

US EPA ARCHIVE DOCUMENT



Greenhouse Gas Inventory 101

Session 3: State Inventory Tool (SIT) Training Session

You will hear music until the webcast begins.
Slides will be e-mailed to all participants.



Greenhouse Gas Inventory 101

Session 3: State Inventory Tool (SIT) Training Session

December 5, 2007

Andrea Denny, EPA & Lauren Pederson, ICF





Welcome and background

- Clean Energy Environment Programs
 - Promote cost-effective clean energy strategies that achieve environmental, energy, public health and economic benefits
 - Clean Energy Environment State Program
 - Clean Energy Environment Municipal Network
- www.epa.gov/cleanenergy/stateandlocal



Logistics

- Phone lines are muted to control background noise.
- Please use question/comment box to submit your questions, we will consolidate questions and ask them during the Q&A session at the end of the presentation.
- Please use color indicators to show if you are confused or need the presenter to slow down. We will keep an eye on this during the presentation.
- We will notify participants of where the recording will be online once it is available.
- Feedback after the training is welcomed, please email denny.andrea@epa.gov with questions or comments.





Session 3

- Audience:
 - Recommended for state officials as the tool is designed to incorporate state-level data.
- Goal:
 - This detailed training for the SIT modules includes implementation of state data to assess GHG emissions by source and sector.



Outline

- Background
- Lessons Learned
- State Inventory Tool
- State Inventory Tool Demonstration
 - CO₂ from Fossil Fuel Combustion module
 - Natural Gas and Oil module
 - Synthesis module
- Projection Tool



Background

- The State and Local Program began in 1990
 - Mission: to build capacity in the states
- Developed the *State Guidance* for estimating state GHG emissions
- Gave grants to states to develop GHG inventories
 - 42 states and Puerto Rico have developed inventories





Lessons Learned

- Inventories are time-intensive
 - Collecting the data
 - Identifying the appropriate emission factors
 - Setting up the infrastructure to calculate emissions
- Inventories for a single year in the 1990s are insufficient for mitigation planning in 2007
- Emission trends are necessary for:
 - projecting emissions, identifying mitigation activities, setting targets, and creating action plans



Lessons Learned (continued)

- Updating methodology is difficult
 - Creation of User's Guide to update methodology and provide guidance for modules
- States need tools
 - To facilitate updates
 - To project emissions
 - To analyze trends
 - To provide a standardized methodology
 - To track progress from year to year
 - To gain perspective on major sources and sinks



State Inventory Tool Goals

- Leverage EPA's extensive inventory experience
 - Development of the National Inventory
 - Contributing to the IPCC Good Practice Guidance
- Provide default state activity data and emission factors, but allow customization
- Maximize transparency
- Provide estimates for the most recent year where data is available
- Enable sector experts to work simultaneously on different parts of the inventory
- Utilize a user-friendly interface





State Inventory Tool Design

- Eleven Excel® modules comprise the State Inventory Tool
 - Ten modules cover the emission source categories
 - One Synthesis Module compiles data from the source modules into a complete inventory
- A companion Projection Tool



Sector Modules

- CO₂ from Fossil Fuel Combustion
- CH₄ and N₂O from Stationary Combustion
- CH₄ and N₂O from Mobile Combustion
- Natural Gas and Oil Systems
- Coal Mining
- Industrial Processes
- Agriculture
- Municipal Solid Waste
- Wastewater
- Land-Use Change and Forestry



Using the Tool

- Complete one module at a time or encourage sector experts to complete relevant modules
- When modules are complete, create export files
- Use Synthesis Module to create summary tables and graphs



Completing a Source Module...

