

Recent Applications of the Control Strategy Tool (CoST) within the Emissions Modeling Framework

Alison M. Eyth, Darin Del Vecchio
UNC Institute for the Environment

David Misenheimer,
Darryl Weatherhead, Larry Sorrels
U.S. EPA

June 4, 2008

Purpose of CoST

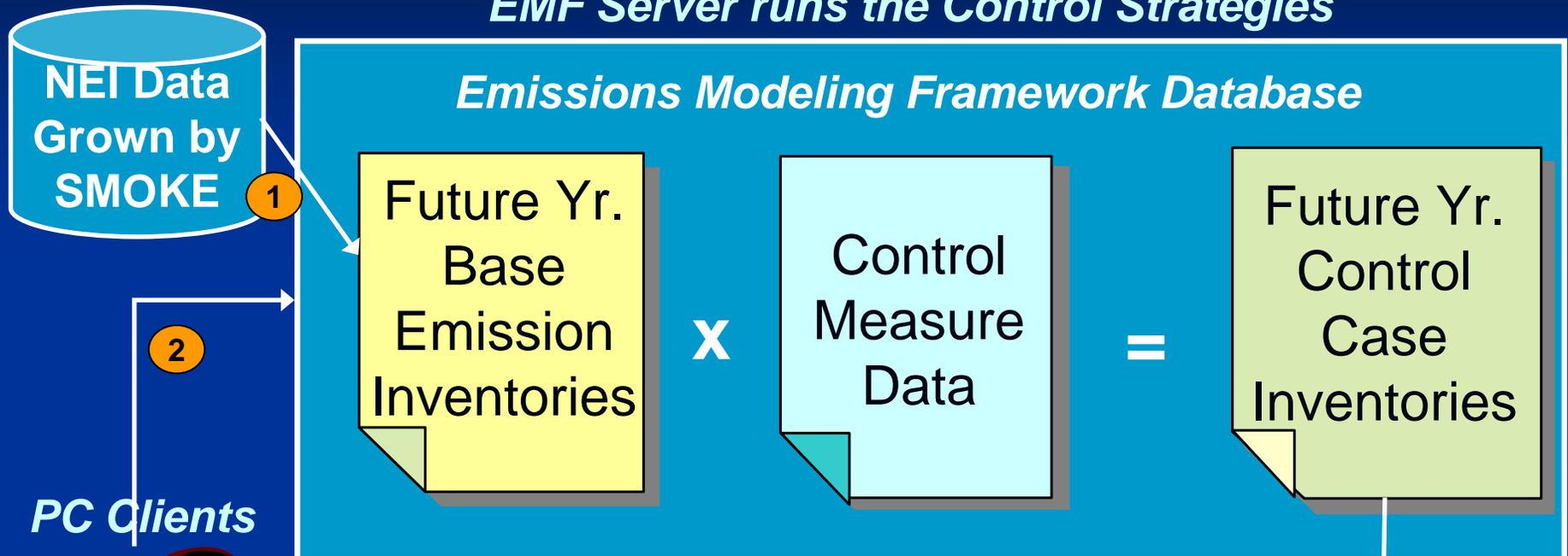
- Support the preparation and analysis of **future year emission control strategies** for point, area, and mobile sources
- Track information on **control measures**, their costs, and the emission sources to which they apply
- Facilitate **multi-pollutant analyses**, including criteria pollutants, HAPs, and greenhouse gases
- *Goal of this talk is to orient you to the software while discussing the recent applications*



CoST within the EMF Client-Server System

EMF Server runs the Control Strategies

Emissions Modeling Framework Database

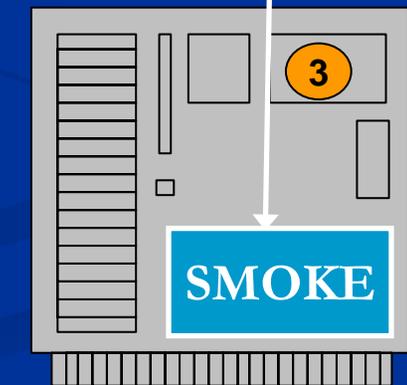


- 1 Import inventories into the EMF
- 2 Create and run a Control Strategy
- 3 Export the controlled inventories for input to SMOKE

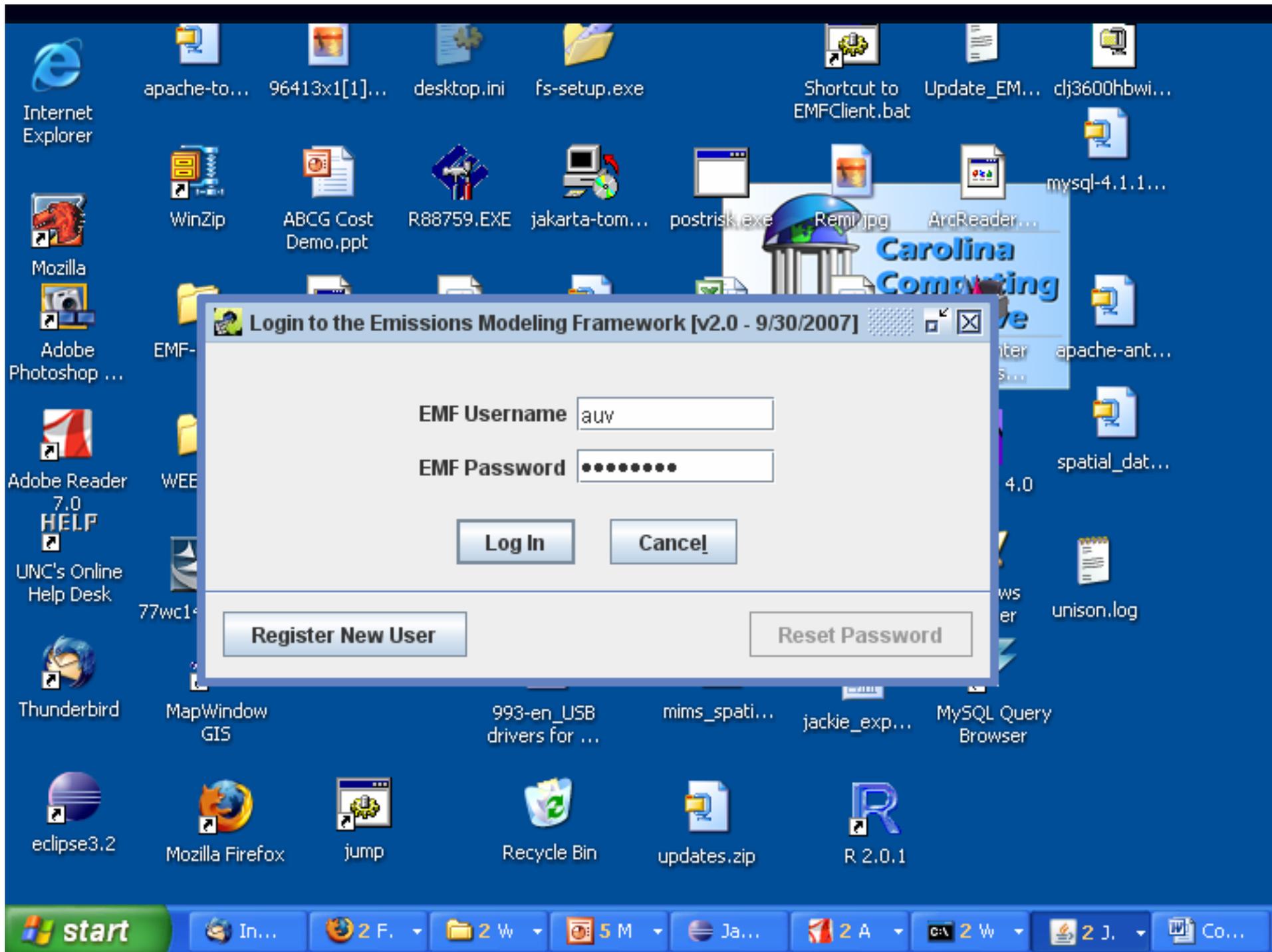


THE UNIVERSITY
of NORTH CAROLINA
of CHAPEL HILL

Institute for the Environment



Compute Cluster





Emissions Modeling Framework (EMF): Alison Eyth (aue)



