Modeling using HOMER –
Part 2 (Making a new file from scratch)

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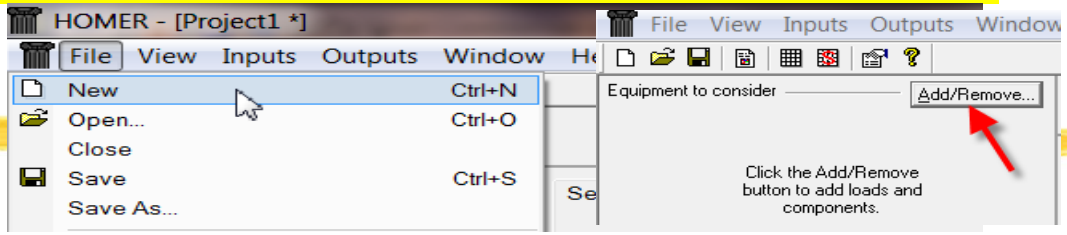
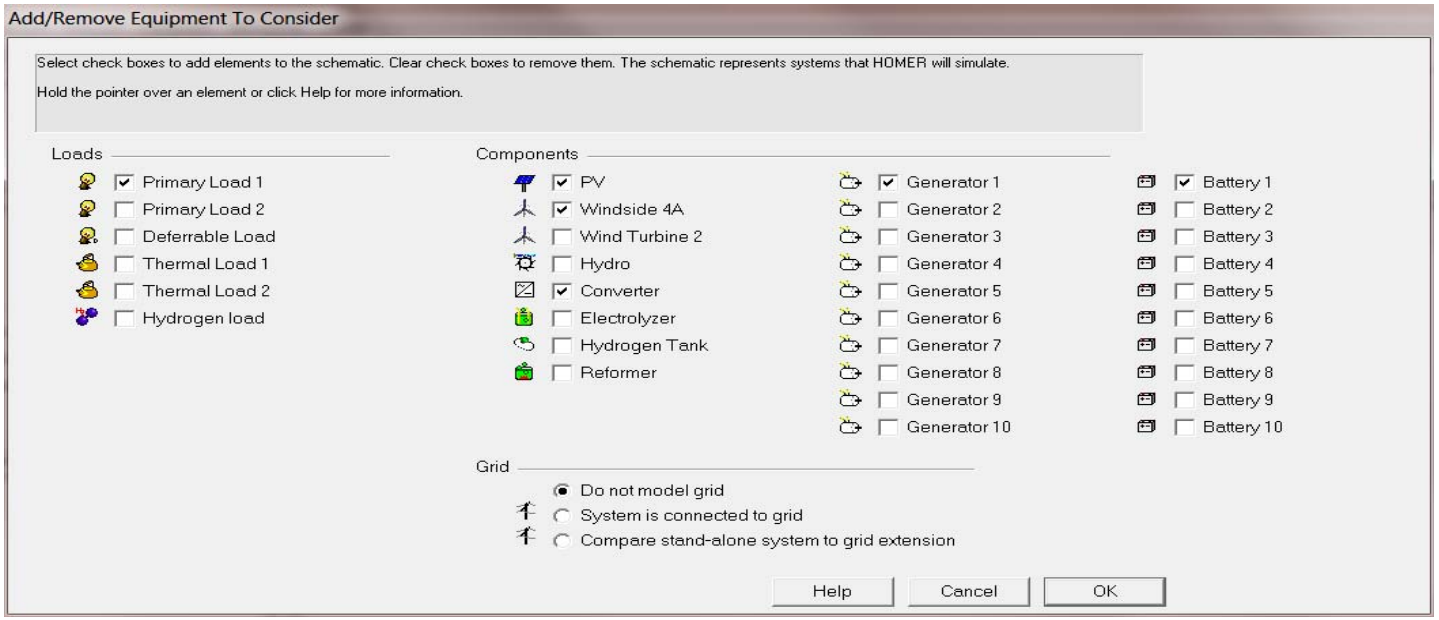
HOMER practice 2: Making a New file from scratch

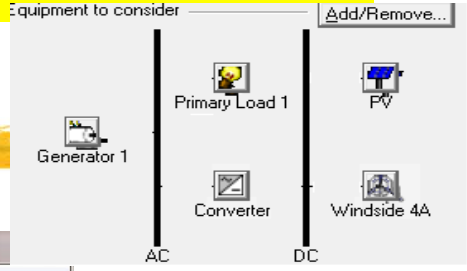
- HOMER
- File > New
- Click “Add/Remove”
- Select: Primary Load, PV, Wind Turbine 1, Converter, and Generator1
- Click “OK”

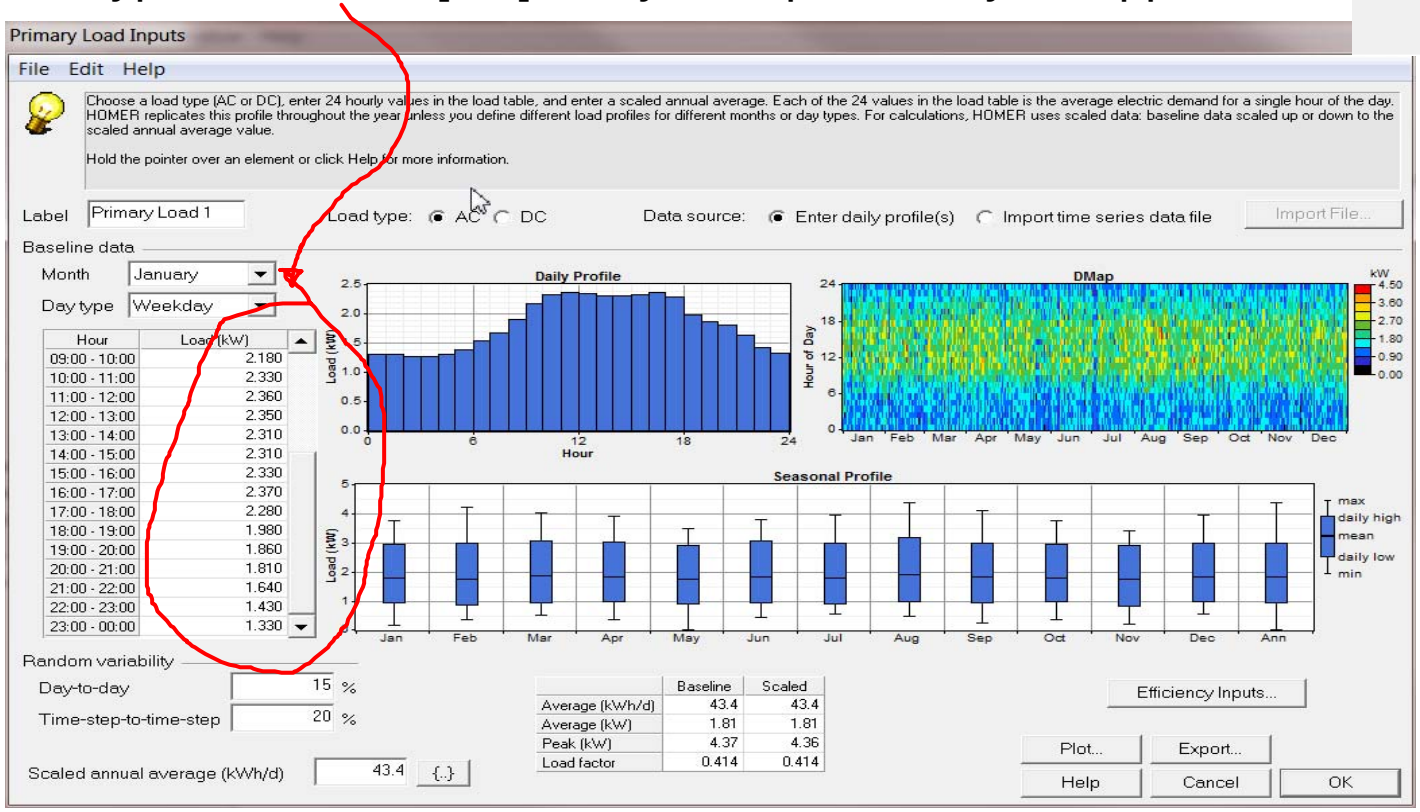




Load Data

- HOMER buttons appear
- NOW click the load button
- Type in the load [kW] every hour period of your application





