Ultra Low Cost Solar Water Heater

Progress Report

1/27/13

Saleh Alsadiq, Matt Beckham, Austin Chott, Thomas Griffin, Chris Heine

Client

- Client: U.S. Environmental Protection Agency (EPA)
 - P3: People, Prosperity, and the Planet Award
 - Research, design, and develop solutions to real world challenges involving the overall sustainability of human society

Need Statement

Current solar water heaters are too expensive and it takes a long period of use to make them financially sensible, therefore current solar water heater designs are financially impractical over a short period of use.

The solution is to design a low cost solar water heater that makes minimal sacrifices in efficiency which result in significant reduction in cost.

Objectives

- Heats water
- Weather resistant
- Low initial cost
- Quick financial return
- Easily integrated into existing system
- Safe
- Reasonable size

Parabolic Collector



Parabolic Collector Cost Analysis

Material	price	% used	# req	cost	
Mylar sheeting 25'x50"	\$ 37.15	25%	1	\$ 9.29	
Plywood 4'x8'	\$ 18.45	100%	2	\$ 36.90	
Flat black paint	\$ 3.00	100%	1	\$ 3.00	
1" x 10' PVC	\$ 3.67	100%	1	\$ 3.67	
Misc fittings	\$ 5.00	100%	5	\$ 25.00	
			Total	\$ 77.86	

• Green indicates easily scavenged

Team Member Roles

Matt Beckham	Electrical automated systems
Austin Chott	Collector construction/Team Leader
Chris Heine	Plumbing/Integration
Thomas Griffin	Organization/Integration
Saleh Alsadiq	CAD Drawings/Plumbing

Final Design

- Based off of the absorption per area per dollar analysis the parabolic collector will be our final design for this semester.
- We will make 3 parabolic collectors.

Collectors	Absorption/Area/\$ Purchased Cost (W/m ² /\$)	Absorption/Area/\$ Scavenged Cost (W/m ² /\$)	
Parabolic PVC	3.20	4.09	
Parabolic Galvanized	2.20	3.10	
Parabolic Painted Galvanized	3.11	4.36	

Project Timeline

	GANTT project			2014			
	Name	Begin date	End date	January	February	March	April
0	Research	9/2/13	10/15/13				
0	Problem Formulation and Project Plan	9/24/13	10/8/13				
0	Problem Formulation/Project Plan Presentati	10/9/13	10/9/13				
0	Identify Key Technologies and Approaches	10/16/13	11/14/13				
0	Prepare Concept Generation and Selection	10/9/13	10/28/13				
0	Concept Generation and Selection Presentati	10/29/13	10/29/13				
0	Engineering Analysis	10/29/13	11/19/13				
0	Engineering Analysis Presentation	11/20/13	11/20/13				
0	Prepare Proposal	11/20/13	12/2/13	<u>h</u>			
0	Submit Proposal	12/3/13	12/3/13	÷			
0	Build Components	12/3/13	1/31/14		B		
Θ	Analyze Performance	12/3/13	1/31/14		₽ ↓		
0	Build Prototype	2/3/14	2/13/14		in the second		
Θ	Prototype Testing	2/14/14	2/24/14				
0	Prototype Analysis	2/25/14	3/10/14		Ľ		
0	Write P3 Proposal	3/11/14	3/14/14			È	
0	Presentation at P3 Expo	4/25/14	4/25/14				•

Austin Chott

Gantt Chart

January:

- Collect materials
- Begin building collectors
- Meet with MBA team/Dr. Nelson to discuss status and marketability

February:

- 3rd 13th: Finish collectors, route plumbing
- 14th 24th: Test components/system
- 25th 28th: Compile/analyze data

March:

- Milestone: 10th Complete data analysis for report
- 11th 14th: Write report for P3 Expo

April:

• 25th – 27th: P3 Expo

Conclusion

- EPA P3 Program Ultra Low Cost.
- Project roles assigned to group members.
- Build and test solar water heater designs.
- Compare results to our analysis.
- Compile data and build final prototype.
- Stay on schedule to complete EPA proposal by March 15th.