File Manage Window Help



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Institute for the Environment



- Datasets
- Cases
- Dataset Types
- Sectors
- Control Measures
- Control Strategies
- Users
- My Profile

CoST menu items



Control Measure Manager

Major Pollutant: Show Details? Refresh

\$0.00

#	Select	Name	Abbreviation	Pollutant
1	<input type="checkbox"/>	Wastewater; Petroleum Wastewater	WWPWW	VOC
2	<input type="checkbox"/>	SCAQMD Proposed Rule 1148.1; Oil and Natural Gas Production - Fugitiv	V1148ONGPF	VOC
3	<input type="checkbox"/>	Reformulation;Wood Product Surface Coating	WWDCTS1104	VOC
4	<input type="checkbox"/>	Reformulation;Pesticide Application	VPESTR	VOC
5	<input type="checkbox"/>	Reformulation;Nonroad - Gas(4-stroke)-Rec Eq	VNRFG65001	VOC
6	<input type="checkbox"/>	Reformulation;Nonroad - Gas(4-stroke)-Pleasure Craft	VNRFG82010	VOC
7	<input type="checkbox"/>	Reformulation;Nonroad - Gas(4-stroke)-Log Eq	VNRFG65007	VOC
8	<input type="checkbox"/>	Reformulation;Nonroad - Gas(4-stroke)-Lawn-Garden Eq	VNRFG65004	VOC
9	<input type="checkbox"/>	Reformulation;Nonroad - Gas(4-stroke)-Ind Eq	VNRFG65003	VOC

174 rows : 4 columns [Filter: None, Sort: Name(-)]

Pollutant:
Cost Year:

The Control Measure Manager shows the available control measures. The Control Strategy Manager shows the existing control strategies.

Status

Last Update : 2008/05/25 17:26 Refresh

Message Type	Message	Timestamp

Mobile Source Analysis for Ozone NAAQS RIA

- CoST reproduced results of an independent analysis
- Different than previous analyses because multiple measures were to be applied to the same source in a specified order
 - order of application impacts estimated costs, but not reductions
- Developed a new strategy analysis type to support this project
 - **"Apply Measures in Series"**: applies all measures that are applicable to each source based on its SCC



Onroad Mobile Measures Used

- Plug-In Hybrids
- Aftermarket Catalyst
- Eliminate Long Duration Idling
- Lower Reid Vapor Pressure (RVP)
- Onroad Scrappage and Retrofit
- Continuous Inspection and Maintenance Programs
- Best Workplaces for Commuters
- Tier 3 Standard



Example Nonroad Mobile Measures Used

- Lower RVP
- Bond Rule (CA and non-CA)
- Nonroad Retrofits
- Diesel Marine National Rule
- Ocean Going Vessel Standards
- Commercial Aircraft Standards
- Diesel Locomotive Standards



Control Measure Characteristics

- Measures had **particular months** to which they apply to emulate seasonal variations in effectiveness
- When measures affected multiple pollutants, **cobenefit reductions** were specified
- Costs were sometimes distributed across multiple pollutants
- County and SCC-specific measures meant large data volume:
 - Over 500,000 records each for onroad and nonroad measures
 - Inventories for each month were approx. 2 million records (onroad) and 3 million records (nonroad) and used **average day** values



Edit Control Measure: Best Workplaces; LD Gas Trucks 1 & 2; Rural Interstate

Summary | Efficiencies | SCCs | Equations

Name: Best Workplaces; LD Gas Trucks 1 & 2; Rural Interstate

Description:

Abbreviation: BWCOLGT1IR

Creator: EMF User

Last Modified Time: 2007/05/10 17:28

Last Modified By: EMF User

Major Pollutant: NOX

Control Technology: Best Workplaces

Source Group: LD Gas Trucks 1 & 2

NEI Device code(s):

Class: Known

Equipment life (yrs): 0.0

Date Reviewed:

Data Sources: 2nd Run Controls to EPA.mdb

Sectors: onroad

Months:

Add **Remove** **Add** **Remove**

Save **Close**



Edit Control Measure: Best Workplaces; LD Gas Trucks 1 & 2; Rural Interstate

Summary | Efficiencies | SCCs | Equations

Name: Best Workplaces; LD Gas Trucks 1 & 2; Rural Interstate Abbreviation: BWCOLGT1IR

Description:

Major Pollutant: NOX EMF User: EMF User

Control Technology: Best Workplace Date: 2007/05/10 17:28

Source Group: LD Gas Trucks 1 User: EMF User

NEI Device code(s):

