Plains CO_2 Reduction (PCOR) Partnership
Energy & Environmental Research Center (EERC)

REVIEW OF SOURCE ATTRIBUTES

Plains CO_2 Reduction Partnership Phase III
Task 1 – Deliverable D1

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NOMENCLATURE AND ABBREVIATIONS

CH_4	methane
CO_2	carbon dioxide
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FRS ID	Facility Registry System Identification
HFC-23	fluoroform
N_2O	nitrous oxide
NO_x	nitrogen oxides
NPRI	National Pollutant Release Inventory
PCOR	Plains CO_2 Reduction
PFC-116	hexafluoroethane
PFC-14	tetrafluoromethane
SO_2	sulfur dioxide

REVIEW OF SOURCE ATTRIBUTES

INTRODUCTION

The Plains CO_2 Reduction (PCOR) Partnership maintains a database of significant regional point sources of CO_2. The database is a key in the development of CO_2 capture–transportation–storage scenarios that have the potential to reduce greenhouse gas emissions in the PCOR Partnership region. To maintain a reasonably current status, the data set undergoes an annual review during which new or missing sources are identified and added, CO_2 emission rates are updated, and facility locations are verified. This report summarizes the data review that took place between October 1, 2011, and July 31, 2012.

APPROACH

Actual emission measurements are used whenever possible but measured data are not always available for each of the sources. In cases where measured data are unavailable, emissions are estimated using the methodologies developed for the U.S. Department of Energy (DOE) National Energy Technology Laboratory by the DOE Regional Carbon Sequestration Partnerships Capture and Transportation Working Group (Capture and Transportation Working Group of the DOE Regional Carbon Sequestration Partnerships, 2010). Web searches are used to acquire updated information regarding fuel type, heat content, and usage rate and/or product slate and quantities; these values are used to estimate CO_2 emissions rates.

Four primary data sets were used to update the PCOR Partnership CO_2 emission database:

- The Environment Canada Reported Facility Greenhouse Gas Data (Environment Canada, 2012), an online greenhouse gas search engine, provides the annual emissions of CO_2, CH_4, N_2O, and other greenhouse gases for point sources from all sectors. The Canadian point sources in the PCOR Partnership database were updated using 2010 data (the most current data). The search engine can be accessed at www.ec.gc.ca/pdb/ghg/onlineData/data Search_e.cfm.

- The U.S. Environmental Protection Agency (EPA) Air Markets Program Data online emission search engine (U.S. Environmental Protection Agency, 2012a) provides CO_2, SO_2, and NO_x emission data for electric utilities and larger industrial heat/power plants. The PCOR Partnership database was updated using facility data from 2011. This search engine can be accessed at http://ampd.epa.gov/ampd/QueryToolie.html.

- The Nebraska State government Web site "Ethanol Facilities Capacity by State and Plant" (Nebraska State Government, 2012) was used to update the U.S. portion of the PCOR Partnership region's ethanol production values (the PCOR Partnership estimates ethanol facility emissions based on the quantity of ethanol produced at the plant). The Web site states that the information it contains was current as of March 2012. It can be accessed online at www.neo.ne.gov/statshtml/122.htm.

- EPA's Greenhouse Gas Reporting Program Data for Calendar Year 2010 was released on January 11, 2012 (U.S. Environmental Protection Agency, 2012b). The searchable site contains CO_2, N_2O, CH_4, PFC-14, PFC-116, and HFC-23 emission data reported from large facilities in nine industry groups: power plants, landfills, metal manufacturing, mineral production, petroleum refineries, pulp and paper manufacturing, chemical manufacturing, government and commercial facilities, and other industrial facilities. The Greenhouse Gas Reporting Program Data can be accessed at http://ghgdata.epa.gov/ghgp/main.do.

