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Introduction to Inventories and Registries

Presentation Outline – PNWIS Managing GHG Emissions
Revision A – 27 May 2004

What is an inventory?

- An inventory is a calculation of all of the GHG emissions attributable to an entity during a prescribed time frame, usually one year.
- Inventories of GHG sequestration are also possible.
- An inventory can be **corporate** or **geographic**.
  - Corporate inventory is all the GHG emissions that the entity is *responsible* for.
  - Geographic inventory is all of the GHG emissions occurring in a definable region, *i.e.* city, county, state or nation.
- Geographic inventories are simpler, because the boundary is *de facto*, there is no question about what should or shouldn't be included.

Protocol for a corporate inventory

- Every inventory must follow a **protocol**: prescription for:
  1. What is the boundary of the entity?
  2. For which sources of GHGs is & isn't the entity responsible?
  3. How often and over what time period does the inventory occur?
  4. How is each source measured or estimated?
  5. How are the sources grouped together and reported?
  6. How does the accuracy of the inventory get controlled?
- WBCSD & WRI have created the *GHG Protocol*, multi-stakeholder.
- Presumptive protocol for all corporate inventories.

Scopes in the GHG Protocol

- GHG Protocol's most notable feature is how it answers question 5: three **scopes**.
- **Scope 1** includes **direct** emissions, that occur inside the entity boundary.
  - Most direct GHGs come from fossil fuel burning.
  - Buildings that are heated by natural gas.
  - Industrial processes that run on natural gas or coal.
  - Vehicle fleets.
  - Tim will describe some of the non-fossil sources

- **Scope 2** includes **indirect** emissions due to energy imports: electricity, heat, steam.
  - Most indirect GHGs come from electricity consumption.
  - The fossil fuel emissions due to the coal or natural gas plant that generated the electricity.
- **Scope 3** includes other emissions.
  - Considered highly proactive to inventory these
  - Employee commute
  - Embodied GHGs in purchased products

Double counting

- Geographic inventories are very clear: the world is divided into countries, countries into states, states into counties.
- Corporate inventories less clear:
  - ownership of facilities can be shared
  - Electric generator inventories can overlap: an electric generator reports direct emissions in Scope 1, but the electricity purchaser reports indirect emissions in Scope 2.
  - Scope 3 emissions can also overlap: the GHGs embodied in purchased widgets may also be reported under Scope 1 by the widget manufacturer.
- The *GHG Protocol* provides guidance on shared facility ownership, but in unregulated environment there is little legal precedence for handling double counting.
- You're on your own, so **transparency** is of utmost importance.

A third kind of inventory: project

- Instead of an entity boundary, define a project boundary.
- Examples:
  - Weatherize a large building that uses gas heat.
  - Use waste heat from an industrial process to heat office buildings.
  - Combust landfill gas to generate electricity.
- A poorly-defined project boundary allows **leakage**.
  - Example: the heat recovery unit on industrial process takes factory space heat away and natural gas heaters in the space get used more.

Inventories and reductions

- One never inventories GHG **reductions**, only entity or project gross emissions. The reductions are calculated by subtracting inventories. (***slide 1***)

- For geographic or entity inventories, the reduction is usually calculated by subtracting an inventory of one year from another, **baseline year**.
- For project inventories it's different.
  - A **counterfactual baseline** inventory estimates what *would have* happened iside the project boundary, during the project's lifetime.
  - The baseline usually isn't just one year, but a series of years equal to the lifetime.
  - Sometimes the project baseline inventory is calculated after the fact, based on local economic, climate and electric mix indicators.

What is a registry?

- A registry is a place to document inventories.
- There are **regulatory** and **voluntary** registries.
  - Regulatory registries record inventories of entities that are required to report by law. Examples:
    - Kyoto national registries (assuming ratification)
    - European ETS
    - United States Acid Rain Program SO_2 Allowance Tracking System
  - Voluntary registries record inventories of entities that *choose* to do so.
  - A voluntary registry can still be a government entity!
  - Voluntary registry examples:
    - California Climate Exchange
    - WEF Global GHG Register
    - Chicago Climate Exchange

Registries are identified with GHG markets

- A greenhouse gas market is defined and regulated by a market **authority**.
- When a registry is regulatory, the regulating government is the market authority.
- When a registry is voluntary, most likely the registry itself is the market authority – it defines the market. CCX is the best example.
- In a GHG market you do not trade GHGs, because they are a liability not an asset. Instead you either trade **allowances** or **offsets**.

