**Objective and Background**

A 40-foot shipping container will be outfitted with electricity, cooling systems, and cooking facilities to help ameliorate the current refugee crisis.

Target: Oure Cassoni Refugee Camp in Chad

- 28,000 refugees
- 85% women and children
- Majority Muslim
- Severe water and fuel shortages
- Security concerns
- Temperatures up to 108°F
- 4 miles from Sudanese border
- Overseen by the UNHCR

60 Million Refugees Worldwide

40% Increase Since 2005

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**Design Constraints**

- $3,500 class budget
- Local temperatures reach 108°F and the container must maintain a tolerable temperature
- Well secured equipment to prevent tampering and theft
- Renewable, off-grid energy supply
- Limited food and water supplies
- Limited external modifications to allow shipping via barge
- Easy assembly for parts installed and set up by refugees

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**Design Decisions**

**Tools**

- Finite Element Analysis
- Computational Fluid Dynamics

**Cooking**

A solar water heater, thermos, and trash-fire cook stove will provide a communal cooking area and clean water for refugees

**Passive Cooling**

Reflective white paint, louvered vents, and turbine roof fans will lower the inside temperature by an expected 12°F

**Active Cooling**

An evaporative cooling system will reduce the temperature by 10°F and increase humidity to a comfortable level

**Solar Power**

Eleven solar modules will supply battery-stored power for cooking, lighting, cell phone charging stations, water delivery, and active cooling

**Structure and Insulation**

Wooden framing, fiberglass insulation, and wall sheathing will reduce the internal temperature and ensure structural integrity

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**Project Costs**

<table>
<thead>
<tr>
<th>Tools</th>
<th>Estimated Market Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000</td>
<td>$1,780</td>
</tr>
<tr>
<td>$446</td>
<td>$1,124</td>
</tr>
<tr>
<td>$5,186</td>
<td></td>
</tr>
</tbody>
</table>

Cooking
Solar
Structure
Passive Cooling

Class Budget: $3,500
Estimated Market Cost: $9,536
Value of Material Donations: $4,527

The team used donated, discounted, and scrap materials when possible to stay within the budget

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**Final Design**

- The container will be shipped to Africa by barge
- The team will partner with an aid organization to transport the container to the Oure Cassoni Camp

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**Implementation**

The class worked with the Batten School to create an implementation plan and aims to have completed one container by May, 2018

- The container will be shipped to Africa by barge
- The team will partner with an aid organization to transport the container to the Oure Cassoni Camp