ENERGY PLANNING USER GUIDE

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Website: https://www.surrey.ac.uk/research-projects/software-framework-optimal-decarbonisation-planning-asean-countries

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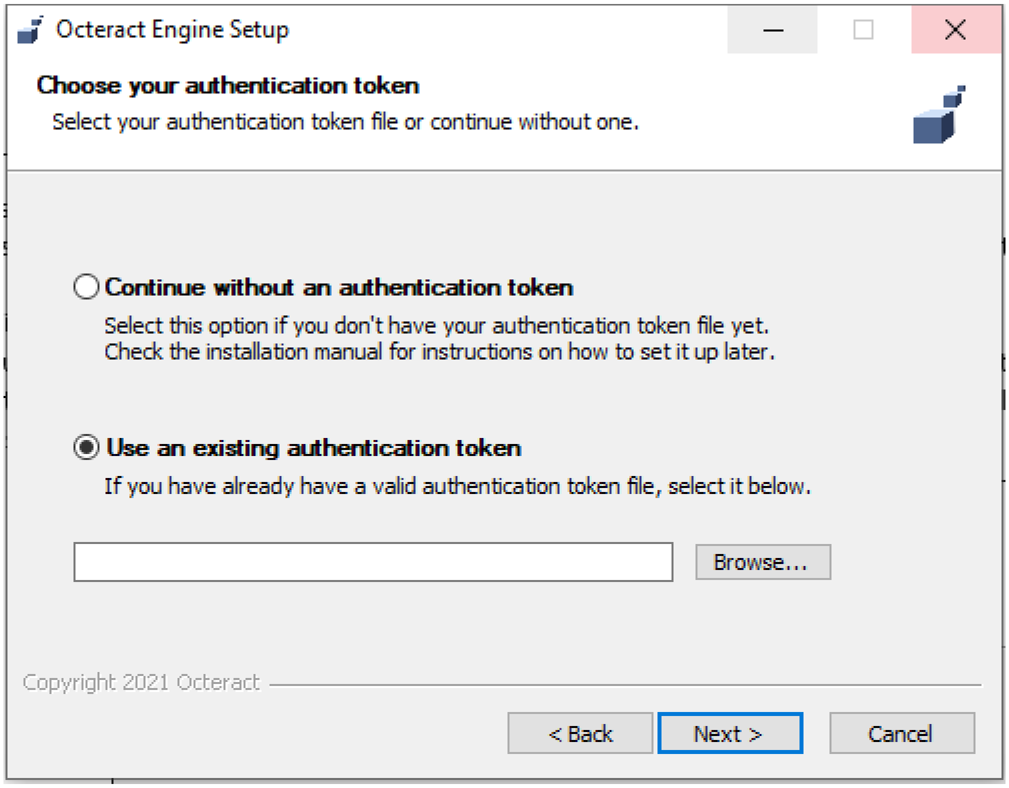
1. Procedure for Octeract Engine Installation in PC

i. A user should install the Octeract Engine from https://octeract.com/#download

ii. A user should also complete the registration process at https://octeract.com/register to obtain the authentication token.

iii. During installation, the user would be prompted to choose the authentication token. The user should choose the second option ‘Use an existing authentication token’ and select the file containing the authentication token downloaded from the website upon completion of registration.



Octeract Engine Setup

Choose your authentication token

Select your authentication token file or continue without one.

○ **Continue without an authentication token**

Select this option if you don't have your authentication token file yet.
Check the installation manual for instructions on how to set it up later.

● **Use an existing authentication token**

If you have already have a valid authentication token file, select it below.