Allowance market registries

- A **closed market** registry trades GHG allowances.
- Allowances are allocated by the market authority prior to opening by fiat or auction.

- Allowance allocation usually designed to decrease year-by-year to force a true environmental benefit.
- Each allowance has a **vintage** corresponding to the year in which it is designated to cancel emissions. (***slide 2***)
- So where does the inventory come in? Annual **true-up**.
  - Each year each entity must possess allowances equal to actual emissions.
  - The actual emissions are known through the entity-wide inventory.
- The U.S. SO_2 Allowance Tracking System is probably the only pure, closed market, emissions allowance registry in existence.
- GHG registries that resemble closed markets (but are in fact hybrids):
  - Kyoto trading
  - CCX

Offset market registries and brokerages

- An **open market** registry trades offsets.
- Offsets are **verified** reductions, calculated as a differential of inventories, per above.
- Offsets also have vintage corresponding to the year in which the emissions were avoided or sequestered.
- **Brokerages** are similar, but match up buyers and sellers on a case-by-case basis.

(***slide 3***)

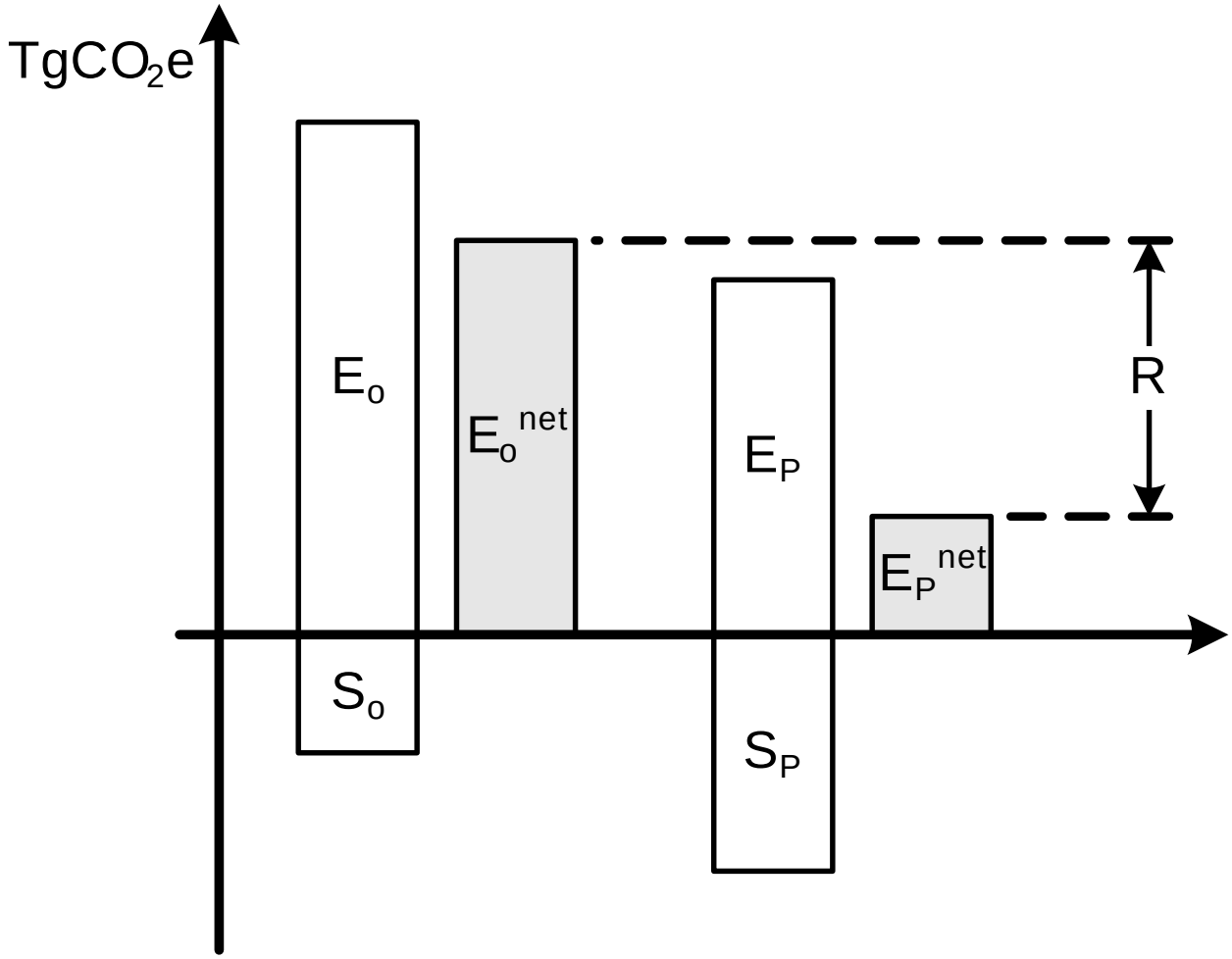
Pre-market registries

- The value of reductions is still low enough (in the U.S.) that there is not intense motivation to create trading registries.
- Many registries are “hall of good deeds,” [credit Wiley] a place to track emissions, get experience in GHG management, or show off reductions for marketing benefit.
- One registry – CCAR – promises **baseline protection** – the market authority (CEC) promises to promote your early action for inclusion (grandfathering) into future regulatory schemes.
- There is no registry in Washington state, though other states have pre-market registries (New Hampshire, Wisconsin were trendsetters).

The Kyoto registries (***slide 4***)

- Walk-through (to cover nearly all concepts)
- Roles of **validation** and **verification**.
- Distinction between **retirement** and **cancellation**

