Aligning the Data Planets: The National Environmental Exchange Network Connects Emissions Data

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The National Environmental Exchange Network has offered one means of reporting Emissions Inventory data for four years. As the national attention has turned to Climate Change, states have taken the lead on collecting greenhouse gas (GHG) emissions data, though The U.S. Environmental Protection Agency (USEPA) is now poised to take action nationally. An international consortium of state, regional, and provincial governments in the U.S., Canada, and Mexico have joined The Climate Registry (TCR) to collect greenhouse gas emissions data. The landscape for this new program is mixed. Several states are enacting mandatory reporting, while industry is asking for voluntary reporting in other areas to establish an emissions baseline. This rapidly evolving program area could easily lead to a patchwork of disparate and disconnected data efforts, but thanks to the National Environmental Information Exchange Network, we have the systems already in place to establish commonality and sharing arrangements now, and to expect that they will be consistent with future USEPA actions. The Exchange Network will help TCR serve its diverse customer base in a common manner, reducing overall costs and improving integration between data sources. The National Emissions Inventory and its successor will be closely tied to this effort. This paper lays out the opportunities and challenges ahead as the many players attempt to establish a reliable GHG inventory for the US and North America.

[1] This paper draws heavily from prior work prepared by the author and many others in support of the Exchange Network Leadership Council as they consider Exchange Network involvement in GHG data exchange. That work is not published or copyrighted. As a collaborative product, authorship is difficult to determine. This paper is intended to summarize the issue from those writings and is not represented as the original work of the author.

Introduction:

As evident in the national press and in the actions of governments at all levels, the debate surrounding greenhouse gasses and global wahrming is no longer about whether it is real, but about how serious it may be, and what must be done. While no doubt the policy debate around solutions will continue for many years, state governments, local authorities, and through them several regional consortia have begun exploring how to collect a relatively complete and credible baseline of current GHG emissions. Accurate, verified GHG emissions data have been identified as foundational in order to ensure the accuracy and accountability necessary to support policies being designed and implemented to address climate change, including sector-specific mitigation policies and future cap-and-trade programs. States, Tribes, and others created TCR as their shared vehicle for data collection. In late 2007, Congress directed USEPA to act on a national basis to collect emissions data on GHGs from a reporting universe to be defined by USEPA. For the first time in the Internet era, governments and others are poised to launch a data collection effort that can be influenced and supported by modern technical approaches without a legacy of older thinking to overcome. There are a huge number of players involved in this issue, along with connections to many existing programs. In addition, there are some real challenges already evident in trying to harmonize the efforts of al involved, and no doubt many more issues that have not yet been foreseen. This paper will explore the current opportunity, focusing on the National Environmental Information Exchange Network, a partnership of states, tribes, territories, and USEPA as a means to exchange data efficiently and effectively.

The Players:

A number of entities at various levels of government have a stake in this issue. In addition, industry has indicated a strong desire to gather good baseline data as soon as possible, so that decisions in the future can recognize the efforts already underway to reduce GHG emissions. In addition, there are obvious and important connections between GHG data and other data collection programs such as the National Emissions Inventory (NEI). Below are some key participants in collection the GHG baseline:

TCR: Historically, a variety of state and local agencies and non-profit organizations have assessed GHG emissions. In the interest of developing a common system to support GHG reporting and reduction policies, thirty-nine States as well as several Canadian Provinces, Mexican States, and Tribes have agreed to "provide an accurate, complete, consistent, transparent and verified set of GHG emissions data from reporting entities, supported by a robust accounting and verification infrastructure". The Climate Registry (TCR) , incorporated in March 2007, is a national, non-federal, multi-state, multi-nation, multi-tribal collaboration to support both mandatory and voluntary GHG emissions reporting. TCR has developed a General Reporting Protocol and a General Verification Protocol, finalized this spring, and will launch the Climate Registry Information System (CRIS) by June 30, 2008.

Emissions Inventory: USEPA is also engaged in developing exchange standards that could or do accommodate GHG data. EPA's National Emissions Inventory Program in

the **Office of Air Quality Planning and Standards (OAQPS)** has been developing the EIS data exchange standard to meet NEI reporting requirements for toxic and criteria air pollutants regulated under the Clean Air Act. It is not necessary or appropriate to attempt to expand on the requirements fo the emissions inventory for this audience.

