Input Files: What Is In Them & How to Set Them Up

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The Five Basic Files

- Unit Availability File (UAF) **ertac_initial_uaf.csv**
  - Backbone of the tool
  - Unit level data
  - Sources: CAMD, EIA, NEEDS, State Staff
- Controls File **ertac_control_emissions.csv**
  - Unit level data for SO2 and NOx
  - Emission rates or control efficiencies
- Growth Rates File **ertac_growth_rates.csv**
  - Growth rates by region and fuel unit type
  - Annual based on EIA reference case (AEO 2013)
  - Peak based on NERC
- Input Variables File **ertac_input_variables.csv**
  - A variety of variables that can be changed for each region and fuel unit type
  - Many deal with new, planned units or GDUs
- CAMD Hourly Base Year Data **camd_hourly_base.csv**

The Four "Extra" Files

- Seasonal Controls File **ertac_seasonal_control_emissions.csv**
  - Unit level data for SO2 and NOx
  - Allows the seasonal manipulation of SO2 or NOx rates
    - Only one year must be provided
    - All years after the provided year that are modeled will use the same rates
- NonCAMD Hourly Base **ertac_hourly_noncamd.csv**
  - Will add or edit existing hourly data
  - Useful for adding additional units that don't report to CAMD
  - Corrections of existing data (negative values, eg)
- Group Total Listing **group_total_listing.csv**
  - Provides regional SO2 and NOx emission levels to the program
  - Outputs a comparison of summed SO2 and NOx for the defined regions (estimated vs supplied levels)
- State Total Listing **state_total_listing.csv**
  - Provides state SO2 and NOx emissions levels to the program
  - Outputs a comparison of summed SO2 and NOx for the defined state (estimated vs supplied levels)

The Five Basic Files

Unit Availability File (UAF)

- A listing of the units that will be grown by the tool
- State supplied info: New units, retirements, fuel switches, simple cycle $\rightarrow$ combined cycle changes
  - **Tool will NOT retire a unit w/o state input**
  - **Tool will NOT switch fuels at a unit w/o state input**
- Other sources:
  - Unit Level CAMD info
  - NEEDS, EIA, other
- Some data are used by the tool. Other data are informational and provided to guide users and state staff. May be used in future tool upgrades.

UAF: Blank Columns

- Some of the columns in the input UAF **should start blank** unless they are needed because an existing unit has little or no BY data (more on that issue later)

- These columns are filled in by the tool-you can see results in the post processed UAF.

- If the tool is run with data already in the columns, then the data supplied in the UAF supplants the calculated data

UAF: Blank Columns

- **Max_ertac_heat_input_hourly_summer**
- **Hourly_base_max_actual_heat_input**
- **Calculated_BY_UF**
- **Max_annual_ertac_UF**
- **Max_BY_hourly_gload or sload**
- **Calculated_BY_average_heat_rate**
- **ERTAC_heat_rate**
- **Unit_optimal_load_threshold**
- **Nominal_heat_rate**

UAF: What is Needed For Existing Units?

- Existing unit: Unit that operated in the BY **only need 9 columns** of data provided
- **ORIS_plant_ID**
- **CAMD_unit_ID**
  - Be careful, these are alphanumeric, and Excel likes to convert to numeric when importing a .csv or .txt file
  - Easy to lose leading zeros, and the ID must match what is in the CAMD hourly file
- **State**
- **Facility_name**
  - The program will provide a warning if state and facility_name in the UAF do not match what is in the CAMD hourly database
- **ERTAC_region**
  - Check the map if you are unsure of the facility's region
  - Google Earth is very helpful for this effort

9 UAF Columns for Existing Units, Con't

- **BY_camd_hourly_data_type**
  - New, Full, Partial, Non-EGU
  - If a unit is marked "full" but has an incomplete record set in the BY, the tool treats it like "partial" and tells you this in the pre-processor log
- **Online_start_date**
  - Did your unit start in the base year? (sometime in 2011, for example)
  - If so, you can choose to set the online start date to 2012 and call it a new unit. This allows the tool to provide the unit a "typical" activity profile. This is useful if the base year's operations are not typical due to start up and you want the new unit to have reasonable activity during the entire year.
  - Or, you can choose to set the online start date to the MM/DD/YY of start up (for example, 02/12/2011 and call the unit a "full" unit. This will tell the tool to use the 2011 data as the basis for the unit's FY activity.
- **Offline_start_date**
  - Both the online and offline_start_date may be a year rather than a month/day/year. If it is a year, the program assumes start up on the first day of the next year or on retirement on the last day of the particular year. Example, if the date is 2016, the program assumes the unit shuts down on December 31, 2016, or begins operations on January 1, 2017.
  - For units not retiring, use a place holder of 2030
- **ERTAC_fuel_unit_type_bin**
  - Coal, Oil, Simple Cycle-Gas, Boiler-Gas, Combined Cycle-Gas
  - Use predominant fuel or operations of the unit to assign

SIDEBAR: What is a Non-EGU?