Known

Value(s): 0.0

Database: 2nd Run Controls to EPA.mdb

Sectors: onroad

OK Cancel

Add Remove Add Remove

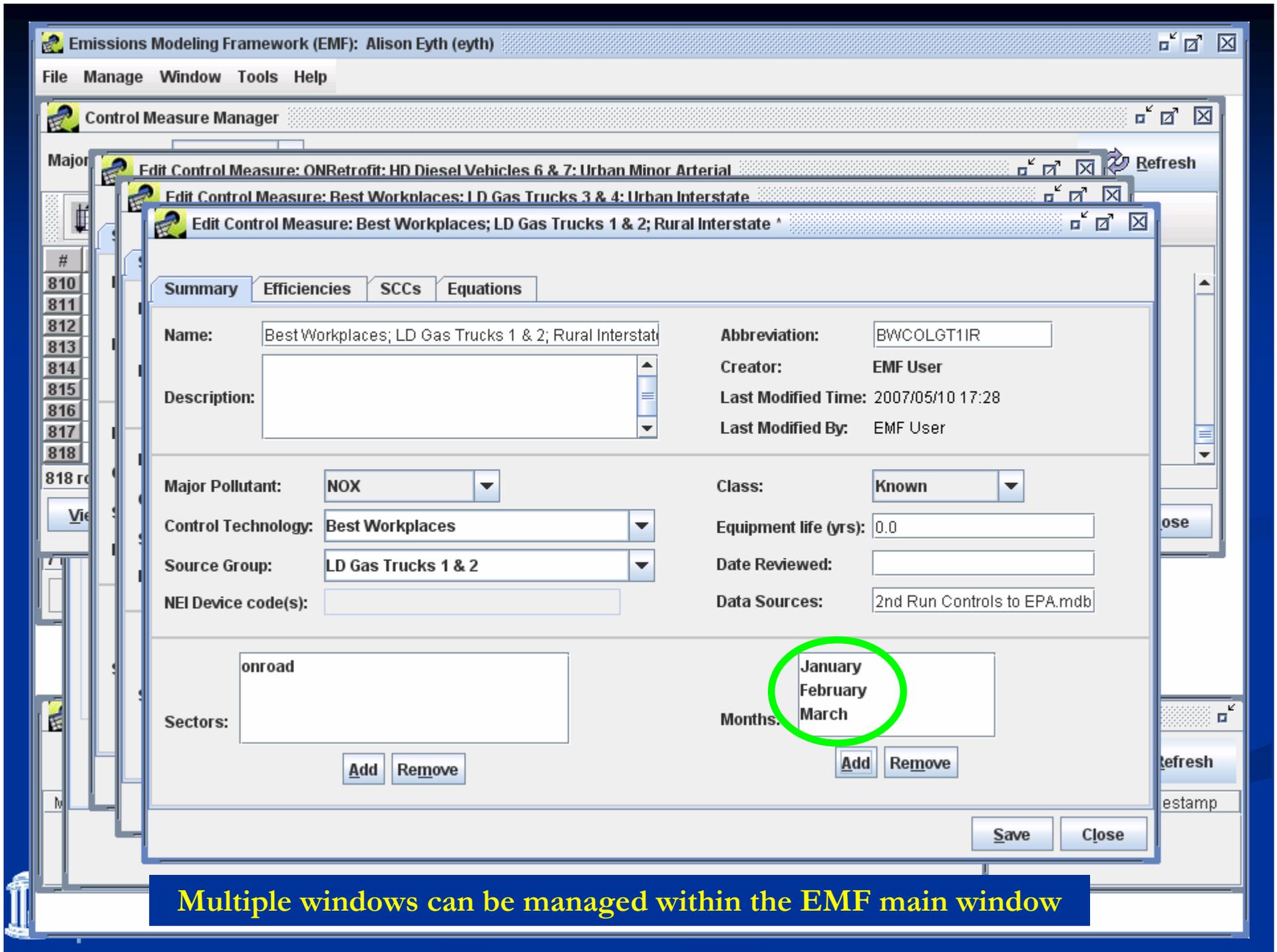
Save Close

Select Months

- None
- All Months
- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November

OK Cancel





Multiple windows can be managed within the EMF main window

Edit Control Measure: ONRetrofit; HD Diesel Vehicles 6 & 7; Urban Minor Arterial

Summary Efficiencies SCCs Equations

Row Limit: 100 Row Filter: Locale<'37015'

Apply

#	Select	Pollutant	Locale	Effective Date	Cost Year	CPT	Ref Yr CPT	Control Efficiency
1	<input type="checkbox"/>	CO	37013		1999		0.00	51.88
2	<input type="checkbox"/>	EXH_VOC	37013		1999		0.00	20.50
3	<input type="checkbox"/>	NOX	37013		1999	9850.00	9850.00	46.44
4	<input type="checkbox"/>	PM2_5	37013		1999		0.00	43.86
5	<input type="checkbox"/>	VOC	37013		1999		0.00	20.50
6	<input type="checkbox"/>	CO	37003		1999		0.00	51.88
7	<input type="checkbox"/>	EXH_VOC	37003		1999		0.00	20.50
8	<input type="checkbox"/>	NOX	37003		1999	9850.00	9850.00	46.44
9	<input type="checkbox"/>	PM2_5	37003		1999		0.00	43.86
10	<input type="checkbox"/>	VOC	37003		1999		0.00	20.50
11	<input type="checkbox"/>	CO	37001		1999		0.00	51.88
12	<input type="checkbox"/>	EXH_VOC	37001		1999		0.00	20.50

15 rows : 22 columns [Filter: None, Sort: Locale(-)]

Add Edit Copy Remove

Save Close

- Efficiency records are available for each county for multiple pollutants with varying costs and control efficiencies



Edit Control Measure: ONRetrofit; HD Diesel Vehicles 6 & 7; Urban Minor Arterial

Summary Efficiencies SCCs Equations

#	Select	SCC	Description
1	<input checked="" type="checkbox"/>	2230073290	Mobile Sources;Highway Vehicles - Diesel;Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7;Urban Minor

1 rows : 3 columns [Filter: None, Sort: None]

Add Remove

Save Close

- Each mobile measure was typically applied to one SCC, but in general measures can apply to one or more SCCs



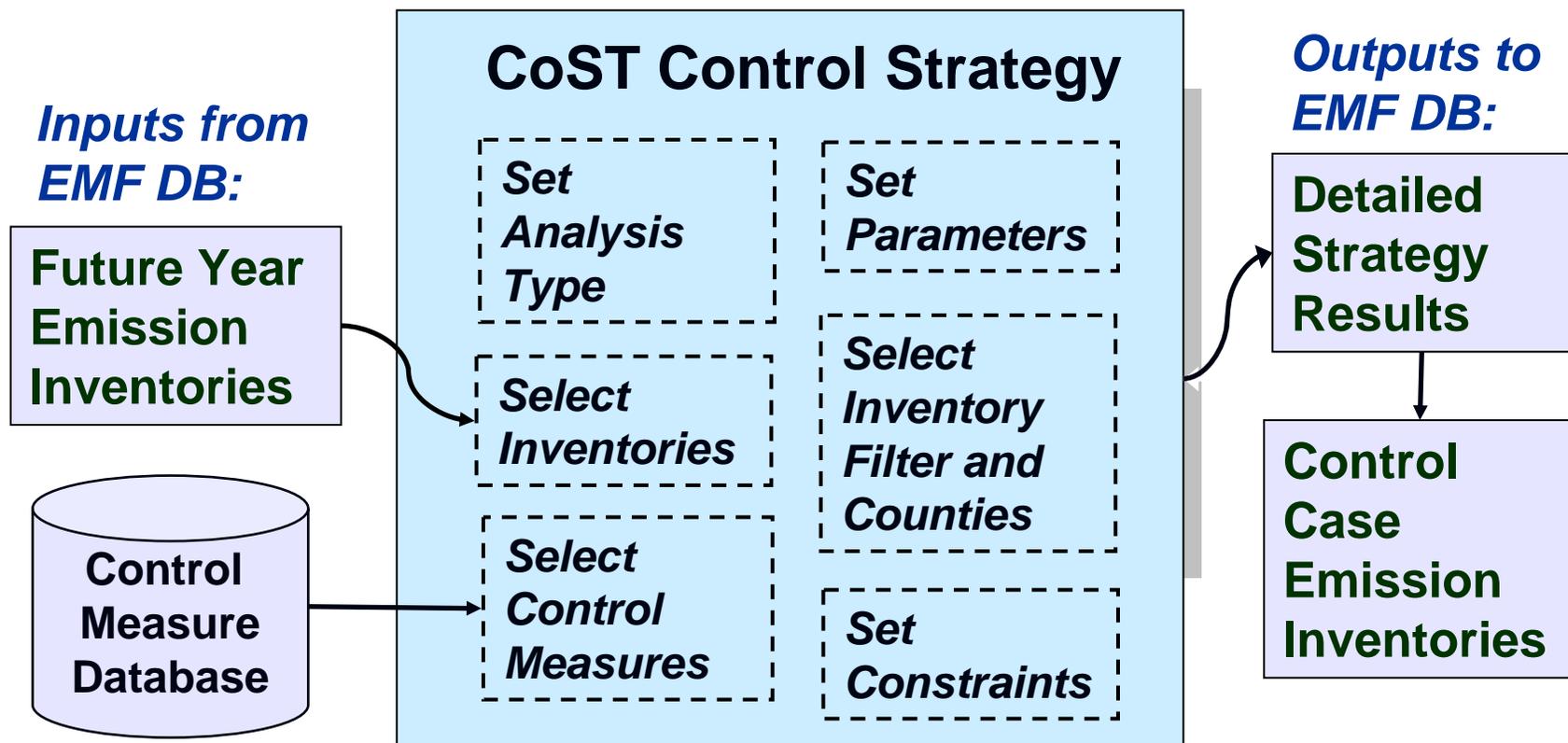
Control Strategy Challenges

- Data volume required direct SQL processing in DB instead of in Java
- Needed to specify **twelve monthly average day** inventories to use (not just a single annual inventory)
- Wanted to **override rule effectiveness and rule penetration** used by the measures for a particular run
- Needed to apply each measure **in a different set of counties**



