Guide for using the PtX-Bornholm operation tool

- The tool is developed by researchers from DTU Wind and Energy system in 2023 for calculating production of hydrogen and waste heat from a wind-driven multi-electrolyser system.

- The tool receives financial support from REACTRF-22-0054 – “Feasibility study for Power-to-X production on Bornholm” which is a project funded by the European Regional Development Fund and Danish Board of Business Development.

Content of the tool

- The tool contains three files as following

i) Wind power data could be read from "SP379-HH100_2016_1hour.txt", which gives hourly wind power data for a 1GW offshore wind farm and can be scaled if relevant.

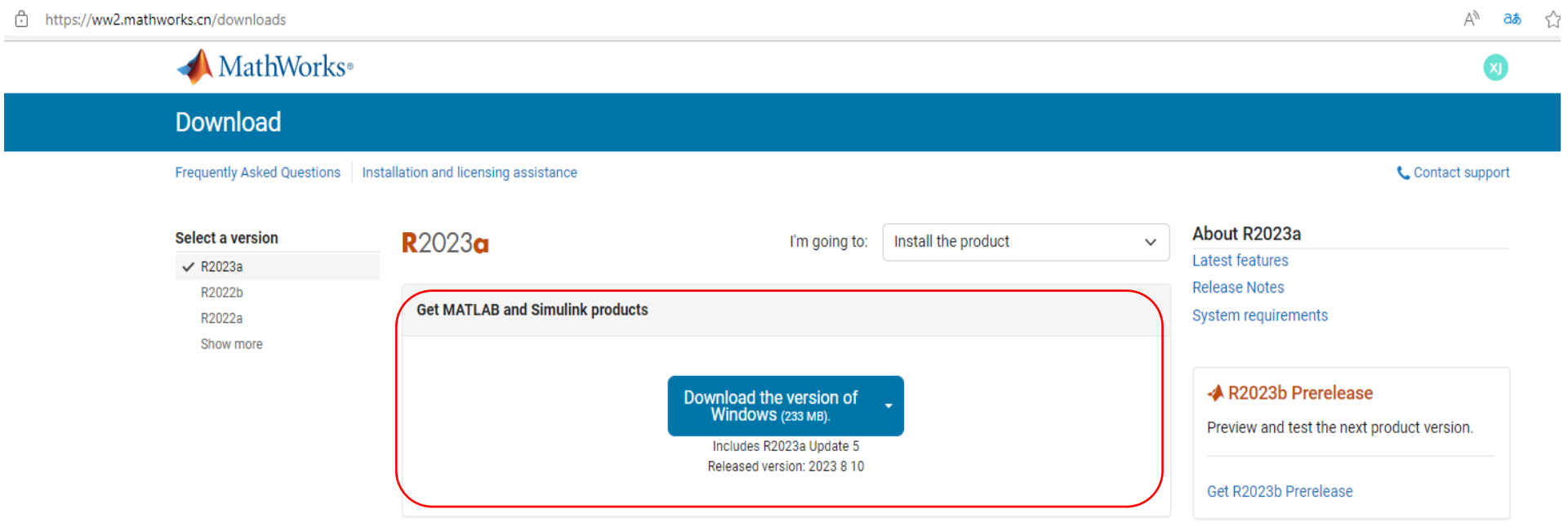
ii)"Function" is used to calculate the voltage and current for a single electrolyser stack.

iii)"Main" is used to calculate the hydrogen production and recovered heat amount of multi module electrolysers. In this file, a particular operation strategy is developed, i.e., "sequential operation", to operate multiple-electrolyser units.

