



BRAYTON CYCLE CALCULATOR

USER GUIDE


Abbreviations

P : Pressure (kPa)
T : Temperature (K)
h : Enthalpy (kJ/kg)
s : Entropy (kJ/kg.K)

• MAIN INTERFACE

BRAYTON CYCLE CALCULATOR is the program which can be used to analyze the performance of the Brayton cycle system. The air that used in this program use references from [1].

This section is the initial interface and the main page when the program is run, where there is an INPUT panel section which is a panel for entering user input data, an OUTPUT panel which is a panel for calculating air properties at each point, a figure panel containing system schema images, and the TS diagram panel which contains graphs to illustrate the TS diagram of the Brayton cycle. There are also buttons:

CALCULATE	To run the whole calculation process
CLEAR DATA	To delete all data filled in the column
	To save data in .xlsx format

PLOT	To display the T-S chart graph of the calculations that have been done
SAVE PLOT	To save a T-S diagram image in (png) format
CLEAR PLOT	To delete the displayed T-S diagram image
HELP	To bring up the help menu

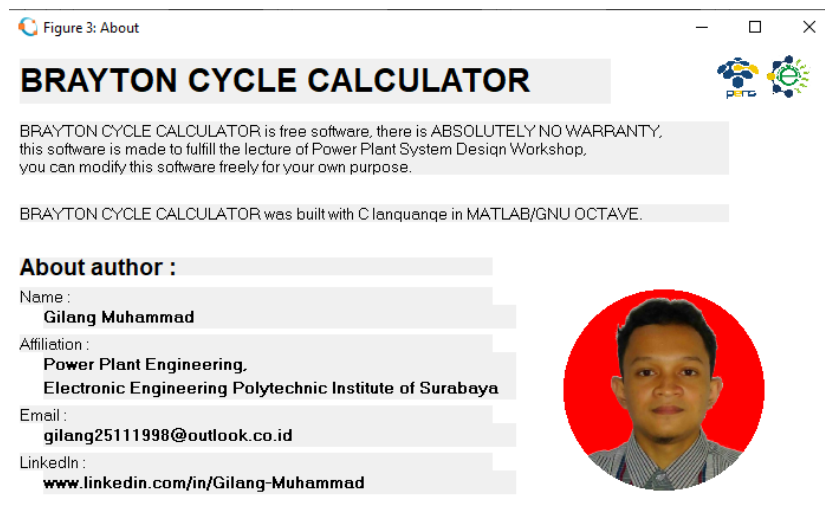
Total Turbine Work (kJ/kg) : Total Heat Added (kJ/kg) : Backwork Ratio :
 Total Compressor Work (kJ/kg) : Thermal Efficiency (0-1) : Net Power Developed (kW) :

The picture above is a column of calculation results from the PLTG system performance which contains: Total turbine work, Total compressor work, Energy input, Thermal efficiency, Backwork ratio, and Total power generated.

- **HELP MENU**



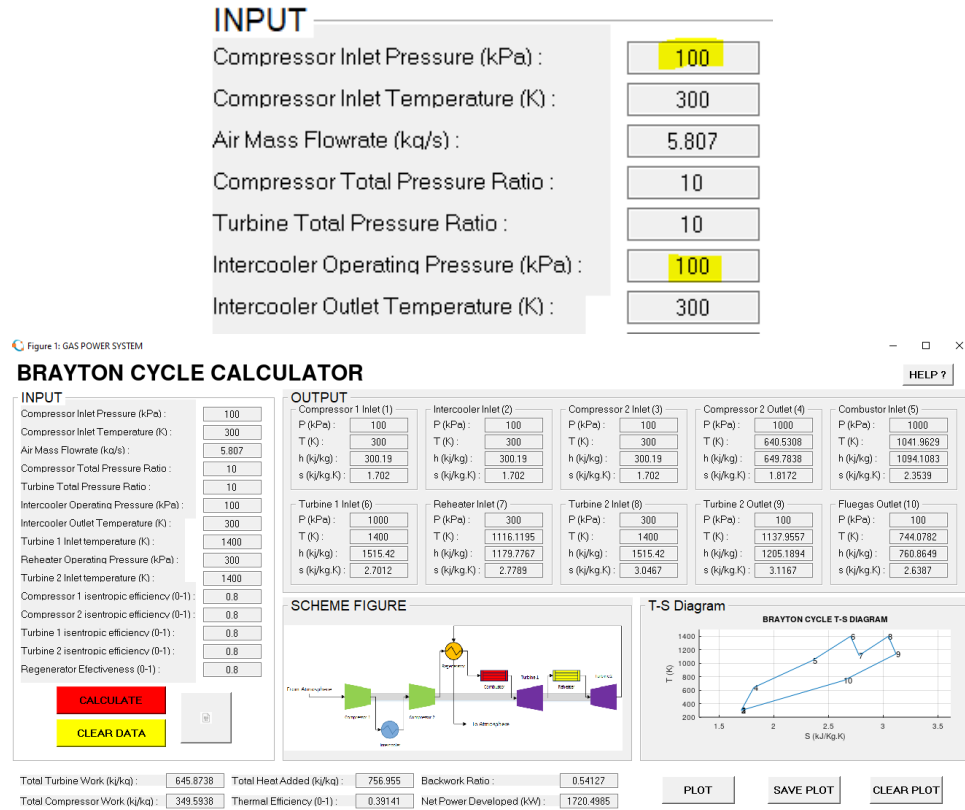
It is an interface that appears when the HELP button is pressed on the main page interface, the help menu contains the GUIDE which contains the procedure for operating the program and about which contains developer information.