Load Profile Example

- Load Data Example

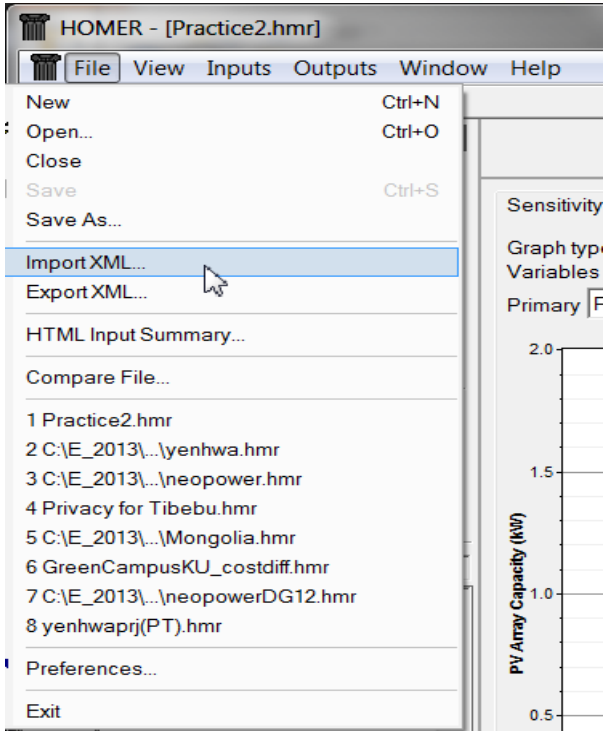
```
Small Commercial Load Profile [kW]
=====================================
 0000 0100 0200 0300 0400 0500 0600 0700 0800 0900 1000 1100
 1.31 1.30 1.27 1.27 1.30 1.39 1.54 1.67 1.90 2.18 2.33 2.36

 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300
 2.35 2.31 2.31 2.33 2.37 2.28 1.98 1.86 1.81 1.64 1.43 1.33

Daily Total [kW]44.60


Stret Light Load Profile [kW]
=====================================
 0000 0100 0200 0300 0400 0500 0600 0700 0800 0900 1000 1100
 3.24 3 24 3.24 3.24 3.24 2.62 1.40 0.18 1.90 0.00 0.00 0.00

 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300
 0.00 0.00 0.00 0.00 0.00 0.42 0.88 1.28 2.47 3.24 3.24 3.24
```

How about Load Profile for this Mobile Security on Demand?

- Mobile security: 2 PV, 4 cameras, Digital recording, battery charger circuits, battery status of charge monitoring and wireless alerting.

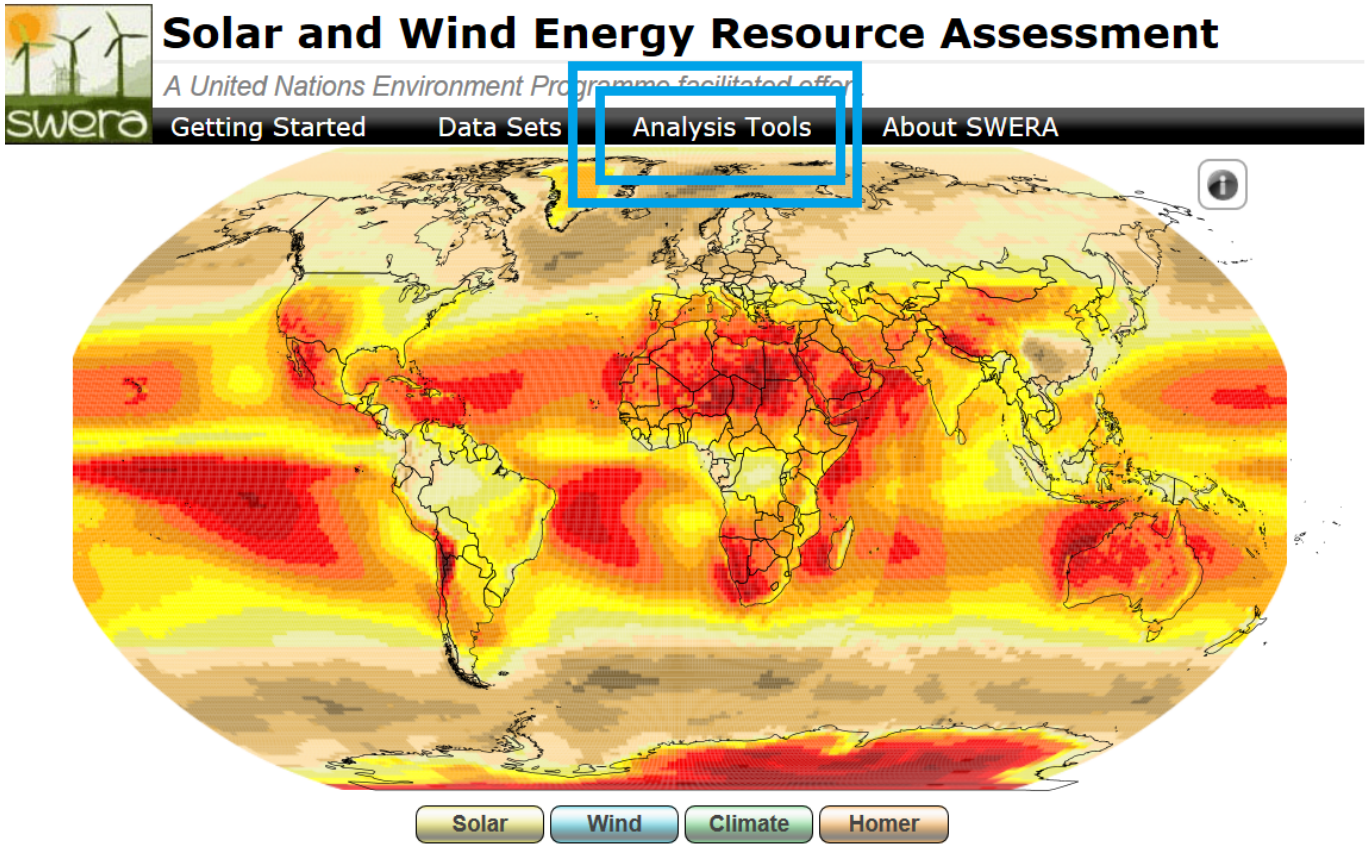
Solar and Wind Resources ---Import XLM File from SWERA

- 1. Find Lat & Lon of your location
- 2. On SWERA
  - Type in Lat & Long
  - Click “Get Homer”
  - From the XLM data screen
    - CTRL+S (save to an XLM file)
- 3. Now with HOMER
  - File>”Import XLM”
  - Wind Resources are automatically filled
  - Solar Resources are automatically filled
    - Lat N, Long E → marking error
    - But kWh/m2 is kept the same.



