**Changes and Updates from 1.7 to 2.0:**

* Base Year Inventory - The hourly BY inventory for 1.7 was CAMD 2007. For 2.0, the hourly BY inventory was CAMD 2011.
* UAF and Controls File Data – The UAF and controls file inputs for 2.0 were developed using the UAF and controls files dated July 18, 2013. The UAF and controls file for 1.7 were also dated July 18, 2013, but these files were based on a BY of 2007.
* Growth Rate Data – 1.7 growth rates were based on AEO2013, in the file named, “2-6-2013 Growth Rates Regional Template ERTAC Round 1\_6.xlsx.” The 2.0 growth rates were based on AEO2013, in the final named “2-6-2013 Growth rates Regional Template ERTAC Round 2\_0.xlsx.” Both files are based on AEO2013 and NERC data. However, there were some differences in the way a few regions were aggregated, which changed a few growth rates, both annual and peak. Overall, growth rate changes between 1.7 and 2.0 were mainly due to the different base year rather than changes in methodology or base EIA data.

* Units with little or no base year data – In the 1.7 input files, some of these units were included in the nonCAMD hourly file, with one line item of “fake” data for each unit that would allow the tool to calculate reasonable heat rates, emission rates, etc for that unit. Others of these units had the additional data supplied in the UAF to allow the program to process these units in the FY, with no additional hourly data supplied in the nonCAMD hourly file. In the 2.0 input files, all units with little or no base year data were supplied the additional data needed in the UAF to allow processing of the units. Version 2.0 did not need a non CAMD input file.
* Non-EGUs – In the 1.7 UAF, some states included units that were non-EGUs in the UAF, while others omitted those units. In the 2.0 UAF, all non-EGUs were included in the UAF and marked as “non-EGUs.”
* In the 1.7 UAF, several units were identified as causing the tool to crash (for example, Alma, Paradise #3). In the 2.0 UAF, only one unit caused a tool crash, an oil fired unit in NWPP (ORIS 2331, unit 1)

**Changes and Updates from 2.0 to 2.1:**

* UAF and Controls File Data – The UAF and controls file inputs for 2.0 were developed using the UAF and controls files dated July 18, 2013. The UAF and controls file for 2.1 were dated December 16, 2013. Changes provided by states included updates from the Midwest, Northeast (including NY information on RACT and other rule changes as well as updates from CT, NH, MD, and NJ), and SESARM (updates from VA and updates from KY including new information on the federal TVA consent agreement).
* The UAF was updated to ensure that any unit listed in the preprocessor as not having enough data to calculate an ertac heat rate, a base year utilization fraction, or a unit optimal load threshold had the appropriate data included in the UAF so that the unit could be processed and available for FY demand.
* In 2.0, Astoria (ORIS 8906) had 6 units identified by NY as being better represented by combining the data in to 3 units. Therefore, units 30, 40 and 50 were added to the UAF. 31RH, 32SH, 41SH, 42RH, 51RHY, and 52SH were marked as non-EGUs. Data from the 6 units were combined with consent and agreement by the state staff into 3 units within the nonCAMD hourly file.
* In 2.0, the preprocessor identified about 141 lines in the BY 2011 data where emissions were negative. CAMD representatives (Louis Nichols) explained these negative values were a by-product of the algorithm CAMD used to parse out data from units exhausting a combined stack and that CAMD was looking into the negative numbers. In 2.1, these 141 lines of hourly data were included in the nonCAMD hourly file, with the negative values replaced with zero. The flag for each was replaced with “ERTAC” to denote exactly which items of information had been substituted. Only negative values were replaced with zero.
* Growth rates used for 2.1 were from the file named, “v3b\_Merged\_gas-EGU-emissions plus capacity\_region.xlsx” from email correspondence with Bob Lopez on 12/5/2013. These rates in 2.1 reflect a no growth assumption (rate=1) for natural gas boilers, which was not included in the 2.0 growth rates. Combustion turbines and combined cycle units were adjusted in the 2.1 factors to account for the boiler-gas generation.

**Changes and Updates from 2.1 to 2.1L1:**

* All input files based on CONUS2.1 including growth rates with the exception of Midwest updates to the control and UAF files. Changes to the control file were submitted by Indiana, Illinois, Wisconsin, Michigan and Ohio primarily for coal fired units; this file is dated March 3, 2014. The UAF file was updated to reflect changes to refueling and/or shutdowns for Indiana, Michigan and Wisconsin; the UAF is dated March 5, 2014 for coal fired units.