Before running

- Please download Matlab from the following website

  https://ww2.mathworks.cn/downloads



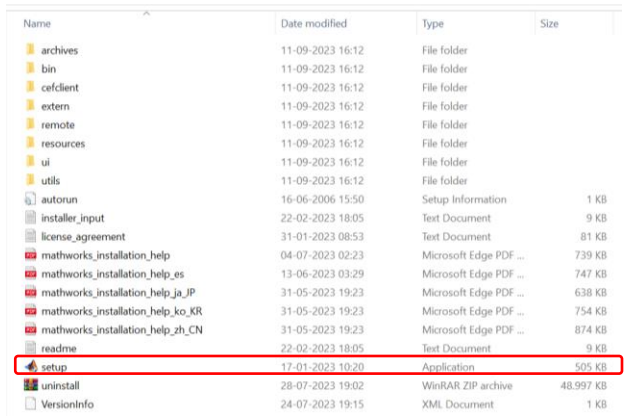
Before running

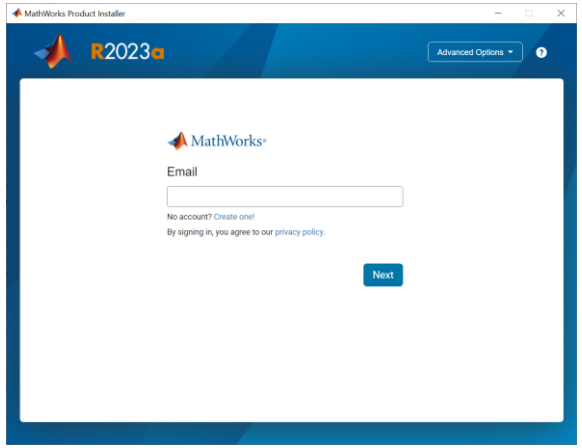
- Install Matlab

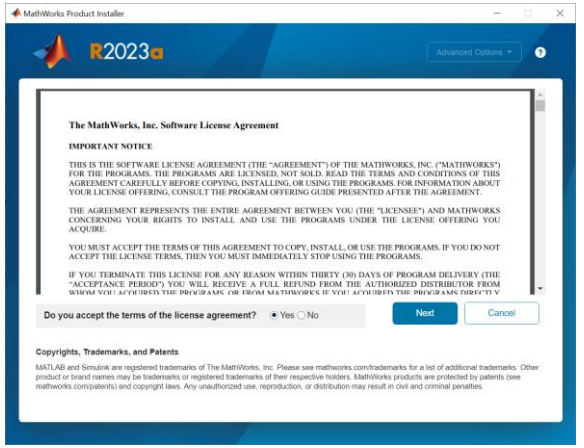
Double-click the matlab_R2023a_win64.exe installer file to launch the installer

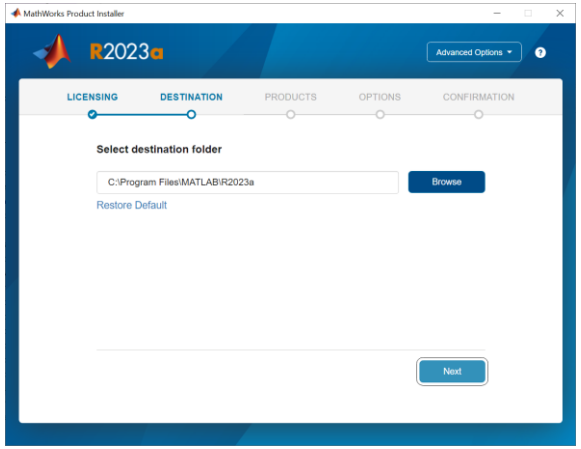
matlab_R2023a_win64 11-09-2023 16:12 Application 238.934 KB

When asked if you want to allow the application to make changes, answer Yes.