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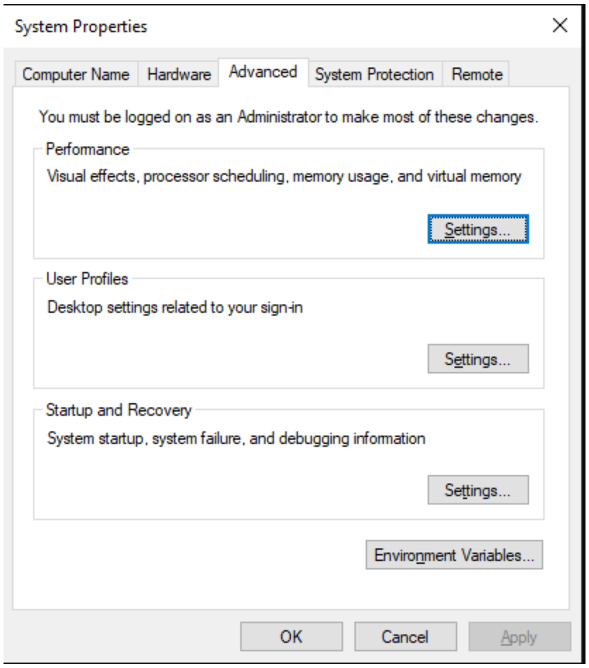
iv. The Octeract Engine should be installed in the same directory as the energy planning files.

v. To ensure that the optimisation work proceeds smooth, a user should edit the ‘Environment Variables’ on the PC. A user should search for ‘environment variables’ and arrive at the page as shown.


System Properties

You must be logged on as an Administrator to make most of these changes.

Performance

Visual effects, processor scheduling, memory usage, and virtual memory

User Profiles

Desktop settings related to your sign-in

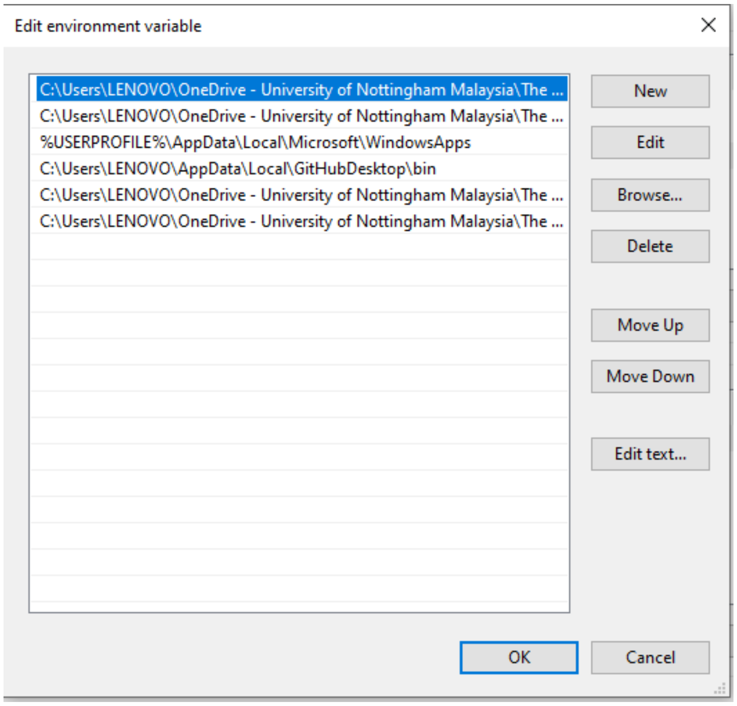
Startup and Recovery

System startup, system failure, and debugging information

vi. Next, the user should click the ‘Environment Variables’.

vii. Under the user variables, a user should be select ‘Path’ and click ‘Edit’

viii. The user should then click ‘New’ to add the directory that contains the Python energy planning files and Octeract Engine.


Edit environment variable

```
C:\Users\LENOVO\OneDrive - University of Nottingham Malaysia\The ...
C:\Users\LENOVO\OneDrive - University of Nottingham Malaysia\The ...
%USERPROFILE%\AppData\Local\Microsoft\WindowsApps
C:\Users\LENOVO\AppData\Local\GitHubDesktop\bin
C:\Users\LENOVO\OneDrive - University of Nottingham Malaysia\The ...
C:\Users\LENOVO\OneDrive - University of Nottingham Malaysia\The ...
```

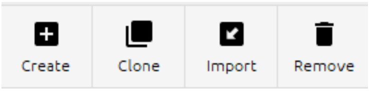
ix. This step avoids any potential conflict of directories during the optimisation process.