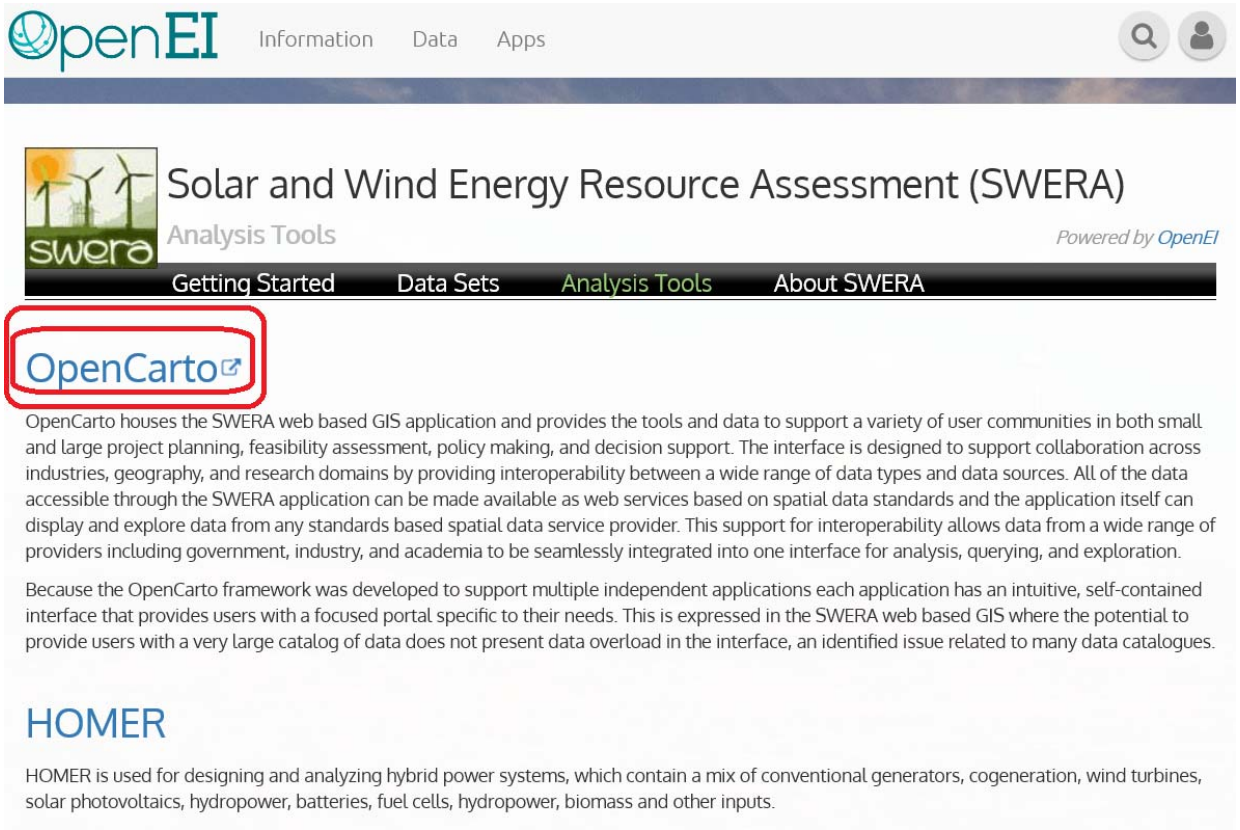
If SWERA Does **not** connect with Homer

