimation of emissions in terms of "measurement." The emission inventory community is more prone to use the term "estimation" or estimates. Of course, as inferred above, if burning a pure carbon fuel, you can make a strong case that these two terms are equivalent, but in the more general case, the factors and protocols used tend to have uncertainties that tend to block the legitimate usage of the term measurements.

There are several estimation approaches used in the registry world such as the World Resources Institute (WRI), the EPA, California and others. While this author has not done a thorough and exhaustive examination and comparison, the general consensus of those who have done so seems to be that they are similar, but have some (relatively?) minor differences. Before a single or group of states decides on which to use, a more thorough and systematic comparison and decision process needs to be completed so that there is consistency. The WRI/WBCSD *GHG Protocol Corporate Standard* utilized by the California Registry upon which ***TCR*** is envisioned to be based, has already established and is internationally recognized. In terms of GHG reporting, however, a variety of program decisions need to be made regarding how this information is captured, stored, reported, and verified.

Other Questions, Answers and Solutions Necessary to Implement *The Climate Registry (TCR)*

The ***TCR***, being posed and initiated by multiple states, is set up under a skeleton of expectations, preliminary agreements and with limited technical details at this time. A technical working group is expected to be formed to work out these details and reach a workable compilation of flexible rules and guides that can make it work. The starting points for these agreements is expected to be based on the tenants already discussed and recorded by the formational group which met several times to compile them. A board member, plus whatever technical work group may be set up will represent each member state.

In establishing a common registry, ***TCR*** procedural information indicates that the registry will reduce costs to states and tribes through pooled resources. It is anticipated that savings may come from designing and implementing a common software platform, developing and maintaining common protocols and centralizing technical expertise and support. If ***TCR*** cannot move in time to meet the needs of participating states and tribes, they propose that the states may develop their own systems, increasing costs and challenges of coordination and harmonization.

The initial discussion material for the ***TCR*** states that for companies with shared ownership of facilities or units, ***TCR*** would require that reporting be done according to the control approach – following either financial control, operational control, or both. Once an approach is chosen, it would be used consistently thereafter. It has not been decided whether a company would also be required to report its entity level emissions following the equity share approach. The reporters would however, be required to report entity-wide emissions (i.e., total entity emissions from all subsidiaries and facilities within the chosen geographical boundaries – not limited to state boundaries). Parent companies or organizations that participate in *The Climate Registry* would be required to report on behalf of their subsidiaries and group operations (i.e. emissions reports should be aggregated at the highest level within *TCR*'s membership, in a single report). Subsidiaries whose parent companies do not participate in *The Climate Registry* could report to *TCR*; however they would also be required to submit a corporate organizational chart that makes clear any relationship to parent companies.

Following this approach, reporters would be required to report facility-level emissions and be encouraged to report emissions data at the unit level for stationary combustion units if data are available. In its initial development ***TCR*** would focus on entity level reporting. However, during subsequent stages of implementation it could also develop standard requirements for reporting emissions reductions projects.

Further, ***TCR*** would require that companies establish a base year for which verifiable emissions data are available and specify their reasons for selecting that particular year. Reporting entities would select a base year rather than calculating a base year from a multi-year average. Base year emissions would be adjusted for structural changes when there is *significant* impact on the consistency of the organization's total emissions. A structural change involves the transfer of ownership or control of emissions-generating activities or operations from one company or organization to another. Structural changes include mergers, acquisitions, divestments, etc. In addition, companies would be required to recalculate base year emissions for any of the following cases: 1) changes in calculation methodology or improvements in the accuracy of emission factors or activity data, or 2) discovery of significant errors or a number of cumulative errors that are collectively significant. ***TCR*** *proposals* outline expectations to require companies to apply the significance threshold that triggers base year emissions recalculation in a consistent manner. They anticipate a quantitative significance threshold would be established during ***TCR***'s implementation phase.

There is significant interest in developing a rigorous accounting framework to also quantify and characterize CO_2 removals from the atmosphere. These removals, or sinks, might include terrestrial sequestration (e.g. forest or agricultural soil based activities) as well as geologic sequestration. ***TCR*** would need to develop a comprehensive framework for accounting and reporting sink activities, from both a project and entity approach, as soon as feasible.

For reporting removals/reductions at a facility, ***TCR*** would rely on the a two tier quantification system that already constitutes the Registry's minimum standards for mandatory programs. Voluntary reporters would need to be transparent in their choice. Emissions data submitted in compliance with a state regulatory program that endorses ***TCR*** would automatically be approved for submission as part of a voluntary report.

Some of the points of the initial discussions that NC and each member state will have to address and resolve are included below as extracted from the **TCR**'s **Statement of Principles and Goals** which was recently sent to the air directors of these states.

- Each state will need to determine how best to work with ***TCR*** to further define rules, agreements, understandings, etc. (i.e. basic rules of engagement) to have a state flexible system within the umbrella of a multi-state arrangement.
- Each state will need to decide whether they will depend on their facilities to voluntarily report their emissions to ***TCR*** or make the reporting mandatory (NC's expectation is to require reporting by TV facilities to the routine annual state inventory to start, and depend upon a voluntary reporting to ***TCR***).
- Each state will need decide how to establish, monitor and evaluate adequacy of third party verification (necessary for any cap/trade arrangements).
- Each state will need to develop a means to interface with entities, for state-specific rules and guides to result in a common GHG emissions reporting system (software), handling each of the multiple greenhouse gases (on the basis of their CO_2 equivalence), or alternately develop modifications to their systems to accommodate the GHG emissions and their submissions to *TCR*.
- States will need to determine details of system for establishing and administering the inventory/registry so it will handle emissions and/or emissions reductions achieved through some mitigation action(s) independently, or on behalf of facilities.

