Student Project Activity #4: Demand Flexibility Measures

Overview:

In this activity, students will propose and evaluate demand flexibility measures for the buildings in the REopt scenario generated from the coincident and diverse projects. Students will also reevaluate their choices of energy efficiency measures from Activity #2 based on their new measure choices.

Tasks:

1. (20 mins) Choose Measures: Browse the measures in the list below and select 1 that you believe will help you achieve your energy objective.
   - Add Pre-Cooling or Pre-Heating (currently located in the measures folder)
   - Add Heat Pump Water Heater
   - Add Packaged Ice Storage System
   - Add EMS to Control EV Charging

   Further detail on each of these measures is available here: https://github.com/NREL/openstudio-load-flexibility-measures-gem/tree/develop/lib/measures

2. (30 mins) Add Measures: Add these measures to your project model
   Link: https://docs.urbanopt.net/resources/customization/adding_own_measure.html
   a. Locate and open the ClassMeasures.rb mapper file (ProjectFolder/mappers/ClassMeasures.rb)
   b. To enable a measure:
      i. Change the "SKIP" value of your chosen measures from "true" to "false"

```
OpenStudio::Extension.set_measure_argument(osw, 'MeasureName', '__SKIP__', false)
```

   c. To edit a measure argument (change a parameter of a measure):
      i. Change the argument value as shown below

```
OpenStudio::Extension.set_measure_argument(osw, 'MeasureName', 'MeasureArgument', <set argument value here>)
```

   d. Save and close this mapper file
3. (60 mins) Run Command: Run this project model with your new measures added by using the path for your classmeasures_scenario.csv file:

```
uo run -f <path/to/FEATUREFILE.json> -s <path/to/SCENARIOFILE.csv>
```

4. (5 mins) Process Command: Post-process general results for each project scenario.

```
uo process -d -f<path/to/FEATUREFILE.json> -s <path/to/SCENARIOFILE.csv>
```

5. (60 mins) Process with REopt Commands: Post-process your existing results using REopt:
   Tutorial: https://urbanopt-tutorial.s3.amazonaws.com/videos/08_REopt-URBANopt.mp4
   a. Process Scenario with REopt Command: Post-process general results for each project scenario.

```
uo process -r -f <path/to/FEATUREFILE.json> -s <path/to/REOPTSCENARIOFILE.csv>
```

b. Process Features with REopt Command: Post-process general results for each project feature (building).

```
uo process -e -f <path/to/FEATUREFILE.json> -s <path/to/REOPTSCENARIOFILE.csv>
```

6. (120 mins) Repeat this process for the other project (coincident or diverse)
7. (60 mins) Assess your Measures: Analyze the effectiveness of your added measures for the coincident and diverse projects (located in the Project "run" folder)
8. (120 mins) Modify and Iterate: If your chosen measures were not very effective in achieving your energy goals, choose other measures (or modify existing measure arguments) that you think may have a better chance of success.
   a. Present a comparison of the cumulative annual electricity consumption for the whole year and plot timeseries hourly electricity consumption profiles over a chosen 3-day period between the baseline scenario and class measures scenario results to display the benefits of your added measures.
9. (120 mins) Write a Final Report: Compile a concise, professional report in which you present your work and findings. Make final recommendations on which energy efficiency or demand flexibility measures to implement for the district based on your modeling and optimization results. Your analysis must include energy and cost comparisons, regardless of your specific evaluation criteria. Use of an executive summary is recommended.

Deliverables: (Week 7-8)

- Final ClassMeasures.rb mapper files used in this project
- Graphical representation of electricity consumption as stated above
- A final report as stated in Task #9