- 1. From SWERA, click **Analysis Tools**



If SWERA Does not connect with Homer

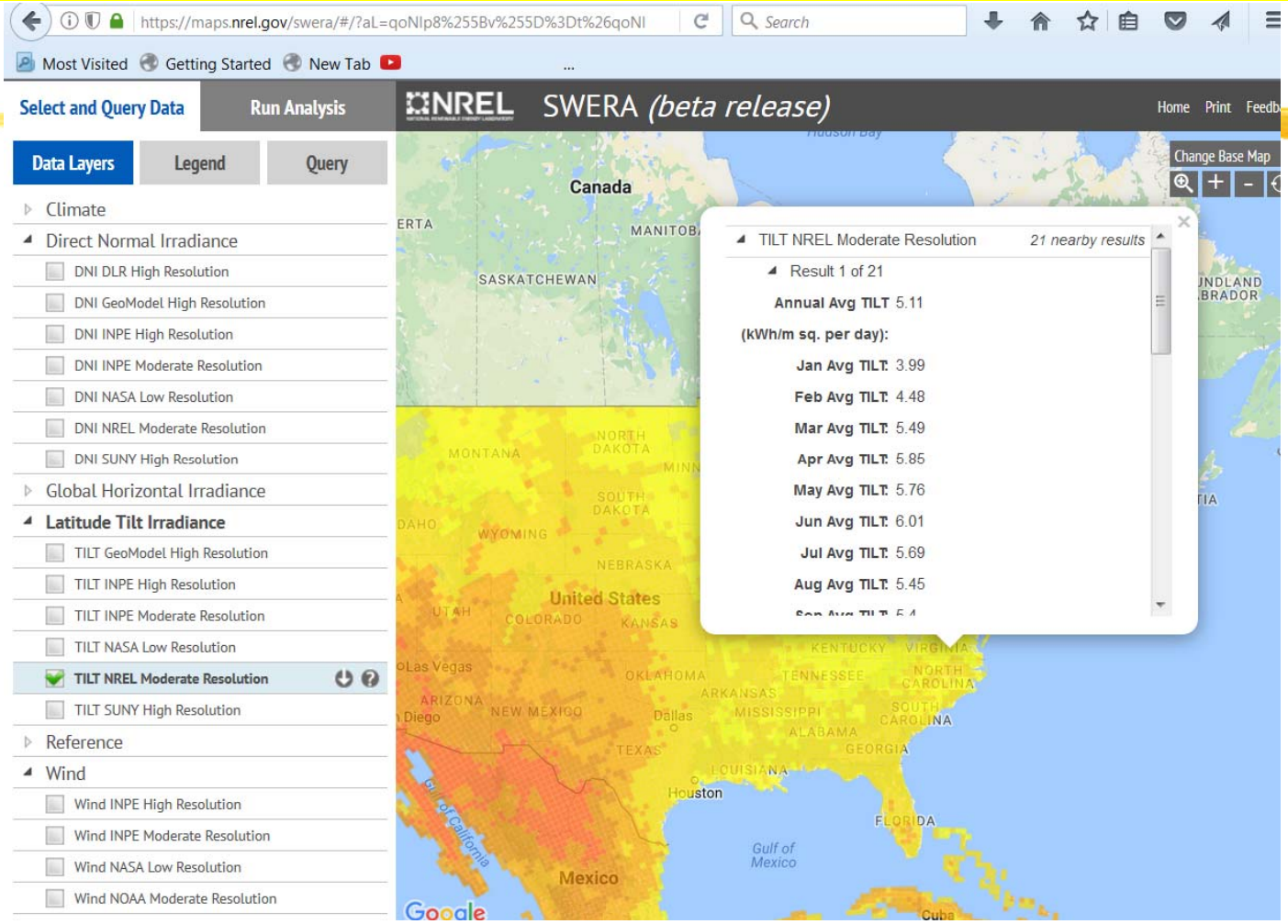
- 2. Then Click **OpenCarto.**



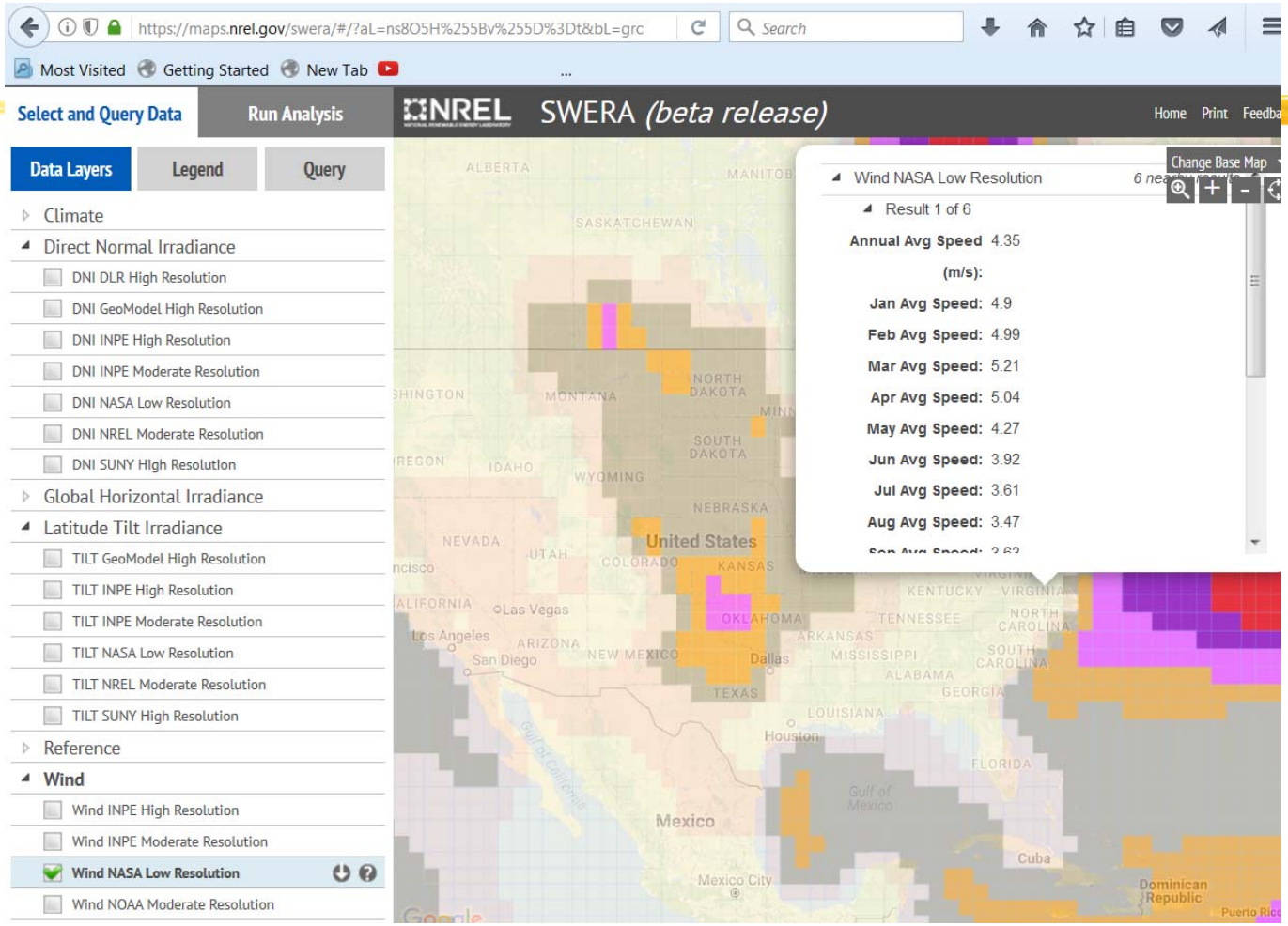
If SWERA Does not connect with Homer

- Select one of Irradiance dataset
- Move your cursor to the city (of your site)
- Then click it
- The data appears in a pop-up window
- Use the data for manually putting the solar/wind resource information
- See the next pages for Solar and Wind data

If SWERA Does not connect with Homer

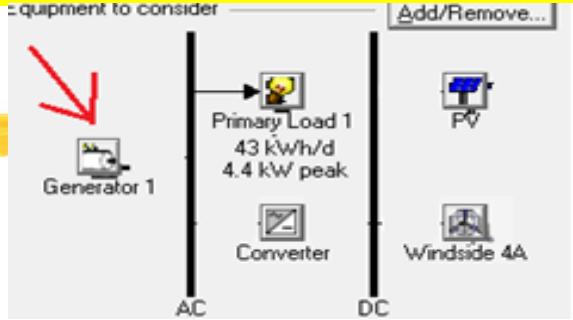


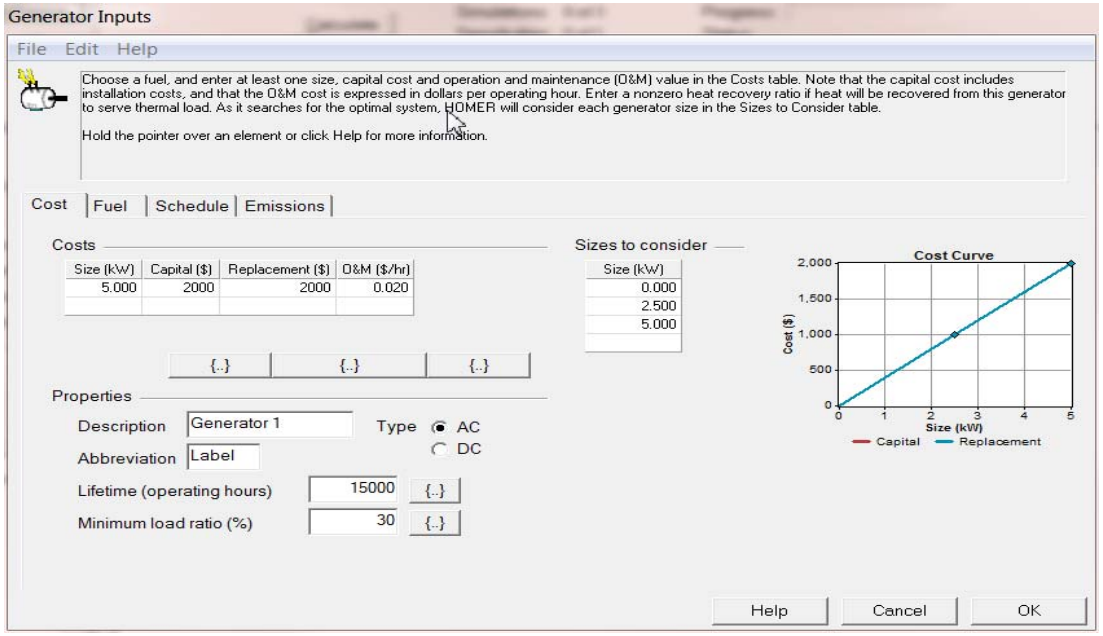
If SWERA Does not connect with Homer



Generator Information

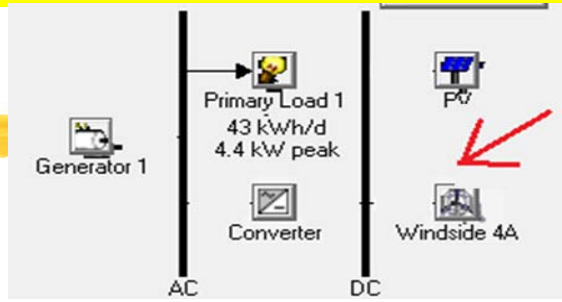
- Now arrow appears from AC bus to load
- Click “Generator”
- Size: 5.0 kW
- Capital: $2000
- Replacement: $2000
- O&M: $0.02/hr
- Sizes to consider: 0, 2.5kW, 5.0kW
- Minimum load capacity: 30%