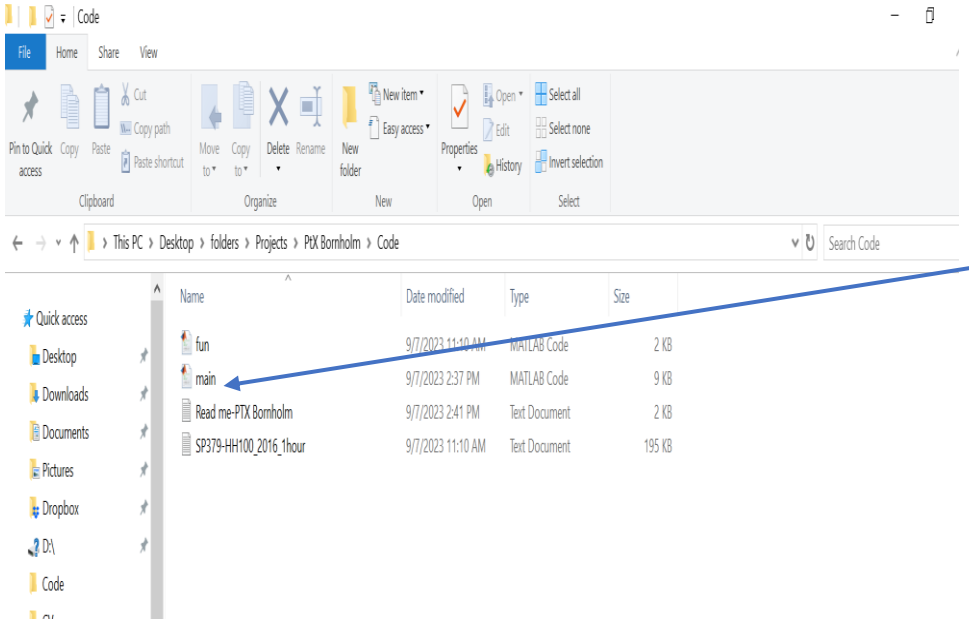


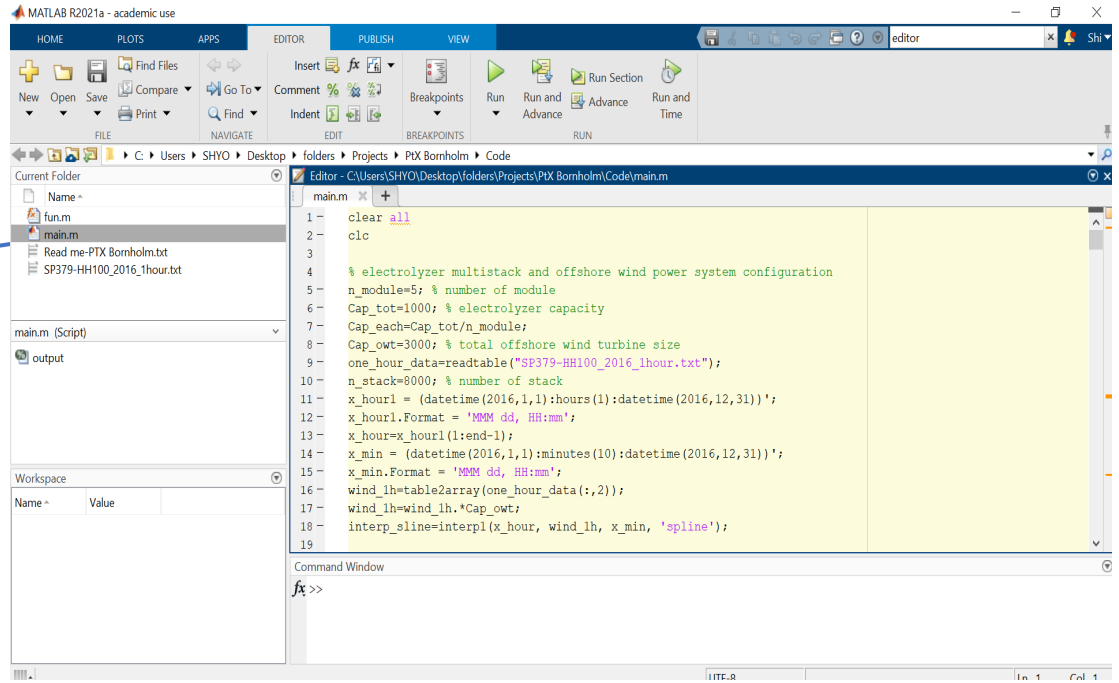


If your computer has been configured to use a proxy server for Internet access, enter the user name and password to continue with a standard installation.
Contact your system administrator for proxy server credentials, if relevant.