- Units report to CAMD for all sorts of reasons
  - RGGI, NBTP, CAIR, ARP, etc
- FY activity for some units may be better predicted using something other than EIA data
  - Units that don't send much electricity to the grid or provide steam to industrial processes
  - Units with nonstandard fuels (TDF, biomass for example)
- **States make this determination**
- Example: In VA, units at paper mills are marked as non-EGUs. Why?
  - Provide little or no electricity to the grid
  - Operations dependent on paper making
  - Better grown using paper industry-specific growth rates, which generally are not as aggressive as EIA growth rates

3 More Columns for Existing Units in the UAF

- These columns are **_not required_** for the projection to run
- Good to make sure they are provided. Best practice is to have these columns filled in for all units in the UAF.
  - **Plant_latitude**
  - **Plant_longitude**
    - These help the modelers to get the ERTAC-to-SMOKE post processor to work
    - If you **like your modelers**, make sure to include these data for all units that are EGUs
  - **Max_unit_heat_input**
    - Mmbtu/hr
    - Available from CAMD for every unit
    - Very helpful for the program to have this data; highly recommended to include for all units in UAF
    - May also be state-supplied
    - Helps tool to determine capacity of the unit

Existing Units with Little or No BY Data

- Some units in the BY provide little or no hourly data
  - May be data errors or incomplete data
  - May have simply not run very much or not at all
- BY data is needed so that a number of columns in the UAF may be calculated:
  - Max_annual ertac_UF (how much the unit operated in the BY)
  - Max_BY_hourly_gload/sload (how hard a unit can run)
  - Calculated_BY_average_heat_rate (average heat rate/efficiency)
  - Unit_optimal_load_threshold (where the unit likes to run)
  - A few others
- How do you identify these units?
  - Pre-processor log will provide a series of warnings regarding units without necessary BY data
  - The 2.3 and 2.4 reference cases have had these units ID'd and appropriate data supplied in the reference input files

Necessary Additional Columns for Existing Units with Little or No BY Data

- **Max_unit_heat_input**
  - Data from CAMD, permits or other sources
  - Suggested to be filled in for ALL units; mandatory for units with little/no BY data
- **Max_annual_ERTAC_UF_state_input**
  - How much should the unit be allowed to operate?
  - Default is 0.9
- **Nominal_heat_rate**
  - The ERTAC_heat_rate is the calculated BY heat rate, unless a nominal_heat_rate is supplied. Any value supplied in the nominal_heat_rate column is automatically used by the tool.
- **Unit_max_optimal_load_threshold**
  - This value is a judgment about where the unit likes to operate.
  - If sufficient BY data is available, will be calculated.
  - For units with little or no BY data, states must supply this value.
  - Can be estimated at about 80% of the maximum capacity of the unit, in MWs

UAF Example: Existing Unit-Input File

orispl_code	unitid	state	plant_latitude	plant_longitude	facility_name	ertac_region	BY_camd_hourly_data_type	online_start_date	offline_start_date	ertac_fuel_unit_type_bin	max_ertac_heat_input_hourly_summer (mmBtu)	hourly_base_max_actual_heat_input (mmBtu)	max_unit_heat_input (mmBtu)	calculated_BY_UF	Max_annual_ertac_UF_state_input	max_annual_ertac_UF	max_BY_hourly_gload (MW)	max_BY_hourly_sload (1000 lbs)	nominal_heat_rate (btu/kw-hr)	calculated_BY_average_heat_rate (btu/kw-hr)	ertac_heat_rate (btu/kw-hr)	unit_annual_capacity_limit	unit_optimal_load_threshold
3	5	AL	31.0069	-88.0103	Barry	SRSE	Full	1971	2030	Coal			11057										
3	6A	AL	31.0069	-88.0103	Barry	SRSE	Full	1950	2030	Combined Cycle Gas			2127										
50	1	AL	34.8825	-85.7547	Widows Creek	SRCE	Full	1952	2016	Coal			2569		.9				13000				100

14

UAF Example: Existing Unit-Processed File

orispl_code	unitid	state	plant_latitude	plant_longitude	facility_name	ertac_region	BY_camd_hourly_data_type	online_start_date	offline_start_date	ertac_fuel_unit_type_bin	max_ertac_heat_input_hourly_summer (mmBtu)	hourly_base_max_actual_heat_input (mmBtu)	max_unit_heat_input (mmBtu)	calculated_BY_UF	Max_annual_ertac_UF_state_input	max_annual_ertac_UF	max_BY_hourly_gload (MW)	max_BY_hourly_sload (1000 lbs)	nominal_heat_rate (btu/kw-hr)	calculated_BY_average_heat_rate (btu/kw-hr)	ertac_heat_rate (btu/kw-hr)	unit_annual_capacity_limit	unit_optimal_load_threshold
3	5	AL	31.0069	-88.0103	Barry	SRSE	Full	1971	2030	Coal	11057	7115.7	11057	0.24		0.9	776			9538	9538		701
3	6A	AL	31.0069	-88.0103	Barry	SRSE	Full	1950	2030	Combined Cycle Gas	2127	2059.8	2127	0.79		0.9	290			7356	7356		269
50	1	AL	34.8825	-85.7547	Widows Creek	SRCE	Full	1952	2016	Coal	2569		2569	0.9	.9	0.9			13000				100

UAF: 12 Columns Needed for New Units

- **ORIS_plant_ID**
  - If a unit has not yet been assigned an ORIS, Wendy will assign a temporary number.
  - Remember to tell ERTAC when the ORIS is assigned!
- **CAMD_unit_ID**
  - If the unit_ID is unknown at the time of the UAF development, tell Wendy and she will assign a temporary number.
  - Remember to tell ERTAC when the unit_ID is assigned!
- **State**
- **Facility_name**
- **ERTAC_region**
  - Use map to figure this out, and Google Earth
- **BY_camd_hourly_data_type**
  - Will be **NEW**