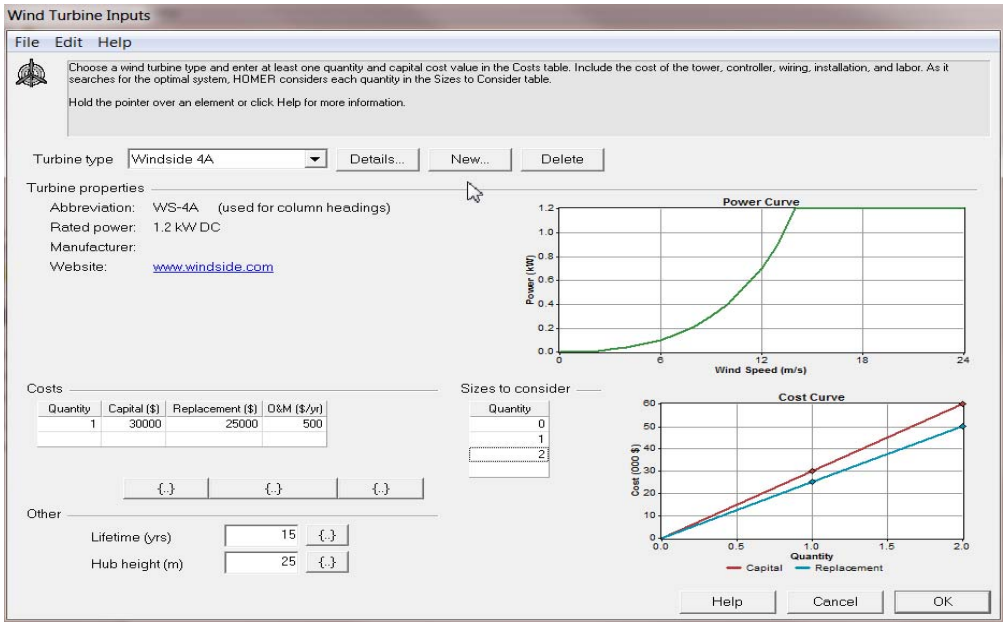




Wind Turbine Information

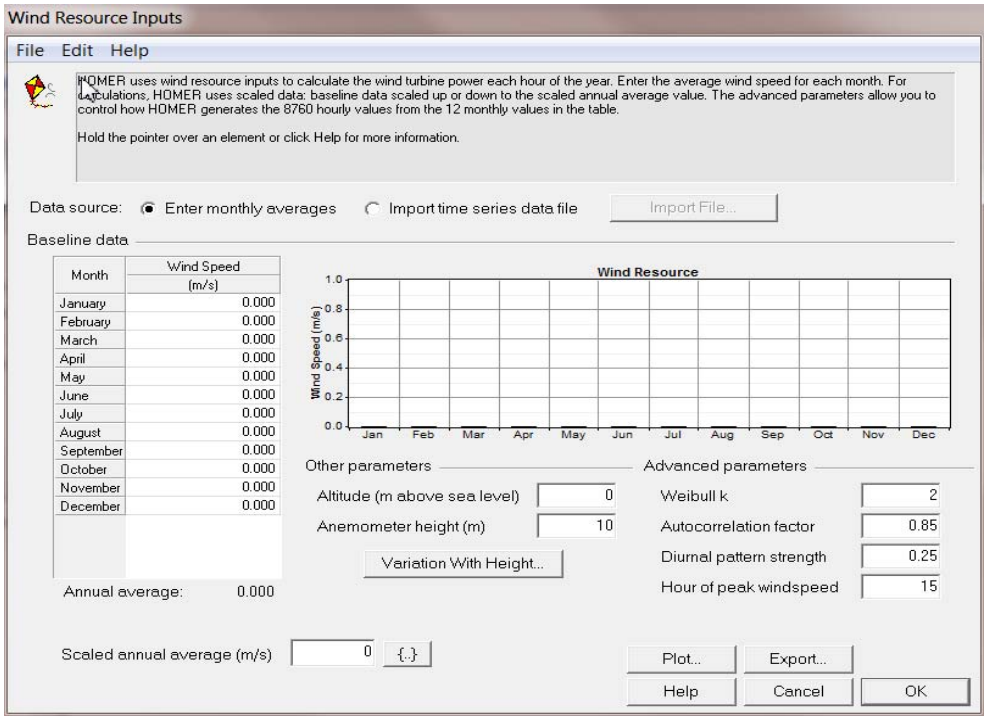
- Click Wind Turbine 1
- Quantitty:1
- Capital: $30000
- Replacement: $25000
- O&M: $500/yr
- Sizes to consider (Qty): 0, 1, 2, and 3





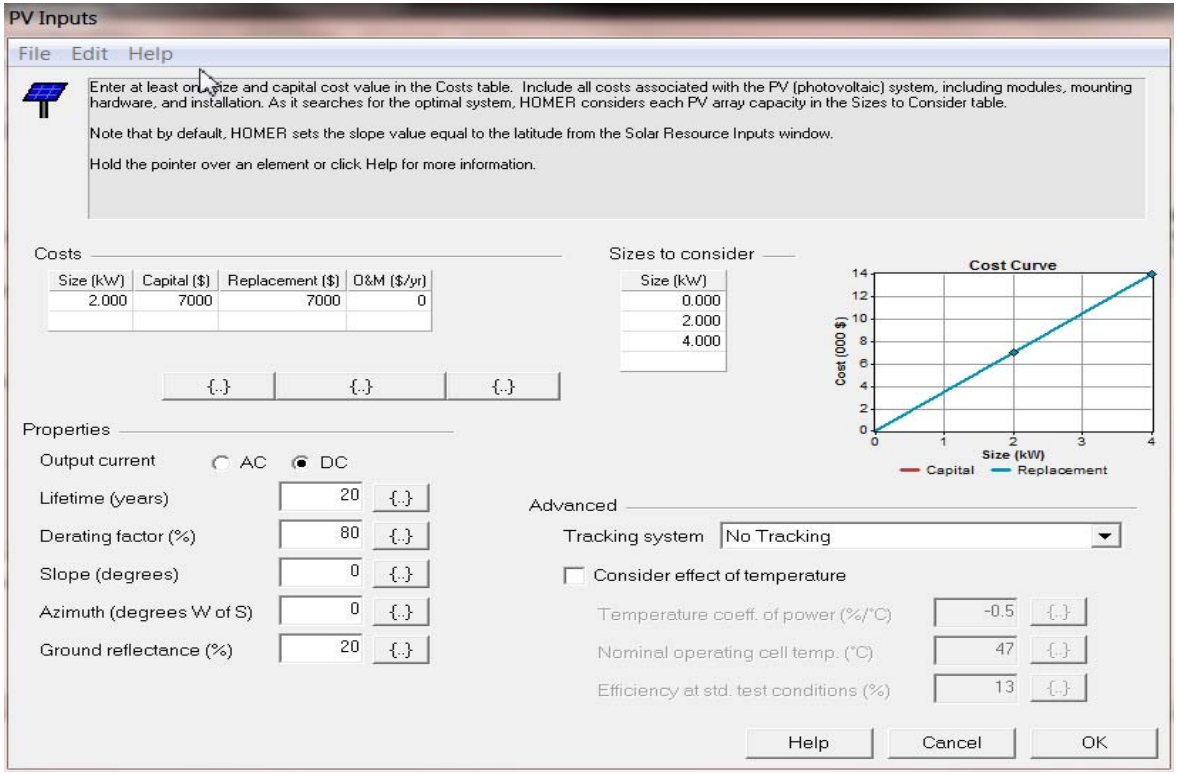
Wind Resources (Unless already done in slide #6)

- Click Wind Resources Button
- **Location of your choice**
  - Your small store
  - Your side of street lights
  - Your (future) vacation home
- Find **Latitude and Longitude**
- Find Wind Speed [m/s] using SWERA or WINDFINDER
- Type in the speed



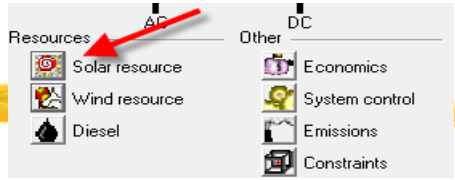
PV Information

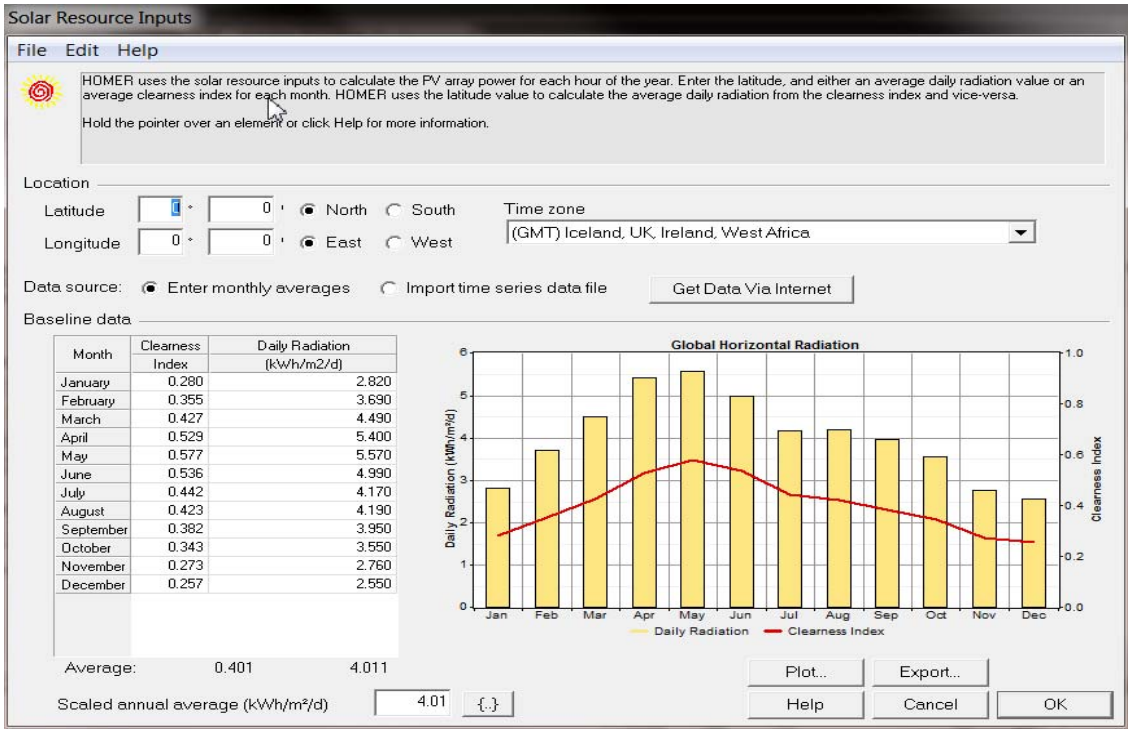
- Click “PV”
- Size: 2kW
- Capital: $7000
- Replacement: $7000
- O&M: $0/yr
- Sizes to consider: 0, 2kW, 4kW



