Input Output Reference

I/O changes for Coincident Plant Sizing. B.Griffith, final 3/17/2015

### SimulationControl

The input for SimulationControl allows the user to specify what kind of calculations a given EnergyPlus simulation will perform. For instance the user may want to perform one or more of the sizing calculations but not proceed to an annual weather file simulation. Or the user might have all flow rates and equipment sizes already specified and desire an annual weather without any preceding sizing calculations. Sizing runs, even for large projects, are quickly run – they do not add much to the overall simulation time. The SimulationControl input allows all permutations of run selection by means of 5 yes/no inputs.

Only one SimulationControl object is permitted for each EnergyPlus input file. While a SimulationControl is needed to trigger sizing calculations, it is optional for other runs (design days, run periods). The actions will still be shown in the eplusout.eio file (see Output Details and Examples Document).

#### Field: Do Zone Sizing Calculation

Input is Yes or No. The default is No. Zone Sizing (see Sizing:Zone object) performs a special calculation, using a theoretical ideal zonal system, and determines the zone design heating and cooling flow rates and loads, saving the results in the zone sizing arrays.

#### Field: Do System Sizing Calculation

Input is Yes or No. The default is No. System Sizing (see Sizing:System object) also performs a special calculation that, to oversimplify, sums up the results of the zone sizing calculation and saves the results in the system sizing arrays for reporting on component size requirements. Thus, in order to perform the system sizing calculations, the zone sizing arrays need to be filled and hence the zone sizing calculations must be performed in the same run. (This requirement is enforced by the program).

#### Field: Do Plant Sizing Calculation

Input is Yes or No. The default is No. Unlike Zone and System Sizing, Plant Sizing does not use the Zone or System sizing arrays. Plant Sizing uses the Sizing:Plant object fields and data on the maximum component flow rates. The data on component (such as coil) flow rates is saved and made available to the Plant code whether or not component autosizing is performed and whether or not zone sizing and/or system sizing is performed. Therefore, you can specify Plant Sizing without also specifying to do Zone Sizing or System Sizing calculations.

#### Field: Run Simulation for Sizing Periods

Input is Yes or No. The default is Yes. Yes implies that the simulation will be run on all the included SizingPeriod objects (i.e., SizingPeriod:DesignDay, SizingPeriod:WeatherFileDays, and SizingPeriod:WeatherFileConditionType). Note that each SizingPeriod object constitutes an “environment” and warmup convergence (see earlier topic under the Building object) will occur for each.

#### Field: Run Simulation for Weather File Run Periods

Input is Yes or No. The default is Yes. Yes implies the simulation will be run on all the included RunPeriod objects. Note that each RunPeriod object constitutes an “environment” and warmup convergence (see earlier topic under the Building object) will occur for each.

#### Field: Do HVAC Sizing Simulation for Sizing Periods

This field is optional. It can be used to enable certain advanced sizing calculations that rely on simulating the sizing periods to collect information. This is currently only applicable when sizing plant loops using the sizing option called Coincident.

#### Field: Maximum Number of HVAC Sizing Simulation Passes

This field is optional and is only used if the previous field is set to Yes. The HVAC Sizing Simulation approach can use iteration to improve sizing calculations. Each iteration is a Sizing Pass. This field is used to manually place an upper limit the number of passes that the sizing algorithms can use.

An IDF example:

SimulationControl,

No, !- Do Zone Sizing Calculation

No, !- Do System Sizing Calculation

No, !- Do Plant Sizing Calculation

Yes, !- Run Simulation for Sizing Periods

Yes, !- Run Simulation for Weather File Run Periods  
 No, !- Do HVAC Sizing Simulation for Sizing Periods  
 2; !- Maximum Number of HVAC Sizing Simulation Passes

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### Output:Diagnostics

Sometimes, messages only confuse users – especially new users. Likewise, sometimes certain output variables exist for only a certain condition but some take them at face value/name. Some features may be very important but under certain instances cause problems. Thus, we have added the **diagnostic output** object to be able to turn on or off certain messages, variables, and features depending on conditions.

Both fields of the Output:Diagnostics command can accept all the applicable keys. More than one object may be entered.

#### Field: key1, key2

Allowable choices are:

**DisplayAllWarnings** – use this to get all warnings (except the developer warnings “DisplayZoneAirHeatBalanceOffBalance”). This key sets all other display warning values to on.

**DisplayExtraWarnings** – use this to get all extra warnings. An example of an extra warning is when a user enters a ceiling height or volume with the Zone object and EnergyPlus calculates something significantly different based on the entered zone geometry.

**DisplayUnusedSchedules** – use this to have the unused schedules (by name) listed at the end of the simulation.

**DisplayUnusedObjects** – use this to have unused (orphan) objects (by name) listed at the end of the simulation.

**DisplayAdvancedReportVariables** – use this to be able to use certain advanced output variables where the name may be misleading and you need to understand the concepts or reasons for use. If you put in this field, then you will be able to report on these features. They are noted in the descriptions of objects or output variables.