Load the file

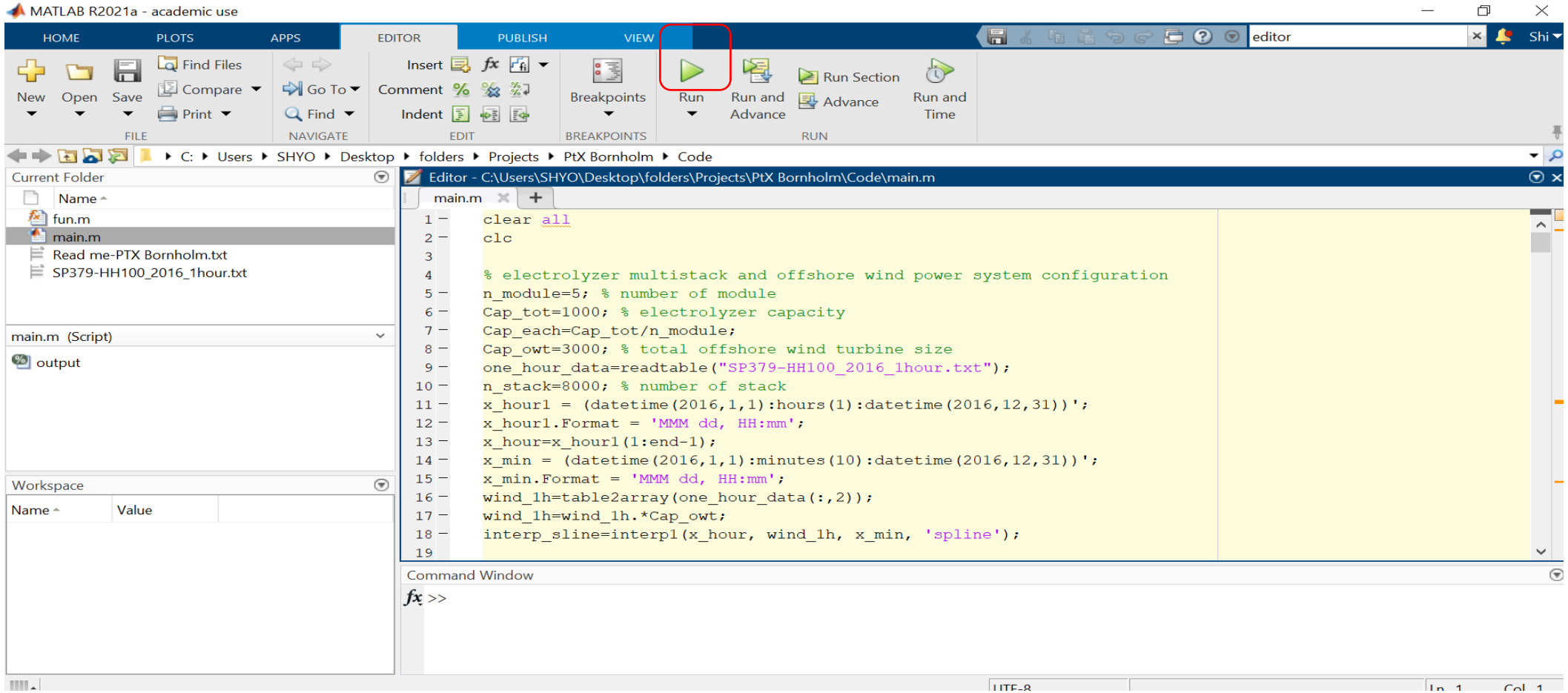
- When you run the code, please save all documents in the same path, then simply open "Main" file in the matlab enviroment.





Run the code

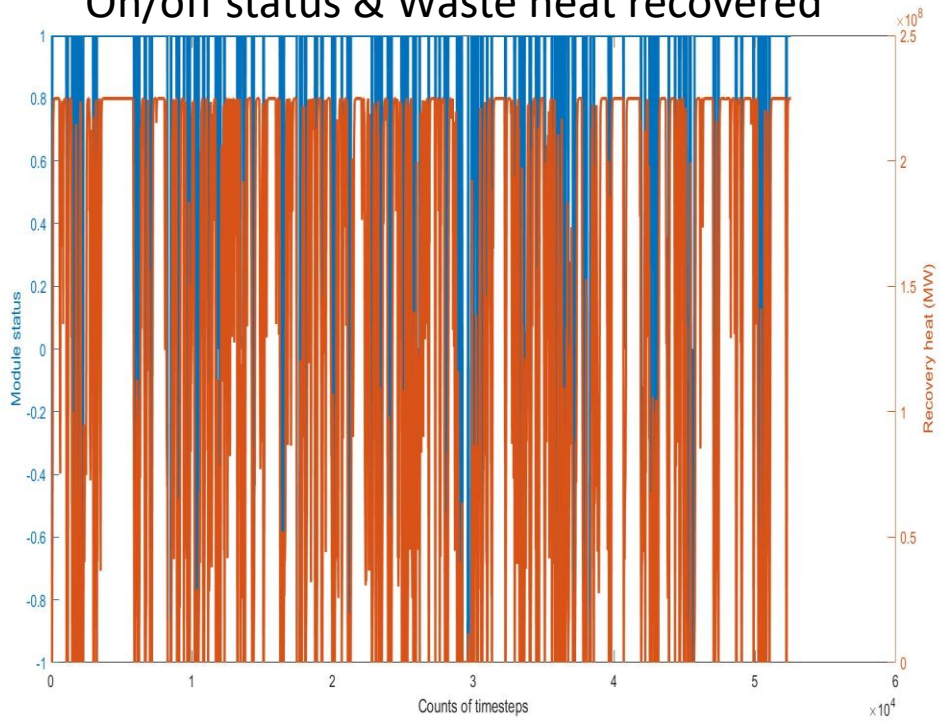
- Simply click the “run” button.



