



**Climate Change Central**

**DESIGN ISSUES FOR THE IMPLEMENTATION AND  
OPERATION OF GREENHOUSE GAS INVENTORIES  
AND EMISSION REDUCTION REGISTRIES**

**Discussion Paper C3 - 09**

**August 2002**

**Prepared by:  
Ingrid Liepa  
Environmental Policy &  
Regulatory Consultant**

## **EXECUTIVE SUMMARY**

In Spring 2002, the Alberta government issued a climate change action plan in the form of a discussion draft. In that plan, it proposed two actions of interest to this project: the implementation of “a mandatory greenhouse gas (“GHG”) emissions reporting program for large emission sources” and a commitment to “lead the development of an approach to emissions trading that reflects Alberta’s unique needs and circumstances...and works with national, continental and international systems.” In May 2002, it required newly approved power plant expansions to maintain or offset GHG emissions at the equivalent of an efficient natural gas facility, which could bring a baseline and credit GHG trading system into play.

This report was commissioned to investigate the experience to date with the design and implementation of greenhouse gas inventories and emission reduction registries, and to identify key learnings that would facilitate policy and design choices around the establishment of an Alberta GHG inventory and emission reduction registry.

Findings were organized into three broad categories. The first category addresses design issues that are universal to both GHG inventories and emission reduction registries. Four key subcategories of design issues and learnings are addressed: organizational issues, data and system integrity, public access and stakeholder involvement, and reporting and data management burden. The second and third broad categories address issues specific to mandatory GHG inventories and emission reduction registries, respectively.

There are several key findings that should inform any reading of this report. First, there has been very little real experience with GHG inventories or emission reduction registries to date, and those that have been developed have differing policy objectives. Second, the experience that has occurred to date points to the critical need for policy objectives and the overall policy framework to be well articulated and agreed upon before inventory and emission reduction registry design can begin. Third, funding and resources must be adequate to carry out the policy framework. And fourth, stakeholder engagement in the development of the policy framework and system design is highly desirable.

## INTRODUCTION

In Spring 2002, the Alberta government issued a climate change action plan in the form of a discussion draft. In that plan, it proposed two actions of interest to this project: the implementation of “a mandatory greenhouse gas (“GHG”) emissions reporting program for large emission sources” and a commitment to “lead the development of an approach to emissions trading that reflects Alberta’s unique needs and circumstances...and works with national, continental and international systems.” In May 2002, it required newly approved power plant expansions to maintain or offset GHG emissions at the equivalent of an efficient natural gas facility, which will likely bring a baseline and credit GHG trading system into play.

As noted by the Pew Center on Climate Change, “no effort to reduce greenhouse gas emissions can succeed without the accurate measuring and tracking of emissions.”<sup>1</sup> Systems for effectively tracking, recording and verifying emissions and emission reductions will form a cornerstone of Alberta’s climate change actions. As a result, this project examines key issues and learnings from other jurisdictions respecting the design and implementation of systems for tracking and accounting of emissions, emission reductions, credit creation, use and transactions of credits for emission reductions. This information has been gathered to assist Climate Change Central in determining what kind of role, if any, it wishes to take in the creation and management of a GHG inventory and emission reduction registry.

To reduce common nomenclature issues around inventories and registries, the term “emission and emission reduction accounting systems” (“EERAS”) will be used as a general term encompassing all these systems. An inventory is used to describe systems for tracking and reporting emissions. Registries describe systems for tracking and reporting emission reductions, baselines, credit creation/use and/or trading.

At minimum, an EERAS has three purposes: 1) to provide regulators with a system for accounting and tracking emissions, emission reductions, credit creation and/or credit transaction/use activity, 2) to provide transparency and public access to emissions, emission reduction and credit transaction/use information, and 3) to provide sources of emissions and emission reductions with a common venue to report and register information. Provided policy makers create sufficient public access to an EERAS, there is, arguably, a fourth purpose, which is to stimulate public accountability.

Where possible, real experience with GHG EERAS was sought, otherwise EERAS created for inventory and trading of emissions of criteria air contaminants were reviewed.

## STATUS OF GHG EERAS DEVELOPMENT

To provide a better understanding of the current state of GHG EERAS development, this section summarizes the status and type of GHG EERAS in discussion, development or implementation in Table 1 below. Of interest to this report, NESCAUM just completed an 18 month state GHG registry collaborative project which involved representatives of eight states in an attempt to design a standard GHG registry model<sup>2</sup>. In the end, no consensus was achieved between the eight states on what a standard model should look like, largely because each state has slightly different policy objectives for its GHG activities. Five general registry models were examined through the NESCAUM initiative with some consensus achieved on design parameters for those specific models. The four models relevant to this report are summarized in (a) through (d) below.

---

<sup>1</sup> See Pew Centre’s brief entitled “U.S.Domestic Response to Climate Change: Key Elements of a Prospective Program: Tracking and Reporting Greenhouse Gas Emissions, [www.pewclimate.org/policy/program\\_tracking.cfm](http://www.pewclimate.org/policy/program_tracking.cfm) .

<sup>2</sup> See NESCAUM’s “State Registry Emissions Information Programs (“Registry”) Issue Paper”, March 2002, available at <http://www.nescaum.org/Greenhouse/> . NESCAUM stands for Northeast States for Coordinated Air Use Management. It is a non-profit collaborative of eight northeastern states: NH, MA, ME, VT, NY, NJ, RI, & CO.