AirDex: The Climate Change Division in EPA's Office of Atmospheric Programs (OAP) has the lead for developing the mandatory cross-sector reporting rule for EPA. OAP is working with other programs within EPA's Office of Air to develop the rule, and will soon embark on the public portion of the rule-making activity. A data systems subgroup has been developed to determine the best ways to report this data. In order for the proposed rule to be ready for release by September, the data exchange standard needs to be finalized by July. OAP has developed the AirDex data exchange standard for communicating GHG information, primarily collected from the electric power generation industry, which is the largest source of GHG nationally.

The Network: The National Environmental Information Exchange Network ("Exchange Network") is a partnership initially launched by the Environmental Council of the States and USEPA in October of 2000 with the production of a "blueprint", and expanded to include tribes, territories, and local governments. Today, every state in the U.S. has a presence on the Network, along with seven tribes, one territory, county government, and several NGOs. The Exchange Network uses standard Internet processes and infrastructure, enhanced by a rigorous approach to standards and data interpretation to allow reliable data exchange between diverse partners.

Industry: In the end, the bulk of the initial reporting burden for collection of GHG data will likely fall on industry. As reporting requirements and protocols are developed at various levels of government, industry is potentially faced with reporting the same or similar data to multiple entities, quite possibly with apparently inconsistent numbers driven by differing methodologies. Much of industry is interested in gathering data on GHG emissions. 162 companies have agreed to "enterprise level" reporting for all of North American operations as the first voluntary reporters to TCR. Industry motivation for voluntary reporting is beyond the scope of this paper, but it is clear that there is a substantial interest in reporting voluntarily. Conflicting or duplicative reporting requirements can do nothing but dim that interest.

Authority and Governance:

Acting under the laws of heir individual jurisdictions, many states and provinces have enacted mandatory reporting of GHGs within their jurisdictions. Many other states are conceptually supportive of reporting, and have joined TCR, but will not require reporting by law. States, tribes, and territories generally have authority over all matters not reserved in law to the federal government. In the case of GHG reporting, this means that every jurisdiction may define any requirements it chooses.

Congress, it the 2008 appropriates act, provided that "… not less than $3,500,000 shall be provided for activities to develop and publish a draft rule not later than 9 months after the

date of enactment of this Act, and a final rule not later than 18 months after the date of enactment of this Act, to require mandatory reporting of greenhouse gas emissions above appropriate thresholds in all sectors of the economy…". Clearly, EPA has been authorized and directed to require reporting of GHG emissions, and additional language in the appropriation gives EPA the authority to determine the universe of reported gasses and emission thresholds that trigger a reporting requirement.

TCR is an incorporated non-profit organization governed by a board of directors. While the Board sets direction and policy for TCR, TCR cannot bind its members by any policy or decision, nor can it require any party to report GHG emissions. However, several states have announced to require reporting of GHG emissions with TCR as the collection agent for the state.

The Exchange Network is co-governed by state, tribal, and EPA participants working in a collaborative and consensus-based manner. The Exchange Network governance set policy for use of the exchange network, but in some sense, these cannot be binding policies. The exchange network uses the Internet as a vehicle, and has no authority over the activities of it's partners or over the use of web services on the Internet. Exchange Network governance is effective only to the extent that adherence to policy enables data exchange that is desirable to the partners.

In short, this area of policy is characterized by a complete lack of central authority. No entity is empowered to require a common approach to GHG emissions reporting. Further, differences of opinion about the severity of the problem may lead to very different approaches. The lack of ability to require compliance has led TCR to very different policies than have characterized most governmental programs.

From a data exchange perspective, this lack of central authority implies that the individual partner's desire for interoperability will guide the "policy" that forms around GHG data exchange. USEPA Deputy Administrator Marcus Peacock has said in a letter to the Environmental Council of the States (ECOS) and confirmed in an address to the spring ECOS meeting on April 14th in New Orleans that "EPA is committed to using the Exchange Network for exchange of Greenhouse Gas Data". One of the founding principles of the Exchange Network is that each partner is solely responsible for the design and structure of their data systems. The Exchange Network has substantial experience designing data exchanges which enable useful communications between partners with different or conflicting business rules.