Setting up a Control Strategy

Emissions Modeling Framework



Currently Available Strategy Analysis Types

- **Maximum Emissions Reduction**
 - Determine the most reduction of target pollutant that is possible using the specified measures
- **Least Cost**
 - Determine the minimum cost way to achieve a specified reduction of the target pollutant
- **Least Cost Curve**
 - Runs least cost analysis for a series of reductions
- **Annotate Inventory**
 - Find measures that provide specified efficiencies
- **Apply Measures in Series**
 - Applies all specified measures in chosen order





File Manage Window Help

- Datasets
- Cases
- Dataset Types
- Sectors
- Control Measures
- Control Strategies
- Users
- My Profile

CoST menu items



Control Strategy Manager

#	Select	Name	Last Modified	Region	Target	Total Cost	Reduction	Strategy Type
1	<input type="checkbox"/>	Annotate Inventory	2008/05/24 10:47		NOX			Annotate Inventory
2	<input type="checkbox"/>	Apply Measures in Series	2008/05/24 10:47		NOX	109800.00	101.10	Apply Measures In Series
3	<input checked="" type="checkbox"/>	Maximum Emissions Reduction	2008/05/24 10:47		NOX	282200.00	95.51	Max Emissions Reduction
4	<input checked="" type="checkbox"/>	Least cost curve	2008/05/24 10:45		NOX	2023000.00	828.10	Least Cost Curve
5	<input type="checkbox"/>	Limited Area Local Controls (C...	2007/05/14 15:14	NC, SC, VA	NOX	0.00	160.40	Max Emissions Reduction
6	<input type="checkbox"/>	Limited Area Local Controls	2007/05/14 15:08	NC, SC, VA	NOX	0.00	505.30	Max Emissions Reduction
7	<input type="checkbox"/>	Statewide Local Controls	2007/05/14 14:41	NC, SC, VA	NOX	71470000.00	18290.00	Max Emissions Reduction

7 rows : 13 columns [Filter: None, Sort: Last Modified(-)]

View Edit New Remove Copy Close

- Used to create, edit, remove, and copy strategies
- The configuration information for strategies and the run results are archived for future reference and comparison



Selecting a Strategy Analysis Type

Edit Control Strategy: Ozone 070 - Onroad

Summary | Inventories | Measures | Constraints | Outputs

Name: Ozone 070 - Onroad

Description:

Project:

Creator: Alison Eyth

Last Modified Date: 01/18/2008 02:53

Copied From:

Type of Analysis: **Apply Measures In Series**

Parameters

Cost Year:

Inventory Year:

Region:

Target Pollutant: NOX

Discount Rate (%): 7.0

Use Cost Equations:

Results

Start Date: 01/17/2008 17:03:28

Completion Date: 01/18/2008 02:53:32

User: Alison Eyth

Total Annualized Cost: 1.648E9

Target Poll. Reduction: 0E0

Save **Copy** **Close** **Run** **Refresh** **Stop**



Using Monthly Inventories and Inventory Filter

Edit Control Strategy: Ozone 070 - Onroad

Summary Inventories Measures Constraints Outputs

Inventories to Process

Icons: [Building], [Funnel], [Eye], [\$000], [Left Arrow], [Checkmark], [Reset]

#	Select	Type	Dataset	Version
1	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_apr	0
2	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_aug	0
3	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_dec	0
4	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_feb	0
5	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_jan	0
6	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_jul	0
7	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_jun	0
8	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_mar	0
9	<input type="checkbox"/>	ORL Onroad Inventory (MBINV)	onroad_2020cc_may	0

12 rows : 4 columns [Filter: None, Sort: None]

Buttons: Add, Set Version, Remove, View

Filters

Inventory Filter: fips not like '02%' and fips not like '15%' and fips not like '72%' and fips not like '78%'

County Dataset: Not selected

County Dataset Version: [Dropdown]

Buttons: Save, Copy, Close, Run, Refresh, Stop

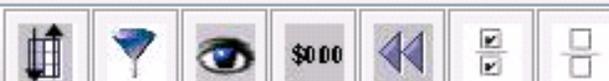


Specifying Measures with Order and RP Overrides

Edit Control Strategy: Ozone 070 - Onroad

Summary Inventories Measures Constraints Outputs

Measures to Include:



#	Select	Abbrev	Order	RE	RP	Name
301	<input type="checkbox"/>	ORVSGMCAU	5.00			Onroad Low RVP Summer , Motorcycles (M
302	<input type="checkbox"/>	ORVSGMCPU	5.00			Onroad Low RVP Summer , Motorcycles (M
303	<input type="checkbox"/>	ONRFMHDVIR	6.00		75.00	ONRetrofit Fall , HD Diesel Vehicles 6 & 7; F
304	<input type="checkbox"/>	ONRFMHDVLR	6.00		75.00	ONRetrofit Fall , HD Diesel Vehicles 6 & 7; F
305	<input type="checkbox"/>	ONRFMHDVMR	6.00		75.00	ONRetrofit Fall , HD Diesel Vehicles 6 & 7; F

470 rows : 8 columns [Filter: None, Sort: Order(+), Name(+)]

Add Edit Remove

Save Copy Close Run Refresh Stop



Mobile Strategy Outputs

Edit Control Strategy: Ozone 070 - Onroad

Summary Inventories Measures Constraints **Outputs**

Output Datasets

\$000

#	Select	Result Type	Record Count	Input Inventory	Re
1	<input type="checkbox"/>	Strategy Summary	2091465		Summary_1473_VO_2008011
2	<input type="checkbox"/>	Detailed Strategy Result	1326631	onroad_2020cc_sep	Strategy_1484_VO_20080118
3	<input type="checkbox"/>	Detailed Strategy Result	1171303	onroad_2020cc_oct	Strategy_1483_VO_20080118
4	<input type="checkbox"/>	Detailed Strategy Result	1171303	onroad_2020cc_nov	Strategy_1482_VO_20080118
5	<input type="checkbox"/>	Detailed Strategy Result	1380356	onroad_2020cc_may	Strategy_1481_VO_20080117
6	<input type="checkbox"/>	Detailed Strategy Result	1171303	onroad_2020cc_mar	Strategy_1480_VO_20080117
7	<input type="checkbox"/>	Detailed Strategy Result	1309364	onroad_2020cc_jun	Strategy_1479_VO_20080117
8	<input type="checkbox"/>	Detailed Strategy Result	1309364	onroad_2020cc_jul	Strategy_1478_VO_20080117

13 rows : 12 columns [Filter: None, Sort: Start Time(-)]

Input Inventory Result Controlled Inventory

Export Folder:



Mobile Emissions Reduction Summary

View QA Step "Summarize by Control Technology and Pollutant" results 0

QA_DSID3553_V0_20080527183750_Control_Te

File Name C:\DOCUME~1\eyth\LOCALS~1\Temp\QA_DSID3553_V0_20080527183750_Control_Technology