**TABLE 1: STATUS OF GHG EERAS DEVELOPMENT**

<b>Jurisdiction</b>	<b>Status of GHG Registry Actions</b>	<b>Type of Registry</b>	<b>Voluntary/Mandatory</b>	<b>Public/Private</b>	<b>Start Dates</b>	<b>Comments</b>
California	Enabling legislation passed in 2000, implementation underway.	Inventory, baseline registration, public recognition	Voluntary	Private	Fall 2002	Database complete and registry enrolment begins
Oregon	Climate Trust in operation since 1997	Emission reductions (offsets)	Mandatory		1997	CT is a non-profit that ‘finds’ carbon offsets for new energy facilities; funded by those facilities.
Illinois	Pre-proposal discussion	Emission reduction	No policy yet	N/a	N/a	IL EPA to report on establishment of a GHG reduction banking and trading registry between Sept 2003 & Sept 2004
Maine	Enabling legislation passed	Inventory	Voluntary	Public	N/a	Maine is expected to adopt the NEG ECP model (see next item)
New England Governors- Eastern Canadian Premiers (NEG-ECP)	Commitments in Climate Change Action Plan (2001)	Inventory and Emission reduction	Mandatory Inventory, Voluntary Trading System	N/a	N/a	A plan for a regional emissions inventory and trading system is expected to be tabled in late Aug, 2002. Note that this is likely to be a “top-down” inventory <sup>3</sup>
New Hampshire	Enabling legislation passed; operational rules adopted.	Emission reduction	Voluntary	Public	2001	Although operational since 2001, there has been no emission reduction registration activity
New Jersey	Operational	Emission reduction	Voluntary	Private**	2000	Only one registration of GHG reductions has occurred since inception in June 2000. ** - the private registry operator went bankrupt, so the system is currently being managed by the state
New York	Pre-proposal discussion	Emission reduction	No policy yet	N/a	N/a	Governor has set up a GHG Task Force; a focus area is registries and

<sup>3</sup> A “top-down” inventory uses measurement protocols and emission calculation methodologies that use annual statistics and data for a region (eg. economic data, fuel use, etc), whereas “bottom-up” inventories require reporting of actual emissions from individual entities within a region.

Jurisdiction	Status of GHG Registry Actions	Type of Registry	Voluntary/ Mandatory	Public/ Private	Start Dates	Comments
						emissions trading
Texas	Pre-proposal discussion	Inventory and emission reduction	No policy yet	N/a	N/a	No firm dates
Wisconsin	Enabling legislation passed; operational rules approved; in place by Jan 2003	Public recognition, emission reduction and baseline protection	Voluntary	Public	January 2003	Wisconsin's registry is distinctive because it tracks four pollutants (CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>2</sub> & Hg)
Canada – Voluntary Challenge/Baseline Protection Initiative (BPI)	BPI is partially operational; validation rules not yet available	Inventory, public recognition and baseline protection	Voluntary	Private	April 2000	Little activity to date; rules are still under development.
U.S.: upgraded s. 1605(b)	Pre-proposal discussion	Inventory, emission reduction, baseline protection, public recognition	Voluntary	Public	2004	New guidelines for upgraded program by January 2004
United Kingdom Emission Trading	Operational	Inventory, baseline protection and Emission reduction	Voluntary	Public	January 2002	Design is driven by emissions trading: cap and allowance with provision for inclusion of baseline & credit
ERT Inc. (private)	Operational	Inventory, baseline creation, Emission reduction	Voluntary	Private	1998	ERT Inc.'s mandate is to develop a GHG registry and associated services to support "robust" GHG emissions trading market. ERT Inc. was created by the Environmental Defence Fund
EMDG (private)	Under development	Emission reduction credits	Voluntary	Private	N/a	EMDG wishes to create a global Carbon Repository that would issue common carbon credits. It is a collaborative effort of NatSource, IETA, and others. EMDG = Emission Market Development Group.

The NESCAUM classification is used in Table 1 as follows:

- a) **inventory**: “bottom-up” emission inventories from emitting facilities within a jurisdiction
- b) **public recognition**: the jurisdiction commits to publicly recognizing a participant’s GHG reporting and reduction actions
- c) **baseline protection registry**: by allowing entities to quantify and record an emissions baseline, these registries seek to ensure that participants will not be penalized under future regulations for making emission reductions now
- d) **emission reduction registry**: emission reduction registries record actions taken to reduce emissions that are then quantifiable and fungible

## EERAS DESIGN AND THE ALBERTA CONTEXT

By dissecting Alberta’s draft discussion paper on Climate Change and the government’s May 15 announcement on the Genessee power plant expansion, the province appears headed towards the creation of a mandatory GHG inventory for large emitting sources, and a baseline & credit trading system that will, at minimum, allow new power plants to offset their GHG emissions to those of an equivalent natural gas fired station. The inventory will be required to track both mass and rate-based emissions at a facility level. A baseline and credit trading system will require the registration of baselines or the allocation of allowances, and the creation & registration of credits for emissions reduced, avoided or removed. A key question for Alberta will be whether it should design a baseline and credit trading system right away, or whether an interim approach based on the implementation of an emission reduction registry would be more appropriate until national and international policy frameworks are more robust.

The following general design issues for EERAS, and specific design issues for mandatory inventories and emission reduction registries have been identified for consideration in discussions on how these programs are best designed and implemented. They are drawn from both literature and recent interviews on experience to date with GHG EERAS. Each of these design issues will be discussed in turn, using examples from real-life experience to illustrate their significance and common pitfalls. See also Appendix A and B for summary tables of EERAS design issues.

## GENERAL EERAS DESIGN ISSUES

General EERAS design issues can be separated into four broad categories: a) organizational, b) data and system integrity, c) public access and stakeholder involvement, and d) reporting and data management burden. A summary of the sub-issues within each category can be found in Table 2, General Design Issues for an EERAS. Each of these broad categories will be looked at in turn in the text below.

**TABLE 2: GENERAL DESIGN ISSUES FOR AN EERAS**

1. Organizational
  - Mandate/Policy Objectives
  - Public or private
  - Funding/Resources
  - Latitude for Adaptability
2. Data and System Integrity
  - Measurement and quantification of data (protocols & guidance)
  - Data verification procedures
  - Auditing
  - Compliance/Enforcement/Liability

3. Public Access and Stakeholder Involvement
  - Public consultation/involvement opportunities
  - Public/stakeholder outreach & education
  - Website content, navigability
  - Confidentiality
  
4. Reporting and Data Management Burden
  - Coordination with other programs
  - Ability to provide, enable technical assistance, support
  - Ease & mechanics of reporting

**a) Organizational Issues**

The starting point for any EERAS is a clear statement of policy objectives and the allocation of adequate resources (staff, technical expertise, funds) to carry out those objectives. Without this kind of framework, the EERAS will fall short of expectations and initial policy commitments. For example, in Wisconsin, the original intent was to design an emission reduction program that was more rigorous than the U.S. Department of Energy's current s.1605(b) program. However, these original objectives had to be compromised significantly when it became evident that there would be no new funding or staff resources for the program. As a consequence, the rigour of the Wisconsin program is not much different than the widely criticized s.1605(b) program. In contrast, California's Registry objectives are well articulated and sufficient start up funds and grants have been allocated by the government to ensure that the Registry is appropriately designed, staff and resourced at the outset. The difference in budget between Wisconsin and California's program is \$25,000 v. \$1.5 M.