Solar Resources Information (Unless already done in slide #6)

- Type in the solar radiation data obtained from SWERA

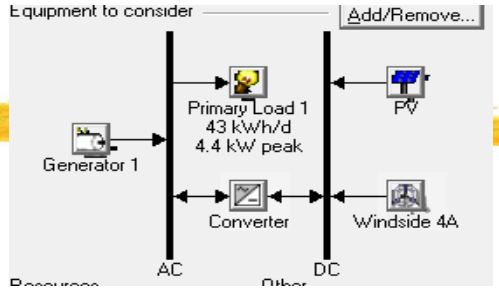


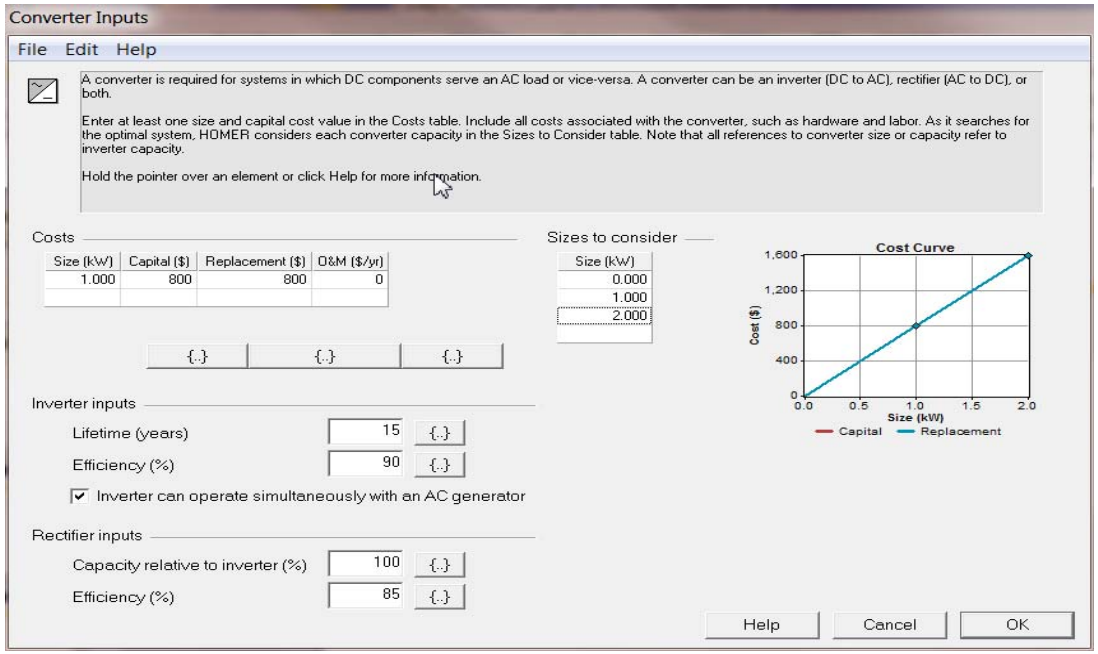


Month	Clearness Index	Daily Radiation (kWh/m2/d)
January	0.280	2.820
February	0.355	3.690
March	0.427	4.490
April	0.529	5.400
May	0.577	5.570
June	0.536	4.990
July	0.442	4.170
August	0.423	4.190
September	0.382	3.950
October	0.343	3.550
November	0.273	2.760
December	0.257	2.550

Converter Information

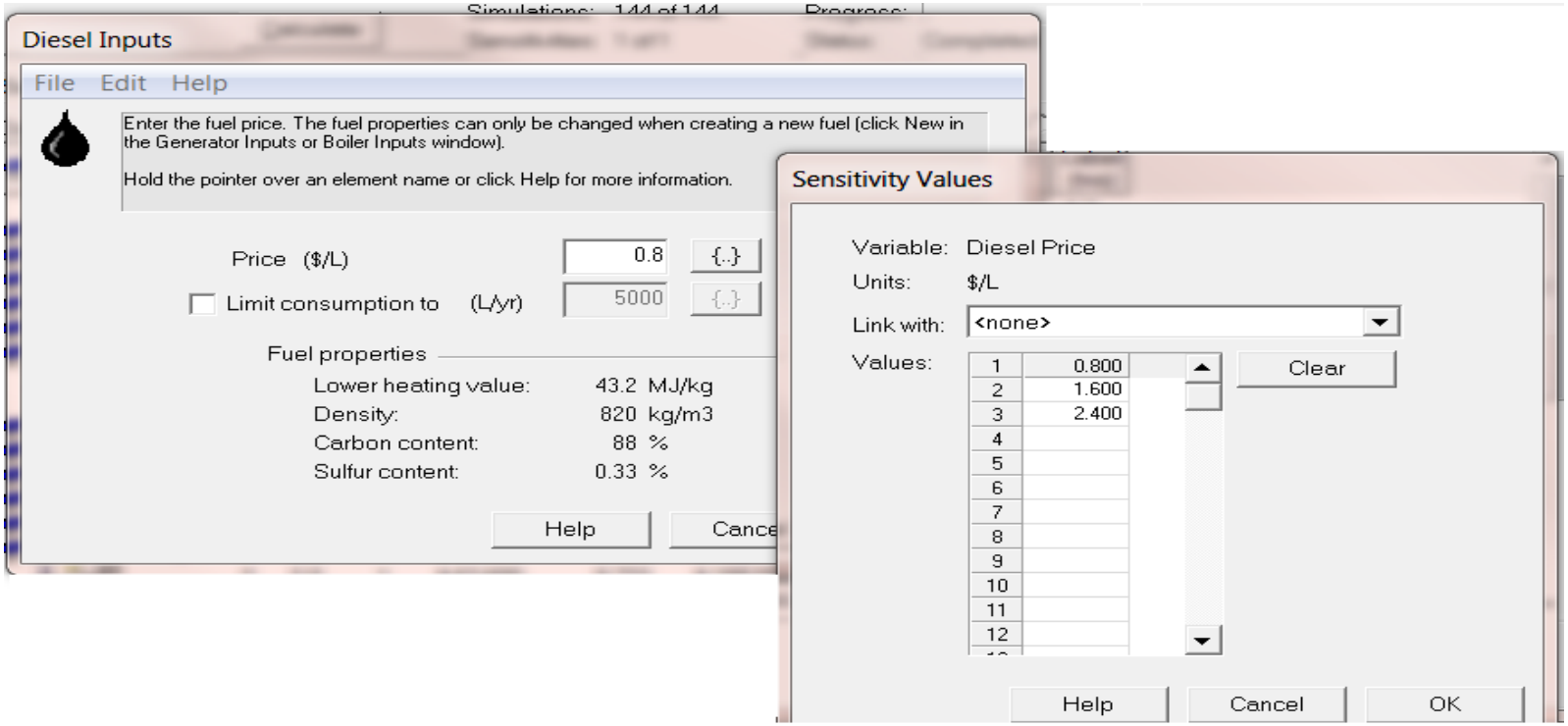
- Converter (DC→ AC)
- Size: 1kW
- Capital: $800
- O&M: $0
- Sizes to consider: 0, 1, 2 kW