**Changes and Updates from 2.1L1 to 2.2:**

* UAF used in 2.2 was from file2011BASUnit\_Availability\_V2.2\_April222014\_code1\_01.xls
  + A couple of additional edits were made:
  + Laskin (1891) in MN: switched to gas as of 12/31/2017. A line item was added to the UAF to include the gas boiler.
  + Wheaton (4014) in WI had a county code switched to 55035 from 50089.
  + ORIS 50240 (Purdue University-Wade Utility) was changed to a nonEGU.
  + Removed the new unit flag Y from ORIS 564, CCB, as the unit started ops in 2009.
  + Added max\_unit\_heat\_input for 56807, Units 1A & 1B of 2,580 mmbtu/hr (each). (Honestly, those Virginia data people are complete idiots. Thank goodness the Virginia modelers are intelligent… ☺ )
  + ORIS 8042 Belew’s Creek was listed as retired in the UAF; NCs submittal showed it as having a 2030 retirement date, so I changed that retirement date to 2030.
  + ORIS 2709 (H F Lee): I changed one of the line items from “HF” to “H F” to alleviate a warning.
  + ORIS 2720 (Buck), 11C and 12C: The start date was in the mid/late 2011 period. This would provide a BY ozone season profile of activity of mainly zero. I changed the unit to “New”, added the New flag, and gave it a start up date of 01/01/2012 to allow the program to calculate an ozone season profile in the future year.
  + ORIS 4042, Units 1, 2, 3, and 4: These were coal units that had line items switching them to natural gas. All had a BY hours of operation of 10,000, which probably was the nominal heat capacity. So, I switched that data over to the nominal heat capacity column. For the coal units, I added in the BY hours of operation from CAMD: 8,080; 7,077; 4,446; and 5,620 respectively.
  + ORIS 2048, Unit AA003: This unit needed a state input UF to be used in the FY. I added in 0.9. I also changed the max\_unit\_heat\_input to 632 mmbtu/hr based on the comment field data.
  + I updated the listing of partial/full year reporters per Wendy’s email of 5/8/2014.
  + ORIS 992, Units 12, 13, and 14 were coal fired non-EGUs, which had been fuel-switched to natural gas in a year after 2011. This was done in an effort to use the UAF as a documentation tool, which has been discussed and agreed to by the ERTAC team in the past. However, the code does not accept this type of setup. For some reason, the fuel switch of a non-EGU in the FY can cause a crash of the preprocessor code. I searched the UAF to see if any other instances of this situation occurred. No other non-EGU fuel switches occurred. With the consent of the state (IN), I removed the gas line items for these units from the UAF and noted in the comments field that they had been switched to natural gas. I left the retirement date in the UAF for the coal units. The code had no problems accepting that information.
* Controls file used in 2.2 was from 2011BASEControl File\_v2.2\_April222014\_code1\_01.xls.
* To make use of the functionality of the 1.01 code, a seasonal controls file was culled from the main controls file. It looks like at this point only GA is taking advantage of this aspect of the tool.
* Growth rates for 2018 and 2020 came from ***v2Working Doc2\_v8a Growth Rates Regional Template\_ERTAC Derived from Round 1 6 \_Active for Base and Future Selected Yr. xlsx***. The tab used was ***It 7 v2.1.2 ref w-Gas Adj***. These use AEO2013 information. The growth rates were truncated to three decimal places, e.g. X.XXX.
  + For 2018 growth rates, three decimal places produced identical annual and peak growth rates for the following regions/fuel unit types. Therefore, I adjusted the peak rates as noted here:
    - NYUP/Oil-Peak and annual were 0.132. Peak was adjusted to 0.133
    - SRDA/CC-Peak and annual were 1.338. Peak adjusted to 1.350
    - SRDA/SC-Peak and annual were 1.338. Peak adjusted to 1.350
  + For the 2020 growth rates, three decimal places produced identical annual and peak growth rates for the following regions/fuel unit types. Therefore, I adjusted the peak rates as noted here:
    - NYLI/Oil-Peak and annual were 0.039. Peak adjusted to 0.040.
    - NYUP/Oil-Peak and annual were 0.105. Peak adjusted to 0.106.
    - SRDA/Oil-Peak and annual were 0.099. Peak adjusted to 0.100.
    - SRDA/BG-Peak and annual were 1.000. Peak adjusted to 1.001.
* In the Input Variables file, I removed the boiler gas ORIS codes for SRVC for any GDUs so that the program will place those automatically.
* For the state and group files, I added the CSAPR state and group totals from the file called CSAPR\_State\_Totals\_8-1-2012.xlsx and CSAPR\_Group\_Totals\_7-19-2012.xlsx. The state and group cap files contain both the CAIR levels and the CSAPR assurance and budget levels.