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M.O.R.E. Life

[Mobile Operating Room Engineering]

04/2011

Road Infrastructure HAITI 2010

http://webpressphoto.com/2011/03/haiti-six-days-laterjanuary-18-201

Haitian Hospital after earthquake in 2010

http://www.pwrdf.org

Overcrowding for medical assistance in HAITI 2010

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Current Solutions

54 feet long Operating room on Wheels

- Requires of road infrastructure
- Difficult to deploy
- Cannot access all affected areas
- Very Costly

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US Military Standard

Deployable Rapid Assembly Shelter

- Consumes large amounts of electrical power
- Costly to deploy
- Requires of road infrastructure

M.O.R.E Life Objective

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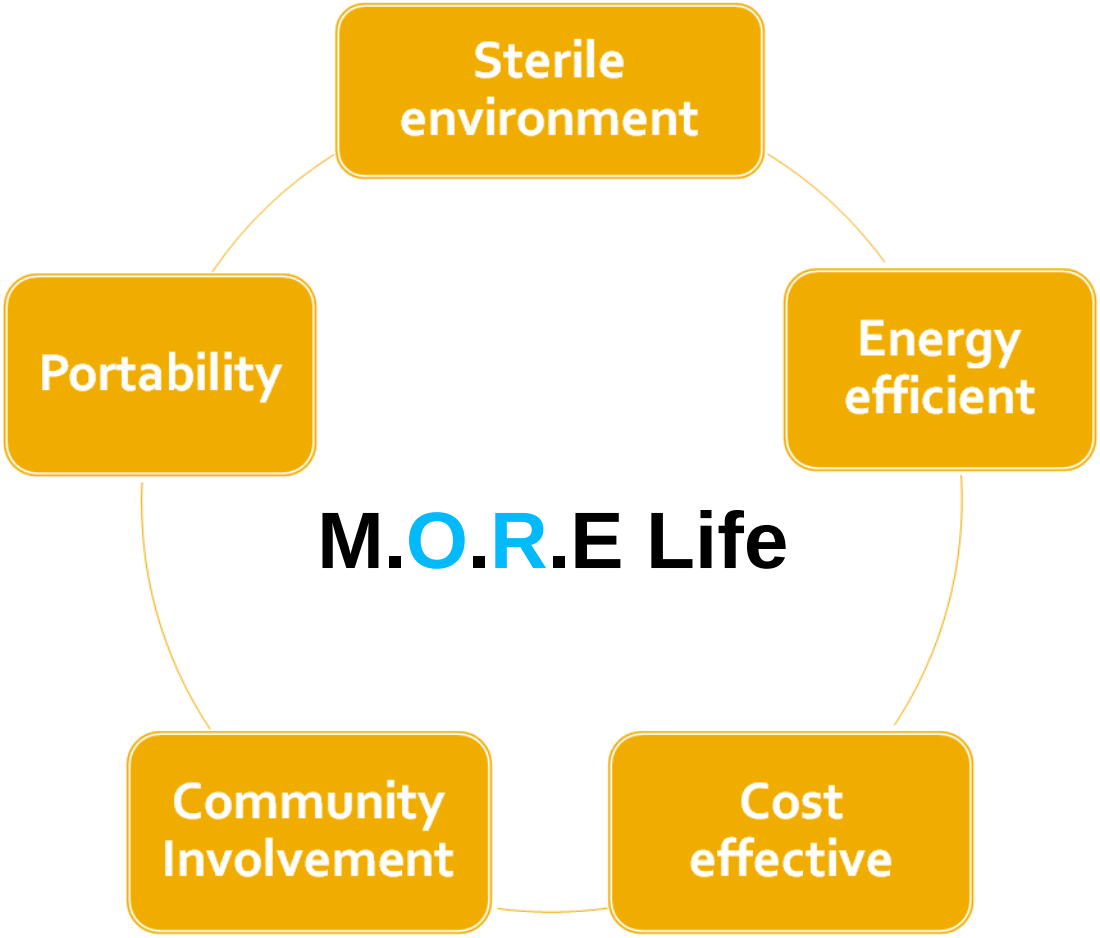