Adequate and consistent funding of the EERAS program will go a long way to ensuring its success. This may seem like an obvious statement, but should not be overlooked in the design phase, especially since New Jersey is now faced with taking over its registry operation because the private operator went bankrupt. California's Registry will be particularly interesting to observe given its objective of operating on a cost-recovery basis. To accomplish this, it will require somewhere between 200 and 300 participants who will, on average, pay \$4000 each year to participate. This reporting fee is above and beyond the participant's internal costs of reporting and subsequent third party verification - not an insignificant outlay for participation in a voluntary program. Wisconsin also noted that its initial policy objectives were compromised when it became evident that no new funds would be available to run its registry program. The consequence for Wisconsin is a less rigorous program with greater likelihood of data integrity issues because of limited staff time available to implement and operate the program. Less funding may also limit database/website design, auditing functions, technical support and assistance, and data handling capacity.

The choice of whether to proceed with a public, private or "hybrid" EERAS will be dictated by factors such as the prevailing political culture, perceived cost savings, a desire to create an arms length relationship between government and the EERAS, and/or to create a multi-stakeholder organization to manage the program. Nonetheless, in all cases, government cannot delegate the entire program over to a private or hybrid entity, and must retain oversight authority. The private EERAS is illustrated by Ontario or New Jersey, where the private registry operator manages only the procedural aspects of applications for emission reductions. New Jersey's registry was planned to work on a cost-recovery basis, but was unable to sustain itself under those conditions and folded. The second model is the hybrid or multi-stakeholder model, as in California's Climate Registry, which has some substantive powers delegated to it, eg. the certification of third party verifiers, the development of measurement and certification protocols, etc. The

California model should be studied carefully because of the legal issues that have arisen as between the authority of the Registry versus that of the State Energy Commission.

Finally, given that GHG reporting is still in fairly nascent stages, any EERAS should be designed to provide latitude for change and adaptation to evolving quantification, verification and reporting requirements. This is most easily accomplished by addressing these items in a Code of Practice or Guidance, which is more easily amended than a regulation or statute. It is also reasonable to predict that GHG reporting requirements are going to become more stringent and comprehensive over time, so there may be longer term advantages to starting off with more rigorous reporting requirements, even though this may cause strong pushback from some participants during policy development and at the outset of implementation.

## **b) Data and System Integrity**

Given the recent evolution of the GHG debate, a new imperative in GHG reporting will be the actual and perceived integrity and robustness of data and reductions reported, and any emission credits that are created. It is clear that GHG reporting and emission reductions are here to stay, so any EERAS initiative is well served by placing significant value on promoting data and system integrity. Not only will this assist the inevitable transformation of reporting and reduction programs once global rules are established, but it will also promote public confidence, accountability and support commercial transactions of emission reductions.

The cornerstone of data quality and integrity will be the protocols used to measure GHG emissions and emission reductions and how effectively the protocols are used by participants. There are several aspects of measurement/quantification protocols that are of interest: a) on what basis are they developed and/or adopted, b) what kind of process supports their development/adoption, and c) how are they made available to participants.

Existing inventories and registries have taken a variety of approaches to protocol development and/or adoption, ranging from permissive use of a very broad set of existing estimation and measurement tools (Ontario emission reporting, NPRI, New Hampshire, U.S. DOE's s.1605(b) GHG reporting program) to developing specific measurement protocols to ensure consistent, accurate reporting techniques (California Registry). The big tradeoff in restricting the use of measurement protocols is the level of sophistication of participants and commensurate ability to use more detailed or involved techniques. Said another way, the longer the list of methodologies, the more likely there is to be a simple way to estimate emissions or emission reductions, but it is also more likely to lack accuracy/precision. How data is calculated by a participant goes directly to the ability of an EERAS to support claims around the accuracy and integrity of reported data.

The second consideration around measurement protocols is the process by which they are developed or adopted and who holds the authority to adopt them. California's Registry has elected to proceed with the development of a general protocol as well as industry specific protocols because it viewed existing protocols, such as the newly published and widely supported WBCSD/WRI GHG Reporting Protocol (see <http://www.ghgprotocol.org/>), as providing too much latitude or "weasel room" in reporting. As a result, the California Energy Commission hired a consultant to develop a protocol guidance document, ie. a framework for measurement protocols, that went through a couple of rounds of public consultation before being finalized, and actual protocol development is now in the hands of the Registry, and will also go through some public consultation process. For the former, a Technical Advisory Committee was created to inform the development of the protocol guidance document, and there is a similar committee in place to assist the actual protocol development. In other instances, existing EERAS have simply elected to adopt what another jurisdiction has already adopted, e.g. adopting the list of measurement protocols itemized under U.S. DOE's s.1605(b) voluntary GHG reporting program.

Another consideration, in light of the relative newness of GHG reporting, is providing enough latitude for participants to propose alternative measurement approaches and have a clear mechanism for accepting or rejecting alternative approaches, as the case may be. California is considering the adoption of an

“exception rule” to accommodate participants who end up with “undue” reporting burdens or unique situations that cannot be addressed by existing protocols.

It is important for protocols to be easily available to inventory participants. The best approach is to have protocols available on-line. It is also helpful if protocols are user friendly and accessible. This where a Technical Advisory Committee can be useful in informing the adoption/development of protocols and provide guidance on how to make them as accessible as possible to participants. Technical assistance, outreach, participant workshops and training should be core elements of an EERAS program.

Verification of reported information can occur in a number of ways: by representation of a senior officer of the reporting participant, by a third party, or by the public managers an EERAS. By far the most common approach for inventories and emission reduction registries has been to require the representation of a senior officer, and to encourage third party verification. There is no good reason for inventory managers to get involved in verification of data submitted for inventory purposes, unless government wishes to assume responsibility for the accuracy of the data. The same goes for verification of emission reductions and emission credits.<sup>4</sup>

Third party verification is a requirement of California’s Registry and New Jersey’s Open Market Trading Registry. For California - which is an inventory program as opposed to an emissions trading program like New Jersey- it remains to be seen whether third party verification is a boon or burden in the long run. Not content just to develop customized reporting protocols and third party verification rules, California has also developed a certification protocol as a guidance for third party verifiers on how to assess the accuracy of reported data. California certifies its third party verifiers, so participants must choose from within the pool of certified verifiers. In contrast, New Jersey requires emission credits to be verified by a professional engineer or chartered public accountant prior to use.

