

White Paper topics for the ERTAC growth model (Also, future updates)

1-How to select transition hours: take care of bins with few units in it or few hours that have generation to avoid strange/impossible NPGR.

2-If a new unit is the first of its type in a fuel/unit bin type in the region, proxy won't work. Will have to be reviewed by the region.

3-If a new unit is the second of its type, the new unit MUST be higher in operational order, because the proxy generation is based on the unit right below it.

4-Future update: how to select the units for emulation? Only emulate one unit? Can weight too heavily a particular hour for a bin type. Makes a negative adjusted future growth rate, potentially.

5. How to do non-reported hours to make it look like CAMD data. State's responsibility for getting that data as good as CAMD data.

Future enhancements:

*-2 growth regions: The growth committee (Bob Lopez) has pointed out that better peak growth rates could be assigned if the program were to be modified such that the application of peak growth rates and annual growth rates were not made on the basis of the same regional boundaries. This change would involve a good bit of recoding in the main body of the generation program.

*-Interregional and inter-fuel/unit type bin generation trading: For regions where certain hours cannot meet demand, a future enhancement would be to have the program examine whether sufficient capacity exists within the region in another fuel/unit type bin and assigning the needed generation to that fuel/unit type bin. Also, for regions where certain hours cannot meet demand and no additional capacity exists within the region, a future enhancement would be to have the program examine if sufficient capacity exists in a neighboring region where transmission constraints allow the transfer of power.

*-Power distribution in more than 2 passes: Currently the program distributes power from the excess generation pool in two passes. The first pass increases production from units to the optimal levels; the second pass increases production to the maximum for the unit. OH has suggested that a more representative approach would be to have power distributed in 4-5 passes.

*-Generation for spinning reserve demands: Currently spinning reserve demands are reported by the program, but in cases where spinning reserve for a region is not met, no new units or other adjustments are made. Future enhancements would include (a) determining if spinning reserve demands could be met by a neighboring region that has transmission capabilities, and if not (b) creating generic units to meet the spinning reserve requirements.

*-Hourly emission factor calculations: Currently the program calculates average emission factors, either annually or seasonally. To better capture the innate variability from hour to hour in emissions, a future

modification could calculate emission factors hour by hour. This function would also need to screen for anomalous data.

*-Hourly heat rate calculations: Currently the program calculates the average heat rate for a unit based upon the base year's total heat input and total gross load. To better capture variability from hour to hour in unit efficiency, a future modification could calculate the heat rate hour by hour. This function would need to screen for anomalous data.

*-Other types of formulas than linear: Currently the program assigns the hour specific growth rates using a linear transition from the peak growth rate to the nonpeak growth rate. An enhancement would be to allow other types of functions for the creation of that transition, such as parabolic.

*-Use of optimal minimum thresholds to turn units off when they get too low and redistribute that power: Right now, there is no lower threshold for how lightly a unit may be utilized, which does not necessarily reflect actual operations. An enhancement would be to put lower thresholds on each unit, and turn a unit off if the lower threshold is breached. Power from the unit would then need to be redistributed to other units that have not been turned off.

*-Quick look reports/updated and improved reporting functions: As the program is used to create a variety of future year inventories for different SIP submittals and modeling analyses, agencies will have a better idea of what types of useful reports are needed. It would be nice to automate some of these functions.

*-Capacity limitation functionality: Currently, the program does not allow a unit to be correctly limited in capacity in the future year. The portion of that functionality where the unit is treated as a new unit in the future year is not working. It would be nice to have this functionality, or a similar unit-by-unit generation limitation, capability.

*-Generic unit heat rate to be an input variable or otherwise specified: Currently, the program uses average CAMD data to determine generic unit heat rates. It would be good to allow that data to be specified by the user.

*-New planned units and generic units in the hierarchy: Currently, the program places generic units in front of the new units in the unit hierarchy. A better approach would be to have the new, state-specified units prior to the generic new units in the hierarchy.

*-Other pollutants: Currently the program only handles NO_x and SO₂. A good modification would be to allow it to handle any other pollutant such as CO₂ or PM_{2.5}.

*-Application of SO₂ and NO_x controls for caps: Currently the program reports on SO₂ and NO_x emissions as compared to state and regional caps but does not ensure that each cap is met. A useful upgrade would automate the application of controls to meet caps.

*-Low density fuel/unit types: In areas where there are few or no units in a particular fuel/unit type bin, the program may not be able to assign proxy generation since there is no unit to mimic. Modifying the program to apply a general profile to new units in these types of situations would be helpful.

*-Additional pollutant calculations: Right now, the hourly hierarchy file is just set up to include NO_x and SO₂ emissions, so the program only uses emission factors supplied for those two pollutants. It would be nice to be able to include emission factors for other pollutants in the controls file and have the program develop hourly inventories in the hourly diagnostic file for all supplied pollutants.

*-Handling of units with no base year activity data: This could be a very helpful upgrade. At this time, the preprocessor only identifies units with no base year activity data (heat input and/or gross load) so that states can review and remove them manually. However, for units that have no base year activity and will not be retired, it would be better to leave them in the algorithm so that they may be available to meet future year demand.

*-More information in the unit level activity summary file: FY OS and annual NO_x, and FY SO₂ emissions. Also, BY data.

*-Adjust proxy for coal so that the new unit(s) do not receive any proxy power on hours where base actual generation for the region is 0. Adjust proxy power for coal so that the new units(s) do not receive more proxy power than is estimated by the base_actual generation times the HSGR.