2. Procedure for Python Set-up in PC

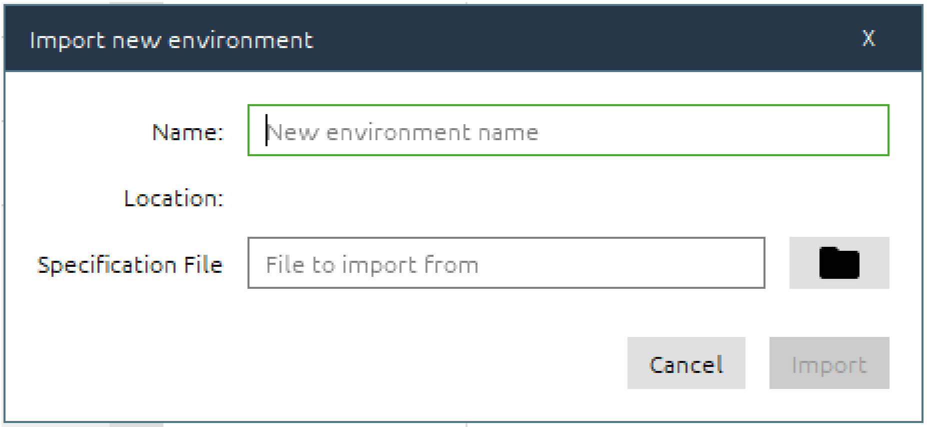
i. A user should install Anaconda from https://www.anaconda.com/distribution/.

ii. From the home page, the user should click the 'Environment' tab

iii. Under the 'Environment' tab, a user would see the following:



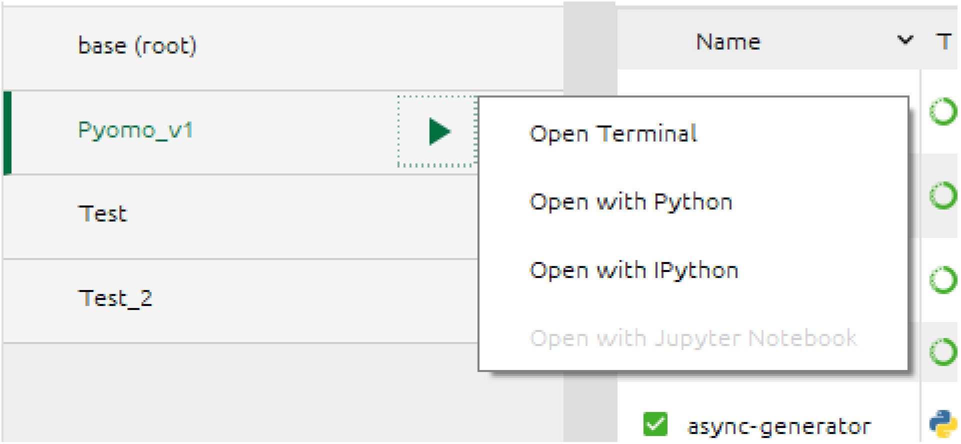
iv. Click on 'Import' and the user would see the following:



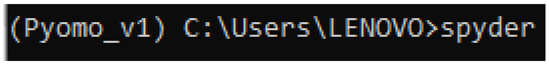
v. The name of the environment may be customised according to the user e.g. Energy Planning.

vi. The specification file to be imported is '**environment.yml**'. This file would be provided to the user.

vii. Next, a user should click the right arrow at the labelled environment. A user may refer to the following diagram as a reference.



viii. At the terminal, the user should type 'Spyder' and click enter, as follows:



```
(Pyomo_v1) C:\Users\LENOVO>spyder
```