UAF: 12 Columns Needed for New Units

- **Online_start_date**
  - Best guess as to the year it will start up
  - If the online_start_date is during a projection year:
    - When only the year (e.g. 2017) is provided, the tool uses Jan 1 of the next year as the start date.
    - When providing MM/DD/YEAR (e.g. May 1, 2017), the tool starts the new unit on the next day (e.g. May 2, 2017).
- **Offline_start_date**
  - 2030
- **ERTAC_fuel_unit_type_bin**
- **Max_unit _heat_input**
  - From permit application? Maximum heat input in mmbtu/hr
- **Nominal_heat_rate**
  - From permit application?
  - Other potential defaults: 6,700 btu/kw-hr for CC; 9,000 btu/kw-hr for SC-gas; 9,000 btu/kw-hr for coal fired boilers; 11,000 btu/kw-hr for boiler-gas
- **New_unit_flag**
  - Include a "Y" for new units

17

UAF: New Unit Examples-Input File

oris_plant_id	camd_unit_id	state	plant_latitude	plant_longitude	facility_name	ertac_region	BY_camd_hourly_data_type	online_start_date	offline_start_date	ertac_fuel_unit_type_bin	max_ertac_heat_input_hourly_summer	hourly_base_max_actual_heat_input	max_unit_heat_input	calculated_BY_uf	max_annual_ertac_uf	max_BY_hourly_gload	max_BY_hourly_sload	nominal_heat_rate	calculated_BY_average_heat_rate	ertac_heat_rate	unit_optimal_load_threshold	new_unit_flag
56808	1	VA	36.9164	-82.3383	Virginia City Hybrid Energy Center	RFCW	NEW	2012	2030	Coal			3132					9400				Y
56808	2	VA	36.9164	-82.3383	Virginia City Hybrid Energy Center	RFCW	NEW	2012	2030	Coal			3132					9400				Y
55939	1	VA	38.917466	-78.189735	Dominion-Warren County	SRVC	NEW	2012	2030	Combined Cycle Gas			3400					6700				Y

UAF: New Unit-Processed File

oris_plant_id	camd_unit_id	state	plant_latitude	plant_longitude	facility_name	ertac_region	BY_camd_hourly_data_type	online_start_date	offline_start_date	ertac_fuel_unit_type_bin	max_ertac_heat_input_hourly_summer	hourly_base_max_actual_heat_input	max_unit_heat_input	calculated_BY_uf	max_annual_ertac_uf	max_BY_hourly_gload	max_BY_hourly_sload	nominal_heat_rate	calculated_BY_average_heat_rate	ertac_heat_rate	unit_optimal_load_threshold	new_unit_flag
56808	1	VA	36.9164	-82.3383	Virginia City Hybrid Energy Center	RFCW	NEW	2012	2030	Coal	3132		3132	.9				9400	9400	333.2	333.2	Y
56808	2	VA	36.9164	-82.3383	Virginia City Hybrid Energy Center	RFCW	NEW	2012	2030	Coal	3132		3132	.9				9400	9400	333.2	333.2	Y
55939	1	VA	38.917466	-78.189735	Dominion-Warren County	SRVC	NEW	2012	2030	Combined Cycle Gas	3400		3400	0.9				6700	6700	439.6		Y

UAF: Fuel Switching Units

- Occurring frequently these days - mainly, **coal** units switching to **natural gas**
- Steps:
  - Retire the coal unit (Offline_start_date=201X)
  - Add a line in the UAF
    - Easy to copy line from the coal unit
    - Leave in all the lat long and other unit ID data (if you want to be nice to your modelers…)
  - Change the following items on the new line:
    - **BY_camd_hourly_data_type**: Change to NEW
    - **Online_start_date:** Make sure that the coal unit's offline_start_date is **_prior_** to the gas unit's online_start_date
    - **Offline_start_date:** 2030, unless the gas unit is also slated to retire in the future
    - **ERTAC_fuel_unit_type_bin**: Change from previous fuel to new fuel (Boiler Gas, for example)
    - **Nominal_heat_rate**: As a new unit, the unit needs a nominal_heat_rate. Maybe 11,000 or 12,000 btu/kw-hr for Boiler-Gas fuel-switched units
    - **New_unit_flag:** Change to Y
  - Not necessary, but for clarity, you may want to clean up the informational columns to remove references to the old fuel and old operational practices
  - If you have any representative emissions data, you should include emission rates in the controls file for the new unit. Best practice to include those ratesin the control file, if available.
- Same steps are used for a unit going from simple cycle→combined cycle
  - In this case, be sure to update the unit's max_unit_heat_input and nominal_heat_rate for the combined cycle unit!
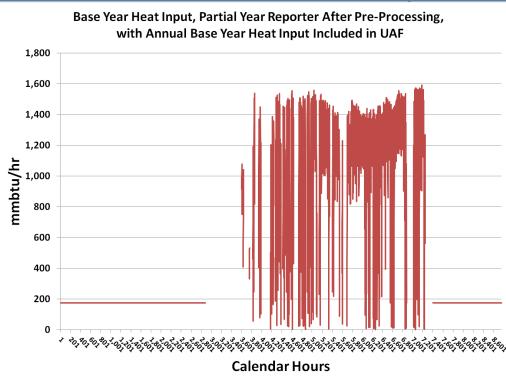
UAF Example: Fuel Switched Unit Coal to Natural Gas