• ANOTHER FEATURES

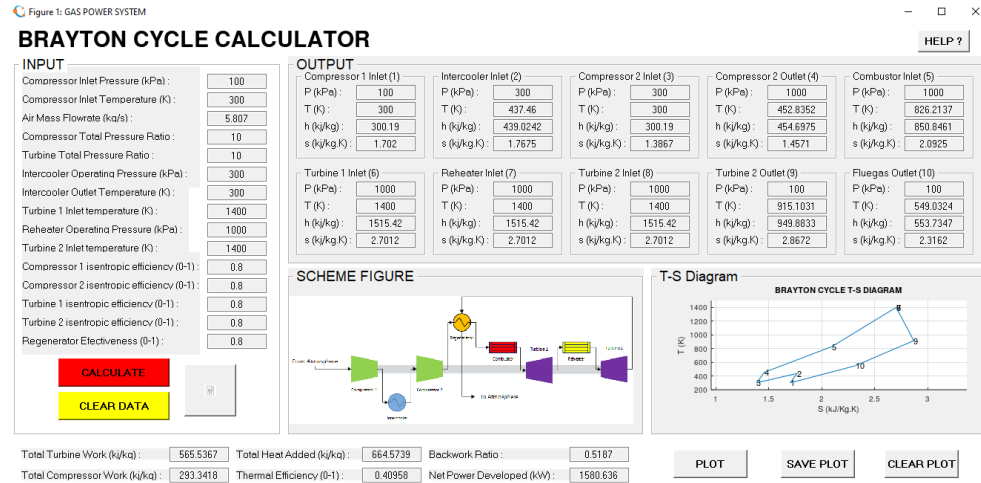
In the following program calculations can be performed by eliminating several other additional components if desired by the user:

1. Eliminate the intercooler component and use a single-stage compressor, by setting the compressor working pressure column equal to the compressor intake air pressure 1:

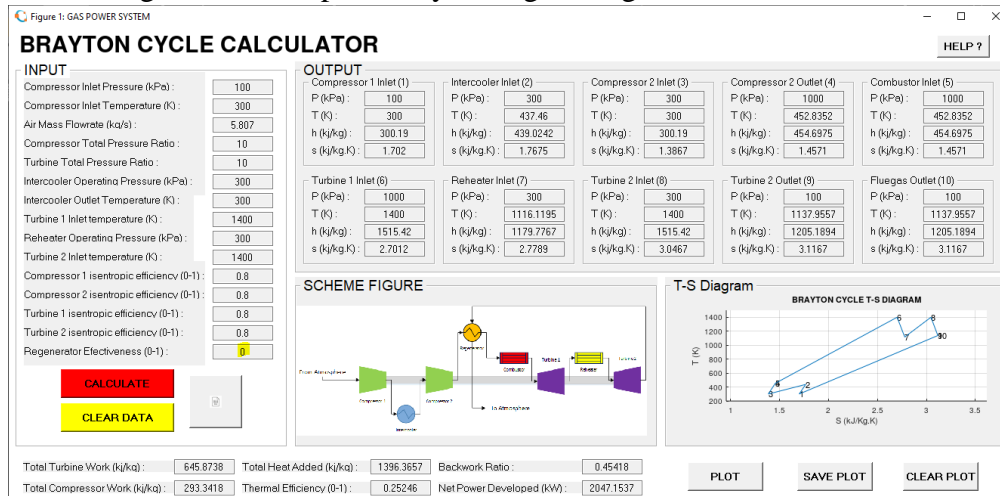


2. Eliminating the reheater and using a 1-stage turbine by setting the reheater working pressure column equal to the pressure entering the turbine 1 (compressor 1 intake pressure x compressor pressure ratio):

Compressor Inlet Pressure (kPa) :	100
Compressor Inlet Temperature (K) :	300
Air Mass Flowrate (kg/s) :	5.807
Compressor Total Pressure Ratio :	10
Turbine Total Pressure Ratio :	10
Intercooler Operating Pressure (kPa) :	300
Intercooler Outlet Temperature (K) :	300
Turbine 1 Inlet temperature (K) :	1400
Reheater Operating Pressure (kPa) :	1000
Turbine 2 Inlet temperature (K) :	1400



3. Eliminate the regenerator component by setting the regenerator effectiveness column to 0:



References :

- [1] Moran, M.J., Shapiro, H.N., Boettner, D.D. and Bailey, M.B., 2010. Fundamentals of engineering thermodynamics. John Wiley & Sons.