How a reduction R is defined



$$R = E_o^{net} - E_P^{net}$$

Allowance trading in the EU markets

Carbon Market Indicator

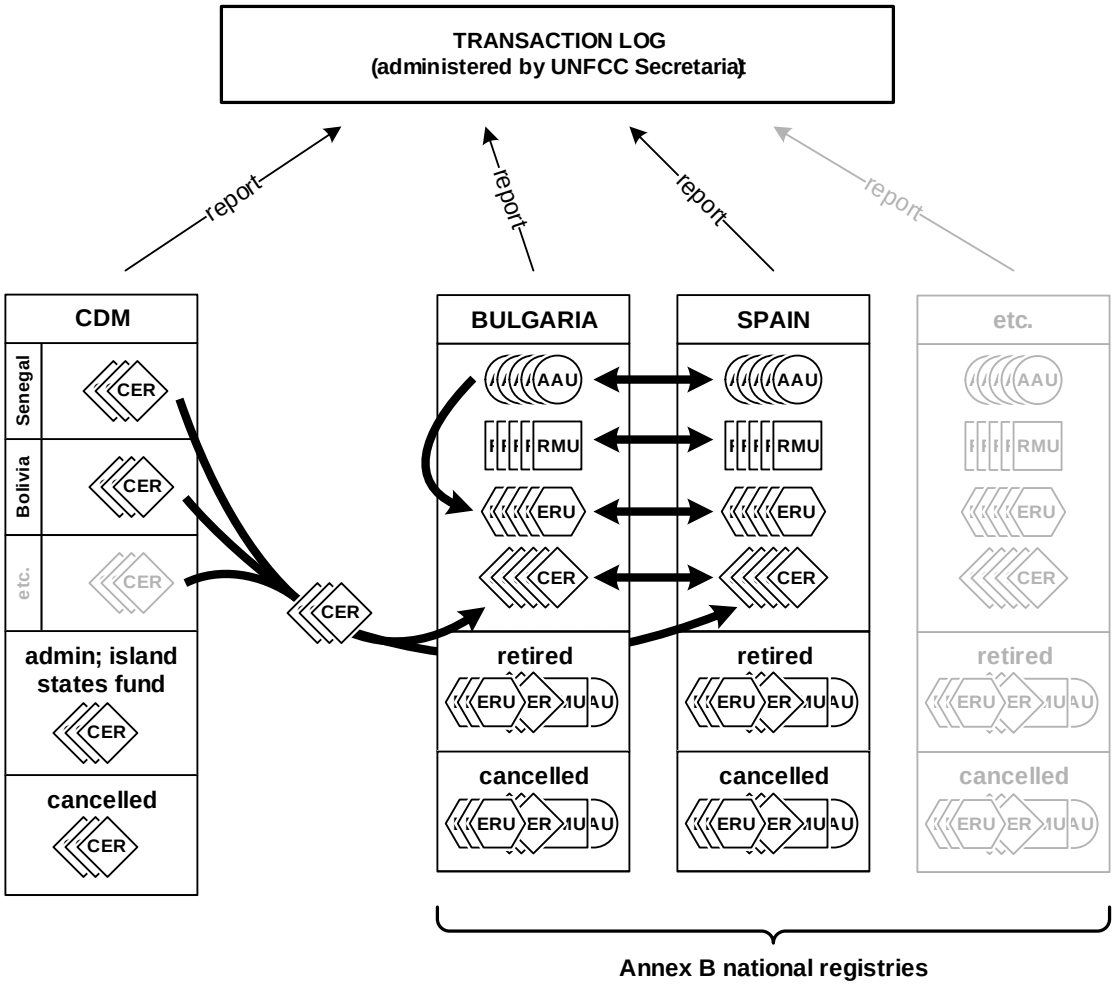
	Bids		Offers		Close		Last
	Volume	Price	Price	Volume	Price	Change	Price
EU 2005	5,000 t	€8.00	€9.00	5,000 t	€8.50	+ €0.55	€8.80
EU 2006	5,000 t	€8.40	€9.60	5,000 t	€8.95	+ €1.00	€7.10
EU 2007	5,000 t	€8.90	€9.90	5,000 t	€9.40	-	€7.20
UK 2004	2,000 t	£3.00	£3.50	2,000 t	£3.25	+ £0.13	£3.50

Quoted prices are for allowances per tCO_2, at close of market 20 May. For methodology, see www.pointcarbon.com. EU 2005: Last: The last trade announced went through 19 May in 5,000 t. 2006: Last trade announced went through 13 May. It was part of a 2005-07 vintage stream trade with 14,000 t in each leg. 2007: Last trade announced went through 13 May. It was part of a 2005-07 vintage stream trade with 14,000 t in each leg. UK: Last trade 6 May, in 3,500 t.

Some GHG registries

Registry	Domain
Allowance trading (incl. hybrids)	
Chicago Climate Exchange	allowance trading: world; offsets: North America, Brazil
Environmental Resources Trust GHG Registry	world
EU ETS	designated industries in the European Union
Kyoto national registries	Annex B countries
New South Wales GHG Abatement Scheme	New South Wales, Australia
UK ETS	volunteer entities in UK
Offset trading & brokers	
Climate Trust	world
Conservation International	world
ERUPT	Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Russia, Slovakia, Slovenia, Ukraine
Kyoto CDM registry	Kyoto parties
Prototype Carbon Fund	Kyoto parties
Pre-market registries	
California Climate Action Registry	California, U.S.
Canadian GHG Reductions Registry	Canada
U.S. 1605(b)	U.S.
WEF Global Greenhouse Gas Register	corporations

The Kyoto registries system



AAU — Assigned Amount Unit– 1 $MgCO2_e$ allowance issued per Annex B allotments

RMU — Removal Unit – 1 $MgCO2_e$ of verified sequestration

ERU — Emission Reduction Unit– 1 AAU converted through a JI project

CER — Certified Emission Reduction– 1 $MgCO2_e$ verified emissions reduction in non-Annex I country