

Role of Hydrogen for Cameroon

Third world countries do not have well-established technical infrastructure, hence the success of technologies like cell phones. Energy utilization might develop without a well-defined electrical grid. Local energy generation like solar energy coupled with hydrogen fuel cells is one possibility. What role might hydrogen play in an off-grid system? More specifically, could an off-grid system including hydrogen support a water pumping system? If not now, what is necessary?

Uses? Local?

Where would the hydrogen come from? Native sources, local generation, import

Transport? Under these scenarios it might be important to transport hydrogen—which scenarios, and how?

Storage? What storage options of hydrogen are necessary?

Policy? What policy issues are there—safety, incentives, maintenance, reliability, assistance from first world, ...

Cost Issues? For each of these scenarios what are the price benchmarks (installation, maintenance, \$\$/km, \$\$/watt)

Q: Which scenarios make sense?

Feb 2

10:00 – 11:00 Problem presentation

11:00 – 12:00 Costing discussion (Alex Waegel)

12:00 – 1:00 problem assignment within group

Feb 4

9:00 – 10:00 Preliminary presentation preparation

10:00 – 11:00 Preliminary presentation (*Which scenarios make sense?*)

11:00 – 12:00 Scale-up problem

12:00 – 1:00 9:00 – 10:00 Use Whiteside's spaghetti diagram to Estimate Reasonable Sources of Energy in 2015? What fraction hydrogen and which scenarios? Prepare energy spread sheet showing sources, uses, and wasted energy. One page for final report (due next class).

Statement of scale-up problem: How would sensible hydrogen scenarios be integrated into full system (PV, fossil, nuclear, geothermal,) in Cameroon in the year 2020? Here the full system would need to consider grid vs. off grid.

Feb 5

12:30 – 1:15 Describe technical advances necessary for hydrogen incorporation. Prepare description of advances, where are we now, what do we need to attain. One page for final report

1:15 – 2:00 Describe policy advances necessary for hydrogen incorporation. Prepare description of government policies that would make technical solutions possible. One page for final report

2:00 – 3:00 Jigsaw Uses, Sources, Transport, Storage, Policy and Cost

3:00 – 4:00 Revisit technical and policy advances necessary for advancement. Finish up report and turn in.

4:00 – 4:30 Make assignments for presentation on 9 Feb.

Feb 9

9:00 – 10:00 Presentations *Roadmap for Incorporation of Hydrogen Energy Technology into Cameroon in 2020.*

10:00 – 11:00 Revisit problem #1—what would your group change

11:00 – 12:00 evaluation of group, course

12:00 lunch

Preliminary reading—G. M. Whitesides and G. W. Crabtree, “Don’t Forget Long-Term Fundamental Research in Energy,” *Science*, **315**, 796 – 798 (2007).

Most recent DOE spaghetti diagram: http://www.eia.doe.gov/aer/pdf/pages/sec1_3.pdf

Engineers without Borders: <http://www.udel.edu/PR/UDaily/2008/nov/cameroon110807.html>

Energy in Chad and Cameroon:

<http://www.udel.edu/PR/UDaily/2008/nov/cameroon110807.html>

background on Cameroon: <http://en.wikipedia.org/wiki/Cameroon>