

# EECE 326 Fundamentals of Energy Systems Lab

## Lab 11. Renewable Energy Micro-Power System Design 2

using

HOMER Quickstart



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# Design for an Actual System

- Work on your own project (or one of the examples)
- Lab Objectives:
  - Site Identification → Mission or Goal
  - Load study → Should match with the site and the goal → Must be able to justify and realistic load
  - **Find the components/devices locally (or Amazon.com) available (Important)**
    - **Correct Size – Price is very important**
    - **Physical Size must be considered for the project site**
  - Check the simulation result

# Suggested Components

- Wind Turbine
- PV Module
- Converter
- Rechargeable Battery



## Example 1 – Green Campus

- Green Campus Feasibility Study for Howard University
- Entire Campus or a building (Engineering bldg. or Medical Library, etc) or an area (such as Quadrangle's lighting)



- Load Study: hourly demand [kW]

## Example 2 - Solar/Wind Pump

### □ Site Information

- Location : Bayannuur, Bulgan, Mongolia (Lat : 47.83. Long : 104.44)
- Population: 1000
- Elevation : 850[m]
- Wind Speed : 10~12[m/s]
- Temperature : -42~30[°C]

### □ Approach

- Supplying power to a pump from Solar and Wind energy sources and providing drinking water to the village folks.

### □ Load Study

- Pump load study – Water Flow need investigation
- 24/7 operation or operation when electric energy is available





## Example 3 – Lighting 14<sup>th</sup> Bridge by Renewable Energy

- 100% Renewable Night Flood Lighting System for the 14<sup>th</sup> Street Bridge

### □ Load Study

- Number of street lights
- kW of each light
- Hours of lighting



# Lab 11 Report Submission

- 0. Everyone should have one's own application
- 1. Lab 11 Report
  - Mission/Purpose, System Site, Location,
  - Solar/Wind resources in the site (by Web resources: NASA, Windfinder, etc)
    - Write justification of using (or not using) PV or Wind Turbine in your project
  - Load study result: daily load, max hourly load, etc.
  - Optimum configuration for the lowest COE: number/size of each component (Ex. 200KW PV, 150 KW converter, etc) and the Lowest COE.
  - MS Word format
  - File name: Lab11\_YourLastName.docx
- 2. Homer Quickstart Detailed Report
  - Pdf format
  - File name: Lab11\_Quickstart\_YourLastName.pdf
- 3. Submission: Electronic submission via email
  - Lab 11 Report
  - Lab 11 Homer Quickstart detailed Report Output
  - **due: Check Class Web page**
- **4. Lab 11 counts double the weights of Lab report**