Header #DATASET_NAME=Summary_1473_V0_20080118022510onroad_2020cc_apr #DATASET_VERSION Full Description

	control_technology	poll	avg_ann_cost_per_ton	annual_cost	emis_reduction
1	Tier 3 Standards	EXH_NOX			73040
2	Tier 3 Standards	EXH_VOC	8400.00	598200000.00	71210
3	Aftermarket Catalysts	EXH_NOX	3700.00	244000000.00	65940
4	Plug In Hybrids	EXH_VOC			38630
5	Aftermarket Catalysts	EXH_VOC			35050
6	Tier 3 Standards	EVP_VOC	8400.00	276900000.00	32960
7	Continuous Inspection	EXH_VOC			32700
8	ONRetrofit Winter	EXH_NOX	3106.00	81830000.00	26350
9	ONRetrofit Spring	EXH_NOX	3101.00	79270000.00	25560
10	ONRetrofit Summer	EXH_NOX	3101.00	77900000.00	25120
11	ONRetrofit Fall	EXH_NOX	3107.00	74650000.00	24030
12	Continuous Inspection	EXH_NOX			22850
13	Plug In Hybrids	EXH_NOX			20830

49 rows : 5 columns [Filter: poll does not contain CO, Sort: emis_reduction(-)]



New Least Cost Analyses

- **Least cost** analysis type finds 'least cost' way to reduce emissions of a pollutant within a region (algorithm is similar to that in AirControlNET)
- Inventories from multiple sectors (point, area, agricultural) can be processed together in a single least cost run
- **Least cost curve** strategy performs a series of least cost runs each n percentage points (e.g., 5%, 10%, 15%, ...) and summarizes the results of each run



Edit Control Strategy: Least cost curve

Summary Inventories Measures Constraints Outputs

Name: Least cost curve

Description:

Project:

Creator: Alison Eyth

Last Modified Date: 05/24/2008 10:45

Copied From:

Type of Analysis: **Least Cost Curve**

Parameters

Cost Year: 2006

Inventory Year: 2020

Region:

Target Pollutant: NOX

Discount Rate (%): 7.0

Use Cost Equations:

Results

Start Date: 05/05/2008 12:27:36

Completion Date: 05/05/2008 12:27:58

User: Alison Eyth

Total Annualized Cost: 2.023E6

Target Poll. Reduction: 8.281E2

Save Copy Close Run Refresh Stop



Edit Control Strategy: Least cost curve

Summary Inventories Measures Constraints Outputs

Inventories to Process

\$000

#	Select	Type	Dataset	Version
1	<input checked="" type="checkbox"/>	ORL Point Inventory (PTINV)	ptipm_cap2002v2	4

1 rows : 4 columns [Filter: None, Sort: None]

Merge Inventories 1 rows

Filters

Inventory Filter:

County Dataset:

County Dataset Version:



Edit Control Strategy: Least cost curve

Summary Inventories Measures Constraints Outputs

All Strategies

Constraints for Target Pollutant:

Minimum Emissions Reduction (tons)

Minimum Control Efficiency (%)

Maximum 2006 Cost per Ton (\$/ton)

Maximum 2006 Annualized Cost (\$/yr)

Minimum Percent Reduction Difference for Replacement Control (%)

Least Cost Curve

Specify an increment, starting and ending percent reduction (%) for the Target Pollutant:

Domain-wide Percent Reduction Increment (%)

Domain-wide Percent Reduction Start (%)

Domain-wide Percent Reduction End (%)

Save Copy Close Run Refresh Stop

- Specify the increment (%), starting, and ending reductions



Edit Control Strategy: Least cost curve

Summary Inventories Measures Constraints **Outputs**

Output Datasets

#	Select	Result Type	Record Count	Result
2	<input type="checkbox"/>	Detailed Strategy Result	13	pct_91_0_least_cost_test_20080505122737803
3	<input type="checkbox"/>	Detailed Strategy Result	13	pct_92_0_least_cost_test_20080505122737948
4	<input type="checkbox"/>	Detailed Strategy Result	13	pct_93_0_least_cost_test_20080505122738230
5	<input type="checkbox"/>	Detailed Strategy Result	13	pct_94_0_least_cost_test_20080505122738495
6	<input type="checkbox"/>	Detailed Strategy Result	13	pct_95_0_least_cost_test_20080505122738698
7	<input type="checkbox"/>	Detailed Strategy Result	8	pct_25_0_least_cost_test_20080505122757152
8	<input type="checkbox"/>	Detailed Strategy Result	9	pct_50_0_least_cost_test_20080505122757573
9	<input type="checkbox"/>	Detailed Strategy Result	13	pct_75_0_least_cost_test_20080505122757902
10	<input type="checkbox"/>	Detailed Strategy Result	13	pct_100_0_least_cost_test_20080505122758277
11	<input type="checkbox"/>	Least Cost Control Measure Worksheet	66	Measure_Worksheet_least_cost_test_200805051227
12	<input checked="" type="checkbox"/>	Least Cost Curve Summary	10	Cost_Curve_Summary_least_cost_test_200805051227

12 rows : 12 columns [Filter: None, Sort: Start Time(-)]

Input Inventory Result Controlled Inventory

Export Folder:

- Individual and summary results are generated



Analyze Control Strategy: Least cost curve0

File

Cost_Curve_Summary_least_cost_test_20080

File Name D:\Cost_Curve_Summary_least_cost_test_20080505122736417_05may2008_v0

Header strategy least cost curve summary #Implements control strategy: least cost test ##EXPORT Full Description