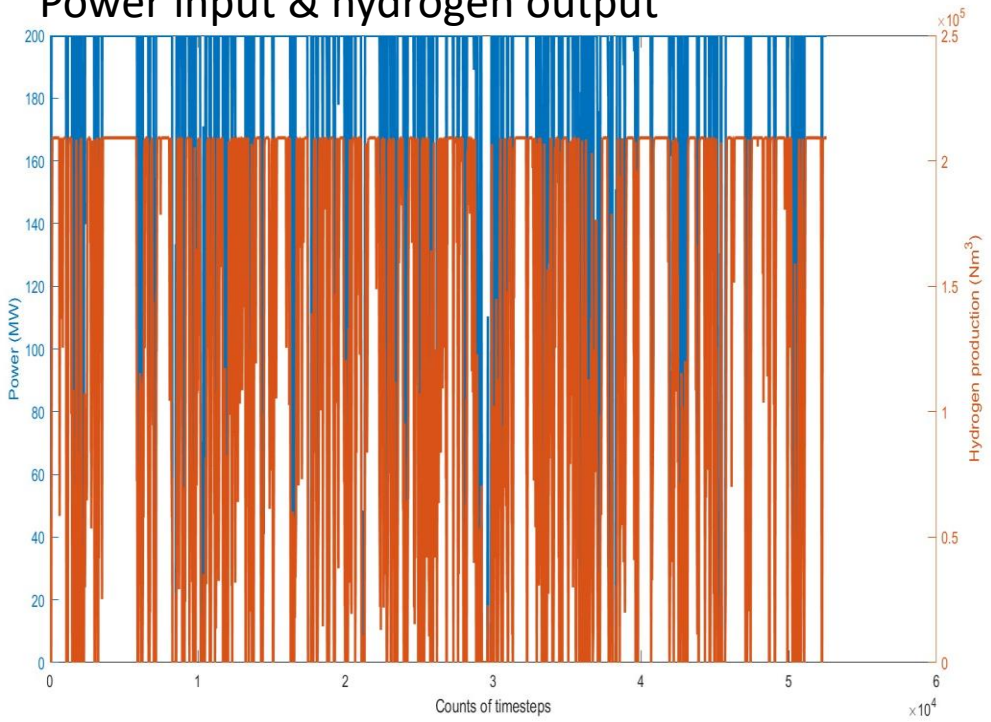
See/plot results

- The results can be plotted after running the code. Figures below illustrate the operation performance of a single electrolyser module over a year with a time resolution of 10 mins.

On/off status & Waste heat recovered



Power input & hydrogen output



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- The default case simulates operation of a 1GW electrolyser system that is directly powered by a 3GW offshore wind farm. The 1GW electrolyser system contains 5 electrolyser modulers, each of which has a nominal power capacity of 200MW.

- Users can adjust input data, e.g., the wind profile, and parameters of the electrolyser system, e.g., capacity, modular size, operation temperature……, according to own needs.

- Additional information about the principle applied can be found in project deliverable “WP4: Integration of Power-to-X into Bornholm’s energy system”- V20200830”.

For any further support/collaboration, please reach out to

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