If an EERAS is concerned about data integrity, it will need an audit process of some kind that involves random checking of reported data to assure that it is of appropriate quality and that there are no deficiencies. This generally catches substantive compliance issues, whereas procedural compliance issues (late reporting, incomplete reporting) are obvious when they occur, provided a form tracking system has been put in place. New Jersey’s emission trading system has encountered legal actions because of faulty emission credits. A government official indicated that one of the contributing factors was a failure to execute the department’s planned audit program, which allowed the deficient emission credits to stay undetected.

Typical penalties were not examined as part of this project, and it is suggested that existing legislation such as the Alberta Environmental Protection and Enhancement Act and inventory programs such as NPRI be looked at for guidance on appropriate penalties. Penalties and enforcement actions, in almost all cases, are managed by public officials. It is recommended that liability and allocation of risk issues arising from emission credit creation and transactions be examined separately.

### **c) Public Access and Stakeholder Involvement**

Given the significant public interest nature of global climate change and the inherent complexities of GHG management and reductions, it is important for the public to be able to obtain accurate, up to date information on emission trends, emission reductions and emission reduction transaction activity. Of course, public access must be balanced against standard rules and customs of business confidentiality. A starting place is the rules found in both federal and provincial access to information statutes.<sup>5</sup> The key

---

<sup>4</sup> In a credit trading system, government may choose to “approve” the creation of emission credits so as to provide greater certainty of credits in the market. This step usually comes after third party verification.

<sup>5</sup> Typically, confidential business information in Canada is defined as follows:

(a) trade secrets of a third party;

(b) financial, commercial, scientific or technical information that is confidential information supplied to a government institution by a third party and is treated consistently in a confidential manner by the third party;

tradeoffs in balancing confidentiality with public access are the relative granularity of publicly available reported information and ability of the EERAS to securely manage confidential information.

Public involvement and stakeholder consultation in the development of registry rules, forms, protocols, and website applications may well be critical to the success of any EERAS program. Both Wisconsin and California went through and are continuing to go through significant public consultation processes related to general registry design, protocol development, reporting requirements, website design, etc. In most instances, it has taken from two to three years to go from an initial state policy commitment to having a registry up and running, which normally includes anywhere from four to eight months of website development and testing. This is a critical time for public and stakeholder involvement that, if done well, will allow a smoother transition into an operational EERAS.

A third prong of transparency and public access to EERAS is related to the information and data that is available to stakeholders via a website and the ease of navigating the website. Some sites, eg. California, have elected to have both a “members only” portal with restricted access to data as well as a public site that provides access to aggregated data. ERT Inc.’s GHG Registry provides a good overview of functionality as between public, participants and Registry management. See <http://www.ecoregistry.org/ghgreports.asp>. This is a useful approach when the granularity of reported data requires confidentiality at the fine level (eg. source or facility level) and public access at the coarse level (eg. data aggregated to an entity level). It can also allow members/participants to engage interactively with the database to create, trade or use emission reductions, while providing the public with more limited “read access” only. The best way to ascertain how to build an EERAS website is to review the existing models, with California’s being one of the top in the bunch. Texas’s NO<sub>x</sub> and VOC emission trading program website is also worth examining.

Finally, there is no understating the value of an EERAS that can turn around reported data onto a website as close to real time as possible. Ontario’s annual emission reporting regulation has been set up so that facility data is transmitted instantaneously from participant to the inventory managers and posted electronically on the website almost immediately. This is a far cry from inventory programs like NPRI that are two years behind in publishing annual reporting data. Recent programs such as the U.K.’s emission trading program run in close to real time, which is an enormous boon to users of the system.

#### **d) Reporting and Data Management Burden**

The reporting and data management burden for participants and EERAS managers is a key practical consideration in the design of an inventory or registry. The challenge for an EERAS designer is to develop a database that can incorporate the tools required by participants (forms, guidance documents, etc) as seamlessly as possible, while keeping website and database design within a jurisdiction’s funding and resource constraints. Thus, this section can be broken down into three aspects: the required content of reporting forms, the ease of use of those forms and how information is processed by the EERAS.

From a content perspective, some registries want participants to include information about measurement methodologies and emission factors (Ontario, California), whereas others just want the “facts” consolidated on one or two pages (New Hampshire, Wisconsin) and strongly encourage the participants to maintain extensive documentation in support of reported data at their offices. Certainly the former approach translates into a much heavier document burden for the registry. For example, Ontario’s emission trading registry rules require the operator to scan all documents related to emission reductions into pdf and keep paper copies for five years.

---

(c) information the disclosure of which could reasonably be expected to result in material financial loss or gain to, or could reasonably be expected to prejudice the competitive position of, a third party; or

(d) information the disclosure of which could reasonably be expected to interfere with contractual or other negotiations of a third party.

From an EERAS perspective, there needs to be a system in place for receiving, storing, managing, and reporting out the data. The EERAS will have to decide on how participants will report into the system and what the database and website will look like. Least expensive and most time intensive for the EERAS is a paper-based system with manual entry into a database. If simple electronic reporting is desired, one option is to use Excel spreadsheets for reporting forms, which can then be integrated into a larger Excel spreadsheet or database program. With the internet, there are opportunities to create “web-enabled” forms that allow users to add data and transmit it instantaneously to the EERAS database and website. Pull down menus on the form, help buttons and links to technical supporting documents can help a participant navigate the reporting forms with greater ease. Of course, these approaches are much more expensive to design up front but are cheaper to operate in the long run because of lower staffing requirements.

Coordination with other programs is important to engaging participant and stakeholder support for the EERAS. An entirely separate program is likely to be seen as more burdensome by participants and there will be greater challenges in coordinating data for big picture viewing. For example, Wisconsin has chosen to combine its emission reduction reporting with mandatory GHG inventory reporting for large sources and plans to link this information when its website is up and running. It also allows users to use the reporting forms from the U.S. DOE’s s.1605(b) program, if they so choose. Texas has combined its Nox and VOC inventory and credit registry in much the same way, which is also very convenient for users interested in both types of information. Ontario and Environment Canada are working on a three year pilot to consolidate emission reporting requirements. These are all good examples of leveraging existing programs and keeping participant and EERAS burdens to a minimum.