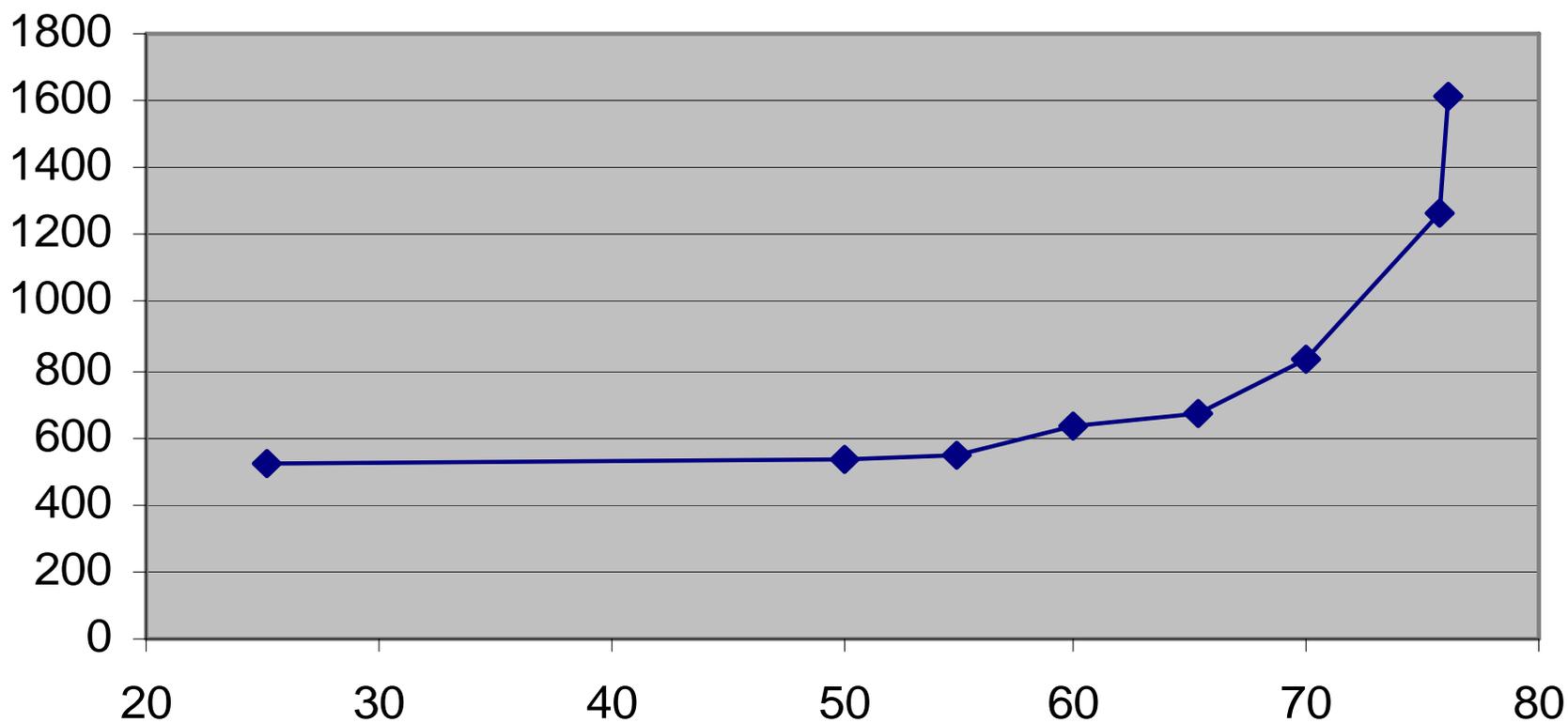
target_perc...	actual_percent_reduction	total_annual_cost	average_ann_cost_per_ton	total_emis_reduction
25	41.214	30212.37	725.08	41.66771
50	50.174	37336.62	736.04	50.72667
75	75.917	91133.98	1187.37	76.75257
90	90.031	230429.62	2531.57	91.0224
91	91.568	248348.26	2682.62	92.576625
92	92.321	257116.91	2754.71	93.3372
93	94.474	282214.06	2954.69	95.514075
94	94.474	282214.06	2954.69	95.514075
95	94.474	282214.06	2954.69	95.514075
100	94.474	282214.06	2954.69	95.514075

10 rows : 11 columns [Filter: None, Sort: actual_percent_reduction(+)]

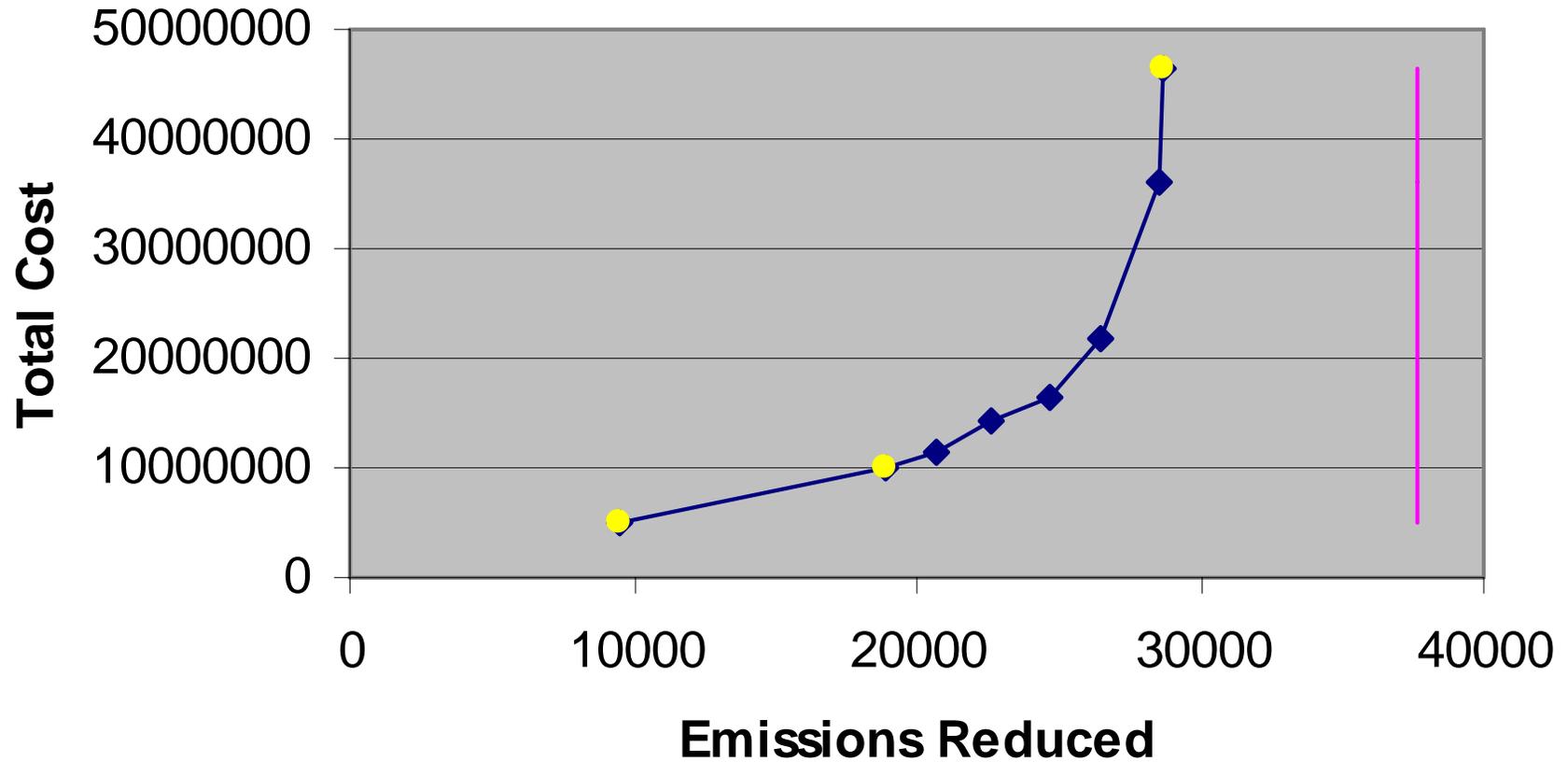
- Cost curve summary shows results for all runs