- States will need to develop detailed universal or state-specific rules for estimation so that the results are accurate, complete, consistent, transparent and verified.
- Each state/tribe needs to determine scope of facility and entity definitions in their reporting requirements (e.g., state/tribe may decide to include all activities and operations connected to that site such as mobile sources, agricultural, area sources etc. that may not easily fit to the self reporting mold).
- Each state will need to identify a minimum data set of greenhouse gas emissions quantification standards to be recognized by member states and tribes in both voluntary and mandatory reporting and emissions reduction programs that make sense (are compatible) relative to each other.
- Each state will need to determine how reporting entities will be able to establish an emissions baseline and document early reductions (including prior years, e.g. 1990, 2000, 2002, etc..
- States will need to determine means for full and public disclosure to provide for public access of greenhouse gas emissions and estimation data, allowing full disclosure but respect rules for minimum of (state-specific) business confidentiality.
- They will need to develop a means to systematically solicit and consider input from stakeholders, including business, local governments, environmental groups and other interested parties, to develop consensus when possible. (Decide what is "possible.") .
- Each state must decide if, and how, the *TCR* data are to be integrated into the routine emissions reporting process in each state for air quality management or whether to develop a new parallel system which has some ties to the air quality emissions system, and what those are.
- Determine what system of identification will be used for facilities (common id's).
- Decide minimum size of facility/equipment/unit/process/operating scenario or other generation to be included/required and determine whether to accept data from facilities below that minimum size (***de minimis***), including things such as will reductions in use of electricity by individual local facilities be allowed or included in reporting and at what level.
- Determine minimum size of that becomes practical to include (a ***de minimis***, again).
- Determine how often the reporting (annual or at longer intervals) needs to take place, as a minimum, and whether to allow voluntary reporting on more frequent intervals and whether smaller facilities should be allowed to report on lesser, but established intervals, e.g. each 5 years, or on the same basis as the NET data (3 years on an established common set schedule).
- Each state will need to develop an infrastructure and staff to accomplish several training and management aspects of the program, or depend upon and support *TCR*'s centralized resources. These include:
    - Train reporting organizations on how to use the protocols and software,
    - Train and support regional offices to provide technical support to reporting organizations
    - Recruit, approve, oversee and train (third party) verifiers
    - Ensure that voluntary project-level reporting is consistent with guidelines set by state regulatory programs

- Develop and manage the software application and database used to collect and report GHG emissions from the voluntary reporting program,
- Receive and review data from reporting entities.
- And likely many others.

Summary and Conclusions

As outlined above, North Carolina's DAQ is essentially locked in place to accomplish a mandatory GHG inventory (registry) process in the state for Calendar Year 2008, for facilities holding a Title V permit, only, but this does not reflect any reporting to ***TCR*** or other system. This results from reports responsive to the state's 2002 Clean Smokestacks Act and continuing efforts under the now developing Climate Action Plan (CAP). This effort is expected to go forward into the future and perhaps expanded to smaller permitted facilities, as a developing and continuing effort, though the state has a bit more homework to finish before the Title V facilities can even properly report their emissions in June of 2009 (i.e. guidance must be available by late 2007 to facilitate the facilities knowing how to properly respond to this requirement).

North Carolina is considering, and will have decided by the date of this presentation, whether it is to be a participating member of (***TCR***). The results of this decision will have significant impact on the future direction and practices of this commitment. It will also have repercussions with the facilities in the state that choose to participate in the likely voluntary registry.

North Carolina DAQ's efforts in climate change will need extensive expansion if the General Assembly establishes a cap; further refinement of both natural and anthropogenic sources will need further and better quantification and reporting details.

North Carolina's AERO (web-based) and ED (internal system) will be able to handle the emissions for routine mandatory reporting with little change, but any decision to provide support for the state to report to ***TCR*** will require several decisions and actions to develop interfaces, rules, options, etc. and would not be available for being a part of any such process any time in the near future.

Each state has the opportunity and perhaps obligation to evaluate the ***TCR*** and their expectations, limits and needs to participate. There is no requirement, but this represents a possible opportunity to make such a registry available to their constituents, but not without many decisions and considerable efforts. Information in this paper and elsewhere, should be considered and worked through with other states and representatives of the ***TCR*** such that an optimal result can be attained, keeping in mind that it may result in a true national registry at some later time, a strong influence on such a registry, or perhaps just a placeholder before the next round of discussions and proposals.

TCR's Steering Committee intends for the Board to release a general reporting protocol, verification protocol, and associated quantification guidance for stakeholders to review in August/September 2007 and will finalize those documents in November 2007. However, in the meanwhile, representatives of the participating states have many decisions that they must make, many in consensus with other states, to make this happen and for it to meet the requirements of being a member of the ***TCR***. The list in the previous section outlines many of those but is not all-inclusive.

TCR holds promise for becoming a "pseudo-national" system for a GHG registry, but could either be a template for a national system as a result of national legislation,

could develop into the national system aside from federal efforts over the long term, could be a boon to states in that it could take over this function with little interference from other state agency actions, and activities, or could become a heavy burden on each state if the centralized rules are inadequate, distorted, or contradictory with state or federal efforts and practices in the air quality management realm.

Views and positions will continue to unfold over the next several months as states and the federal positions solidify and unfold. The role of each state can be important and significant, once the boundaries of the playing field are determined and which field is to be played upon becomes more apparent.

Integration of GHG Point Source Emissions into the Routine Air Emission Inventory Process in North Carolina
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