- On the control worksheet: select the state, select the parameters of the inventory (where necessary), and fill in the emission factors (or utilize default parameters)
- On the calculation worksheet: enter activity data or select default data
- On the summary worksheet: view the summary of emissions
- On the control worksheet: export the summary data to a separate file



Control Worksheet

State Inventory Tool - CO₂ Emissions from Combustion of Fossil Fuel

File Edit Module Options Typ

State Inventory Tool - CO₂ Emissions from Combustion of Fossil Fuels

1. Choose a State

This is very important - it selects the correct default variables for your state.

2. Fill In the Variables that are used throughout the module for:
Either Type in the value/percentage or Click the Default Box.

Combustion Efficiencies

Fuel	Default Efficiency	Efficiency Used	Use the Default? (Check for Yes)
Coal	100.0%	100.0%	☒
Natural Gas	100.0%	100.0%	☒
Petroleum	100.0%	100.0%	☒
LPG	100.0%	100.0%	☒

Carbon Contents (lbs Carbon/million Btu)

Fuel	Default Carbon Content	Carbon Content Used	Use the Default? (Check for Yes)
Asphalt and Road Oil	45.42	45.4	☒
Aviation Gasoline	41.56	41.6	☒
Distillate Fuel	43.94	43.9	☒
Jet Fuel, Kerosene	variable by year	variable by year	☒
Jet Fuel, Naphtha	43.50	43.5	☒
Kerosene	43.44	43.4	☒
LPG (industrial)	variable by year	variable by year	☒
LPG (energy only)	variable by year	variable by year	☒
Lubricants	44.58	44.6	☒
Motor Gasoline	variable by year	variable by year	☒
Residual Fuel	47.33	47.3	☒
Misc. Petro Products	variable by year	variable by year	☒
Feedstocks, Naphtha	39.96	40.0	☒
Feedstocks, Other Oils	43.94	43.9	☒
Pentanes Plus	40.18	40.2	☒
Petroleum Coke	61.34	61.3	☒
Still Gas	38.57	38.6	☒
Special Naphthas	43.74	43.7	☒
Unfinished Oils	variable by year	variable by year	☒
Waxes	43.63	43.6	☒
Residential Coal	variable by year	variable by year	☒

Control Residential Commercial Transportation Electric Power Bunker Fuels Industrial Summary-MMTCO₂E Summary





Calculation Worksheet

State Inventory Tool - CO₂ Emissions from Combustion of Fossil Fuel

File Edit Module Options Type a question for help

3. Residential Consumption and CO₂ Emissions in Colorado

CO₂ emissions from fossil fuel combustion in the residential sector are calculated by multiplying energy consumption (in the residential sector) by carbon content coefficients for each fuel. These quantities are then multiplied by fuel-specific percentages of carbon oxidized during combustion ("combustion efficiency"). The resulting fuel emission values, in pounds of carbon, are then converted to short tons of carbon and million metric tons of carbon equivalent (MMTCE), then to million metric tons of carbon dioxide equivalent (MMTCO₂E), and summed. For further detail on this method, refer to the CO₂FFC Chapter in the User's Guide.

According to the methods developed by the International Panel on Climate Change, CO₂ emissions from the combustion of biogenic sources (e.g., fuel wood) are not counted in greenhouse gas inventories, provided that those sources are harvested on a sustainable basis. The carbon in wood fuel was originally removed from the atmosphere by photosynthesis, and under natural conditions, it would cycle back to the atmosphere eventually as CO₂ due to degradation processes. For processes with CO₂ emissions, if the emissions are from biogenic materials and the materials are grown on a sustainable basis, then those emissions are considered to close the loop in the natural carbon cycle.

Click here for possible data sources.

Go to the Control Sheet

Check All Boxes

Clear All Data

Residential Sector 1990 ☒ Default Consumption Data?