Data Exchange Scenarios; the Opportunities:

While much of the policy around GHG reporting remains in flux, it is safe to say already that reporting universes, scope of reported data, and the protocols and calculation methodologies will vary from one player to another. Despite this, GHG is a global issue. Assuming that no data collection by any of the players will be perfect in all respects, there are two possible outcomes:

- The various collections of GHG data are designed to interoperate, so that weaknesses in one set can be buttressed by another collection, leading to a more useful data set.
- The completing methods and collections can produce mutually exclusive and conflicting answers that will further muddy the waters as policy evolves to address GHG reductions.

Assuming our target is the fist outcome, below is a list of anticipated uses of GHG data, and of ways that existing data sets may be used to improve the quality of the overall picture around GHG. This list is illustrative—not comprehensive.

TCR to member: TCR will collect GHG data on behalf of members from industry when industry reports voluntarily, or when TCR is collecting data as an agent of some jurisdiction which requires reporting. The traditional approach would be to design reports that can be executed by the partner—but with many members, the permutations and support could be onerous.

TCR to Consortium: Many regional consortia hae formed to deal with GHGs over a broader area, creating cap and trade schemes and other approaches to effect real GHG reductions. These consortia have need for data on a regional basis, much like the direct partners.

Member to TCR: A number of jurisdictions have already established mandatory reporting rules—mostly to be phased in after TCR is running. Some members of TCR will collect data themselves for various legal reasons. As members (and potential consortium members as well), they have a need and commitment to deliver data to TCR.

TCR to EPA or EPA to TCR: While it is too early to know what EPA will require in its reporting rule, it seems almost given that the reporting universe, protocol, and scope will not be exactly that of TCR. This implies that if the two collections are comparable and can be aggregated, they can help each other to form a more complete picture. In addition, TCR will build goodwill if they are able to accept the mandatory reports for any facility operated by a voluntary reporting partner.

Government to EPA: Again, it is unclear what EPA will require, but some scenarios might have other governments who implement the Clean Air Act reporting some elements of GHG emissions to EPA. As "co-regulators", a standard and trusted exchange path is desirable to reduce overhead.

Business to collection authority: Much of industry will be required to report (hopefully to only one authority). Those operations using environmental management systems will wish to report electronically. While the Exchange Network is not designed for this purpose, a common reporting format and process can reuse much of the infrastructure needed for the above exchanges.

Challenges:

The number of unknowns in the EPA rulemaking and in any new data management process means that there are many unknown challenges. Even as data management systems are being designed, protocols and policies are evolving. Even so, it is possible to identify some critical issues if the elements of various data collections are to be reconciled.

Data scope: GHG emissions are described under the TCR protocols as part of three "scopes". Scope 1 is direct emission, generally from an onsite combustion process, and is relatively straightforward (though calculations of emissions can be complex). Scope 2 involves reporting of emissions to produce energy the reporter consumes. Power plant emissions attributed to electricity used fall in the scope. Scope 3 includes emissions as an indirect result of the reporter's activities. For example, emissions from a train bring raw materials to a factory would fall in scope 3. The challenge in collecting a complete baseline is to know what emissions are being reported by each entity, and to correlate reports. If a power producer reports direct emissions, ten it would be wrong to count them again as a scope 2 emission in the total. Similarly, if the railroad is reporting train emissions, then the scope 3 example above should be subtracted from the total.

Calculation protocols: Every entity collecting GHG emission data will need to specify how the reporting parties calculate emissions. Every methodology has both strengths and weaknesses. For example, if emissions are reported as a direct proportion to fuel consumed, that methodology will be unresponsive to any technologies that might reduce emissions relative to fuel consumption. Clearly, different authorities may specify different protocols. The challenge is to identify how consumers of the data will be able to make use of mixed data sets.

Verification processes: TCR, as an organization without legal authority, has chosen a process that will require third party validation/verification of reported quantities. While a process such as this might be cumbersome for EPA or another government, they have the authority to require self-certification, and to apply penalties for fraudulent or inaccurate reporting. This implies that different data and data elements will apply to emissions from different sources. Reconciliation of data will require recognition of these differences in a useful and consistent manner.