This was the first year that data from the EPA Greenhouse Gas Reporting Program Data for Calendar Year 2010 site were incorporated into the PCOR Partnership database. For most of the source types, the emission data could be easily incorporated into the PCOR Partnership data set. However, this was not found to be the case for the ethanol plants. The PCOR Partnership tracks combustion- and process-related CO_2 emissions separately for potential carbon utilization purposes. The EPA site purports to break down the emissions as either combustion-related or biogenic CO_2. However, many of the ethanol plants are listed as producing combustion-related CO_2 but no biogenic (i.e., fermentation process-related) CO_2. Since an ethanol plant produces considerably more CO_2 during fermentation than it does through combustion, these values were considered suspect and the CO_2 emissions produced by the region's ethanol plants were determined using the methodology based on ethanol production that has been used since the database originated. Attempts to better understand the split between combustion and biogenic CO_2 on the EPA Web site will be made over the course of the next year so that measured ethanol-related CO_2 values can be incorporated into the PCOR Partnership database during the 2013 update.

The EPA searchable database presents a second challenge in that it is difficult to determine the total CO_2 emissions as opposed to the total CO_2 equivalent emissions for some of the source types. One example of this is sugar processing facilities with their inherent lime production. This is not true for all source types.

A final note about the use of the EPA database: the power plants are listed as producing CO_2 from both "stationary combustion" and "electricity generation." These values must be summed to produce the total CO_2 emissions at such sites of the demonstration project and provide basic information about the effort.

RESULTS

As of July 31, 2012, the updated PCOR Partnership database contains 1050 sources that produce an estimated 625 million short tons of CO_2 annually. This compares to the September 2011 values of 906 sources producing an estimated 606 million short tons of CO_2 each year. The breakdown of the CO_2 emissions by broad source category is presented in Table 1.

The PCOR Partnership does not include sources in the database having CO_2 emission rates less than 15,000 short tons/yr. Many sources produced less CO_2 during the past calendar year as a result of efficiency gains, changes in production, etc. During this update, 17 sources were removed from the database because they no longer produced the minimum amount of CO_2 required for inclusion in the PCOR Partnership database.

Occasionally, the name of a source is found to have changed in an emission data set. This happened repeatedly this year because the EPA database listed the U.S. CO_2 emission sources under different names than they were listed in the other, older data sets used to build the PCOR Partnership database. The PCOR Partnership database was modified to reflect the name change of 333 sources since October 1, 2011.

Sources that no longer exist or that were found to be duplicate entries in the database were eliminated. There were a total of 40 such point sources in the PCOR Partnership database.

Table 1. Summary of CO_2 Point Sources Found Within the PCOR Partnership Region as of July 31, 2012

Broad Category	Number of Point Sources	Emissions, millions of short tons/yr	Percentage of Total Number of Sources	Percentage of Emissions
Agricultural and Agriculture-Related Processing	90	10.37	8.6	1.7
Electricity Generation	186	375.86	17.7	60.1
Chemical and Fuel Production	43	18.59	4.1	3.0
Ethanol Manufacture	126	55.50	12.0	8.9
Cement/Clinker Production	24	17.04	2.3	2.7
Industrial	58	18.91	5.5	3.0
Small-Scale Heat and Power	50	4.76	4.8	0.8
Manufacturing	87	10.35	8.3	1.7
Petroleum- and Natural Gas-Related	284	90.34	27.0	14.4
Paper and Wood Products	81	22.34	7.7	3.6
Waste Processing	21	1.39	2.0	0.2
Total	1050	625.44	100.0	100.0

On the other hand, 210 new facilities were found to be missing from the data set and were added to it. Figure 1 shows the locations of the new facilities.

The location coordinates for 57 point sources were changed either because of the higher resolution of the newer Google Earth images or because additional information allowed a more precise location to be determined.

Of the 1050 sources now contained in the database, updated CO_2 emission information was found for 413 of them. Table 2 summarizes the changes made to the PCOR Partnership CO_2 emission database as a result of the data update.