Several registry officials indicated the importance of being able to provide or enable technical assistance and support for EERAS participants. Their findings to date are that participants are new and somewhat sketchy about GHG reporting, and even with simple, clear, comprehensive protocols, participants are likely to require some assistance. This message was especially strong from California and New Hampshire. Technical advice can be provided in two ways, one in-house (which may be preferred if the EERAS is run by a public agency) and the other is to refer parties to consultants “certified” or otherwise recommended by the EERAS. The latter is, of course, a paying option for participants.

### **SPECIFIC DESIGN ISSUES FOR A MANDATORY INVENTORY**

Experience with GHG and other emission inventories suggests that there are several additional “core” issues that are especially relevant to GHG inventories. These issues also have some relevance to emission reduction registries, but are not “core” in the same way as they are to inventories. They are summarized in Table 3 below.

**TABLE 3: SPECIFIC DESIGN ISSUES FOR A MANDATORY INVENTORY**

- Scope of reporting (Entity, facility)
- Emissions reported (including type, indirect)
- Reporting Metrics (rate based, mass based, CO2e)
- Reporting thresholds
- Frequency of reporting

The obvious starting place for mandatory GHG inventory reporting is who reports what, how, and when. For Alberta, the initial question of who reports what appears to have been decided: large point source emitters of GHGs will report annual mass and rate-based emissions. Thus, facility level reporting can be anticipated. The next questions are whether this should be accompanied by entity level reporting and, if so, what geographical boundaries, if any, will be used to limit or focus reporting. Jurisdictions like Wisconsin have determined that only facilities and projects within the state should be included in their GHG inventory and emission reduction registry. California strongly encourages entities with out-of-state

operations to report their national GHG emissions, although this is not mandatory. Finally, although the inventory is mandatory for large point source emitters, should it also accommodate those facilities and entities that wish to report voluntarily. Considerations in deciding geographical boundaries will be the over-riding purpose of the inventory, coordination with other programs, reporting burden for participants and the data management burden for the registry.

In terms of emissions reported for inventory purposes, the focus has been clearly on CO2 to date. One of the reasons for this is that measurement techniques for other GHG's are not viewed as sufficiently robust at this time. This is the view of both California and individuals who participated in NESCAUM's GHG Registry State Collaborative.

Ontario's emission reporting regulation requires annual reporting of the six GHGs named in the Kyoto Accord, and there have been discussions by National Pollutant Release Inventory (NPRI) working groups for a couple of years on including those gases as part of annual NPRI reporting requirements. The latter programs are not GHG inventory programs per se, but are in a position to collect and report this kind of data (Ontario already does this on a facility basis – see <http://www.ene.gov.on.ca/environet/onair/splash.htm>.) California's Registry will accept reporting of GHG's other than CO2, and at this time require them to be reported in CO2 equivalents.

Should reporting of both direct and indirect emissions be required, the main consideration is keeping the two types of emissions separate for both reporting and registry purposes. This eliminates double counting and allows separate tracking of mass emissions and overall efficiency improvements within energy intensive industries. Clear ownership rules are required if indirect emissions are reported. California's Registry ownership rules provide a reasonable model.

Reporting thresholds and frequency of reporting will dictate who reports what and the timing of reporting. This is important to understanding the data management burden an inventory program creates and has consequences for staffing and resources. The Alberta GHG inventory reporting appears to be annual, which means that there will be concentrated activity by inventory managers both before and especially after the reporting deadline, with little or no activity occurring at other times of year.

## **SPECIFIC DESIGN ISSUES FOR AN EMISSIONS REDUCTIONS REGISTRY**

Just as GHG inventories have unique core design issues, so do emission reduction registries. With emission reduction registries, it becomes more difficult to separate pure policy from the design of registry mechanisms. Table 4 shows a short list of design issues which are considered in the subsequent text. For a more extensive list of design issues for both registries and inventories, see Appendix A and B.

### **TABLE 4: SPECIFIC DESIGN ISSUES FOR AN EMISSIONS REDUCTIONS REGISTRY**

- Rules for setting baselines
- Rules for claiming emission reductions and/or credits, including ownership
- Tracking emission reductions, usage & annual compliance reconciliation/"true-up"
- (inc. retirement, cancellation)
- Emission reduction/credit transfer rules & enabling emissions trading

Emission reduction registries can be much more complex in terms of data management than inventories, especially if they are designed to support trading or transfers of emission reductions. One of the first tasks that must occur with any emission reduction exercise is the establishment of a baseline. This has been a contentious point for all of the GHG emission reduction registries because it involves tradeoffs between using a standard, consistent rule for setting baselines or allowing participants to choose their baseline from 1990, 1991 or some other date onwards. There are further considerations in terms of whether baselines should represent an average of two or three years of operation. Depending on how the

registry rules are set up, decisions on how to set baselines have in some instances been left to the registry to determine, eg. New Hampshire, Wisconsin, California.

Rules for claiming emission reductions and credits may have several facets: a) criteria on allowable reductions or removal projects, which will normally take into account the type and location of projects, b) data required as evidence of reductions, c) ownership rules, d) verification requirements, and e) credit creation rules. Depending on how these rules are established, the registry may have a greater or lesser red tape burden.

For example, under (a) above, registry rules may choose to include or preclude certain types of projects based on their nature (eg. carbon sequestration) or location (outside of the jurisdiction). Carbon sequestration projects are still viewed by some jurisdictions as controversial from a measurement perspective, so some emission reduction registries are choosing to keep them out at this stage (eg. New Hampshire, New Jersey). Parties may also wish to register reductions or offsets that they have already registered elsewhere. This should be tracked and recorded. It may also be useful to track registry developments at the international level, for example, under the COP mechanism there is a group working on registries that recently issued a discussion paper entitled “Possible Technical Standards for National Registries, the Clean Development Mechanism Registry and the Transaction Log under the Kyoto Protocol” (June 2002).

Depending on how rules are set up, the burden of substantiating emission reductions or credits can vary significantly. For example, Wisconsin’s registry, which stops short of credit creation, will capture all emission reduction projects, regardless of type or pollutant, on one database view, require participants to keep track of all their own records, and does not have any verification requirements. The only determination that is made by registry officials is whether the information provided is complete and meets the specified requirements. In contrast, Ontario’s emission trading registry, which enables the creation of credits, has much more onerous substantive and procedural requirements around proof of emission reduction and credit creation, including a 30 day public comment opportunities for the latter.