**DisplayZoneAirHeatBalanceOffBalance** – this is a developer diagnostic which you can turn on, if you desire.

**DoNotMirrorDetachedShading** – use this to turn off the automatic mirroring of detached shading surfaces. These surfaces are automatically mirrored so that the user does not need to worry about facing direction of the surface and the shading surface will shade the building as appropriate. Note that Shading:Zone:Detailed surfaces are also mirrored and there is no way to turn that “off”.

**DisplayWeatherMissingDataWarnings** – use this to turn on the missing data warnings from the read of the weather file.

**ReportDuringWarmup** – use this to allow reporting during warmup days. This can show you exactly how your facility is converging (or not) during the initial “warmup” days of the simulation. Generally, only developers or expert simulation users would need this kind of detail.

**ReportDetailedWarmupConvergence** – use this to produce detailed reporting (essentially each warmup day for each zone) for warmup convergence.

**ReportDuringHVACSizingSimulation** – use this to allow controlling reporting to SQLite database during sizing period simulations done for HVAC Sizing Simulation. The regular reporting is done in the usual way. This can show details of how advanced sizing adjustments were determined by documenting how the systems operated when doing the intermediate sizing periods. Depending on the number of iterations performed for HVAC Sizing Simulation, there will be a number of sets of results with each set containing all the Sizing Periods.

In IDF use:

Output:Diagnostics,

DisplayExtraWarnings;

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### Sizing:Plant

The Sizing:Plant object contains the input needed for the program to calculate plant loop flow rates and equipment capacities when autosizing. This information is initially used by components that use water for heating or cooling such as hot or chilled water coils to calculate their maximum water flow rates. These flow rates are then summed for use in calculating the Plant Loop flow rates.

The program will size any number of chilled water, hot water, condenser water and other plant loops. There should be one Sizing:Plant object for each plant loop that is to be autosized.

#### Field: Plant or Condenser Loop Name

The name of a Plant Loop or Condenser Loop object corresponding to this Sizing:Plant object. This is the plant loop for which this data will be used for calculating the loop flow rate.

#### Field: Loop Type

The possible inputs are *Heating, Steam, Cooling,* or *Condenser*.

#### Field: Design Loop Exit Temperature

The water temperature in degrees Celsius at the exit of the supply side of the plant loop, Thus this is the temperature of the water supplied to the inlet of chilled or hot water coils and other equipment that places loads on a plant loop.

#### Field: Loop Design Temperature Difference

The design temperature rise (for cooling or condenser loops) or fall (for heating loops) in degrees Celsius across the demand side of a plant loop. This temperature difference is used by component models to determine flow rates required to meet design capacities. Larger values lead to smaller design flow rates.

#### Field: Sizing Option

This field is optional. This field controls how concurrence issues impact the plant loop design flow rate. If it is not used then the program uses noncoincident method, which is the historical behavior prior to version 8.3. There are two choices, noncoincident and coincident. The use of Coincident sizing option requires that the SimulationControl object be set to YES for the input field called Do HVAC Sizing Simulation for Sizing Periods.

#### Field: Zone Timesteps in Averaging Window

This field is optional and is only used if the preceding field is set to Coincident. This is the number of zone timesteps used in a moving average to determine the design flow rate from HVAC Sizing Simulation approach. This allows using a broader average over time when using coincident plant sizing. This is similar in concept to the similar field in Sizing:Parameters which specifies the averaging window for zone loads. The default is 1.

#### Field: Coincident Sizing Factor Mode

This field is only used if the sizing option is set to Coincident. This field controls the behavior of coincident sizing with respect to what, if any, sizing factor should be applied to further modify the flow rate measured while running HVAC Sizing Simulations. There are four options. Enter the keword *None* to use the raw value for flow rate without modification. Enter the keyword *GlobalHeatingSizingFactor* to modify the flow by the sizing factor entered in the object called Sizing:Parameters for heating. Enter the keyword *GlobalCoolingSizingFactor* to modify the flow by the sizing factor entered in the object called Sizing:Parameters for cooling. Enter the keyword *LoopComponentSizingFactor* to modify the flow by a sizing factor determined from the combination of component-level sizing factors in the associated plant loop.

An IDF example:

Sizing:Plant,

Chilled Water Loop, ! name of loop

Cooling, ! type of loop

7.22, ! chilled water supply temperature

6.67, ! chilled water delta T  
 NonCoincident, !- Sizing Option  
 1, !- Zone Timesteps in Averaging Window

GlobalCoolingSizingFactor; !- Coincident Sizing Factor Mode

### Plant Sizing Outputs

The loop flow rates are reported on the *eplusout.eio* file along with the component sizing results.

When coincident plant sizing method is used, the eio file contains special summary report with various details and interim values from the calculations, under the following record header: ! <Plant Sizing Coincident Flow Algorithm>, Plant Loop Name, Sizing Pass {#}, Measured Mass Flow{kg/s}, Measured Demand {W}, Demand Calculated Mass Flow{kg/s}, Sizes Changed {Yes/No}, Previous Volume Flow Rate {m3/s}, New Volume Flow Rate {m3/s}, Demand Check Applied {Yes/No}, Sizing Factor {}, Normalized Change {}, Specific Heat{}.