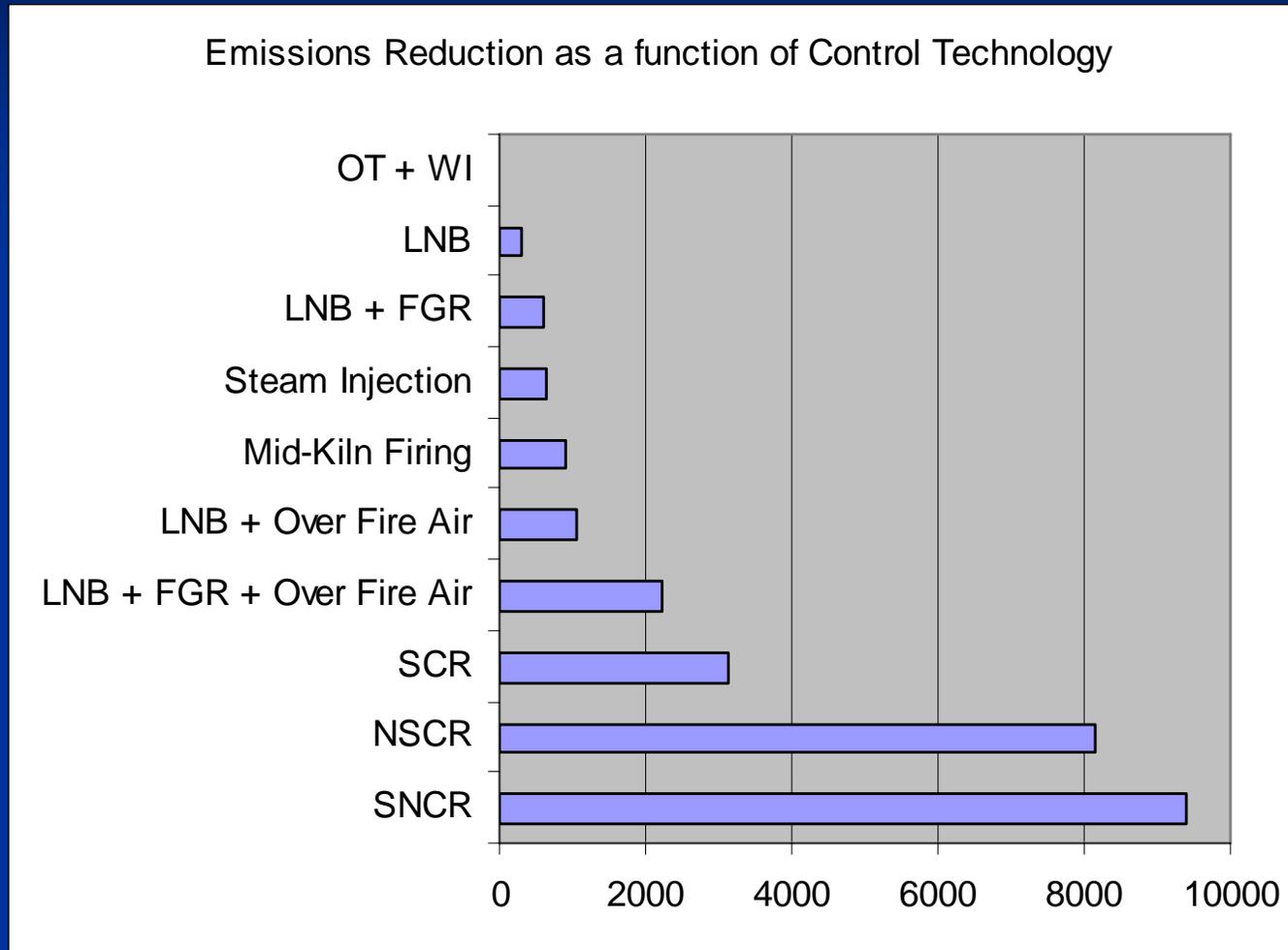
Cost per ton as a function of percent reduction (EGU sector)



EGU Sector Total Cost as f(Emissions Reduced)



Technologies used by a Least Cost Run



Ongoing Work: Annotate Inventory

- New strategy analysis type that associates available measures with inventories based on control efficiency in the inventory
- Really need for inventory providers to fill in the control efficiency (ceff) and control device code whenever possible
- This prevents improper application of additional controls to already controlled sources
- Applying this has helped identify additional needs for control measure data



Annotation Results

measure_abbrev	inv_ceff	measure_ ceff	ceff_abs_ diff	pri_control_device	measure_name
NSTINGTNG	79.99	80	0.01	STEAM OR WATER INJECTION	Steam Injection; Gas Turbines - Natural Gas
NLNC3UBCT2	69.99	58.3	11.69	MISCELLANEOUS CONTROL DEVICES	LNC3; Utility Boiler - Subbit Coal/Tangential
NLNC3UBCT2	69.99	58.3	11.69	MISCELLANEOUS CONTROL DEVICES	LNC3; Utility Boiler - Subbit Coal/Tangential
NLNBUGTNG	54.99	68	13.01	STEAM OR WATER INJECTION	LNB; Gas Turbines - Natural Gas
NLNC3UBCT2	89.99	58.3	31.69	STAGED COMBUSTION	LNC3; Utility Boiler - Subbit Coal/Tangential
NNGRECBNG2	84.99	50	34.99	CONTROL OF % O2 IN COMBUSTION AIR (OFF STOICHIOMETRIC FIRING)	NGR; External Combustion Boilers, Elec Gen, Nat Gas (2)
NNGRECBNG2	84.99	50	34.99	CONTROL OF % O2 IN COMBUSTION AIR (OFF STOICHIOMETRIC FIRING)	NGR; External Combustion Boilers, Elec Gen, Nat Gas (2)
	97.99			WET SCRUBBER - HIGH EFFICIENCY	
	94.6			DRY LIMESTONE INJECTION	



Ongoing Work: Control Programs

- Control Program information is needed to project base year inventories to future years
 - Once complete, this will allow users to apply projection and control factors to project inventories to a specified future year
- Control programs can list preferred control measures or technologies to use
 - If unspecified, CoST will give a best guess or leave blank if none are close enough
- **Control program information from states would be helpful for improved accuracy**



Types of Control Programs

- Plant closures
- Planned reductions at specific plants
- Planned growth at specific plants
- Caps on emissions at existing plants
- SCC-based reduction programs
- Commuter programs
- Estimated growth for specific sectors



Ongoing work: GHG Study for Cement Plants

- A preliminary application for the greenhouse pollutant Elemental Carbon was performed last year
- This year we are performing an analysis of CO₂ targeting the cement sector
- CO₂ control measure data is being added for cement sources (via EPA summer intern)
- Developing a CO₂+criteria pollutant inventory for cement plants that will be usable in CoST
- **GHG Analyses would be SO MUCH easier if a detailed (unit level) inventory was available!**



Other Recent Enhancements

- Support cost equations for point sources so that cost can be represented in a way other than a simple cost/ton (approx. 8 types are available)
- New detailed result summaries are available (e.g., state+scc+control technology)
- Creates controlled ORL format inventories that specify which control measures have been applied to each source
- Find Measures for SCCs feature



Other Priorities for Summer '08

- Examining ways to perform least cost optimization for multiple target pollutants (e.g., NO_x + SO_x)
- Facilitate uncertainty and sensitivity analyses in control strategies



Acknowledgments

- This work was funded by the Air Benefit and Cost Group of the Health and Environmental Impacts Division of U.S. EPA's Office of Air Quality Planning and Standards
- Technical support at UNC was provided by Darin Del Vecchio and Dongmei Yang



Control Measure Manager

Major Pollutant: ALL Show Details? Refresh

\$0.00

#	Select	Name	Abbreviation	Pollutant
1	<input type="checkbox"/>	Add-On Controls;Wood Furniture Surface Coating	VWDCTADDON	VOC
2	<input type="checkbox"/>	Advisory Program;Wood Burning Fireplaces, Stoves	PRESWDEDAD	PM10
3	<input type="checkbox"/>	AF + IR; Internal Combustion Engines - Gas	NAFRIICGS	NOX
4	<input type="checkbox"/>	AF RATIO; Internal Combustion Engines - Gas	NAFRICGS	NOX
5	<input type="checkbox"/>	Amine Scrubbing; Sulfur Recovery Plants - Elemental Sulfur (Claus: 2 Stage w/o control (92-95% r...	SAMSCSRP95	SO2
6	<input type="checkbox"/>	Amine Scrubbing; Sulfur Recovery Plants - Elemental Sulfur (Claus: 3 Stage w/o control (95-96% r...	SAMSCSRP96	SO2
7	<input type="checkbox"/>	Amine Scrubbing; Sulfur Recovery Plants - Elemental Sulfur (Claus: 3 Stage w/o control (96-97% r...	SAMSCSRP97	SO2
8	<input type="checkbox"/>	BARCT;Automobile Refinishing	VATRFBARCT	VOC
9	<input type="checkbox"/>	Best Workplaces; LD Gas Trucks 1 & 2; Rural Interstate	BWCOLGT1IR	NOX