Unambiguous reporter identity: For voluntary reporting to TCR, repots are required to cover the "enterprise" within all of North America. The emissions will be reported at a facility level to TCR, but aggregated to the enterprise level for public data access. Various legal authorities (including EPA) will require reporting—given their jurisdiction, it will likely be at a process or facility level. A usable aggregated baseline will require that data submitted to more tan one authority be identified so that it is not double-counted. Given the intricacies of identifying a facility in a consistent manner, it would be easy to double-count or incorrectly exclude data points when reconciling data collections.

The Exchange Network Solution:

The Exchange Network can support the cross-jurisdictional integration necessary to seamlessly exchange GHG emissions data between states, TCR and EPA, and facilitate reporting and publication for partners who wish to access and share GHG data. All fifty states have the infrastructure in place to exchange environmental information. This technology is just one element of successfully managing data that the Exchange Network can provide to partners. The Exchange Network's shared-management partnership approach and experience in developing and managing a national information program provides additional value to partners. The Exchange Network community of partners includes states, tribes, territories, EPA, health agencies, non-governmental organizations, local governments, and other federal agencies, who engage with one another through a shared information management approach designed to be secure, reliable, and cost-effective, and to meet program needs and fuel innovation.

The Exchange Network can also position partners to meet future development needs. As the demand for technical solutions and expanded opportunities for sharing and using GHG registry data increases, and realization that a 'life-cycle management' approach to climate change data, involving procedures and practices as well as applications, can expand the potential use of this data, the Exchange Network can be applied to meet cross-media interconnectivity between data sets, and links to decision-support tools. The Exchange Network offers data standards, XML schema design approaches, security and web protocols on data exchange, and the opportunity for TCR and EPA to leverage State infrastructure for data reporting and publication. Proven software for multiple technical platforms is available at no cost to expand the Network to other partners as needed.

The Exchange Network has the potential to support data exchange efforts associated with GHG emissions data in several ways:

Widespread infrastructure: The Exchange Network provides reliable access to a common technological platform through Exchange Network infrastructure, which includes nodes and clients, EPA's Central Data Exchange, XML schema, and other components that have now been deployed in all 50 states. This implies a significant potential costs savings for implementation to partners.

Common language: The Exchange Network provides a common technical language through XML schema and data standards that facilitate data exchange between partners. XML schema can facilitate harmonization across different accounting and reporting systems for GHG emissions and climate change data sets.

Experience Defining Common Business Processes: The Exchange Network community has experience defining data exchange scenarios and relationships for entities in various reporting communities, and collaborating on technology solutions. Partners can leverage Exchange Network experience with reconciling schema, reconciling various reporting entities at various reporting levels, and reconciling different organizational and data structuring approaches.

Experience Developing Authoritative Central Facility Identification System: Information collection at the facility or enterprise level, and from multiple sources, is often complicated by inaccuracies and varying degrees of refinement, quality and completeness. The Exchange Network has experience developing a meaningful and authoritative central facility reporting system that can be updated continuously and easily, allows for improvements in the quality of information, eliminates redundant collection of facility data by partners, and supports reconciliation of duplicate entries. The Exchange Network facility system allows key facility identifying information to be collected and stored, and supports public accessibility, and data correction and verification.

Potential for Reuse and One-stop Shopping: Existing Exchange Network data exchanges, such as NEI, may provide a technological solution for regulatory GHG reporting.

Partnership Experience and Opportunities: The Exchange Network is an established and growing partnership, and can provide access to partners beyond traditional air reporting groups who might also be interested in exchanging and utilizing GHG emissions data. These partnerships create opportunities to share data and collaborate on technology solutions. The Exchange Network has experience creating partner agreements, and the administrative support in place to forge new partnerships. The Exchange Network can also support international partners; any party that can enter into a partnership agreement can use the Exchange Network.

Model State-Federal Partnership: The Exchange Network is a model state and federal partnership. There is no central decision authority for the Exchange Network; partners have established a common governance model and work together to define and meet the shared goal of better environmental information management. With increasing activity at the federal level around climate change policy, interest is increasingly focused on how best to integrate state and local policies and actions in developing federal programs to ensure maximum effectiveness while preserving state creativity, allowing for federal flexibility, and limiting the potential for preemption. The Exchange Network is a model of the partnership needed to fully integrate climate change policies in order to meet the goals as needed to stabilize the climate. If TCR and EPA can demonstrate a shared federal and state approach by taking advantage of the existing partnership forged through the Exchange Network, it might prove a useful example of the integration possibilities.