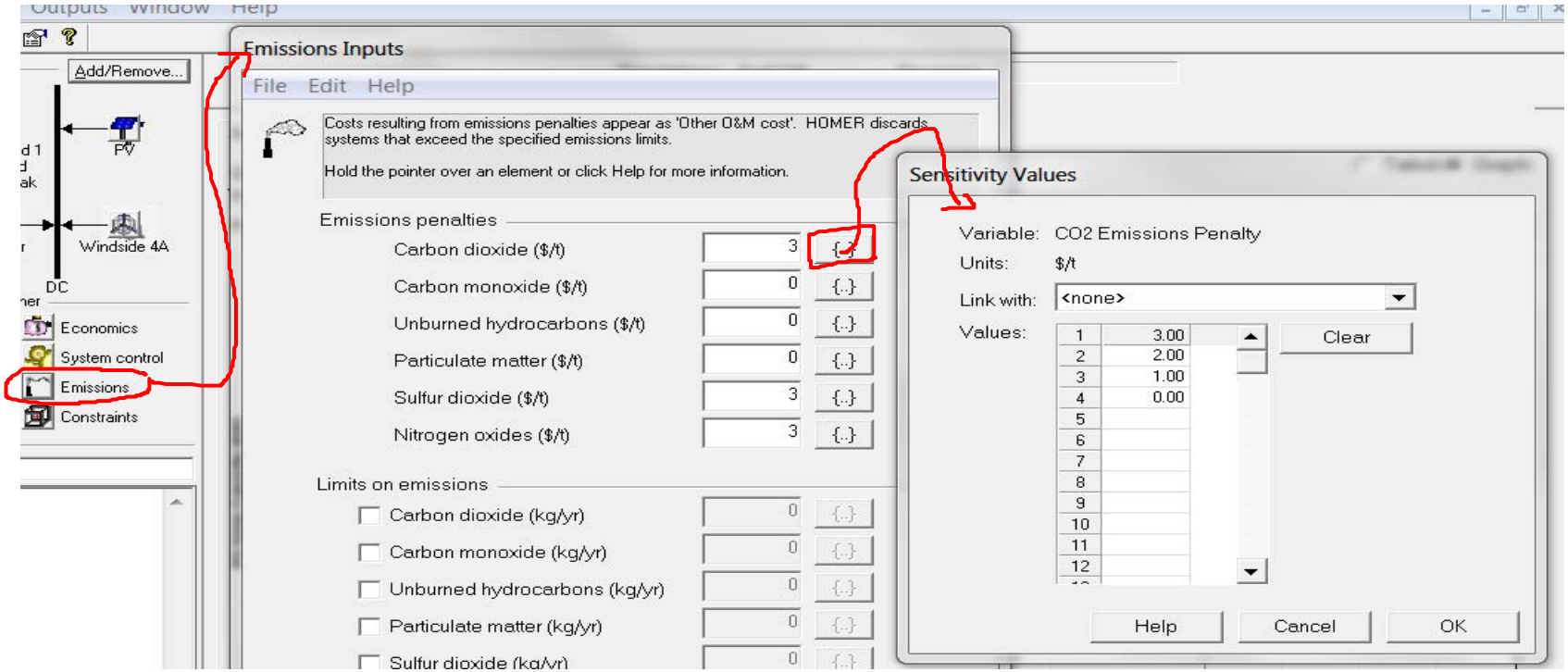
Diesel Resources Information

- Fuel Price: $0.8/L
- Sensitivity Price: $0.8, 1.6, 2.4/L



Emission Information

- CO2: $3/ton
- CO: $0
- C02: Sensitivity Data {0, 1, 2, 3}



Simulation

- Optimization Result

Sensitivity Results | Optimization Results

Sensitivity variables

Diesel Price ($/L) 2.4

Double click on a system below for simulation results.

Categori Ov

PV (kW)	WS-...	Label (kW)	Conv. (kW)	Initial Capital	Operating Cost ($/yr)	Total NPC	COE ($/kWh)	Ren. Frac.	Diesel (L)	Label (hrs)
2		5.0	1	$ 10,600	19,040	$ 253,996	1.254	0.13	7,350	8,754
		5.0		$ 2,000	19,788	$ 254,962	1.259	0.00	7,711	8,759
2		5.0	2	$ 12,200	19,056	$ 255,798	1.263	0.13	7,339	8,754
4		5.0	2	$ 19,200	18,596	$ 256,925	1.269	0.24	7,123	8,658
4		5.0	1	$ 17,600	18,836	$ 258,390	1.276	0.24	7,235	8,743
6		5.0	2	$ 26,200	18,239	$ 259,355	1.281	0.33	6,952	8,517
6		5.0	1	$ 24,600	18,781	$ 264,687	1.307	0.32	7,181	8,735
2	1	5.0	1	$ 40,600	20,107	$ 297,631	1.470	0.15	7,310	8,753
2	1	5.0	2	$ 42,200	20,116	$ 299,351	1.478	0.15	7,296	8,753
	1	5.0	1	$ 33,600	20,856	$ 300,205	1.482	0.02	7,653	8,759
4	1	5.0	2	$ 49,200	19,673	$ 300,683	1.485	0.26	7,086	8,652
4	1	5.0	1	$ 47,600	19,927	$ 302,339	1.493	0.25	7,204	8,742
	1	5.0	2	$ 35,200	20,898	$ 302,348	1.493	0.02	7,653	8,759
6	1	5.0	2	$ 56,200	19,333	$ 303,343	1.498	0.34	6,923	8,514
6	1	5.0	1	$ 54,600	19,885	$ 308,802	1.525	0.33	7,156	8,735

- Electrical

System Architecture: 2 kW PV, 5 kW Generator 1, 1 kW Inverter, 1 kW Rectifier

Total NPC: $ 253,996
Levelized COE: $ 1.254/kWh
Operating Cost: $ 19,040/yr

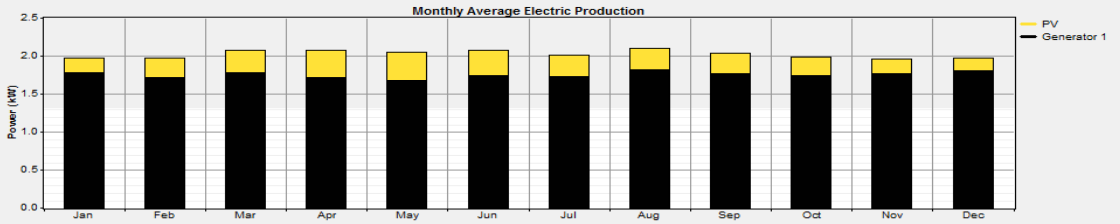
Cost Summary | Cash Flow | Electrical | PV | Label | Converter | Emissions | Hourly Data

Production	kWh/yr	%
PV array	2,341	13
Generator 1	15,396	87
Total	17,737	100

Consumption	kWh/yr	%
AC primary load	15,841	100
Total	15,841	100

Quantity	kWh/yr	%
Excess electricity	1,737	9.79
Unmet electric load	0.0000340	0.00
Capacity shortage	0.00	0.00

Quantity	Value
Renewable fraction	0.132



XML Report | HTML Report | Help | Close

Sensitivity Analysis

Tabula Graphi

Export... Details...

Double click on a system below for optimization results

Diesel ($/L)	PV (kW)	WS-...	Label (kW)	Conv. (kW)	Initial Capital	Operating Cost ($/yr)	Total NPC	COE ($/kW...	Ren. Frac.	Diesel (L)	Label (hrs)
0.800			5.0		$ 2,000	7,451	$ 97,252	0.480	0.00	7,711	8,7...
1.600			5.0		$ 2,000	13,620	$ 176,107	0.870	0.00	7,711	8,7...
2.400	2		5.0	1	$ 10,600	19,040	$ 253,996	1.254	0.13	7,350	8,7...