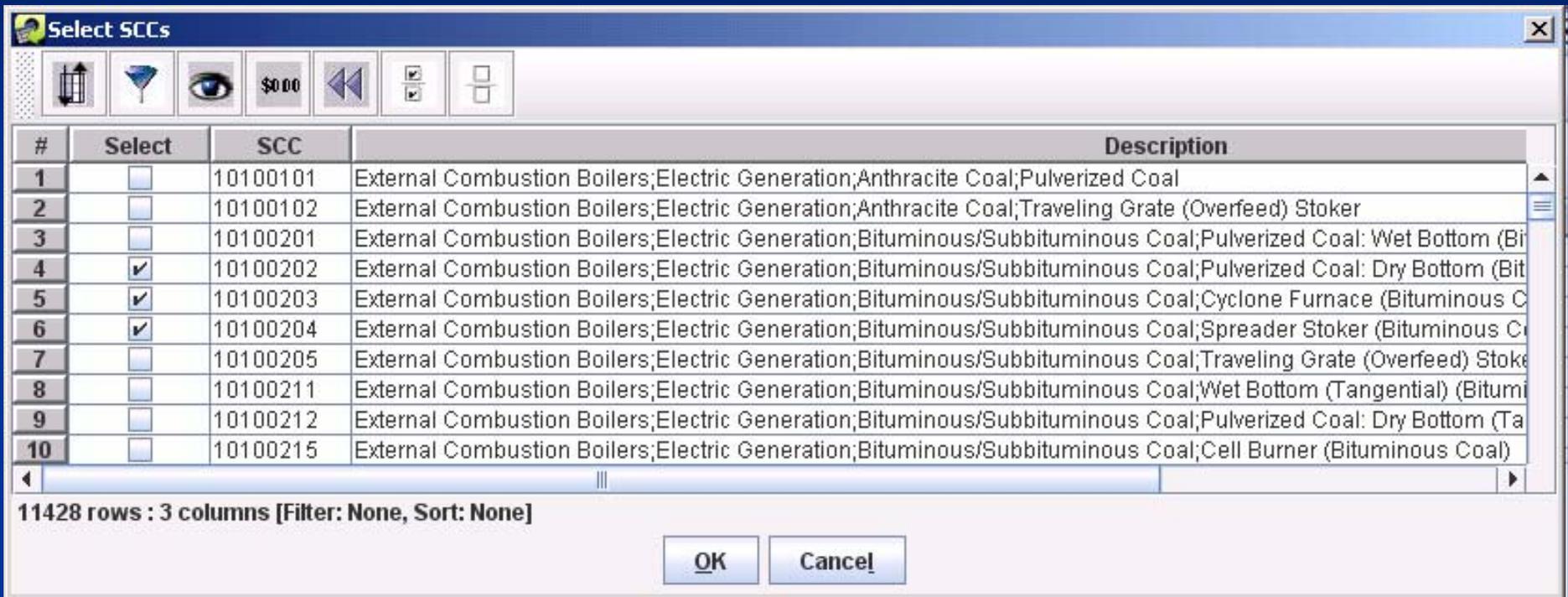
1287 rows : 4 columns [Filter: None, Sort: Name(+)]

Pollutant: MAJOR

- A need for a new feature was identified: Find Control Measures that apply to sources with particular SCCs



Select the SCCs of Interest



The screenshot shows a software window titled "Select SCCs". It features a toolbar with icons for a funnel, an eye, a dollar sign, and navigation arrows. Below the toolbar is a table with the following columns: "#", "Select", "SCC", and "Description". The table lists 10 rows of SCCs. Rows 4, 5, and 6 have their "Select" checkboxes checked. At the bottom of the window, there is a status bar that reads "11428 rows : 3 columns [Filter: None, Sort: None]" and two buttons labeled "OK" and "Cancel".

#	Select	SCC	Description
1	<input type="checkbox"/>	10100101	External Combustion Boilers;Electric Generation;Anthracite Coal;Pulverized Coal
2	<input type="checkbox"/>	10100102	External Combustion Boilers;Electric Generation;Anthracite Coal;Traveling Grate (Overfeed) Stoker
3	<input type="checkbox"/>	10100201	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Pulverized Coal: Wet Bottom (Bi
4	<input checked="" type="checkbox"/>	10100202	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Pulverized Coal: Dry Bottom (Bit
5	<input checked="" type="checkbox"/>	10100203	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Cyclone Furnace (Bituminous C
6	<input checked="" type="checkbox"/>	10100204	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Spreader Stoker (Bituminous C
7	<input type="checkbox"/>	10100205	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Traveling Grate (Overfeed) Stoker
8	<input type="checkbox"/>	10100211	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Wet Bottom (Tangential) (Bitumi
9	<input type="checkbox"/>	10100212	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Pulverized Coal: Dry Bottom (Ta
10	<input type="checkbox"/>	10100215	External Combustion Boilers;Electric Generation;Bituminous/Subbituminous Coal;Cell Burner (Bituminous Coal)

- Can select manually or use a filter on SCC and/or Description to select all from a group



Control Measure Manager

Major Pollutant: Select one Show Details? Retrieved measures for SCC: 10100202 10100203 10100204 Refresh

#	Select	Name	Abbreviation	Pollutant	Avg CPT	Avg CE	Min CE	Max CE
1	<input type="checkbox"/>	SNCR; External Combustion Boilers, Elec Gen, Sub/Bit Coal (2)	NSNCRECBE2	NOX	1136.00	40.00	40.00	40.00
2	<input type="checkbox"/>	SNCR; External Combustion Boilers, Elec Gen, Sub/Bit Coal (3)	NSNCRECBE3	NOX	1136.00	40.00	40.00	40.00
3	<input type="checkbox"/>	Coal Washing; Utility Boilers - Coal Fired	SCWSHUBCF	SO2	320.00	35.00	35.00	35.00
4	<input type="checkbox"/>	Fuel Switch - High to Low S Content; Utility Boilers - High Sulfur ...	SFWHLUBHS	SO2	140.00	60.00	60.00	60.00
5	<input type="checkbox"/>	SNCR; Utility Boiler - Cyclone	NSNCRUBCY	NOX		35.00	35.00	35.00
6	<input type="checkbox"/>	SNCR; Utility Boiler - Coal/Wall	NSNCRUBCW	NOX		35.00	35.00	35.00
7	<input type="checkbox"/>	SCR; Utility Boiler - Cyclone	NNSCR_UBCY	NOX		90.00	90.00	90.00
8	<input type="checkbox"/>	SCR; Utility Boiler - Coal/Wall	NNSCR_UBCW	NOX		90.00	90.00	90.00

26 rows : 23 columns [Filter: None, Sort: Avg CPT(-)]

View Edit Copy New Find Pollutant: MAJOR Cost Year: 2006 Import Export Close

- Control Measures that can apply to the selected SCCs are shown
- Clicking **Show Details** causes manager to show average cost per ton, min/max/avg control efficiency, etc.