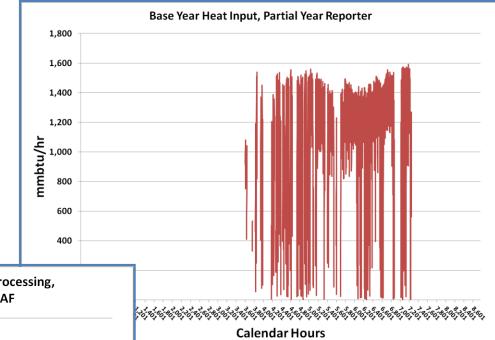| oris_plant_id	camd_unit_id	state	plant_latitude	plant_longitude	facility_name	ertac_region	BY_camd_hourly_data_type	online_start_date	offline_start_date	ertac_fuel_unit_type_bin	max_unit_heat_input	nominal_heat_rate	new_unit_flag
3775	1	VA	36.9328	-82.1986	Clinch River	RFCW	Full	1958	12/30/2014	Coal	1920		
3775	1	VA	36.9328	-82.1986	Clinch River	RFCW	NEW	2015	2030	Boiler Gas	1920	12000	Y

UAF: Partial Year Reporters

- Units that didn't report a full year of data in the BY=Partial year reporters
- BY_camd_hourly_data_type=Partial
- BY_Annual_HI_for_Partials
  - Optional
  - The base year annual heat input in mmbtu/yr
  - If provided, tool will subtract reported data from annual data
  - Non reported period will be assigned a flat temporal profile
- Units marked as Full but without a full year of data are treated as Partial units by tool
- Preprocessor log will detail each unit's status

UAF Partial Year Reporters

States may choose to supply annual activity (heat input) in UAF

Base Year Heat Input, Partial Year Reporter

Base Year Heat Input, Partial Year Reporter After Pre-Processing, with Annual Base Year Heat Input Included in UAF

Tool will create non-reported time period's profile, if data is supplied. Non-reported profile is flat.

UAF: Units with Annual Constraints

- Suppose a unit that operated freely in the BY has a FY constraint:
  - Consent order, permit requirement, other SIP requirement…
- **Max_annual_ERTAC_UF_state_input**=range from >0 to <1
  - Value limits the total annual amount of power the unit may produce.
  - For instance, a unit that has maximum capacity of 100 MW can theoretically produce 876,000 MW-hrs of power (100 MW x 8760 hrs/yr). If the unit_annual_capacity_limit=.5, the unit will be capped at 438,000 MW-hrs of power in the FY.
- Did a lot of work with this in a recent series of trials for SRVC-works very well.

UAF: Unused Fields

- A couple fields aren't yet filled in because the code has not yet been updated for a particular functionality
  - **Other_consuming_regions**: For updates to code that will allow power from the unit to flow to other regions than the ERTAC_region
  - **Max_ertac_heat_input_hourly_winter**: for units like GTs where capacity may depend on seasonal temperature and humidity
  - **Unit_minimum_optimal_load_threshol**d: for units to be turned off in any particular hour where the load drops below reasonable levels
- At this time, these fields are not being used. Just ignore them.
- When tool updates become available that uses these fields, the ERTAC Users Group (you) will get email about it.

UAF: Other Considerations

- Heat Rates are important!
  - The pre processor log flags units with calculated BY heat rates outside the range of 3,000-20,000 btu/kw-hr.
    - For these units, you may want to examine the calculated heat rate supplied in the log
    - If the calculated heat rate is not representative, supply reasonable heat rate in nominal_heat_rate column.
  - Comparing 1.7 (2007) and 2.0 (2011) BY results shows that heat rates do change some—can affect capacity
- Any changes you want in the master files should be submitted to ERTACEGUFeedback@gmail.com.

DISCUSSION: So, what could we do with the UAF? What questions could we ask?

Controls File

- Very simple structure
- Control data only affects emissions; does NOT affect activity
  - **The Tool WILL NOT apply control w/o state input!**
- In areas that are sensitive, it's a good idea to closely manage emission rates of large emitters using the control file
  - Historic nonattainment areas, maintenance areas, etc.
- Pre-processing log file checks this input file
  - Are the ORIS/Unit IDs listed in the UAF?
  - Do dates overlap?
  - Are start dates after the BY?
    - EFs with start dates before and during the BY are not used by the tool
    - Pre-processor log warns of this situation

Controls File

- Pre-processing log file checks this input file
  - Are the ORIS/Unit IDs listed in the UAF?
  - Do dates overlap?
  - Are start dates after the BY?
    - EFs with start dates before and during the BY are not used by the tool
    - Pre-processor log warns of this situation
- For NEW units, including fuel-switched units, <u>best practice</u> is to include NOx and SO2 emission rates in lbs/mmbtu for the new units in the controls file
  - Otherwise, you take your chance on what the tool estimates…..

