Clean Energy Research Center Project Info

Jim Leidel
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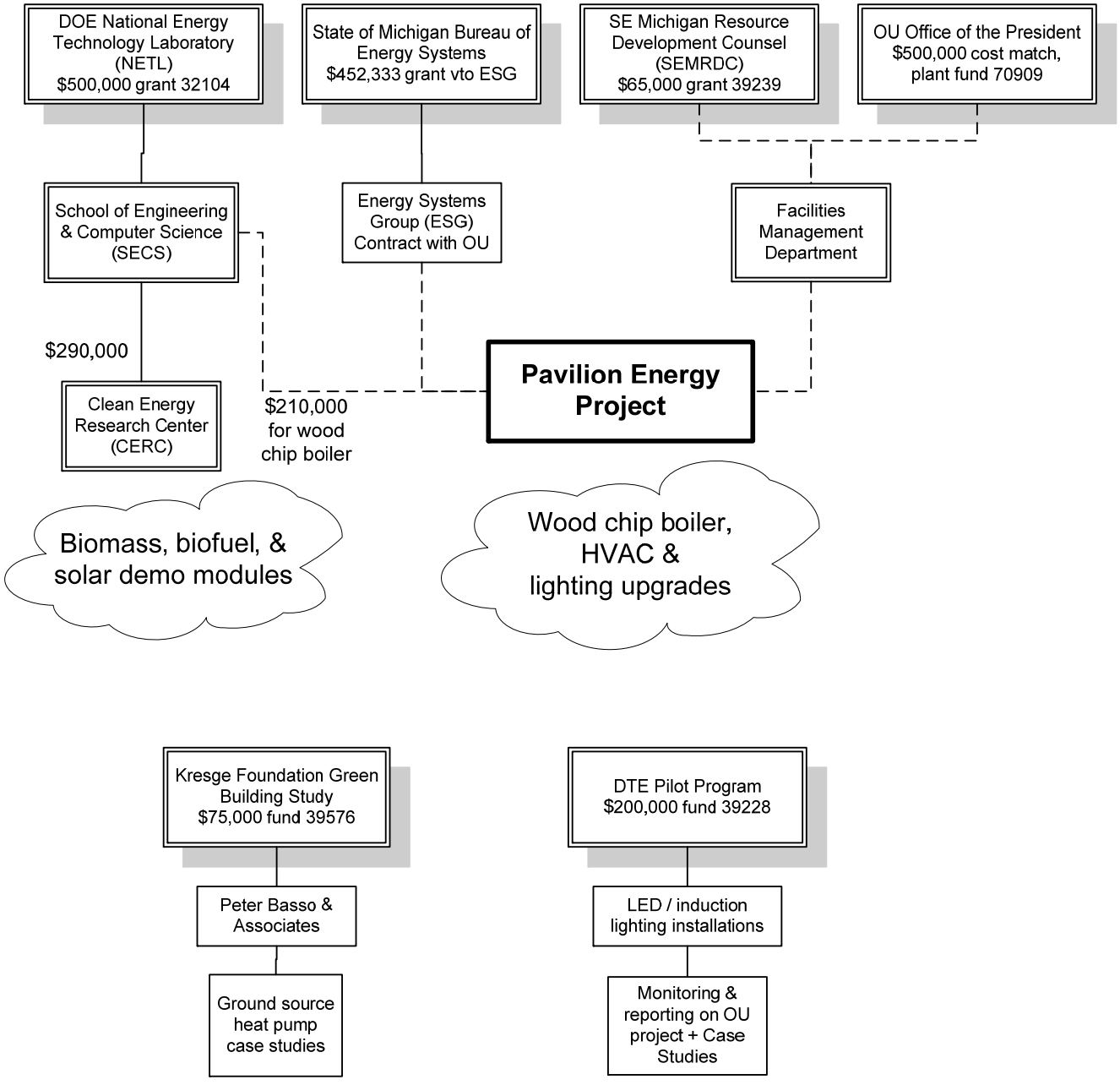

Oakland University Alternative Energy Education, DE-EE0003277
STATEMENT OF PROJECT OBJECTIVES - SUMMARY

TASK 1.0 University Course Development

- Subtask 1.1 ME 510: Introduction To Energy Management (4 credits)
- Subtask 1.2 ME 511: Energy Management (4 credits)
- Subtask 1.3 ME 512: Energy Management Project (4 credits)

TASK 2.0 Pre-College Student (and Community) Outreach

TASK 3.0 Clean Energy Educational System Integration

- Subtask 3.1 Biomass Boiler and CHP Installation
  - Subtask 3.1.1 Small Biomass Steam Boiler / Steam Engine Unit
  - Subtask 3.1.2 5 kW Biodiesel Fueled Micro CHP Unit
- Subtask 3.2 Multi-Feedstock Biomass Densification
  - Subtask 3.2.1 Procure a pellet mill system & wood chipper/shredder
  - Subtask 3.2.2 Procure feedstocks for testing
  - Subtask 3.2.3 Produce both blended and homogeneous
  - Subtask 3.2.4 Perform lab testing of pellets
  - Subtask 3.2.5 Perform field combustion testing
- Subtask 3.3 Liquid Biofuel Production
  - Subtask 3.3.1 Ethanol Production
  - Subtask 3.2.2 Biodiesel Production
- Subtask 3.4 Ignition and Combustion of Biomass

CERC Task and Project Info

Subtasks 1.1, 1,2, and 1.3 course creation
Substitute ME 454 & Energy Management Certificate Program

TASK 2.0 Pre-College Student (and Community) Outreach
DAPCEP activities

BioEnergy Demonstration Modules (all tasks in 3.0)