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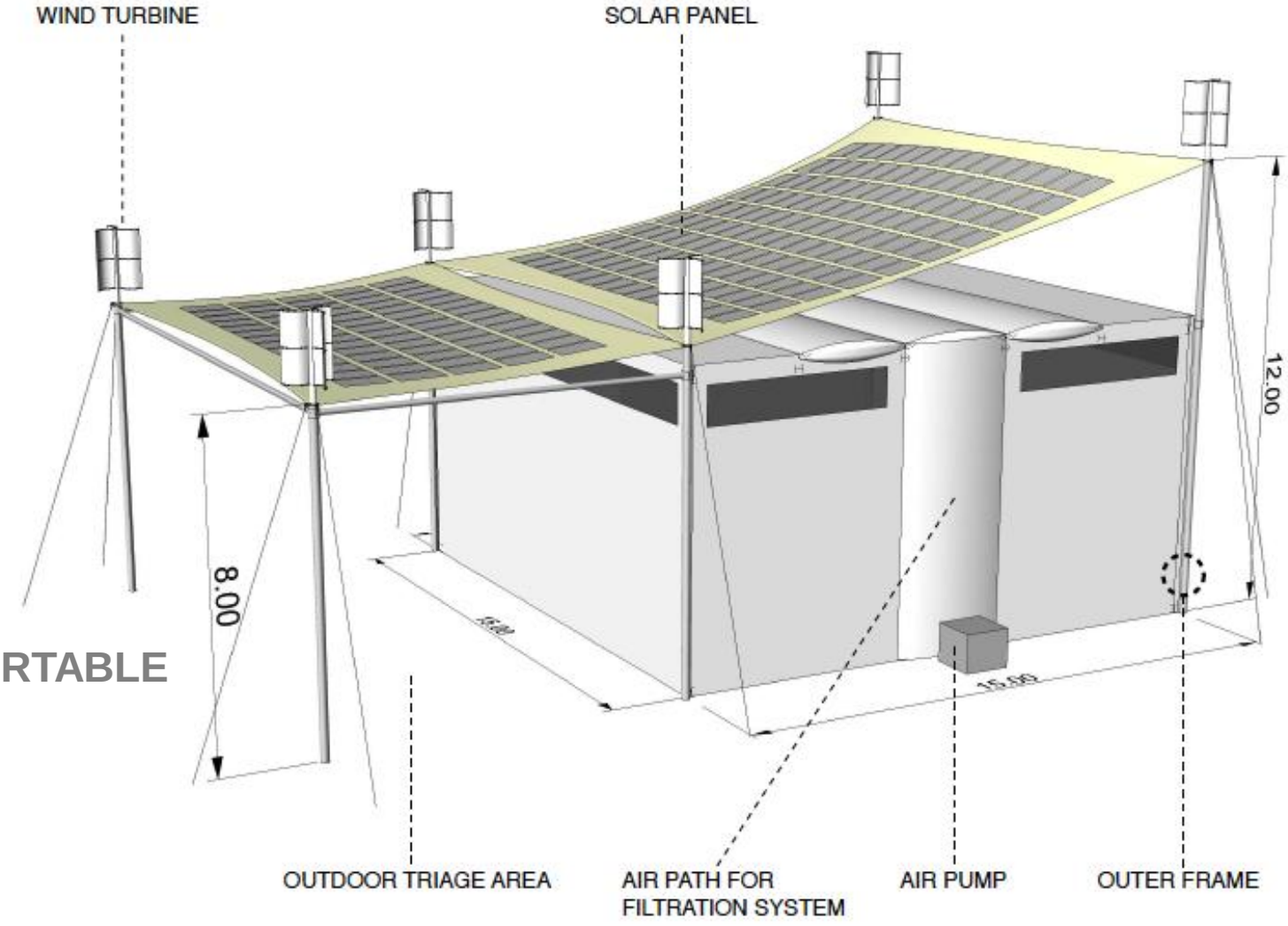
M.O.R.E Solution

ENERGY EFFICIENT

Rear View



MODULAR DESIGN

PORTABLE

STERILE

M.O.R.E Solution

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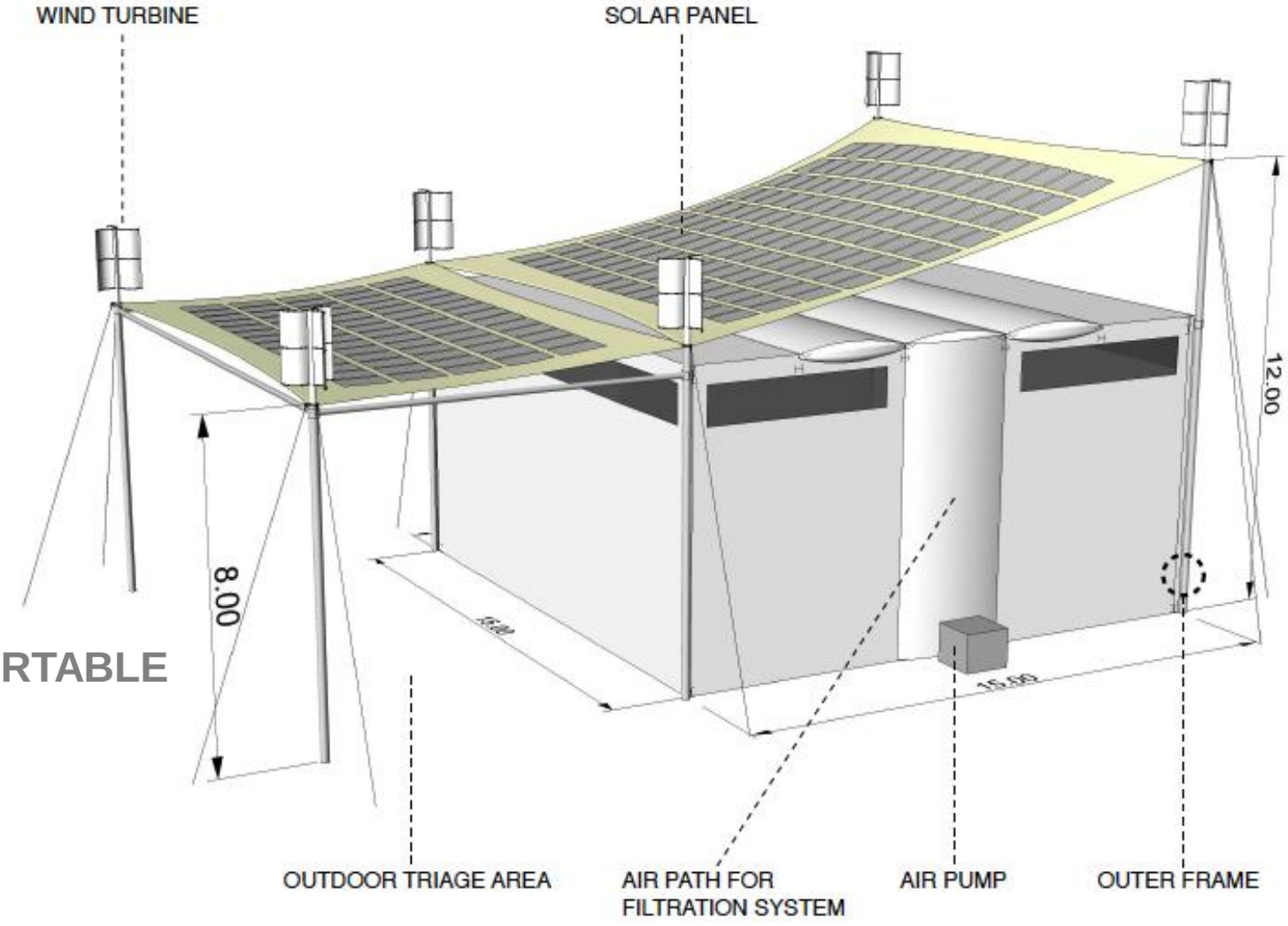
ENERGY EFFICIENT

