

# HOMER – A tool for planning Minigrids

HOMER is tool for modeling grid-connected and off-grid minigrids serving a given load profile, and comprising any combination of dispatchable and non-dispatchable generation and storage. Dispatchable resources include small hydro, biomass power, reciprocating engine generators, micro-turbines, fuel cells, batteries, and hydrogen storage. Non-dispatchable resources include photovoltaic (PV) modules and wind turbines.

	FL30 (Quantity)	Gen (kW)	Batteries (Quantity)	Converter (kW)
1	0	135.00	0	0.00
2	1		16	30.00
3	2		32	60.00
4	3		48	120.00
5	4		64	
6			96	
7			128	
8				

i Search space comprising 140 system configurations ( $5 \times 1 \times 7 \times 4 = 140$ ).

For a given load profile, HOMER will help to:

**SIMULATE:** System configuration to satisfy load of each hour of the year. System configuration is determined by aggregating modular generation and storage resources in the search space.

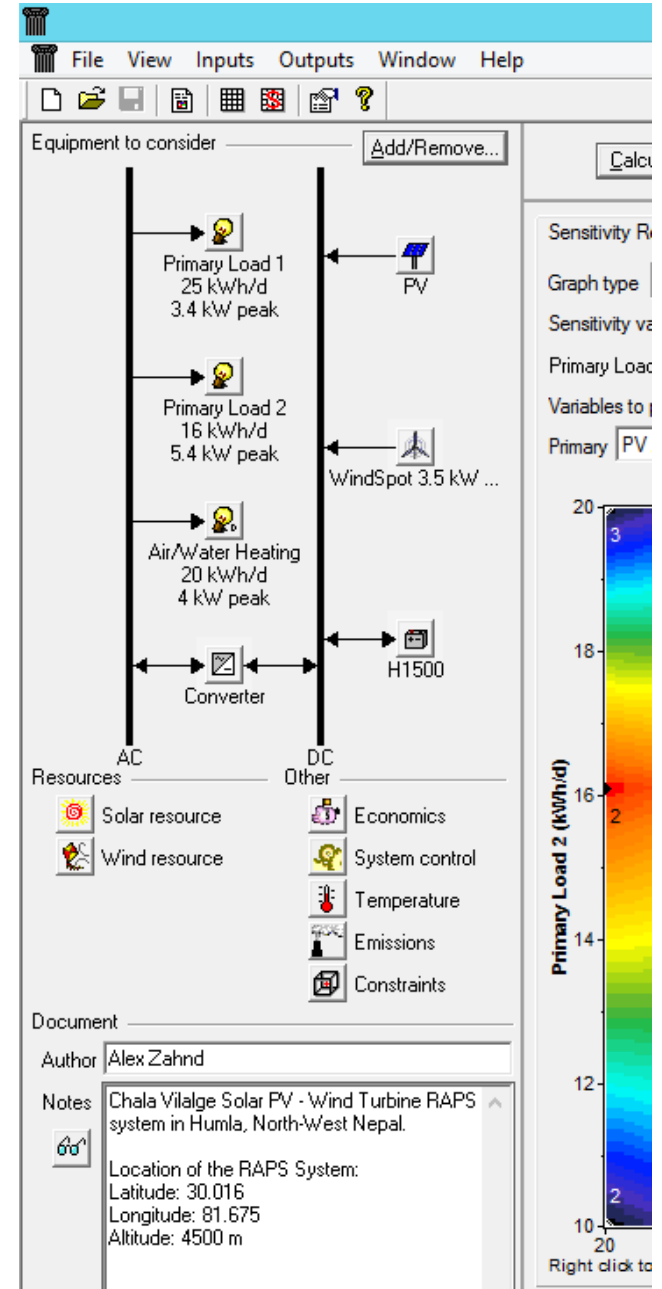
**OPTIMIZE:** Several system configurations using different combinations of modular generation and storage resources will be estimated in simulation. Optimal results, with the lowest life-cycle cost, will be available to the user. Optimal results can inform system sizing decisions.

**SENSITIVITY ANALYSIS:** HOMER allows the user to carry out sensitivity analysis to assess impacts of key variables on system configuration and performance.