- General Tasks
    - Finalize west area floor plan
    - Need furniture & partitions for 2-3 computer / desk workstations
    - Safety and fire protection issues
    - Chemical and feedstock storage and logistics
    - Gather and post MSDS sheets
    - Training manuals will be needed for each module
    - Operations procedure and manuals will be needed for each module
    - Develop educational materials for each system for future use
    - Sign off by Cora Hansen and Dominic
    - Fire protection review by Bob Tyrell

OU Inc / Shotwell Pavilion Facility Upgrades

- Wood boiler system (part of subtask 3.1) and steam to HW conversion
- Building HVAC controls upgrade
- Office area lighting upgrade
- Pavilion lighting upgrade
- This facilities upgrade project is on schedule for completion in 1st quarter 2012

Pellet furnaces & boiler (Subtask 3.1)

- All equipment will be on site at the end of Nov 2011.
- Pellet burning systems include:
    - The main building hot water 1,000,000 BTU/hr wood boiler
    - A 500,000 BTU/hr hot air pellet furnace for the pavilion
    - A 65,000 BTU/hr hot air pellet furnace for testing (residential sized system)

Small Biomass Steam Boiler / Steam Engine Unit (Subtask 3.1.1)

- This unit will be donated by Saginaw Valley State University, Chris Schilling with the support of the Michigan Corn Growers Association

5 kW Biodiesel Fueled Micro CHP Unit (Subtask 3.1.2)

- Major parts have been donated by Jim Leidel but final fabrication will not be done.
- Funds for this task have been allocated to a solar PV powered golf cart and a hydrogen fuel cell hybrid golf cart.

Biomass pelletization system (Subtask 3.2.1)

- Unit is on site. Buskirk Engineering supplied pellet manufacturing system on a skid.
- Coordinate with Kyle Eggerstedt (ME masters student of Xia Wang)
- Need to provide 480VAC power. Planning to feed via overhead busbar to be installed in by end of 2011. Temporary power feed was used for an initial commissioning & training session in Oct 2011.
- Diesel powered Morbark wood chipper was purchased and is on site
- Need layout and procedures for the whole process
    - Need feedstock and final product storage and logistics

Procure feedstocks for testing (Subtask 3.2.2)

- Jim Leidel's personal feedstocks have been donated and are all on site
    - 1 ton switchgrass from Ernst Conservation Seed in Pennsylvania
    - ½ ton bale of Miscantus grass from University of Illinois
    - Self harvested corn stover
    - Self harvested soybean stover
    - Self gathered oak and maple leaves
    - OU wood chips
    - Wood shop cedar shavings from Kyle Eggerstedt

Produce both blended and homogeneous bio-pellets, lab testing, and combustion testing (Subtask 3.2.3, Subtask 3.2.4, Subtask 3.2.5, and Subtask 3.4)

- Work has been started by Kyle Eggerstedt, but will continue into first quarter of 2012.

Ethanol processor (Subtask 3.3.1)

- Need to fabricate/purchase base (done & on site, Oct 2011)
- Finalize design – Jim Leidel & Ed Granchi
- Purchase remaining components
    - Need fermentation tank
- Pipe and fabricate
- Need layout and procedures for the whole process
- Need to design a de-watering method to produce anhydrous ethanol to make E85 or test directly

Biodiesel processor (Subtask 3.2.2)

- Finish cataloging parts from Tim Travis at Goldner Walsh Nursery
- Agree on pricing and pay Tim Travis
- One more load will be delivered
- Put the word out for volunteer assistants & student help
    - Ed Granchi (fellow biodieseler) selected as project manager. Will retain Ed as a subcontractor or equipment supplier
- Need to fabricate/purchase base & containment (done and on site, Oct 2011)
- Finalize design – Ed Granchi
- Pipe and fabricate – Ed Granchi
- Need layout and procedures for methanol, glycerin and waste oil storage.

- Need to come up with a waste oil procurement and transportation plan. A policy of the type of oil that can be donated to the project and logistics to receive it needs to be developed. Only certain types of oil with low free fatty acid contents can be accepted.

<u>Wood gasification system (if funds permit & not part of the base scope of work)</u>

- Purchase pre-made 10kW skid package
- Need layout and procedures for the whole process

Other possible biodiesel related – add on projects:

1. Methanol recovery system
2. Wastewater filtration and purification system
3. Glycerine usage study: blend into biomass pellets, direct combustion, soap making, distillation and purification for sale
4. update www.biodieselmichigan.com website
5. update the "Michigan Biofuel Production Cooperative Development Plan"
    a. see www.biodieselmichigan.com
6. policy, logistics, planning and a brochure on waste oil collections.
    a. What types of oil, how and who will transport, logistics, storage, purification, and some guidance documents such as a brochure.

Other clean energy projects (with available funding):

1. Commercial geothermal case studies
2. LED outdoor lighting project: monitoring and verification

Contact List

Jim Leidel, Project Manager
248-765-2027 cell
leidel@oakland.edu

Ed Granchi, Biodiesel Project Manager
248-765-7995
jeepman84@hotmail.com

Chris Kobus, Professor of Mechanical Engineering
248-701-9895 cell
cjkobus@oakland.edu

Shamon Murdock
Grant Officer
248-370-2557
smurdock@oakland.edu

Bob Tyrell, Fire & Smoke Systems Coordinator
248-370-4198
rtyrell@oakland.edu

Cora Hanson, Environmental Health and Life Safety Manager
248-370-4427
chanson@oakland.edu

Domenico Luongo, Laboratory Compliance Manager
248-370-4314
luongo@oakland.edu