PORTABLE

MODULAR DESIGN

STERILE



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M.O.R.E Solution

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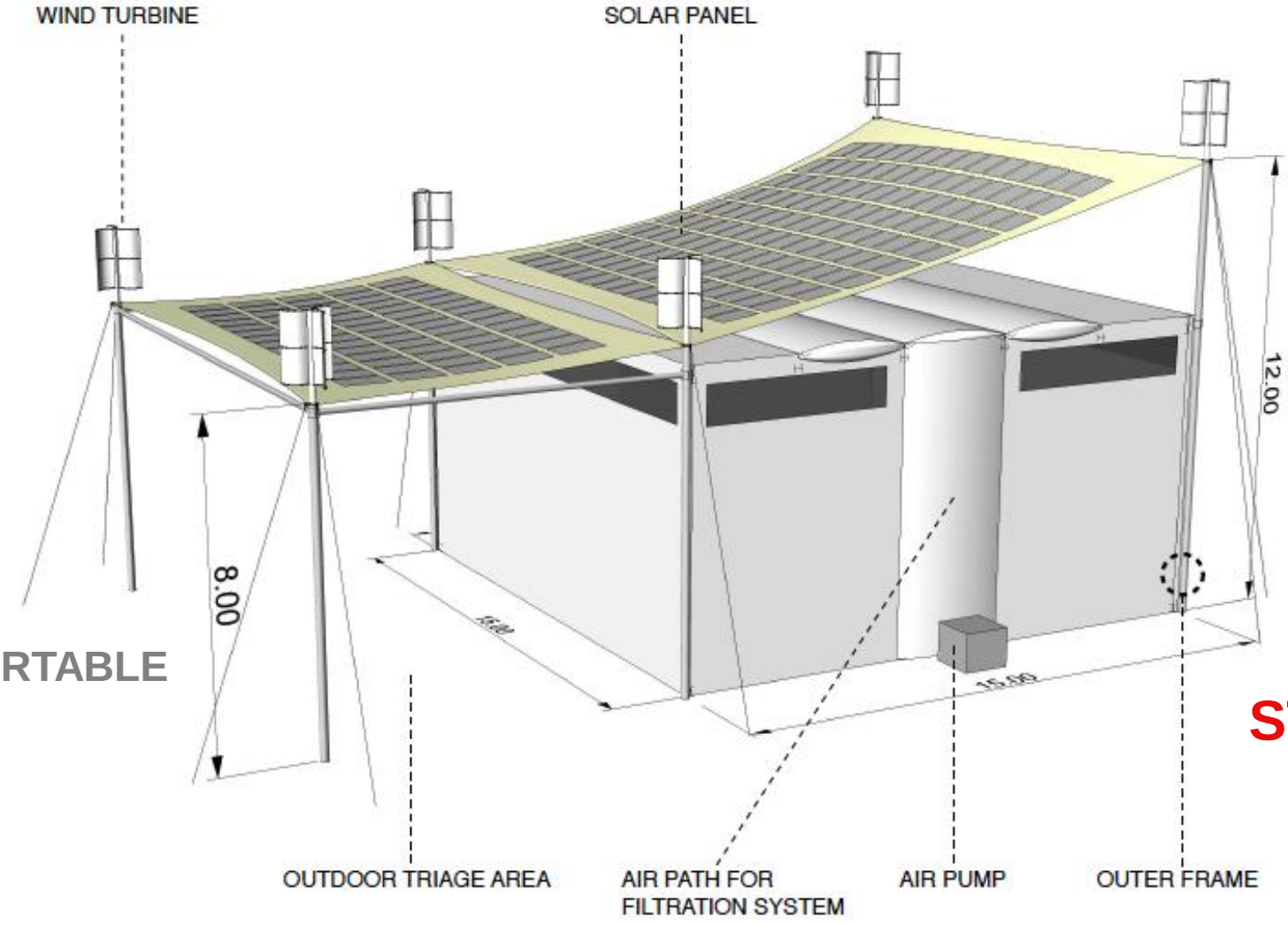

