

6. Modeling using HOMER: Team Project and Summary

TVET Program

Charles Kim, Ph.D.

Howard University, Washington, DC USA

January 21-25, 2012



KOREA UNIVERSITY OF TECHNOLOGY AND EDUCATION
Human Resource Development Institute

Course Contents and Schedule

⌘ Day 5: January 25, 2013

☒ Team Project

- Hybrid Renewable System Design

☒ Team Presentation

☒ Summary and Conclusions



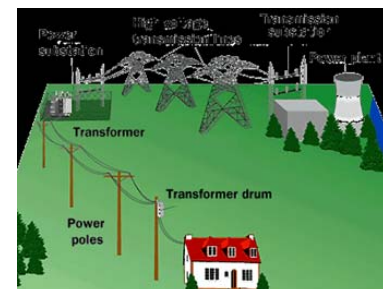
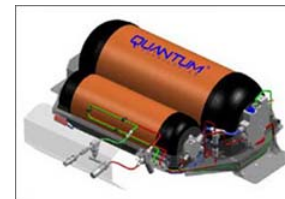
Team Project - Brief

- ⌘ Analysis of a Hybrid Energy System (Grid may be connected)
- ⌘ Site: **Your (School or Company or resort or ...)**
- ⌘ Objective: Find the optimum system with sensitivity analysis
- ⌘ Components Considered: Grid, Converter, Wind Turbine, PV panel, Fuel Cells, Electrolyzer, and Hydrogen Tank
- ⌘ Project Lifetime: 20 years
- ⌘ Fixed Cost: \$10,000
- ⌘ Load Profile
- ⌘ Resource data on your work location
 - ⌘ Solar Radiation {provide also sensitivity}
 - ⌘ Wind Speed {sensitivity}



Suggested Component Data – Wind and PV

- ⌘ Wind Turbine
 - ⊞ Size: 30 kW
 - ⊞ Quantity: 10: [0, 5, 10]
- ⌘ PV Module
 - ⊞ Size: 200kW: [0,100,200,300] kW
 - ⊞ Derating Factor: 90%
- ⌘ Electrolyzer
 - ⊞ Size: 100kW: [0, 50, 100] kW
 - ⊞ Lifetime: 20 years
- ⌘ Fuel Cell
 - ⊞ Size: 200kW: [0, 100, 200, 300] kW
- ⌘ Hydrogen Tank
 - ⊞ Size: 2000 kg: [0, 1000, 2000, 3000]kg
- ⌘ Converter
 - ⊞ Size: 200kW: [0, 100, 200, 300]kW
- ⌘ Grid (Optional)
 - ⊞ Single rate
 - ⊞ Price (\$/kWh): \$0.15 :
 - ⊞ Sellback (\$/kWh): \$0.15
 - ⊞ Demand: \$0
 - ⊞ **Purchase Capacity: 300kW**
 - ⊞ Sellback Capacity: 200kW



Analysis Points and Team Presentation

⌘ Analysis Points:

- ⊞ Site Identification → Mission or Goal
- ⊞ Load study → Should match with the site and the goal
- ⊞ Find the Solar Radiation, and give Sensitivity values
- ⊞ Find the Wind Speed, and give sensitivity values
- ⊞ Calculate and Check the Optimization results
- ⊞ Check the Sensitivity Results
- ⊞ Find the optimum results
- ⊞ Find the components/devices locally available (Important)
- ⊞ Prepare Slides for team presentation (Tomorrow morning)
 - ⊞ System Site, Location, etc (+ Real components and vendor info)
- ⊞ Also run the HOMER in the presentation

Teams and Goals

⌘ Neo-Power (2)

- ☑ Kwang Hyun Ahn
- ☑ Hyun Jun Lee
- ☑ Island
- ☑ Zero-Energy



⌘ Green Campus (2)

- ☑ Hyun Wook Kim
- ☑ Yong Taek Oh
- ☑ Energy cost impact to the renewable source penetration to university campuses
- ☑ Cost of Energy



Teams and Goals

⌘ Renewable sourced pump system (2)

- ☑ Jae Bum Park
- ☑ Jung Woon Ahn
- ☑ Supply drinking water to a Mongol village



⌘ Yonhwa Island (3)

- ☑ Su Hyun Lee
- ☑ Suk Muk Hong
- ☑ Il Dong Kim
- ☑ Zero-energy energy self-sustainability (Energy Independence)



Team Presentation

- ⌘ 1 Neo-Power (Kwang Hyun Ahn and **Hyun Jun Lee**)
- ⌘ 2 Green Campus (**Hyun Wook Kim** and Yong Taek Oh)
- ⌘ 3 Renewable Pump System (Jae Bum Park and **Jung Woon Ahn**)
- ⌘ 4 Yonhwa Island (Su Hyun Lee, **Suk Muk Hong**, and Il Dong Kim)



Group Photo



www.mwftr.com/kt2013.html