# EnergyPlus Exercise Output 1
Create Reports and Custom Output

General Description

This exercise will introduce you to creating custom output results using .RVI files. You will work with a 1-zone model similar to an earlier exercise. You will add new reports and variables for reporting at various time aggregations. Run with an annual run using your local weather file. After a successful simulation you will change and modify parameters and report variables to explore further.
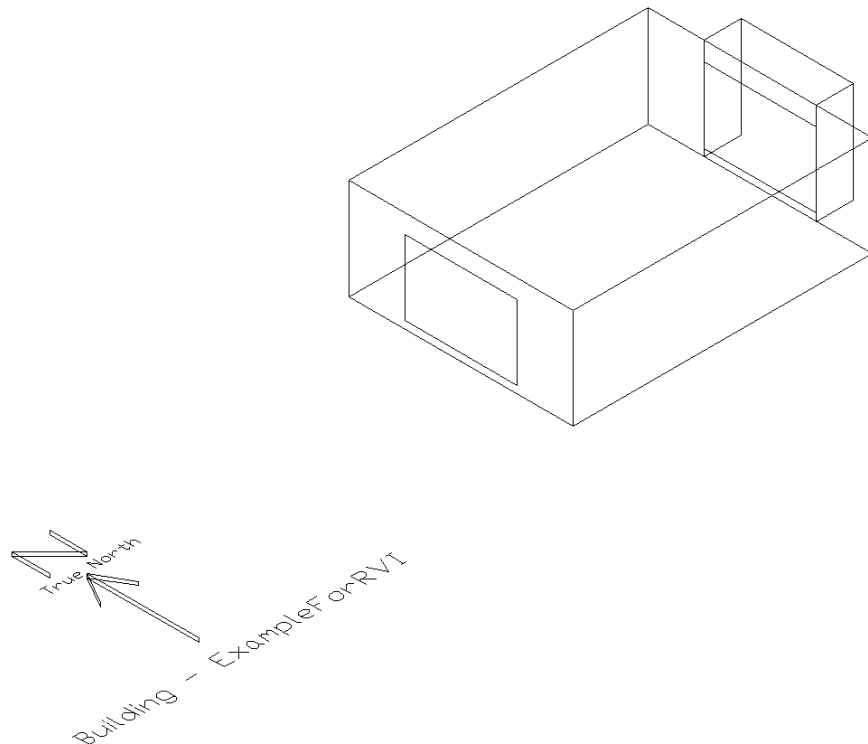
Basic File Description

1 story building modeled as a single zone, with windows in the east and west walls. The west window is shaded by wings and an overhang. Internal loads include 4 people and 200 W of office equipment. The infiltration is 0.5 air changes per hour.

HVAC System Description

Packaged DX cooling with gas heat. All equipment is autosized.

Instructions

You will run the existing input file to generate a list of the report variables available for your simulations. Then you will add report variables at various time aggregations to the file and run the simulation again. You will also create a .RVI file to extract specific data at various time aggregations.

[You can change the location and design-days to your local weather by opening your local weather .DDY file and cutting/pasting the location and appropriate design-days into the ExerciseOutput1.idf file.]

Read more about obtaining custom output files (.CSV) using .RVI (Report Variable Input) files from the output in the InputOutputReference.pdf, beginning on page 1565 (or pg 1606 of the PDF).

An .RVI is a text file with a list of report variables that you want reported in a .CSV. You can easily develop multiple .RVI files which create different types of .CSV files. For example, a .CSV with just the exterior environment data or one with only equipment energy consumption. Both .RVI and .MVI follow this structure:

```
eplusout.eso
eplusout.csv
<variable name 1>
<variable name 2>
...
<variable name n>
0
```

The first two lines are the default output file .ESO and the default .CSV filename. This is followed by a list of report variables, with the last line containing a 0.

1. Run the ExerciseOutput1.IDF file.

2. Open ExerciseOutput1.RDD and select at least 10 loads-related variables.
   Note in ExerciseOutput1.IDF, the object "Output:VariableDictionary, idf;" writes the RDD output file as complete objects which can be pasted directly into the IDF file and then edit the reporting frequency.