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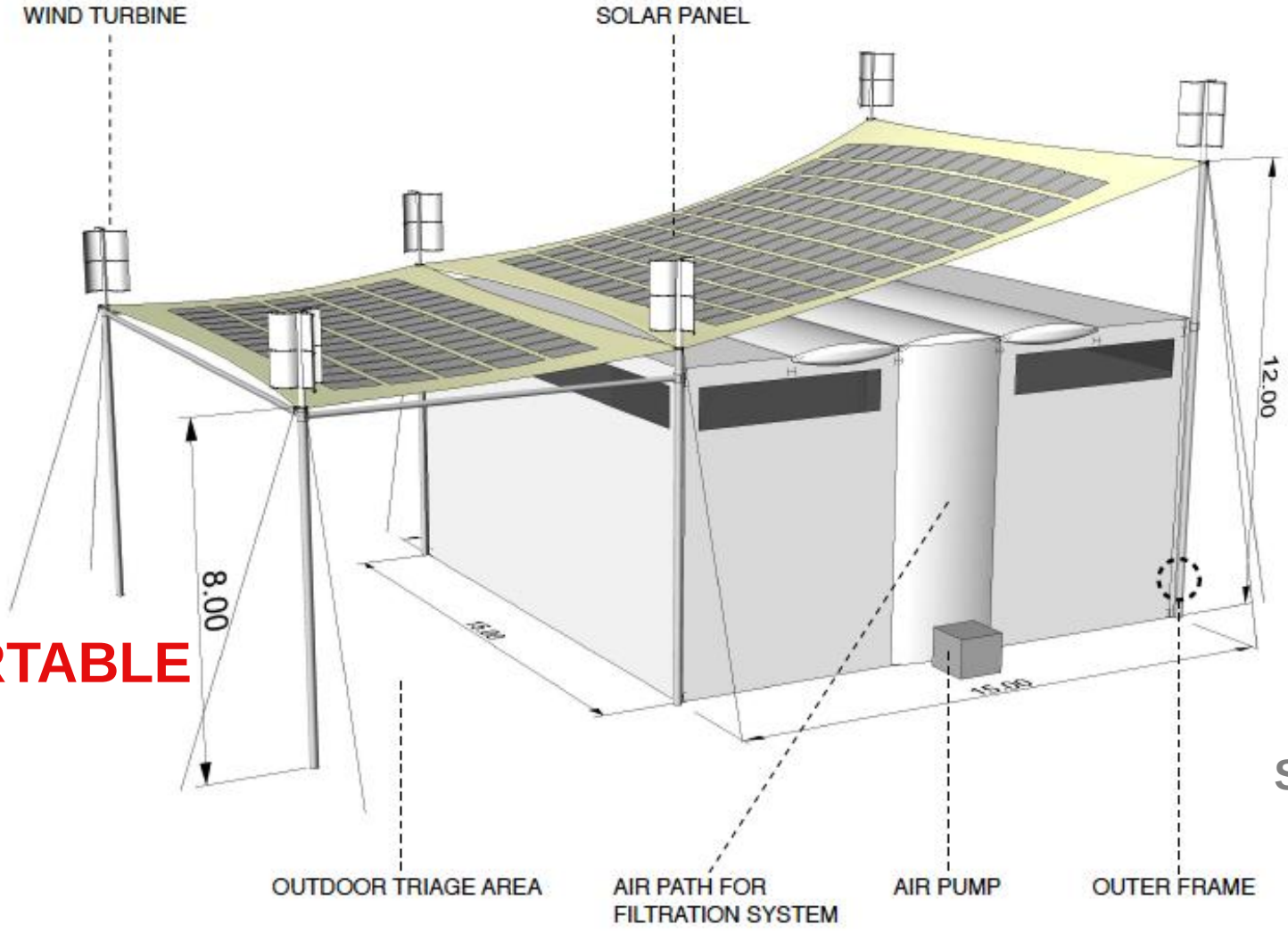

Filtration & Sterility

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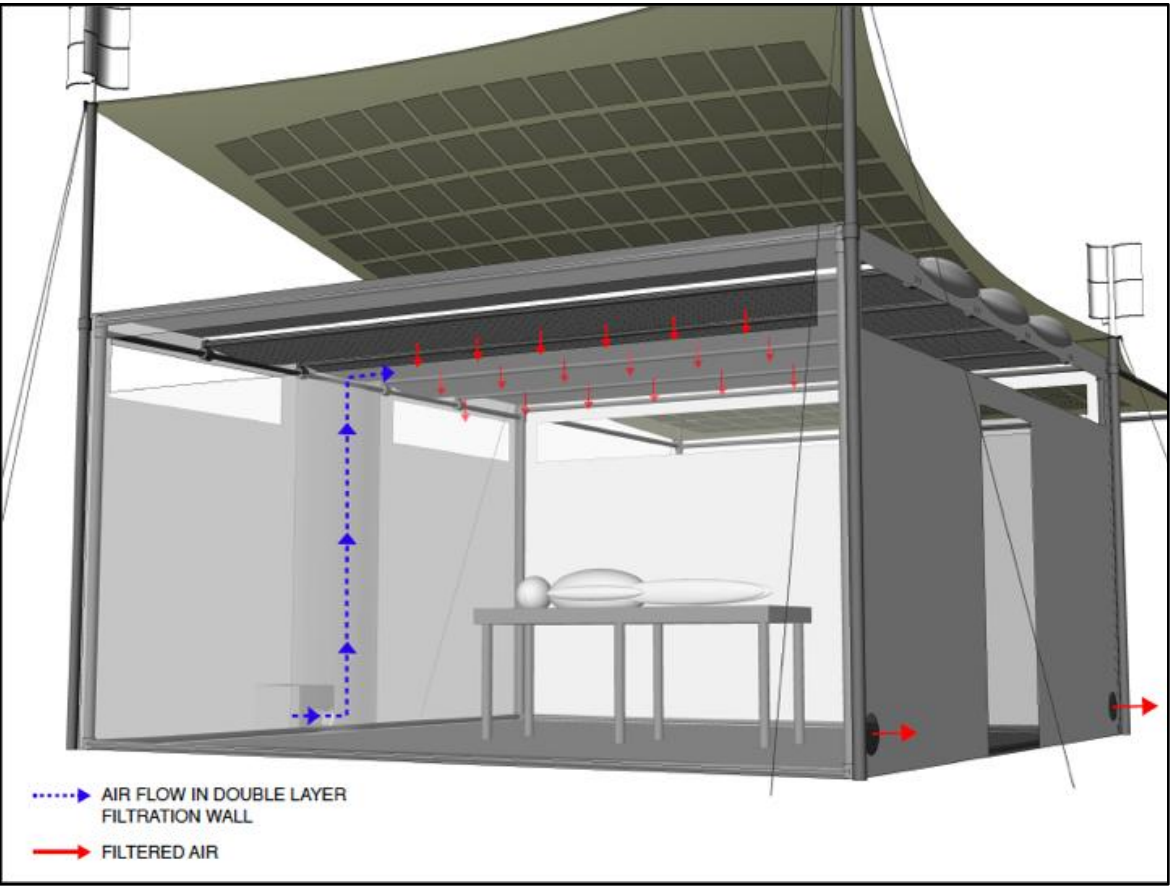