Clear ownership rules for emission reductions are essential for an emission reduction registry. Having these rules in place helps ensure that an entity’s reported annual reconciliation of emissions is in accordance with the emission reductions it holds. This not only reduces the risk of double counting but also provides some certainty in transactions of emission reductions. California has probably gone the furthest in terms of elaborating ownership rules. These are available on the Registry website.

In practice, with the exception of New Jersey, no North American jurisdiction has implemented a formal GHG credit creation system and existing registries are focused on registering emission reductions at most. In terms of enabling GHG emissions trading in the future, an emissions reduction registry should ensure that all claimed reductions meet the criteria for creating emission reduction credits: they must be quantifiable, verifiable, surplus and eventually enforceable. What is required to achieve this is outside the scope of this report.

The New Jersey experience has been less than ideal and has created a number of learnings for future GHG trading programs. In summary, New Jersey decided to piggyback GHG credits onto its existing Open Market Emissions Trading Registry, which was run by a private operator. Since its creation in 2000, only one GHG credit has been registered and the Registry has seen the private operator go bankrupt and legal actions around deficient credits. New Jersey officials suggested three key learnings from this experience: emission credits should not be registered until they are appropriately verified (NJ’s rules only required verification prior to credit use), registries should be run by an agency, and auditing programs must be a core activity of a registry.

In practice, there are a number of ways of tracking emission reductions/credits within a registry. The Wisconsin model is currently designed to include all types of emission reductions, regardless of pollutant or whether they are mass based or rate based, on one registry. In contrast, the NESCAUM GHG Registry State Collaborative concluded that an emission reduction registry is best served by creating different sub-registries for the following: registered emission reductions, registered offsets (including carbon sequestration, if applicable), use/retirement/cancellation of registered emission reductions, and transfers of registered emission reductions or offsets. The NESCAUM collaborative also recommended that

allowable emission reductions be mass-based only, and that direct and indirect emission reductions be registered separately. Of some interest, some existing non-GHG emission trading programs, like Texas, also include a sub-registry of forms and guidance documents as well as of prospective buyers and brokers.

No matter how a registry is ultimately set up, three criteria should be paramount in terms of the user interface: easy, timely access to information; simple, clear mechanisms to report and track the registration and transfer of emission reductions; and a secure, tamper-proof system. The first two of these have already been addressed in the general design discussion. With respect to the latter, some emission trading registry systems address data security by posting regularly updated pdf files to show new registrations and transfers. Others use a password protected member access portal. The PERT and ERT Inc. system, as mentioned previously, creates different levels of access to data depending on the user. This type of tiered approach may be more complex initially to set up, but has the advantage of being better adapted to the needs of different users. It also allows for protection of confidential information.

Given that Alberta will require new coal-fired electricity facilities to offset GHG emissions to an equivalent natural gas fired facility, an emission reduction registry must be able to track transfers, use and retirement of GHG emission reductions and offsets. This will require the creation of a sub-registry for emission reduction and offset transfers as well as a system for the coal-fired facilities to document use of those emission reductions and offsets. This requires the creation of a use or retirement sub-registry (or account) and a system for annual reconciliation and compliance reporting. In most existing systems, the latter occurs before the end of the 1<sup>st</sup> quarter subsequent to the compliance year.

Key for Alberta's policy framework will be a determination of whether government wants to be in the business of creating and approving emission credits or whether transactions of emission reductions and offsets occurs on a buyer beware basis according to specified protocols, with subsequent compliance auditing by government to assure that claimed emission reductions and offsets meet requirements. As suggested earlier, this may be an interim approach before establishing a full-fledged baseline and credit trading system.

## CONCLUSIONS

GHG EERAS design theory is still at an early stage and there is little real experience with existing programs to draw upon. EERAS developed so far have been designed with different policy objectives, which has resulted in a variety of different models and approaches. It is also clear that it is premature to judge the relative success or failure of existing EERAS, largely because there has been little incentive for participation by U.S. companies – in essence, the programs have been (or are being developed) but there are no real customers for them as yet. As a result, the real test of successful operation will come when participation in the program becomes mandatory or highly incented. The learning for Alberta is that a jurisdiction's policy objectives in creating an EERAS should be clear and well articulated. Because policy impacts EERAS design on so many levels (who reports, how they report, what do they report, etc) the key policy questions should be settled prior to EERAS design so that actual EERAS design and implementation can be executed efficiently and effectively. Stakeholder involvement and participation should be integral to the policy development and subsequent EERAS design process. It is also critical for policy makers to allocate sufficient resources to enable the EERAS to meet policy objectives, both in terms of design and ongoing operations.

Next steps for Alberta to consider in establishing a GHG inventory and emission reduction & trading registry are as follows: a) determine desired policy outcomes, resources available to support development of EERAS mechanisms, and how stakeholders should be engaged in the design process. All of these factors will have significant influence on the design process; b) propose draft policy objectives for the mandatory inventory, seek public comment and form a stakeholder working group on inventory design; and c) further examine different models for handling the CO<sub>2</sub> offset commitments made by EPCOR and TransAlta, eg. a simple emission reduction registry with a compliance program around claiming offsets or reductions, a more formal baseline and credit trading system, or an offset model like the Oregon Climate Trust, to determine which approach best suits Alberta's current and future needs.

## **BIBLIOGRAPHY OF WEBSITES & RECOMMENDED READING**

NESCAUM GHG REGISTRY STATE COLLABORATIVE

<http://www.nescaum.org/Greenhouse/Registry>

<http://www.nescaum.org/Greenhouse/Registry/software.pdf>

For recommended reading on GHG registries, see website for:

“How to Report: Possible Resources for Participation and Administration”

“State GHG Registry Emissions Information Programs (“Registry”) Issue Paper”

“State Greenhouse Gas Registry Collaborative”

CALIFORNIA CLIMATE ACTION REGISTRY

[www.climateregistry.org](http://www.climateregistry.org)

ONTARIO EMISSIONS TRADING REGISTRY

<http://www.ene.gov.on.ca/envision/air/etr>

WISCONSIN VOLUNTARY EMISSION REGISTRY ADVISORY COMMITTEE

<http://www.dnr.state.wi.us/org/aw/air/hot/climchgcom>

NEW HAMPSHIRE GHG REGISTRY

<http://www.des.state.nh.us/ard/climatechange/ghgr.htm>

NEW JERSEY OPEN MARKET EMISSIONS TRADING REGISTRY

<http://www.state.nj.us/dep/aqm/omet/>

ENVIRONMENT RESOURCES TRUST, Inc.

