This is an instruction for using the Integrated Power Generation Expansion Planning (IPGEP) model. The model can be run under 3 different modes:

1. Baseline projection,
2. Generation cost minimization, and
3. Damage cost minimization.

In each mode, different scenarios can be defined by changing the learning assumption and discount rate. All models (except for Baseline models) here are built based on the nonlinear optimization algorithm.

To run all models, first you need to download the initialization supporting files: ***EIA.xlsx*** and ***Fuel.xlsx.*** These files contain the projection of fuel cost and electricity demand based on IEO 2013.

1- Baseline Projection Model

In this model, the generation pattern is produced to match the forecasted demand for each technology. To run this model:

a. Download: ***EIA_main.m, CONC.m, FORCE.m,*** and ***TEMP.m***
b. Run ***EIA_main.m***
c. Generation capacities of different technologies and corresponding temperature for each time step through the modeling horizon are stored in variable ***S***, the construction costs are stored in ***CCON***, fixed operation costs are stored in ***CFOP***, variable operation costs are stored in ***CVOP***, and fuel costs are stored in ***CF***.

2- Generation Cost Minimization Model

In this model, the optimal generation pattern is produced to match the total forecasted demand for electricity while minimizing the total cost of generation. To run this model:

a. Download the initial guess file: ***init.xlsx***
b. Download: ***E_MAIN.m, E_fun.m, NEXT.m, CONC.m, FORCE.m,*** and ***TEMP.m***
c. Run ***E_MAIN.m***
d. Generation capacities of different technologies and corresponding temperature for each time step through the modeling horizon are stored in variable ***S***, the construction costs are stored in ***CCON***, fixed operation costs are stored in ***CFOP***, variable operation costs are stored in ***CVOP***, and fuel costs are stored in ***CF***.
e. Set the coefficient of ***Cost(1, t3)*** equal to ***1*** and the coefficient of ***Cost(2, t3)*** equal to ***0*** in ***NEXT.m***
f. You can change the discount rate in line 139 in ***E_MAIN.m***
g. You can change the learning assumptions by commenting (No learning)/uncommenting (learning) lines 139 and 140 in ***NEXT.m***

3- Damage Cost Minimization Model

In this model, the optimal generation pattern is produced to match the total forecasted demand for electricity while minimizing the damage cost of climate change. To run this model:

a. Download the initial guess file: ***init.xlsx***

b. Download: ***E_MAIN.m, E_fun.m, NEXT.m, CONC.m, FORCE.m,*** and ***TEMP.m***
c. Run ***E_MAIN.m***
d. Generation capacities of different technologies and corresponding temperature for each time step through the modeling horizon are stored in variable ***S***, the construction costs are stored in ***CCON***, fixed operation costs are stored in ***CFOP***, variable operation costs are stored in ***CVOP***, and fuel costs are stored in ***CF***.
e. Set the coefficient of ***Cost(1, t3)*** equal to ***0*** and the coefficient of ***Cost(2, t3)*** equal to ***1*** in ***NEXT.m***
f. You can change the discount rate in line 139 in ***E_MAIN.m***
g. You can change the learning assumptions by commenting (No learning)/uncommenting (learning) lines 139 and 140 in ***NEXT.m***