- FILTRATION
- Triple layer material
- 1.) **Solid outer wall**
- 2.) HEPA filter
- 3.) Perforated Innermost wall

- STERILITY
- Clean circulating air
- Anti-microbial coating

Filtration & Sterility

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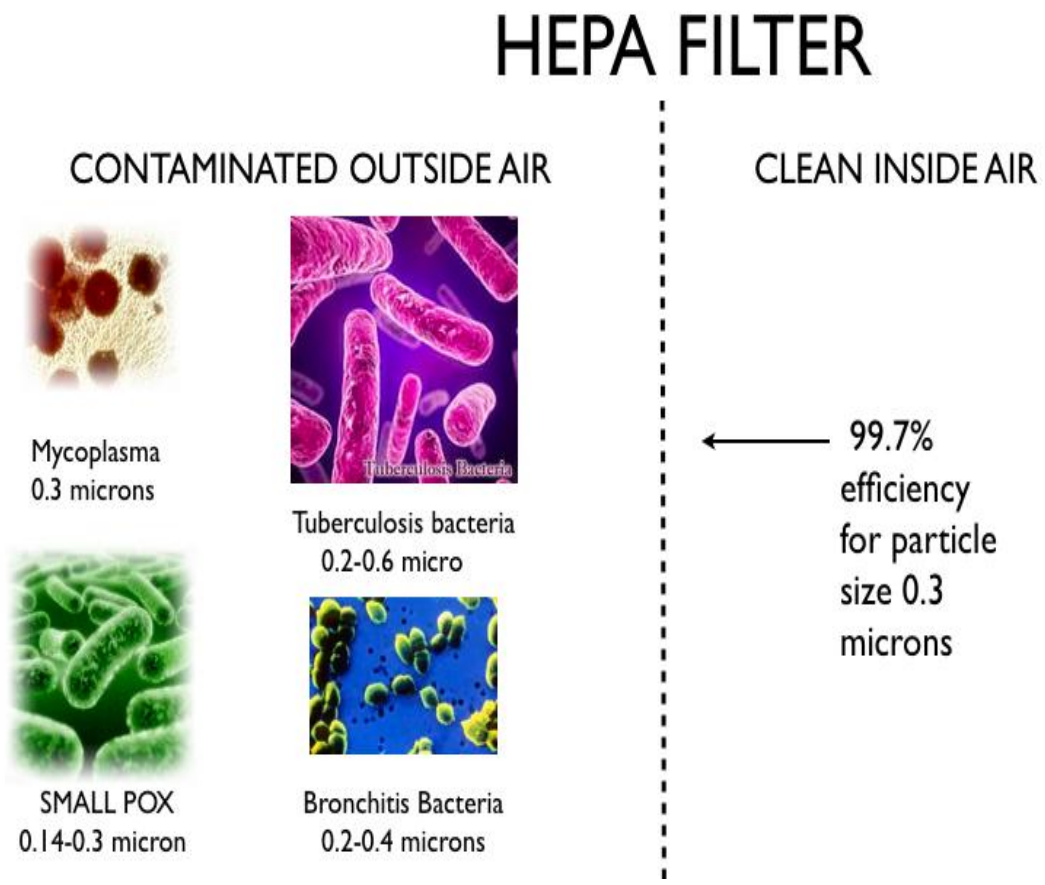