Controls File: Typical Entries

orispl_code	unitid	factor_start_date	factor_end_date	pollutant_code	emission_rate	control_efficiency	control_programs	control_description	submitter_email	state	facility_name	control_equipment
1250	5	1/1/2012	1/1/2030	SO2		96.0	ARP		ldeahl@kdheks.gov	KS	Lawrence Energy Center	Wet Scrubber
593	5	1/1/2012	1/1/2030	NOX	0.125		ARP, CAIRNOX, CAIROS, CAIRSO2, RGGI	Annual mass limit of 1348 tons of NOx and 4600 tons of SO2 (multi-p regulation).	Robert.Clausen@state.de.us	DE	Edge Moor	LNBO, SNCR

- **Blue** columns are needed for processing
- May submit either emission rate or control efficiency
  - If both are submitted, emission rate is used
  - **For new or fuel-switched units, emission rate rather than control percentage is needed (no BY data to which the control efficiency may be applied!)**
  - Be careful applying NOx control efficiencies-the control is applied to both OS and Non OS rates.
- **Orange** columns are very helpful, but the code will process the data with blanks in these columns

Control File Updates

- If you think the BY is a pretty accurate reflection of EFs to be used in the FY, no control files information is needed.

- If you think in the FY, the unit will be operated differently, apply that data to the controls file.

- State updates may be sent to ERTACEGUFeedback@gmail.com

DISCUSSION: So, what could we do with the Controls File? What questions could we ask?

Input_Variables File

- Allows users to adjust various calculations within the tool
- ERTAC users group has not done extensive tests on the affects of these variables.
- **Ozone_Season_Start_Date/Ozone_Season_End_Date**
  - Allows user the option to change the ozone season for a particular region
  - In case future regulations change this period
- **Hourly_Hierarchy**
  - Hourly hierarchy based on BY demand
  - Calculations can differ between hourly, siz-hour and 24 hour estimates
  - Allows users to choose which methodology to apply to each region and fuel unit type bin
- **New_Unit_Max_Size/New_Unit_Min_Size**
  - These values regulate the way generation deficit units are parsed in a region.
  - Example: A region needs 500 MW of generation. The Max size is 120 MW and the min size is 50 MW. The program will create four 12 MW units and one 50 MW unit (total 530 MW of generation).
- **Demand_Cushion**
  - Allows users to change the generation deficit in a region
  - Tool will multiply the deficit by the cushion and create that amount of generation to meet demand

Input_Variables File, Continued

- **Facility #1 through Facility #10**
  - If these are blank, tool will place GDUs at facilities in capacity order (highest capacity first)
  - If the user doesn't like these locations (perhaps the first few facilities are located in nonattainment areas, the user can specify up to 10 ORIS IDs. The tool will place the GDUs at these locations, in order from #1 to #10.
- **Maximum_Annual_ERTAC_UF**
  - What is the maximum a unit in that region and fuel unit type bin may run, annually?
  - Default is 0.9 (90% of annual capacity)
  - This value may be changed on a unit basis in the UAF
- **Capacity_Demand_Deficit_Review**
  - Tool processes FY generation in hierarchy order
  - The hour set here is where the tool stops and checks to see if FY demand is being met by FY capacity.
- **Unit_Optimal_Load_Threshold_Determinant**
  - The percentile of the unit's operation that is assigned as the optimal load
  - Used for assigning excess generation to other units
- **Proxy_%_(for_coal_only)**
  - Sets the level of operation of new, planned or GDU coal fired units
  - Percentage of maximum capacity

Input_Variables File, Continued

- **New_Unit_Percentile_for_placement_in_the_unit_ allocation_hierarchy**
  - Places new, planned units and GDUs in the unit hierarchy.
  - Since mimic unit is the unit just below the new unit in the hierarchy, this value also selects the mimic unit.
- **Percentile_for_emission_factor_calculations_for_new_units**
  - Also for GDUs
  - Chooses unit in the region and fuel unit type bin ranked emission rate at this percentile for new, planned unit EFs or GDUs
  - EFs supplied by states in controls file for new units overrides this value
  - Units are ranked separately for:
    - Annual SO2 EF (lbs/mmbtu)
    - OS NOx EF (lbs/mmbtu)
- **Percentile_for_maximum_heat_input_hourly_calculations**
  - Hourly heat input data can have distortions
    - Substitution
    - Other reporting issues
  - Using the maximum hourly heat input value can vastly over estimate unit size
  - Industry representatives suggested having a mechanism to adjust the maximum unit size based on hourly heat input data

Input_Variables: Four Fields Not Currently Being Used

- Generic_SO2_control_efficiency
- Generic SCR NOx control lbs/mmbtu
- Generic SNCR NOx control lbs/mmbtu
- Unit minimum optimal load threshold percentile
- Tool has not been upgraded to use these data, yet

Example Entries for Input_Variables

ERTAC Region	ERTAC Fuel/Unit type bin	Base Year	Future Year	Ozone Season Start Date	Ozone Season End Date	Hourly Hierarchy	New Unit Max Size	New Unit Min Size	Demand Cushion	Facility #1	Facility #2	Facility #3	Facility #4	Facility #5	Facility #6	Facility #7	Facility #8	Facility #9	Facility #10
SRVC	Boiler Gas	2011	2018	1-May	30-Sep	HOURLY	150	50	1	3809	3803	3809	3803						
SRVC	Coal	2011	2018	1-May	30-Sep	24-HOUR	600	300	1										
SRVC	Combined Cycle Gas	2011	2018	1-May	30-Sep	6-HOUR	500	250	1	3809	3803	55439	52019	55927	3797	10633	3295	7834	55386
SRVC	Oil	2011	2018	1-May	30-Sep	HOURLY	150	50	1										
SRVC	Simple Cycle Gas	2011	2018	1-May	30-Sep	HOURLY	160	80	1										