Fuel Type	Consumption (Billion Btu)	Emission Factor (lbs C/Million Btu)	Combustion Efficiency (%)	Emissions (short tons carbon)	Emissions (MMTCE)	Emissions (MMTCO ₂ E)
Coal	248	57.93	100.0%	7,180	0.007	0.024
Distillate Fuel	160	43.94	100.0%	3,519	0.003	0.012
Kerosene	127	43.44	100.0%	2,759	0.003	0.009
LPG	6,150	37.96	100.0%	116,725	0.106	0.388
Natural Gas	92,191	31.87	100.0%	1,469,161	1.333	4.887
Other					0.000	0.000

Residential Sector 1991 ☒ Default Consumption Data?

Fuel Type	Consumption (Billion Btu)	Emission Factor (lbs C/Million Btu)	Combustion Efficiency (%)	Emissions (short tons carbon)	Emissions (MMTCE)	Emissions (MMTCO ₂ E)
Coal	251	57.93	100.0%	7,269	0.007	0.024
Distillate Fuel	127	43.94	100.0%	2,780	0.003	0.009
Kerosene	136	43.44	100.0%	2,963	0.003	0.010
LPG	6,865	37.95	100.0%	130,251	0.118	0.433
Natural Gas	100,304	31.87	100.0%	1,598,462	1.450	5.317
Other					0.000	0.000

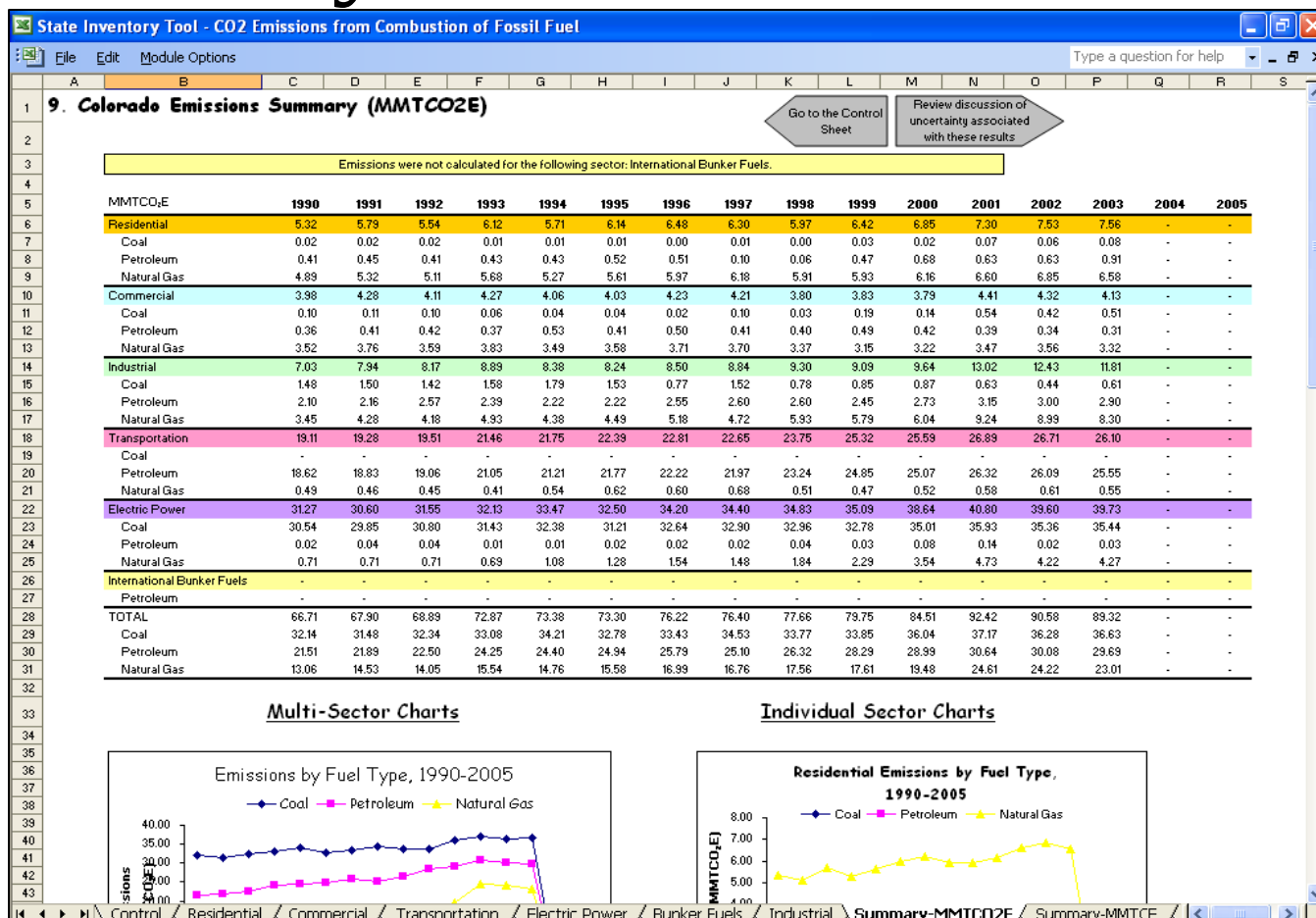
Residential Sector 1992 ☒ Default Consumption Data?