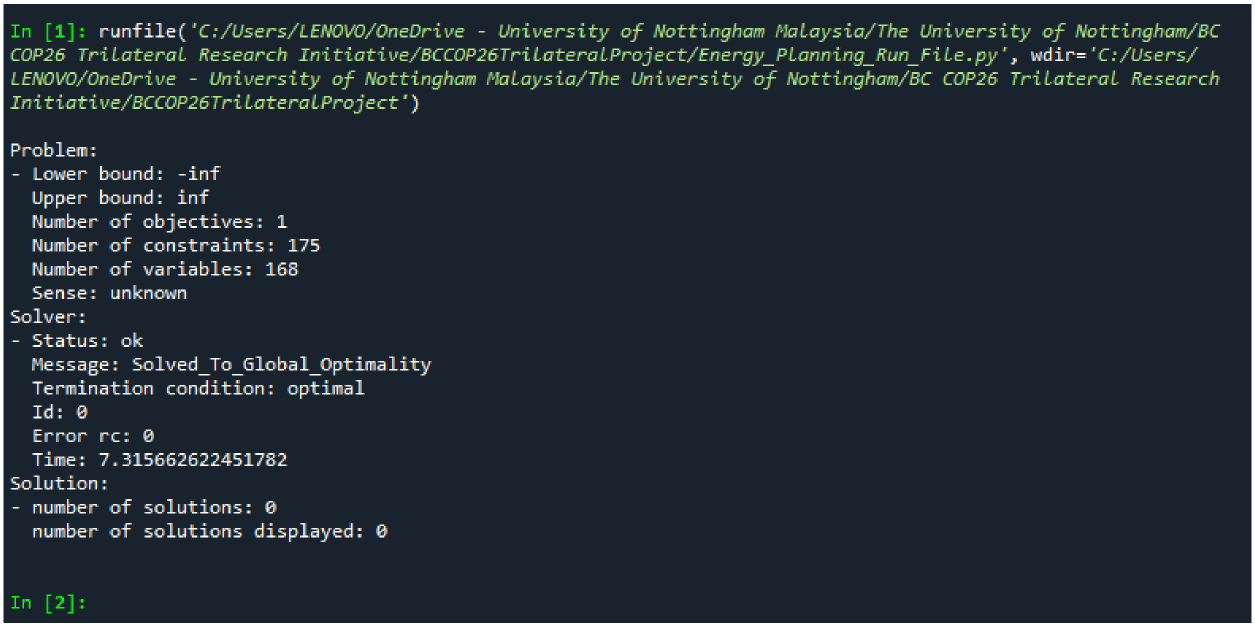
3. Procedure for Energy Planning Optimisation via Python

ix. A user should load the file titled ‘Energy_Planning_Run_File’ by selecting ‘Open’ under the ‘File’ tab.

x. Once the ‘Energy_Planning_Run_File’ file is loaded, a user should edit the file directory and ensure all the relevant energy planning files are located within the same directory.

xi. Before running the optimisation file, a user should input all data in the Microsoft Excel file titled ‘Energy_Planning_User_Interface’. The user should also choose the choice of optimisation i.e., min budget or min emission.

xii. The next step would be to click F5 to run the file. The running step is considered completed once the solver status is displayed. Kindly refer to the following illustration as a guide.



```
In [1]: runfile('C:/Users/LENOVO/OneDrive - University of Nottingham Malaysia/The University of Nottingham/BC
COP26 Trilateral Research Initiative/BCCOP26TrilateralProject/Energy_Planning_Run_File.py', wdir='C:/Users/
LENOVO/OneDrive - University of Nottingham Malaysia/The University of Nottingham/BC COP26 Trilateral Research
Initiative/BCCOP26TrilateralProject')

Problem:
- Lower bound: -inf
  Upper bound: inf
  Number of objectives: 1
  Number of constraints: 175
  Number of variables: 168
  Sense: unknown
Solver:
- Status: ok
  Message: Solved_To_Global_Optimality
  Termination condition: optimal
  Id: 0
  Error rc: 0
  Time: 7.315662622451782
Solution:
- number of solutions: 0
  number of solutions displayed: 0


In [2]:
```

xiii. A user should open the Microsoft Excel file titled ‘Energy_Planning_User_Interface’ to view the detailed results.

xiv. A user should be able to close Python by closing Spyder, command prompt and Anaconda.