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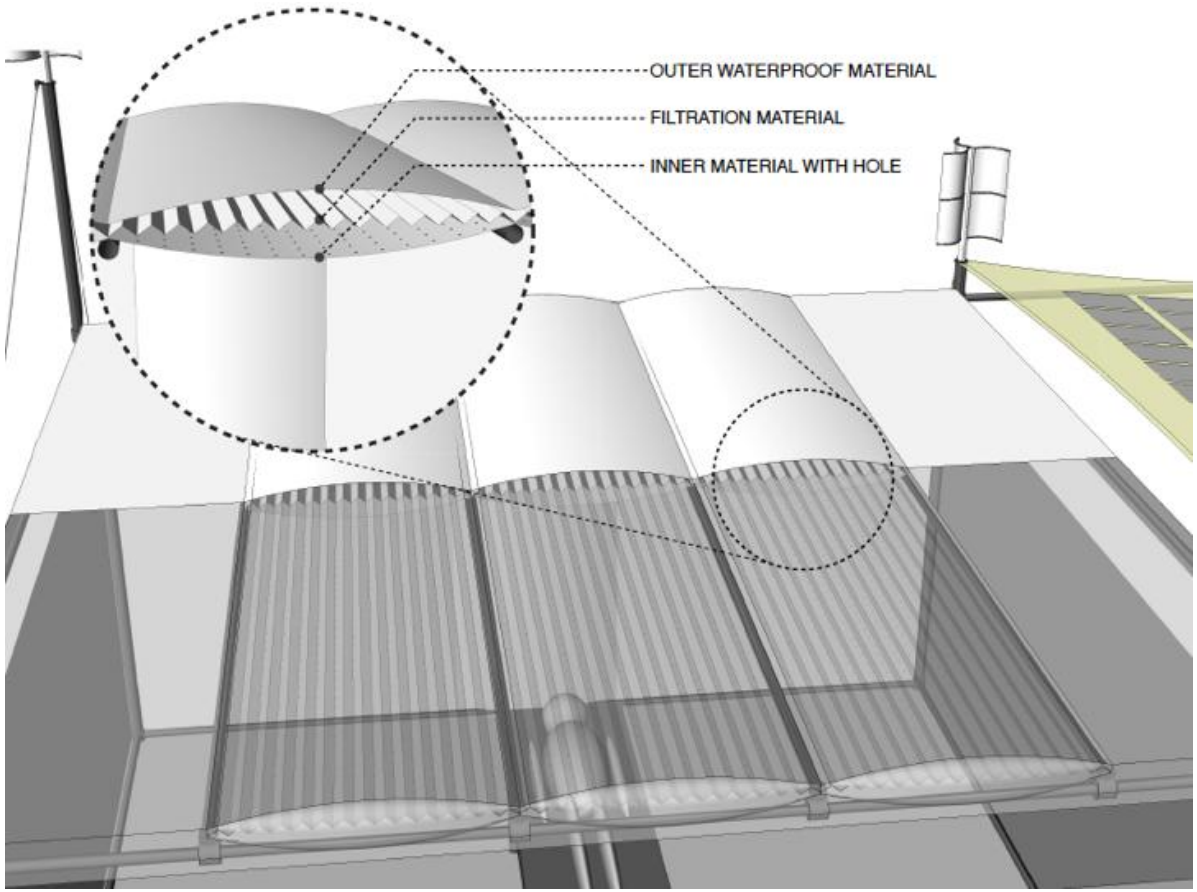

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Filtration & Sterility

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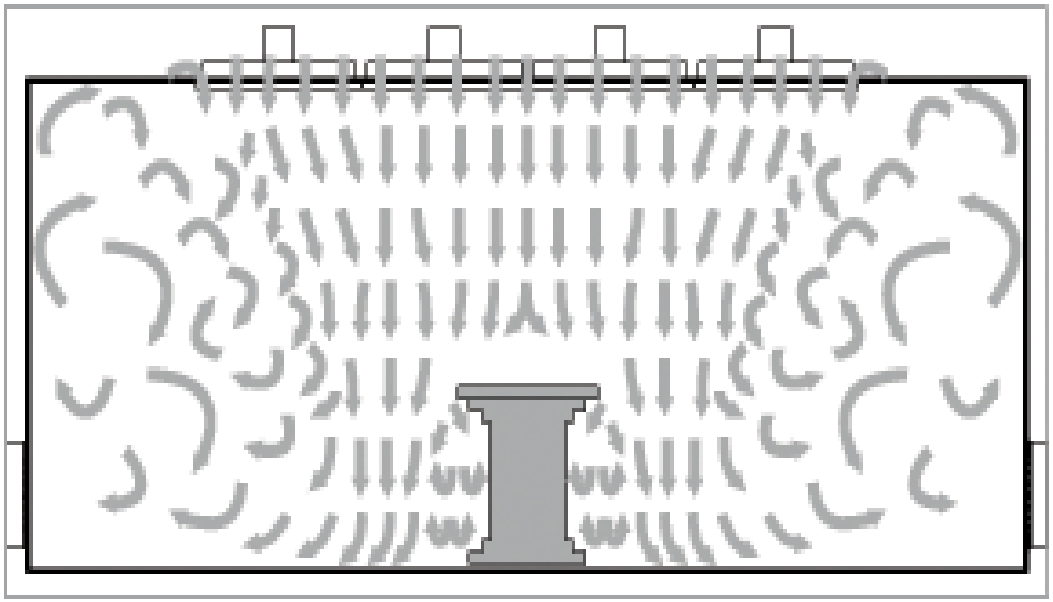
LAMINAR AIR FLOW



American Society of Heating, Refrigerating and Air-Conditioning Engineers

- Same air flow as in standard US Operating Rooms
- Cooling effect for patient and doctors
- Creates a curtain of clean air

- FILTRATION
- Triple layer material
- 1.) Solid outer wall
- 2.) HEPA filter
- **3.) Perforated Innermost wall**