Fuel Type	Consumption (Billion Btu)	Emission Factor (lbs C/Million Btu)	Combustion Efficiency (%)	Emissions (short tons carbon)	Emissions (MMTCE)	Emissions (MMTCO ₂ E)
Coal	251	57.93	100.0%	7,269	0.007	0.024
Distillate Fuel	127	43.94	100.0%	2,780	0.003	0.009
Kerosene	136	43.44	100.0%	2,963	0.003	0.010
LPG	6,865	37.95	100.0%	130,251	0.118	0.433
Natural Gas	100,304	31.87	100.0%	1,598,462	1.450	5.317
Other					0.000	0.000

Control Residential Commercial Transportation Electric Power Bunker Fuels Industrial Summary-MMTCE Summary-MMTCE



Summary Worksheet





Exporting Data

State Inventory Tool - CO2 Emissions from Combustion of Fossil Fuel

File Edit Module Options Type a question for help

	Default	Storage Factor	Used	Use the Default? (Check for Yes)
49 Fuel				
50 Asphalt and Road Oil	100%		100%	☒
51 Distillate Fuel	50%		50%	☒
52 LPG	variable by year		variable by year	☒
53 Lubricants	9%		9%	☒
54 Residual Fuel	50%		50%	☒
55 Feedstocks, Naphtha	variable by year		variable by year	☒
56 Feedstocks, Other Oils	variable by year		variable by year	☒
57 Misc. Petro Products	0%		0%	☒
58 Pentanes Plus	variable by year		variable by year	☒
59 Petroleum Coke	50%		50%	☒
60 Still Gas	80%		80%	☒
61 Special Naphthas	0%		0%	☒
62 Waxes	58%		58%	☒
63 Industrial Coking Coal				
64 Natural Gas				

Clear/Select All Defaults

3. through 8. Complete Individual Sectors

Complete the Residential Sheet

9. Review the Summary Information

Go to the MMTCO₂E Summary Sheet

Go to the MMTCE Summary Sheet

10. Export the results for use in the Synthesis Tool.

Export Data

Control / Residential / Commercial / Transportation / Electric Power / Bunker Fuels / Industrial / Summary-MMTCO₂E / Summary-MMTCE



Exporting Data (cont. 1)