   Edit ExerciseOutput1.IDF using the text editor, and save as ExerciseOutput1A.IDF. Paste output:variable objects for each of your loads-related variables requesting hourly data. Then copy each object and paste in 4 copies for a total of 5. Then edit the frequency parameter on each, changing "hourly" to timestep, daily, monthly, and annual, retaining hourly for one of them. There are already system related output variables with multiple reporting frequencies in the .idf file that you can use as a model. For example, Zone Window Heat Gain and Zone Window Heat Loss, insert these objects in your IDF to get data at each of these time steps:

```
Output:Variable, *, Zone Window Heat Gain, timestep;
Output:Variable, *, Zone Window Heat Gain, hourly;
Output:Variable, *, Zone Window Heat Gain, daily;
Output:Variable, *, Zone Window Heat Gain, monthly;
Output:Variable, *, Zone Window Heat Gain, annual;
Output:Variable, *, Zone Window Heat Loss, timestep;
Output:Variable, *, Zone Window Heat Loss, hourly;
Output:Variable, *, Zone Window Heat Loss, daily;
Output:Variable, *, Zone Window Heat Loss, monthly;
Output:Variable, *, Zone Window Heat Loss, annual;
```

Note that this step may also be done using IDF Editor. When an RDD file is present, the Output:Variable object will have an active drop-down list showing all of the report variable names present in the RDD output file.

3. Run the ExerciseOutput1A.IDF file.

4. Using your text editor, open ExerciseOutput1A.idf. Open a new file, and save it as ExerciseOutput1A-LOADS.RVI. Type in the following:

```
eplusout.eso
eplusout.csv
```

In the .idf file, locate the Output:Variable commands you just added. Copy them, and paste them into the new .RVI file. Delete the duplicates with different reporting frequencies, saving one instance of each variable. Delete everything but the variable name. Add a final line containing only a 0 (zero). For Window Heat Loss and Heat Gain, the .RVI file would look like this:

```
eplusout.eso
eplusout.csv
Zone Window Heat Gain
Zone Window Heat Loss
0
```

5. Rename file "ExerciseOutput1-CustomCSV.b~t" to "ExerciseOutput1-CustomCSV.bat" and edit this file in a text editor to make sure the path at the top of the file matches where your version of EnergyPlus is installed. The current path in the file is:

```
set post_proc=C:\EnergyPlusV6-0-0\PostProcess\
```

6. Open a Command Window (Start, Run, Command)

7. Change to the directory containing your ExerciseOutput1A.IDF, results files, and your new ExerciseOutput1A-LOADS.RVI. For example:

   CD D:\EnergyPlus Training\EnergyPlusExercises *<-- substitute your path here*

Note: This assumes that the ExerciseOutput1-CustomCSV.bat file is located in the same directory as your IDF and RVI. This is what EP-Launch does for single simulations.

8. Type: ExerciseOutput1-CustomCSV ExerciseOutput1A ExerciseOutput1A-LOADS

   and press Enter.

9. ExerciseOutput1-CustomCSV reads the ESO output and creates a .CSV for the .RVI for only the variables listed in the .RVI. A .CSV is created for each of the time steps in the output file--timestep, hourly, daily, monthly, or runperiod: inputfilename_timestep.csv, or for this exercise, ExerciseOutput1A.idf:

> ExerciseOutput1A_timestep.csv
> ExerciseOutput1A_hourly.csv
> ExerciseOutput1A_daily.csv
> ExerciseOutput1A_monthly.csv
> ExerciseOutput1A_annual.csv

If there is no data at the requested time step, that .CSV file will be empty, although that should not occur here.

10. Add report variables to the IDF for energy end-uses. Review .RDD, .MDD and .MTR file for variables to include. Open and save ExerciseOutput1A.idf as ExerciseOutput1B.idf. Create an energy end-use .MVI using the same structure as above but replace eplusout.eso with eplusout.mtr in the first line. Rerun the new IDF and run ExerciseOutput1-CustomCSV again:

  ExerciseOutput1-CustomCSV ExerciseOutput1B ExerciseOutput1B-ENERGYENDUSE

11. Experiment with creating other .RVIs and variables. Example .RVIs for ExerciseOutput1-EquipmentConsumption and ExerciseOutput1-ExternalEnvironment are included.