<http://www.ert.net/ghg>

OREGON CLIMATE TRUST

<http://www.climatetrust.org/>

CLEAN AIR CANADA (formerly PERT)

<http://www.cleanaircanada.org/home.html>

U.S. DEPARTMENT OF ENERGY, s.1605(b) + related proposals for PROGRAM REVISIONS

<http://www.eia.doe.gov/oiaf/1605/frntvrgg.html>

<http://www.energy.gov/HQPress/releases02/julpr/pr02136.htm> (letter to President)

<http://www.pi.energy.gov/enhancingGHGregistry>

VOLUNTARY CHALLENGE REGISTRY – BASELINE PROTECTION INITIATIVE

[http://www.vcr-mvr.ca/home\\_e.cfm](http://www.vcr-mvr.ca/home_e.cfm)

THE PEW CENTRE FOR CLIMATE CHANGE

Recommended Reading:

“Greenhouse Gas Reporting and Disclosure: Key Elements of a Prospective U.S. Program” at

[http://www.pewclimate.org/policy/index\\_ghg.cfm](http://www.pewclimate.org/policy/index_ghg.cfm)

**APPENDIX A**  
**SUMMARY OF DESIGN FACTORS RELEVANT TO INVENTORIES AND REGISTRIES**

<b>Design Factor</b>	<b>Applicability to an Inventory</b>	<b>Primary Considerations</b>	<b>Applicability to an Emission Reduction Registry</b>	<b>Primary Considerations</b>
<b>mandatory or voluntary</b>	Yes	Voluntary reporting will lead to incomplete inventory; mandatory approaches more likely to adopt stringent rules	Yes	To encourage participation, existing voluntary reporting schemes have favoured less stringent rules at the expense of accuracy, credibility
<b>who can/must report</b>	Yes	completeness of inventory: what percentage of total GHG sources should be targeted for inclusion	Yes	Inclusion of sequestration projects, emissions avoided: some jurisdictions have chosen to exclude these to reduce complexity, credibility issues
<b>thresholds/triggers for reporting</b>	Yes	Most jurisdictions have adopted a de minimis rule, eg. <5% of total emissions & > 10,000 tons CO <sub>2</sub> e	Yes	Unlikely that credits < 1 ton CO <sub>2</sub> e would be accepted for a registry
<b>GHGs reported</b>	Yes	Robust quantification techniques for GHGs other than CO <sub>2</sub> are still being developed	Yes	Should reductions be reported as specific GHGs or as a CO <sub>2</sub> e. If formula for CO <sub>2</sub> e conversion changes, will CO <sub>2</sub> e reductions from other gases be grandfathered; CO <sub>2</sub> e is likely common currency for international trading
<b>Reporting metric: mass and/or rate-based</b>	Yes	While absolute mass emissions are of greatest interest, some argue this should not be at the expense of encouraging efficiency gains through inventory reporting; rate-based reporting does not make sense for all industries, eg. manufacturing.	Yes	classifying efficiency gains as a “reduction” can be misleading b/c mass emissions may actually be higher
<b>Entity, facility or project based reporting</b>	Yes	Entity based reporting is more complex because of fleet/ownership changes; facility based reporting is commonly used for emissions inventory	Yes	Facility or project based reporting provides an entity with greater scope for “emission shifting”; recognizing reductions at a facility or project level risks

<b>Design Factor</b>	<b>Applicability to an Inventory</b>	<b>Primary Considerations</b>	<b>Applicability to an Emission Reduction Registry</b>	<b>Primary Considerations</b>
		reporting. Project based reporting not applicable.		rewarding entities whose overall emissions may be increasing; sequestration is usually project based
<b>What is reported</b> <b>a) emissions</b> <b>b) emission reductions</b> <b>c) offsets (inc. sequestration)</b>	a) yes b) no c) no	Emission reductions are reported implicitly if annual reporting is used; however, reason for reduction would have to be reported for this to be meaningful; consideration can be given to reporting both gross and net (adjusted for allowances/credits held)	a) yes (if baseline) b) yes c) yes	Most registries do not maintain an emissions inventory per se, although some, like UK, require emission reporting for setting baselines in a trading system
<b>Geographic boundaries</b>	Yes	Jurisdictional inventories are often restricted to sources within jurisdiction; however, if reporting is entity-based it could cause ‘emission shifting’ to entity facilities outside of jurisdiction	Yes	Should registry register emission reductions and credits created from intra-jurisdiction, country or international sources; concern is lack of national or international rules; least risk is with intra-jurisdictional emission reduction activities
<b>Types of emissions/emission reductions</b> <b>a) direct</b> <b>b) indirect</b>	Yes	Tracking indirect emissions widens the scope of participation. Useful if visibility of energy use is a goal. Double counting is a major concern – need to track these separately.	Yes	Tracking both is a way of encouraging both supply and demand side reductions; need to be recorded separately to avoid double counting; ownership issues arise.
<b>What years’ emissions/emission reductions must an entity report</b>	Yes	Inventories normally require reporting of the most recent year’s emissions. A specific year must be selected.	Yes	Some voluntary systems use “anytime” reporting, others require annual reporting. If baseline creation is desired, a baseline year must be chosen
<b>Frequency of reporting</b>	Yes	Inventories are normally reported annually.		Emission reductions are normally reported annually, or when achieved.
<b>Quantification, measurement protocols</b>	Yes	Can be developed by jurisdiction or adopted from other sources, eg. WRI/WBCSD GHG Protocol. Important for		Same as for inventories.