State Inventory Tool - CO2 Emissions from Combustion of Fossil Fuel

File Edit Module Options Type a question for help

	Default	Storage Factor	Used	Use the Default? (Check for Yes)
Fuel	Storage Factor			
49 Asphalt and Road Oil	100%		100%	☒
50 Distillate Fuel	50%		50%	☒
51 LPG	variable by year		variable by year	☒
52 Lubricants	9%		9%	☒
53 Residual Fuel	50%		50%	☒
54 Feedstocks, Naphtha	variable by year		variable by year	☒
55 Feedstocks, Other Oils				
56 Misc. Petro Products				
57 Pentanes Plus				
58 Petroleum Coke				
59 Still Gas				
60 Special Naphthas				
61 Waxes				
62 Industrial Coking Coal				
63 Natural Gas				
64				
65				
66 3. through 8. Complete Individual				
67 Complete the Residential Sheet				
68				
69				
70				
71				
72				
73 9. Review the Summary Information				
74				
75 Go to the MMTCO ₂ E Summary Sheet				
76				
77				
78				
79				
80 10. Export the results for use in the Synthesis Tool.				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				

Save Summary Output File As...

Save in: SUMMARY FILES

CO2FFC_Summary
Wastewater_Summary
Stationary_Summary
Waste_Summary
Gas and Oil_Summary
Mobile Combustion_Summary
Forest Management_Summary
IP_Summary
Coal_Summary
Agriculture_Summary

File name: CO2FFC_Summary

Save as type: Excel Files

Save Cancel

Control Residential Commercial Transportation Electric Power Bunker Fuels Industrial Summary-MMTCO₂E Summary-MMTCE



Exporting Data (cont. 2)

State Inventory Tool - CO2 Emissions from Combustion of Fossil Fuel

File Edit Module Options Type a question for help

Fuel	Default Storage Factor	Storage Factor Used	Use the Default? (Check for Yes)
Asphalt and Road Oil	100%	100%	☒
Distillate Fuel	50%	50%	☒
LPG	variable by year	variable by year	☒
Lubricants	9%	9%	☒
Residual Fuel	50%	50%	☒
Feedstocks, Naphtha	variable by year	variable by year	☒
Feedstocks, Other Oils	variable by year	variable by year	☒
Misc. Petro Products	0%	0%	☒
Pentanes Plus	variable by year	variable by year	☒
Petroleum Coke	50%	50%	☒
Still Gas	80%	80%	☒
Special Naphthas	0%	0%	☒
Waxes	58%	58%	☒
Industrial Coking Coal	10%	10%	☒
Natural Gas	variable by year		☒

Clear/Select All Defaults

3. through 8. Complete Individual Sector Worksheets

Complete the Residential Sheet → Complete the Commercial Sheet → Complete the Transportation Sheet → Complete the Industrial Sheet

9. Review the Summary Information

Go to the MMTCO₂E Summary Sheet → Go to the MMTCE Summary Sheet

10. Export the results for use in the Synthesis Tool.

Export Data

State Inventory Tool

The summary data were successfully exported!

OK

Control Residential Commercial Transportation Electric Power Bunker Fuels Industrial Summary-MMTCO₂E Summary-MMTCE



Tool Demonstration: State Inventory Tools





Q&A for the State Inventory Tool Modules





Projection Tool Overview

- Project emissions by gas and by sector through 2020
- Import historic emissions from SIT modules (if applicable)
- Project future emissions
 1. Based on historical data
 2. Forecasting using projected activity data



Projection Example: CO₂FFC

- Projections based on EIA's regional energy consumption data to 2020
- State specific estimates calculated using historic percentage of energy consumption in the region



Tool Demonstration: Projection Tool



Q&A for the Projection Tool



Additional resources

- Energy CO₂ Emissions by State
http://epa.gov/climatechange/emissions/state_energyco2inv.html
- State Greenhouse Gas Inventories
http://epa.gov/climatechange/emissions/state_ghginventories.html
- Inventory of U.S. Greenhouse Gas Emissions and Sinks
<http://www.epa.gov/climatechange/emissions/usinventoryreport.html>



For more information:

Andrea Denny

State and Local Branch, U.S. EPA

1200 Pennsylvania Avenue (6202 J)

Washington, DC 20460

Phone (202) 343-9268

Fax (202) 343-2337

Denny.Andrea@epa.gov