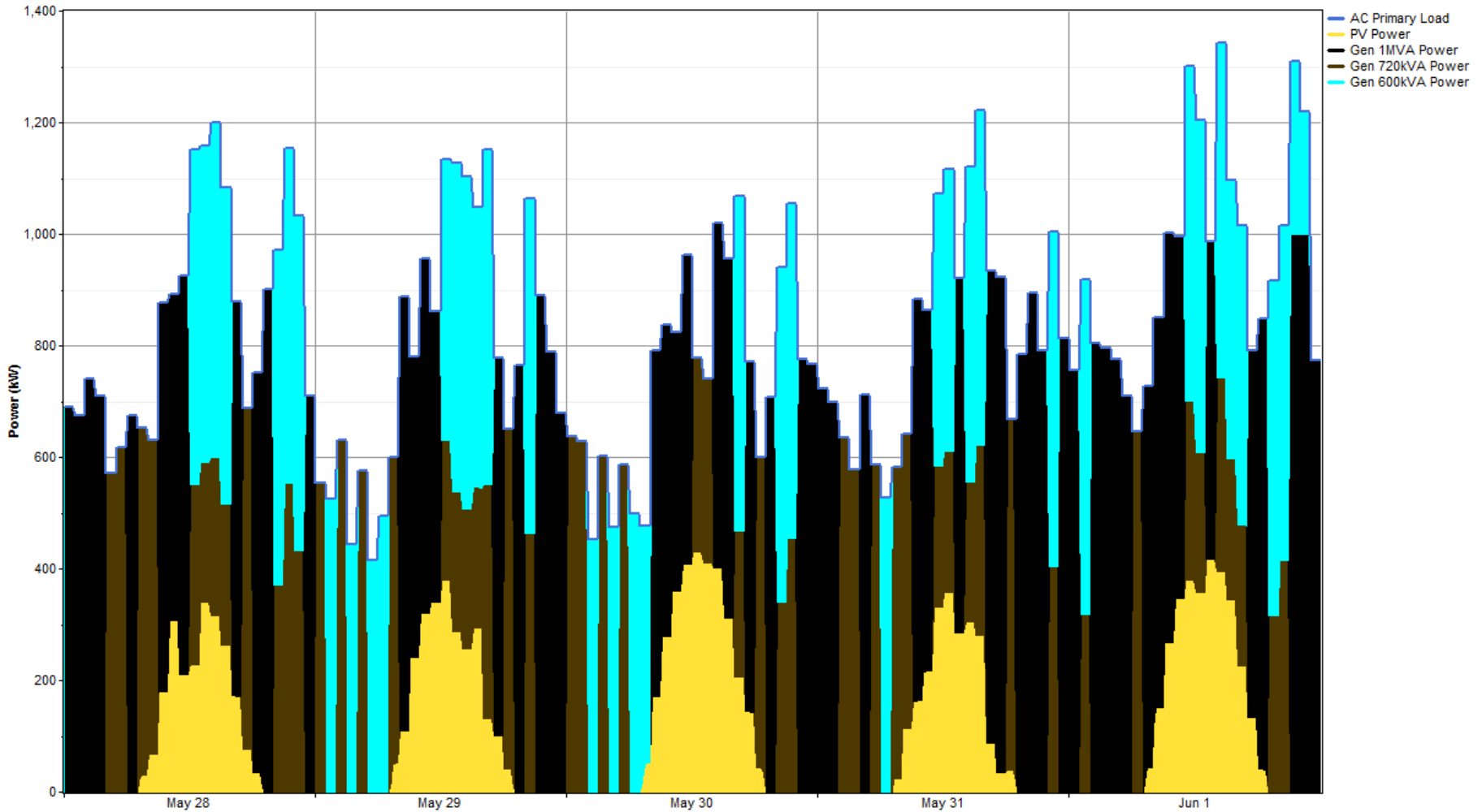
# HOMER – How it Works?