- **Green shaded columns may be blank.**
- **These columns tell the tool where to place GDUs.**
- **If the columns are blank, the tool uses capacity size of existing units to locate GDUs, if GDUs are needed.**

Example Entries for Input_Variables

ERTAC Region	ERTAC Fuel/Unit type bin	Maximum_annual_ERTAC_UF	Capacity Demand Deficit Review	Unit Optimal Load Threshold Determinant	Proxy % (for coal only)	Generic SO2 control efficiency	Generic SCR NOx control lbs/mmbtu	Generic SNCR NOx control lbs/mmbtu	New unit percentile for placement in the Unit Allocation Hierarchy	Percentile for emission factor calculations for new units.	Unit minimum optimal load threshold percentile	Percentile for maximum heat input hourly calculations
SRVC	Boiler Gas	0.9	400	90	50	93	0.1	0.15	98	90	75	95
SRVC	Coal	0.9	400	90	50	93	0.1	0.15	95	90	75	95
SRVC	Combined Cycle Gas	0.9	400	90	50	93	0.1	0.15	95	90	75	95
SRVC	Oil	0.9	400	90	50	93	0.1	0.15	98	90	75	95
SRVC	Simple Cycle Gas	0.9	400	90	50	93	0.1	0.15	98	90	75	95

- Yellow columns are not currently used

Growth Rates

- Input files 2.3 (2011) represent reference case data
  - AEO 2014 for annual growth rates
  - NERC 2013 for peak growth rates
- Transition hours represent the hierarchical hour where the tool transitions from peak to non peak growth rate estimates
  - Generally set at 10/50 for non-coal and 200/2000 for coal
  - Experimented with elongating these points for non-coal, and particularly combined cycle
  - As combined cycle becomes more of a base load technology, will need to evaluate a range similar to 200/2000 for those units

Example Growth Input File

New EIA NEMS/EMM Region	NERC Region or Council	New NERC Assessment Area or SubRegion	ERTAC Region	Fuel Source	Base_Year	Future_Year	Annual Growth Rate	Peak Growth Rate	NonPeak Growth Rate	Transition Hour Peak to Formula	Transition Hour to NonPeak	Interpolation Method
AZNM	WECC	DSW	AZNM	Boiler Gas	2011	2018	0.590865	0.585733		10	50	Linear
AZNM	WECC	DSW	AZNM	Coal	2011	2018	1.024038	1.015143		200	2000	Linear
AZNM	WECC	DSW	AZNM	Combined Cycle Gas	2011	2018	0.590865	0.585733		10	50	Linear
AZNM	WECC	DSW	AZNM	Simple Cycle Gas	2011	2018	0.590865	0.585733		10	50	Linear
CAMX	WECC	CAL-S & CAL-N	CAMX	Boiler Gas	2011	2018	1.511628	1.627572		10	50	Linear
CAMX	WECC	CAL-S & CAL-N	CAMX	Coal	2011	2018	0.978955	1.054041		200	2000	Linear
CAMX	WECC	CAL-S & CAL-N	CAMX	Combined Cycle Gas	2011	2018	1.511628	1.627572		10	50	Linear
CAMX	WECC	CAL-S & CAL-N	CAMX	Simple Cycle Gas	2011	2018	1.511628	1.627572		10	50	Linear

- **Green** columns are required to be filled in
- **NonPeak_Growth_Rate** must be blank; program calculates this value and supplies it in the post-processed file
- Right now, "**Linear**" is the only option for Interpolation Method. There is some thought that eventually the tool might offer other choices, like parabolic or bell curve, and use a different formula.
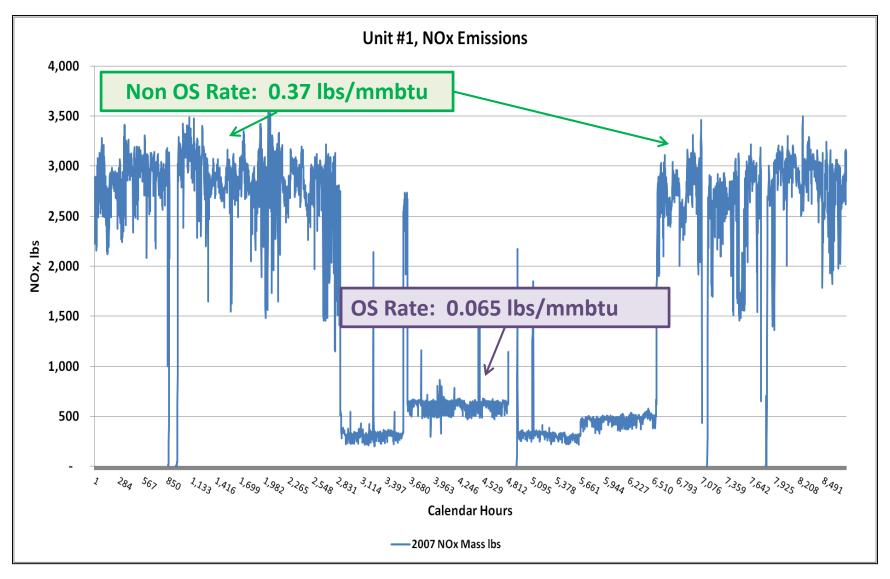
BY Hourly CAMD File