Building for the Future: The Exchange Network platform can power automated access to data and analytic tools. The Exchange Network platform supports new functionality and opportunities, including combining disparate or complementary data sets; linking data to analytical tools; and evaluating data across media and jurisdictional boundaries. The Exchange Network has also been implemented with flexibility for future growth. The Exchange Network can adapt to provide validation of permit-related trading systems, and the Core Reference Model (CRM) provides a high-level data model to accommodate a variety of environmental topics and support data exchanges that share common components. Exchange Network integration implies future data flow interoperability for

potentially data-reliant policy approaches like cap and trade systems or future national registries.

Lessons Learned – the Air Force Emissions Project: A pilot data exchange has been developed as a collaborative project among the U.S. Air Force, the EPA, and environmental agencies from the states of Nebraska, North Carolina, Texas, Utah, and Washington, demonstrates the feasibility of using Exchange Network technology to streamline the submission of air emissions data from Air Force bases to the states and eventually to the EPA as part of the states' National Emissions Inventory (NEI) submittals. Network governance has supported the Air Force project through schema development assistance, and by ensuring that the flow fulfills business requirements of NEI and state reporting.

ROI: The Return on Investment analysis that ECOS conducted on Exchange Network implementation suggests that for existing Network partners (comprising all 50 states at present), ROI is very high for all but the first use of the Exchange Network. In this context, partner effort for a GHG exchange should be expected to be low. This work should help in making the case for the use of the Exchange Network where no existing competitive system exists.

Security: As a part of the existing infrastructure of the exchange Network, the Network security protocols can provide a secure and authenticated environment for exchange of GHG data. Given the likely uses of collected data in a regulatory or trading market context, an existing security protocol can save TCR the entire cost of developing that component. Preliminary analysis suggests that the existing security model can be extended for both international use and for use with regulated facilities.

Support for reconciliation of data sets, data correction, and verification: The Exchange Network's established data standards, and experience with reconciliation of facility data between states and EPA may be of value as TCR grapples with a thorny issue: How can we avoid redundancies and omissions in the national inventory when it is clear that some entities will report at an enterprise level (for a number of facilities), while many mandatory state programs wil require reporting at a facility level.

Activities:

A number of activities are currently underway to attempt to capitalize on the opportunities presented by this brand new business area. For most, it is to soon to report on outcomes—it is a work in progress, and the intent of this paper is to highlight issues. Key activities include:

- The designers of EIS (the application replacing NEI) have designed the application with the Exchange Network and XML reporting in mind. They are working with the designers of AirDex and with TCR to develop a shared XML schema.

- TCR has at least tentatively adopted he Exchange Network as its vehicle for exchange with TCR members. The Exchange network governance will sponsor setup and startup of a "network Node" for TCR.
- The Exchange Network Leadership Council will sponsor a joint requirements workshop this July to identify a management process for addressing new issues, and to identify expectations around interoperability before designs are frozen.
- USEPA has committed to ECOS to use the Exchange Network for its GHG data exchange activities.

Conclusion:

This paper is speculative in nature. We have identified a major opportunity, from both a policy and information management perspective. The establishment of an entirely new program gives all involved a chance to build an effective data management tool that can support GHG reduction regulations, cap-and-trade programs, and scientific analysis.

However, this opportunity could be easily squandered, through lack of attention. In the absence of an organizing function and vision, all the players descried above will proceed to meet their individual needs—likely in manners that cannot be easily reconciled after the fact.

Many of the challenges arising from a problem space with so many autonomous players are those that the Exchange Network was designed to address. It offers a valuable tool, but one that can only be used effectively by a community of interest with a common objective. Through open discussions, the Exchange Network can help a willing community finds ways to interoperate effectively while maintaining control over their business rules and processes. Within 6 months to one year, it will be evident whether we have met the challenge, or created a data mismanagement "legacy" to be resolved later. The Exchange Network is committed to ensuring the former with the help of an involved community of program managers.