## Model Components

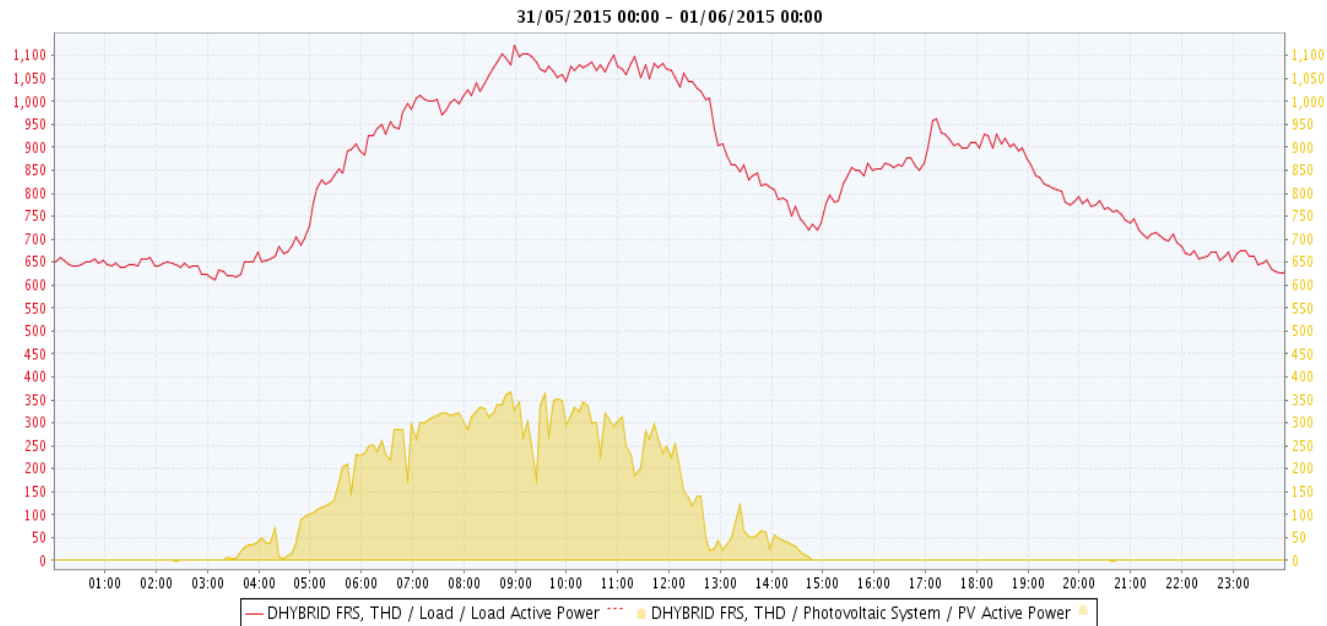
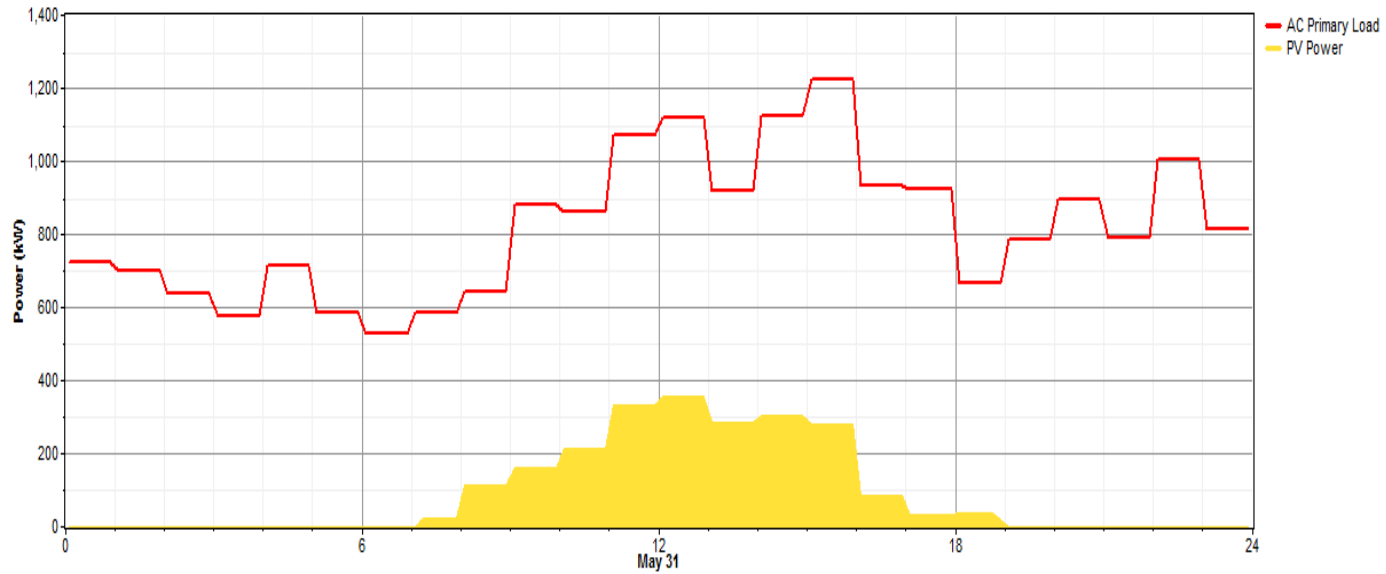
- 1. Loads** – Primary and Deferrable, Thermal Loads
- 2. Resources** – Solar, Wind, Hydro, Biomass, Fossil-fuel
- 3. Components/Technologies**
  - a. PV Array
  - b. Wind Turbine
  - c. Hydro Turbine
  - d. Generators
  - e. Battery Bank
  - f. Converter
  - g. Grid
  - h. Others
- 4. System Dispatch** – Operating Reserve, Dispatch Strategy, Renewable Share
- 5. Economic Modeling** – Net present cost and levelized cost of energy based on capital costs, operations and maintenance costs, fuel costs, salvage value at a given discount rate.



# HOMER – Hourly Simulation



# HOMER – Model versus Actual



# HOMER – Sensitivity Analysis