The identification numbers assigned to the CO_2 point sources by EPA or Environment Canada were added to the data set. In the case of EPA, the FRS ID (Facility Registry System Identification) numbers have been included. The NPRI (National Pollutant Release Inventory) numbers from the Environment Canada Web site were included in the Canadian source data.

The process of moving this latest data set to the PCOR Partnership Decision Support System (DSS, © 2007 EERC Foundation) is currently under way. When the process is complete, the updated emission data will be reflected via the online geographic information systems on the PCOR Partnership DSS and DOE's national portal.

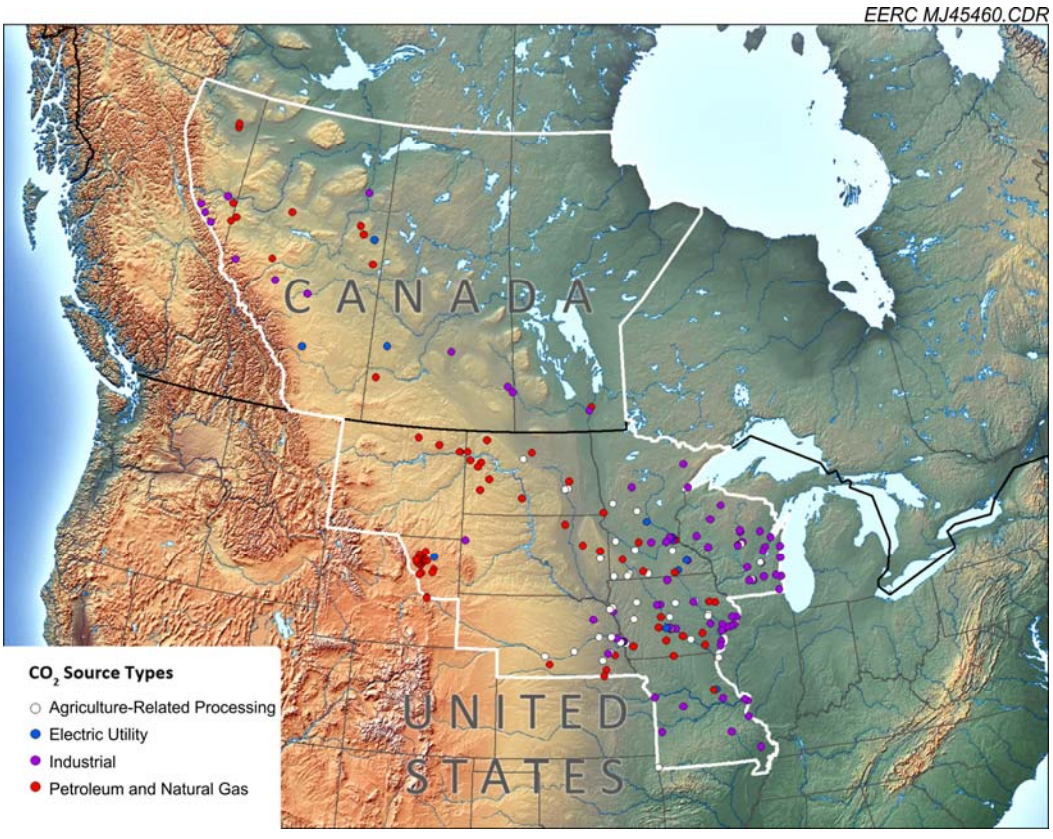

Figure 1. Location of the new facilities identified during this database update.

Table 2. Changes Made to the PCOR Partnership CO_2 Emission Database Between October 1, 2011, and July 31, 2012

Explanation	Number of Sources Affected
Removed Because the Source Now Produces Less Than 15,000 short tons/yr	17
Source Name Was Found to Have Changed	333
Sources That No Longer Exist	34
Location Changes	57
Removed Duplicate Plants	15
New Facilities Added to the Database	210
Updated CO_2 Emission Information on Existing Sources	413

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