- The hourly data files are available from EPA on their FTP site.
- Contains every hour of CAMD data for the BY (2011 for CONUS 2.3) for every unit reporting to CAMD
  - 4,000+ units
- The file is large—about 4GB.
- Since the tool allows regional runs, running a region can be a lot easier for those using laptops
- ERTAC has a BY Hourly CAMD file available on the MARAMA FTP for those who'd like to try a CONUS run
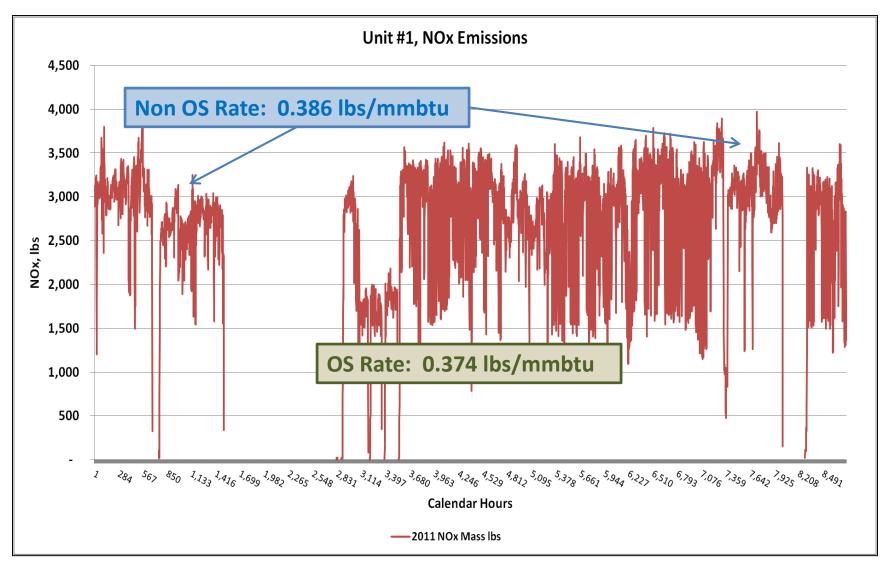
The Four "Optional" Input Files

Seasonal Controls File

- Very useful file-for CONUS runs, you can expect to include a version of this file in your trials
- In both the 2007 (v1.7) and 2011 (v2.0) BYs, some units operated controls in a seasonal manner.
  - SCR on and running hard during May-Sept, for example
  - Other months, SCR running less or offline
- Some units operated the controls in very different manners between the two years
- If no control file emission rates are provided, BY OS and Non OS rates will be used in the FY.
  - Why is this important? See next two slides…

Unit Example: 2007 Data

Unit #1, NOx Emissions

Non OS Rate: 0.37 lbs/mmbtu

OS Rate: 0.065 lbs/mmbtu

2007 NOx Mass lbs

Same Unit: 2011 Data

Unit #1, NOx Emissions

Non OS Rate: 0.386 lbs/mmbtu

OS Rate: 0.374 lbs/mmbtu

NOx, lbs

Calendar Hours

— 2011 NOx Mass lbs

Seasonal Controls File

- Allows the user to manipulate the FY emission rate by pollutant of a unit down to monthly increments

- GA and VA Examples
  - Supplied OS and Non OS NOx EFs in control file
  - Best estimate of future operations

Seasonal Control File Entries

orispl_code	unitid	factor_start_date	factor_end_date	season_start_month	season_end_month	season_start_date	season_end_date	pollutant_code	emission_rate	control_efficiency	control_programs	control_description	submitter_email	state	facility_name	control_equipment
703	1BLR	1/1/2012	12/31/2030	1	4	1	30	NOX	0.176			non-ozone season controlled Nox emission rate (calendar day calculation); control start June 2010	Name @GA.US	GA	Bowen	
703	1BLR	1/1/2012	12/31/2030	5	9	1	30	NOX	0.056			ozone season controlled NOx emission rate (from 2011 CAMD monthly data); permit limits OS NOx to 0.07 lbs/MMBtu	Name @GA.US	GA	Bowen	
703	1BLR	1/1/2012	12/31/2030	10	12	1	31	NOX	0.176			non-ozone season controlled Nox emission rate (calendar day calculation); control start June 2010	Name @GA.US	GA	Bowen	
3797	4	1/1/2013	12/31/2030	1	4	1	30	NOX	0.10			30 day rolling ave limit from federal CD	name@ VA.gov	VA	Chester	SCR
3797	4	1/1/2013	12/31/2013	5	9	1	30	NOx	0.066			Seasonal ave from historical OS data	name@ VA.gov	VA	Chester	SCR
3797	4	1/1/2013	12/31/2013	10	12	1	31	NOx	0.10			30 day rolling ave limit from federal CD	name@ VA.gov	VA	Chester	SCR

Seasonal Control File Data

- States communicate the seasonal nature of the controlled rates in the controls file-the ERTAC team translates that info to the seasonal controls file.
  - In the <u>controls file</u> comments section, GA told the ERTAC Team to use these values for every projection year starting 2017.
  - In the controls file comments section, VA told the ERTAC Team to us these values for every projection year starting 2013.
- Using the seasonal controls file allows the user to input these values once, and then the tool will determine if the projection year should use these values, or average values.
  - For example, if the projection year is 2016, the tool would apply the VA values.
  - For 2016, the GA values would NOT be applied. For GA, the average BY emission rates for OS and non-OS would be used.
- Allows states to manage emissions of important units or high emitters
  - A lot of work on the states' part
  - Of value for high emitters and/or units located in or near sensitive areas