- **STERILITY**
- **Clean circulating air**
- **Anti-microbial coating**

Filtration & Sterility

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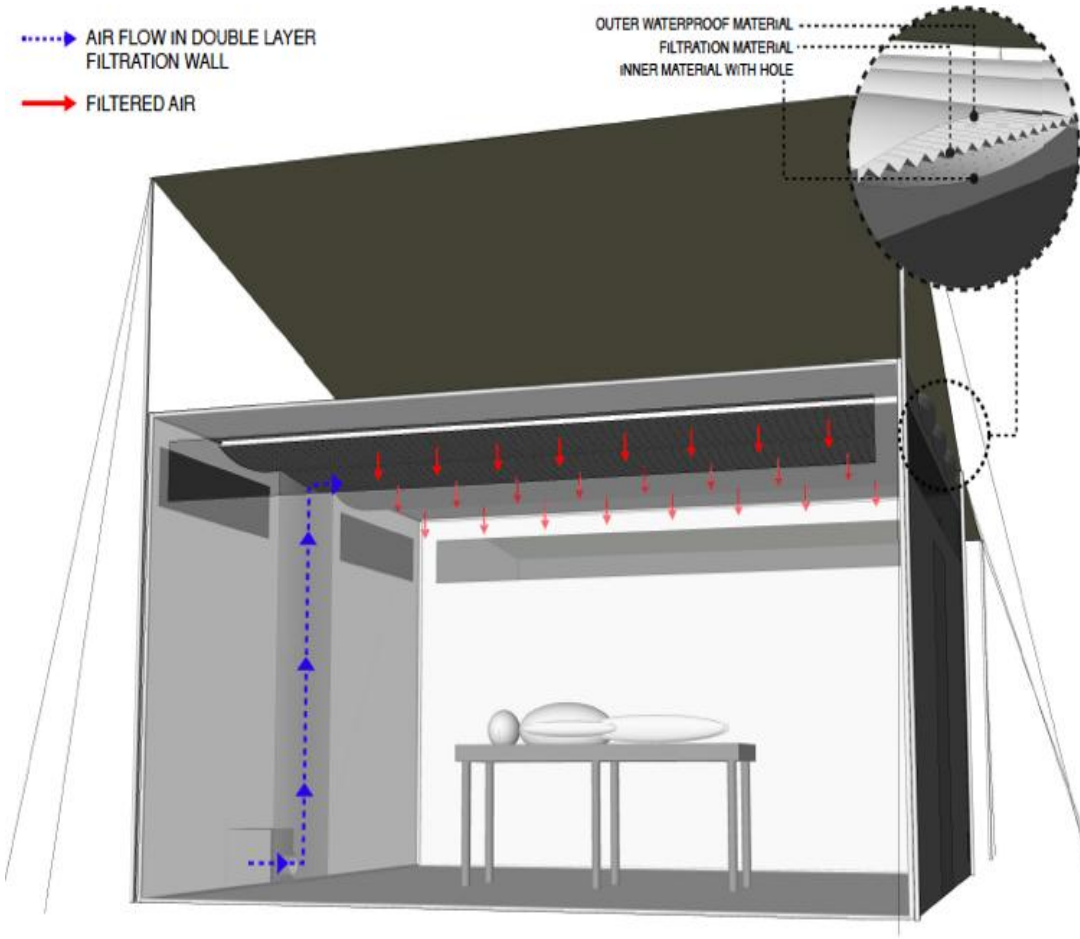
- Criteria
  1. Laminar flow downward

     15cm/s
  2. Maintain positive pressure
  3. Air must be sterilized every hour



Power

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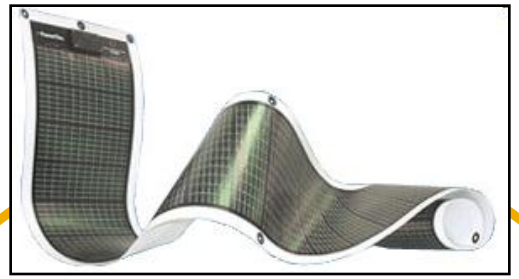

FTL Flexible Solar Material 1200

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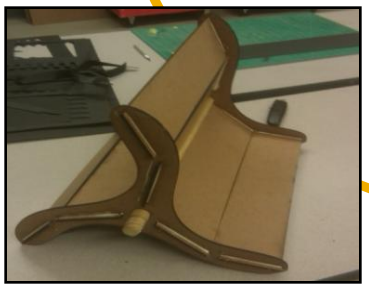
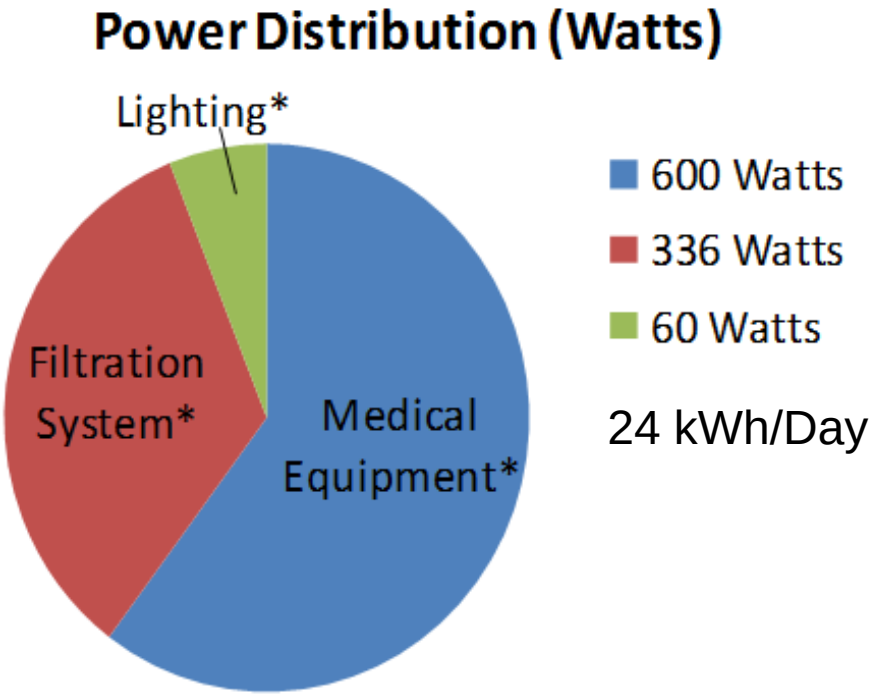


