

Project #	Project Name	Project Track	Project Family
P16487	Biochar Heat Recovery System	Mechanical Engineering, Sustainability	Kon-Tiki Biochar Kiln
Start Term	Team Guide	Project Sponsor	Doc. Revision
Fall 2015	Sarah Brownell	Kathleen Draper Ithaka Institute	1

Purpose: The purpose of this meeting is to communicate project design and proof-of-concept.

Topics to be reviewed

- Engineering Requirements
- Risk Assessment
- Prototyping
- Bill of Materials
- Build/Test Plans
- Engineering analysis
- Product Design

Meeting Date: November 17th, 2015

Meeting Location: Design Center (4th floor of the Computer Engineering Building)

Meeting time: 12:30pm – 1:45pm

Timeline:

**Timeline is tentative, adjustments may be made during presentation.*

Meeting Timeline		
Start time	Topic of Review	Required Attendees
12:30pm	Phase Overview	Sarah Brownell
12:35pm	Engineering Requirements	Sarah Brownell
12:45pm	Prototyping for Leaf Subsystem	Sarah Brownell
12:55pm	Prototyping for Water Subsystem	Sarah Brownell
1:05pm	Engineering Analysis – Feasibility & Validation	Sarah Brownell
1:20pm	Risk Assessment	Sarah Brownell
1:30pm	System Design	Sarah Brownell
1:45pm	Bill of Materials	Sarah Brownell

Project Description

Project Background:

The Ithaka Institute is a nonprofit organization that supports renewable technologies throughout the

Strategy & Approach

world. They have been producing and distributing the KonTiki kiln which is a cone shaped firepit type device used to create biochar from organic materials. The KonTiki is used around the world in multiple climates and by people with various living conditions.

Problem Statement:

We have been tasked with creating a heat recovery system for the standard KonTiki kiln. There is a lot of heat generated from kiln operation and we plan to use the excess heat in a beneficial and productive way

Objectives/Scope:

1. Use waste heat for a beneficial purpose.
2. Develop a system that is usable in multiple geographic regions.
3. Develop a system that can be operated by a nontechnical person.

Deliverables:

- Create a working prototype.
- Generate usable quantities of purified water.
- Deliver a product that is scalable to multiple sized kilns

Expected Project Benefits:

- Contribute to RIT's involvement in the local and international biochar movement.
- Provide a cost effective technology that can be used to benefit people in developing regions.
- Use waste products of one process to generate usable resources for another.

Core Team Members:

- Kyle Bossung
- Courtney Smith
- Phung Tran
- Kent Derbyshire
- Zak Gustaveson

Assumptions & Constraints:

Our team must first learn the specifics of the KonTiki design and operation specifications. These complex design and operation dynamics are imperative to the generation of high quality biochar and involve temperature profiles, convection currents, detailed feeding methods, and quenching processes. The heat recovery system must be operational without drastically hindering these specifications. It must also fit in conjunction with the current KonTiki design. Other constraints include; using materials local to developing regions, final system cost of \$250, and operational safety.

Issues & Risks:

- Obtaining Current Data
 - Poor support from international experts.
 - Understanding what makes KonTiki biochar such high quality.
- Burn Testing Capabilities
 - Collecting enough feedstock.
 - Feeding kiln techniques.
 - Location and time constraints.
- Material Sourcing
 - Materials are expensive
 - Materials are not found in developing regions.
 - Durability and lifetime of materials.
- Water Purification
 - Temps don't reach necessary levels.
 - System does not produce usable amounts of water.

System Design

Projected Preliminary Design



Validation Test Setup



System Architecture