NonCAMD Hourly File

- This file allows the user to selectively edit hourly data in the BY hourly file
  - Any hours provided in the nonCAMD hourly file overwrite the hours for that ORIS/Unit ID in the BY hourly file from CAMD
  - Has been used for a number of purposes
- Also allows the user to append additional hourly data to the BY hourly file
  - Handy if a state wants to include a unit that should be grown as an EGU in one of the fuel/unit type bins
  - The unit might have hourly data available due to the presence of CEMS
  - Unit might be too small to trigger Part 75 CAMD reporting requirements

NonCAMD Hourly File Structure

STATE	FACILITY_NAME	ORISPL_CODE	UNITID	OP_DATE	OP_HOUR	OP_TIME	SLOAD GLOAD	SO2_MASS	SO2_MASS_MEASURE_FLG	SO2_RATE	SO2_RATE_MEASURE_FLG	NOX_RATE	NOX_RATE_MEASURE_FLG	NOX_MASS	NOX_MASS_MEASURE_FLG	CO2_MASS	CO2_MASS_MEASURE_FLG	CO2_RATE	CO2_RATE_MEASURE_FLG	HEAT_INPUT
FL	Crist	641	7	5/30/2011	0	0.5	2	3.105	Mes'd	6.21	Calc'd	0	ERTAC	0	ERTAC	1.182	Mes'd	2.364	Calc'd	0.5
IN	F B Culley	1012	2	1/1/2011	23	0.53	0	0	ERTAC	0	ERTAC	0	Calc'd	0	Mes'd	0.109	Mes'd	0.057	Calc'd	1.908
IN	F B Culley	1012	2	6/19/2011	0	1	0	0	ERTAC	0	Calc'd	0.021	Calc'd	0.164	Mes'd	0.463	Mes'd	0.059	Calc'd	7.9

State and Group Files

- These files provide info to the tool to allow comparison charts to be created by the tool as outputs.

- The data in these files does NOT affect projections of activity

- The data in these files do NOT affect projections of emissions
  - That might be a future upgrade

State Input File Structure

State Abbreviation	CapTime Period (OS or Annual)	Cap Pollutant (SO2 or NOx)	Cap, in TPY or TPOS	Year Applicable	Comments	Contact Info
ST	OS	NOx	32,182	2017	pp 25342-25343 4/28/06 40 CFR Parts 51,52,et al.	State@ST.gov
ST	Annual	NOx	69,020	2018	page 25407 4/28/06 40 CFR Parts 51,52,et al.	State@ST.gov
ST	Annual	NOx	85,775	2019	CSAPR Assurance level 40 CFR 97.410	State@ST.gov

- **State postal abbreviations-may list as many or as few as the user chooses for each state.**
- **Output will compare the projection year to the appropriate values by year. For example, FY 2018 values would be compared to those with Year Applicable equal to 2017 or 2018, but not 2019.**

State File Output Example, FY 2018

State	Cap Pollutant	Cap (TPY or T/OS)	Cap Year	FY Emissions	Comments
ST	OS NOx	32,182	2017	16,189.759	pp 25342-25343 4/28/06 40 CFR Parts 51,52,et al.
ST	Annual NOx	69,020	2018	38,415.302	page 25407 4/28/06 40 CFR Parts 51,52,et al.

- No data for 2019 cap, since the projection year is 2018
- FY Emissions are summed automatically into the chart for the user to compare to the cap
- If the FY emissions are greater than the cap, the tool makes no effort to change emission rates.

Group Input File Structure

Group Name	States Included	Cap Time Period (OS or annual)	Cap Pollutant (SO2 or NOx)	Cap (TPY or TPOS)	Year Applicable	Comments	Contact Info
2015 CAIR OS NOx	AL, AR, CT, DC, DE, FL, IA, IL, IN, KY, LA, MA, MD, MI, MO, MS, NC, NJ, NY, OH, PA, SC, TN, VA, WI, WV	OS	NOx	484,506	2015		User@gov
2020 Annual NOx CAP	AL, DC, DE, FL, GA, IA, IL, IN, KY, LA, MD, MI, MO, MS, NC, NJ, NY, OH, PA, SC, TN, TX, VA, WI, WV	annual	NOx	1,241,888	2020		User@gov
2018 CSAPR Annual SO2	AL, DC, DE, FL, GA, IA, IL, IN, KY, LA, MD, MI, MO, MS, NC, NJ, NY, OH, PA, SC, TN, TX, VA, WI, WV	annual	SO2	3,624,012	2018		User@gov

- **States must be two letter postal abbreviations and separated by a comma and a space**
- **Tool will sum results in a tabular format as an output file for the states listed so that the value can be compared to the listed cap**
- **These data inputs will NOT affect emissions or activity yet**

Group File Output Example

Group	Cap Pollutant	Cap (TPY or T/OS)	Cap Year	FY Emissions	Comments
2015 CAIR OS NOx	OS NOx	484,506	2015	398,594.47	
2018 CSAPR Annual SO2	Annual SO2	3,624,012	2018	1,884,641.6	

- **Tool will sum the emissions in the appropriate timeframe for the states in the group.**

- **Tool will NOT apply any additional control, beyond that supplied in the seasonal controls file and the controls file.**

Any Questions/Comments/Thoughts?