

Solar Storage Dispatch Optimization:

The following procedure will provide a joint optimization model for battery dispatch in a grid connected solar system, aiming to minimize grid spending over a specified time period. Specifically, the code will utilize multi processing and Pyomo to run more than one case at once, allowing the user to compare and contrast what they would like.

Ensure that you've installed each required library on your machine. Use the following code on your terminal to do so:

```
pip install pandas numpy pyomo joblib
```

To install the CBC Solver, use the following code:

On Ubuntu: `sudo apt-get install coinor-cbc`

On Mac: `brew install cbc`

Download the Python script in a file along with the CSV data file group and the `case_params.json` file. Your `case_params.json` file should follow this format:

```
[  
  {  
    "case_id": 1,  
    "demand_file": "demand.csv",  
    "generation_file": "generation.csv",  
    "rate_file": "rate.csv",  
    "timeSpan": 24,  
    "batteryCapacity": 100,  
    "chargeEfficiency": 0.95,  
    "dischargeEfficiency": 0.9,  
    "chargeLimit": 20,  
    "dischargeLimit": 15  
  }  
]
```

The case number is flexible and can be decided by the user, each will run in parallel.

Run the code. Let's say the name of your Python script is "battery_optimization.py," then your code to run the Python script should look like:

```
python battery_optimization.py
```

You'll get two CSV file outputted per case, which will be outputted in the same folder that your Python script was placed in. Please refer to these to analyze the optimization output.

EXAMPLE CASE:

Let's say that your Python script is located in the Desktop section of your machine in a folder called "BTM_Optimization." To get into that folder on the terminal, use the following code:

```
[(base) maevemaguracomey@Maeves-MacBook-Air-7 ~ % cd Desktop  
[(base) maevemaguracomey@Maeves-MacBook-Air-7 Desktop % cd BTM_Optimization  
[(base) maevemaguracomey@Maeves-MacBook-Air-7 BTM_Optimization % ]
```

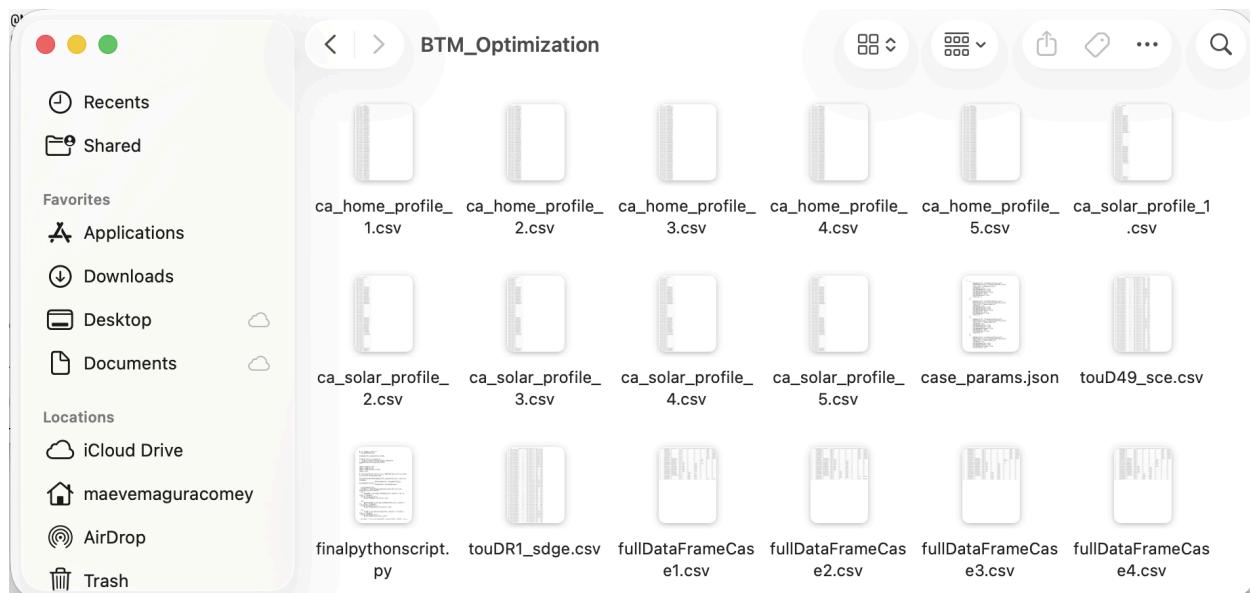
Check the version of your Python:

```
[(base) maevemaguracomey@Maeves-MacBook-Air-7 BTM_Optimization % python --version  
Python 3.13.5 ]
```

Install each library and the CBC Solver:

```
[(base) maevemaguracomey@Maeves-MacBook-Air-7 BTM_Optimization % pip install pandas numpy pyomo joblib  
Requirement already satisfied: pandas in /opt/anaconda3/lib/python3.13/site-packages (2.2.3)  
Requirement already satisfied: numpy in /opt/anaconda3/lib/python3.13/site-packages (2.1.3)  
Requirement already satisfied: pyomo in /opt/anaconda3/lib/python3.13/site-packages (6.9.5)  
Requirement already satisfied: joblib in /opt/anaconda3/lib/python3.13/site-packages (1.4.2)  
Requirement already satisfied: python-dateutil>=2.8.2 in /opt/anaconda3/lib/python3.13/site-packages (from pandas) (2.9.0.post0)  
Requirement already satisfied: pytz>=2020.1 in /opt/anaconda3/lib/python3.13/site-packages (from pandas) (2024.1)  
Requirement already satisfied: tzdata>=2022.7 in /opt/anaconda3/lib/python3.13/site-packages (from pandas) (2025.2)  
Requirement already satisfied: ply in /opt/anaconda3/lib/python3.13/site-packages (from pyomo) (3.11)  
Requirement already satisfied: six>=1.5 in /opt/anaconda3/lib/python3.13/site-packages (from python-dateutil>=2.8.2->pandas) (1.1  
7.0)  
[(base) maevemaguracomey@Maeves-MacBook-Air-7 BTM_Optimization % brew install cbc ]
```

Make sure that your case_params.json file as well as your ca_home_profile_1.csv, ca_solar_profile_1.csv, etc. are located in the same BTM_Optimization folder before proceeding:



Run the Python script using your version of Python. Let's say the Python script is called "finalpythonscript.py," in this case. Then, use the following code:

```
[(base) maevemaguracomey@Maeves-MacBook-Air-7 BTM_Optimization % python3 finalpythonscript.py ]
```

Finally, you should be able to see each outputted CSV file in the BTM_Optimization folder in your Desktop on your machine:

fullDataFrameCase1.csv	Today at 4:23 PM	3 KB	CSV Document
fullDataFrameCase2.csv	Today at 4:23 PM	3 KB	CSV Document
fullDataFrameCase3.csv	Today at 4:23 PM	2 KB	CSV Document
fullDataFrameCase4.csv	Today at 4:23 PM	2 KB	CSV Document
fullDataFrameCase5.csv	Today at 4:23 PM	3 KB	CSV Document
gridPullCase1.csv	Today at 4:23 PM	245 bytes	CSV Document
gridPullCase2.csv	Today at 4:23 PM	251 bytes	CSV Document
gridPullCase3.csv	Today at 4:23 PM	239 bytes	CSV Document
gridPullCase4.csv	Today at 4:23 PM	238 bytes	CSV Document
gridPullCase5.csv	Today at 4:23 PM	245 bytes	CSV Document

You've completed the tutorial!