Graph type: Spider graph

Tabula Graphi

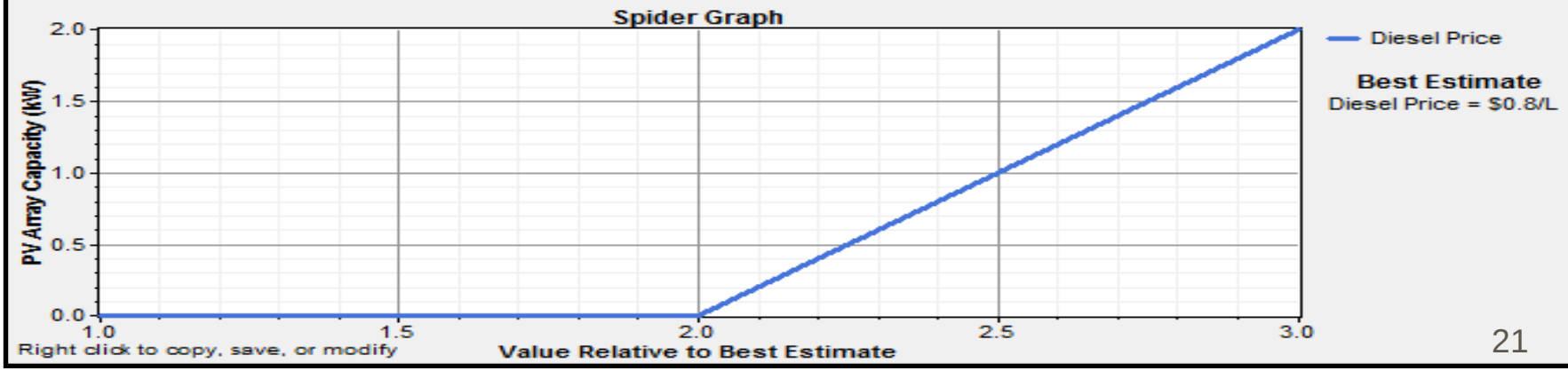
Sensitivity variables

Diesel Price ($/L): 0.8

Variables to plot

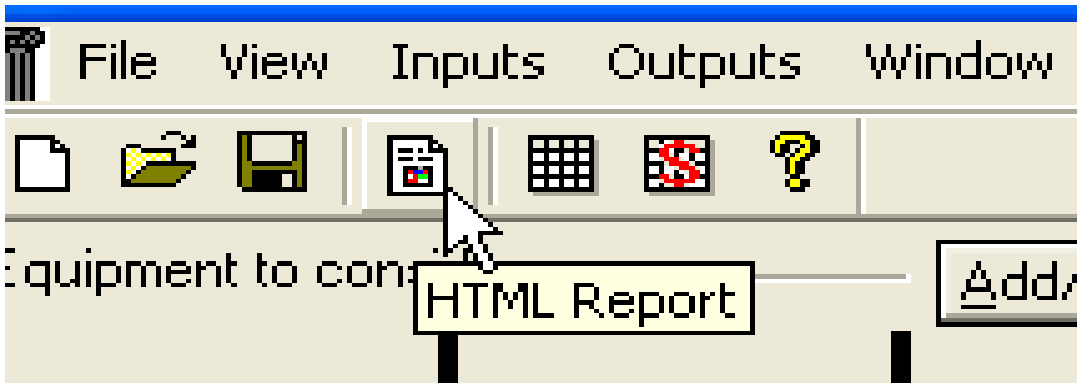
Primary: PV Array Capacity

New Window...



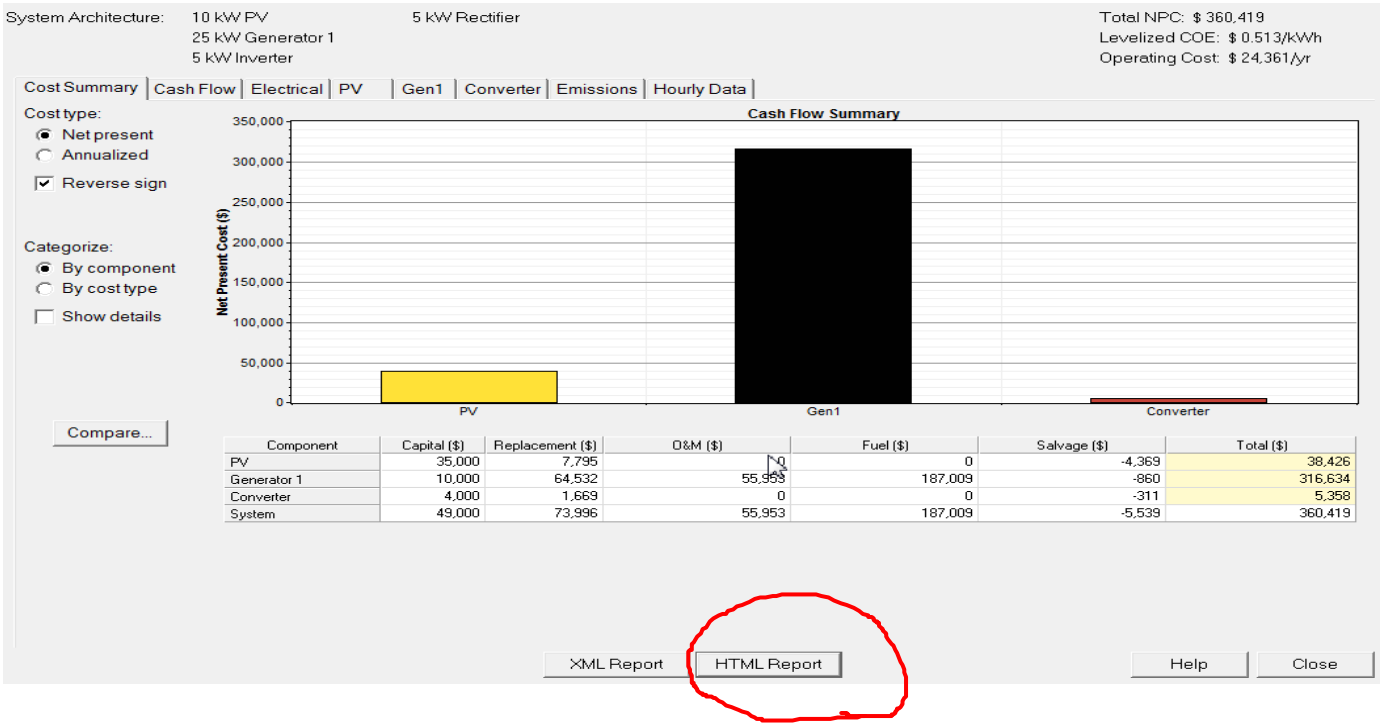
HOMER – Input Summary Report

- HOMER Produces An Input Summary Report:
  - Click HTML Input Summary from the File menu, or click the toolbar button:
  - HOMER will create an HTML-format report summarizing all the relevant inputs, and display it in a browser. From the browser, you can save or print the report, or copy it to the clipboard so that you can paste it into a word processor or spreadsheet program.

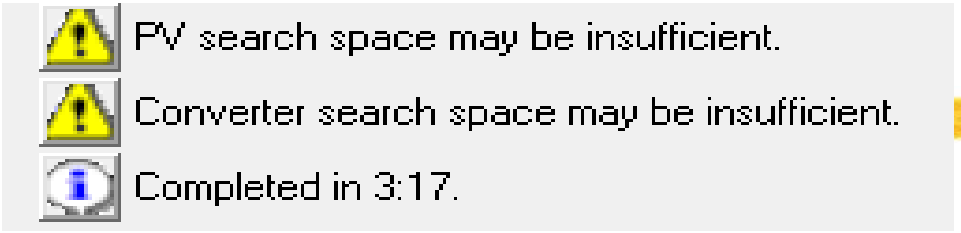


HOMER – Simulation Result Report

- HOMER Produces A Report Summarizing The Simulation Results
  - Just click the HTML Report button in the Simulation Results window:



What is this message for?



- Those messages mean that:
  - you need to expand your search space to be sure you have found the cheapest system configuration.
  - If the total net present cost varied with the PV size in this way, and you simulated 10, 20, 30, and 40 kW sizes, HOMER would notice that the optimal number of turbines is 40 kW, but since that was as far as you let it look, it would give you the "search space may be insufficient" warning because 50 kW may be better yet.
  - It doesn't know that until you let it try 50kW and 60kW.
  - If you expanded the search space, HOMER would no longer give you that warning, since the price started to go up so you have probably identified the true least-cost point.

Lab 10 -- Report

- Follow the steps for creating a new Homer file for your own load at your own location
- Submit your report:
  - Description of your load and your application and location
  - Homer reports (input, electrical, etc)
  - Conclusion