<b>Design Factor</b>	<b>Applicability to an Inventory</b>	<b>Primary Considerations</b>	<b>Applicability to an Emission Reduction Registry</b>	<b>Primary Considerations</b>
		them to be readily accessible to users; consistency with other jurisdictions significant for future data rollups, coordination initiatives.		
<b>Requirements for verification, certification</b>	Yes	Who certifies inventory: officer of submitting party? Third party? Jurisdiction? Most have chosen one of former two. Jurisdictional role normally limited to checking content of submissions, ensuring completeness. Quality of these requirements confirm credibility of inventory. If inventory contemplated for future use as regulatory baseline, verification is critical.	Yes	Who certifies emission reductions: officer of party responsible? Third party? Jurisdiction? If credits are to be created in future, apportionment of risk & liability + quality/credibility of credits in relation to trading market are key considerations. Certification of emission reductions as credits is addressed separately. Trend is to 3 <sup>rd</sup> party verification. Overly onerous verification requirements can discourage participation. Nonetheless, reductions should be real, surplus, quantifiable and verifiable for max. credibility
<b>Compliance Auditing</b>	Yes	Relevant if mandatory inventory	Yes	Relevant to ensure credibility of reductions claimed & overall system
<b>Enforcement &amp; penalties</b>	Yes	Relevant if mandatory inventory. Late, incomplete or otherwise deficient reporting normally attracts fines/penalties		If emission reduction reporting is voluntary, materially significant deficiencies could disqualify reductions and/or disallow participation.
<b>Technical Support/Assistance</b>	Yes	This can be provided “in-house” or via referrals to competent outside parties; if in house, additional resources required.	Yes	Same as for inventory.
<b>Recognition programs available</b>	Yes	This is more relevant to a voluntary registry; for mandatory inventories, like NPRI, recognition will	Yes	Again, this tends to be more relevant to voluntary emission reduction registries and promoting

<b>Design Factor</b>	<b>Applicability to an Inventory</b>	<b>Primary Considerations</b>	<b>Applicability to an Emission Reduction Registry</b>	<b>Primary Considerations</b>
		often encompass both ‘good’ and ‘bad’ performers. Rules ensuring credibility are critical to a public recognition program.		“good performers”. Can be designed as an incentive for participation. If so, rules ensuring credibility of data are critical to backing claims.
<b>Fiscal Incentives</b>	No		Yes	If reduction targets are created and surpassed, tax credits could be made available.
<b>Public Access</b>	Yes	Public availability of data on an internet site provides maximum transparency/accountability and opportunity for informed public input on associated policy matters	Yes	Same as for inventory.
<b>Locus of Administration</b>	Yes	Public, private or hybrid. Inventories are usually run by a jurisdiction, although California’s voluntary inventory is run by a non-profit with a multistakeholder Board of Directors and requires annual reports to legislature.	Yes	Public, private or hybrid. Both public and private models exist. Technically speaking, private and hybrid models require jurisdictional oversight; private models relieve jurisdiction of procedural, but not substantive, aspects of system. Questionable whether private registries save costs. Further risk if private registry folds (eg. New Jersey).
<b>User Fees/Transaction Fees</b>	No	With the exception of California’s voluntary inventory, there is usually no charge associated with inventory data collection.	Yes	Key considerations are extent to which cost recovery is important to maintaining program and at what point fees discourage activity
<b>Reporting Forms/Software</b>	Yes	Ease and simplicity of reporting will support participation. Manual reporting is more secure, but has higher red tape burden. Electronic reporting is simpler but requires system security. Electronic reporting could	Yes	Same as for inventory.

<b>Design Factor</b>	<b>Applicability to an Inventory</b>	<b>Primary Considerations</b>	<b>Applicability to an Emission Reduction Registry</b>	<b>Primary Considerations</b>
		facilitate coordination with other systems.		
<b>Addressing leakage</b>	No	Leakage could be relevant if public reporting causes an entity to shift emissions to its non-reporting facilities outside the jurisdiction	Yes	To address leakage, jurisdictions could require participants to explain, qualitatively and quantitatively, the reason behind changes in emissions each year. Reductions not attributable to direct actions to reduce emissions would not be registered
<b>Additionality requirements</b>	No		Yes	Several types of additionality: financial, regulatory, environmental. Claimed reductions should go beyond what is required by regulation.
<b>Ownership</b>	Yes	Require clear rules for attributing ownership of emissions.	Yes	Require clear rules for attributing ownership of emission reductions – this is especially relevant because of multiple parties potentially associated with a reduction – esp. indirect reductions
<b>Coordination, compatibility with other jurisdictions</b>	Yes	Overall design should not be significantly out of step with developments in other jurisdictions. National and continental GHG inventory roll-ups are inevitable. Also consider coordination with existing inventories, eg. NPRI	Yes	Same as for inventory; must also adjust for uncertainty of Canada adopting a Kyoto-based rule system.

## APPENDIX B

<b>SUMMARY OF ADDITIONAL CONSIDERATIONS FOR ALLOWANCE AND/OR EMISSION REDUCTION CREDIT/TRADING REGISTRIES</b>
---

Design Factor	Primary Considerations
What types of projects can result in credits	Absolute emission reductions, relative emission reductions (eg. Efficiency gains), sequestration projects (agricultural, forestry, other), indirect emission reductions, renewable energy projects
Credit creation/registration	Establishing clear ownership/title, real and surplus reduction, verification requirements,
Restrictions on use of credits and allowances	Should an entity be able to meet offset requirements using only one type of credit, or, if applicable, is a mix of credits and allowances preferable.
When can credits be used	Annually? Quarterly? Anytime? (this could bear on how a company chooses to report its progress towards GHG reduction goals)
Temporal limitations on credits	For how long should a specific type of credit be usable
Banking rules	Should there be any restrictions on banking of credits, given the potential impact on markets and signals for ongoing GHG reduction/removal.
Verification of Credits	Who should verify credits and when (eg. Prior to registration or after), what criteria should be used to verify credits, how should the verification scheme allocate risk as between buyer and seller.
Who can trade	Should there be any geographic, commercial or other restrictions on who can trade credits within the system
Public Notification, Access & Review	Should there be a role for public review/comment in credit creation; what activities (and associated information) should be transparent to the public
Tracking allowances	These need to be tracked separately from credits
True Ups in hybrid allowance based trading	A true up period is required in allowance and hybrid trading systems to ensure that an entity possesses sufficient credits and/or allowances to meet emission limits. This normally occurs in the first quarter following each trading year.
Tracking transfers	Should allowance and/or credit transactions be tracked as part of the registry
Coordination with other jurisdictions, private registries	Protocols for credit identification, use and retirement to prevent leakage and double counting.