Wind Turbines

Gas Generator Wacker 2500

- Sources of power & power distribution
- Power Schematic
- Advantages

Power



- **Sources of power & power distribution**
- Power Schematic
- Advantages

*Considering minimal power requirements for a single tent

Power

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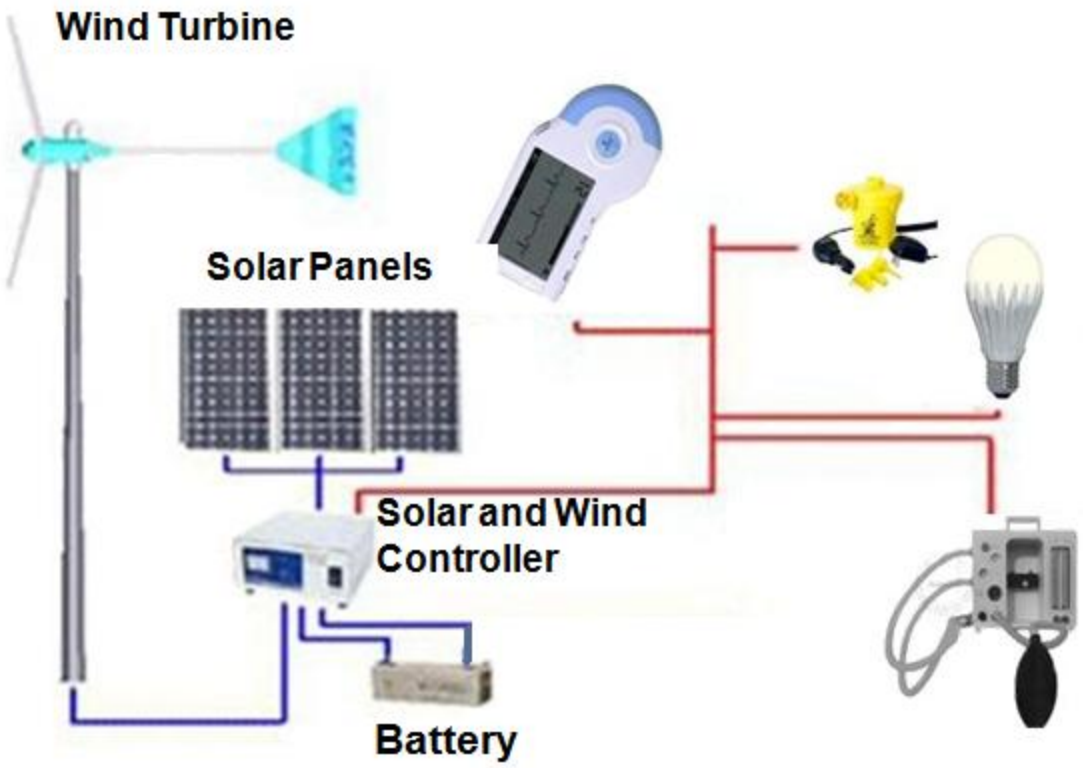
Energy Supply

Power Source	Watts	Hours/Day	kWh/Day
Solar Panels PowerMod 1200	1000	6	6
Wind Turbines	1000	24	24
Gas Generator Wacker 2500	2500	As Needed	
Total	**4700**		**30**

- **Sources of power & distribution**
- Power Schematic
- Advantages

Power



- Sources of power & power distribution
- **Power Schematic**
- Advantages

Power

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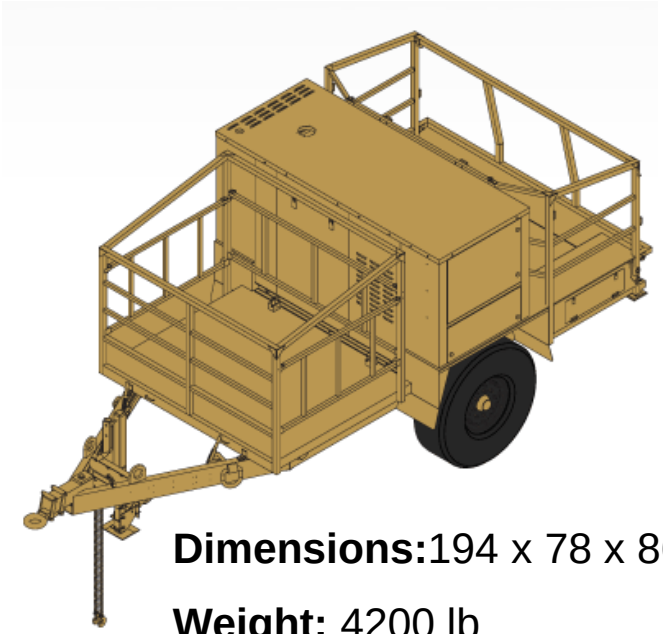
DRASH Utility Support Transport (UST)



Dimensions:194 x 78 x 86in

Weight: 4200 lb

Tank Capacity: 60.6 L

Wacker 2500

Dimensions:24.5 x 17.2 x 17.5in

Weight: 92.5 lb

Tank Capacity:17L

The average price per gallon in a disaster zone is of $50

Modularity

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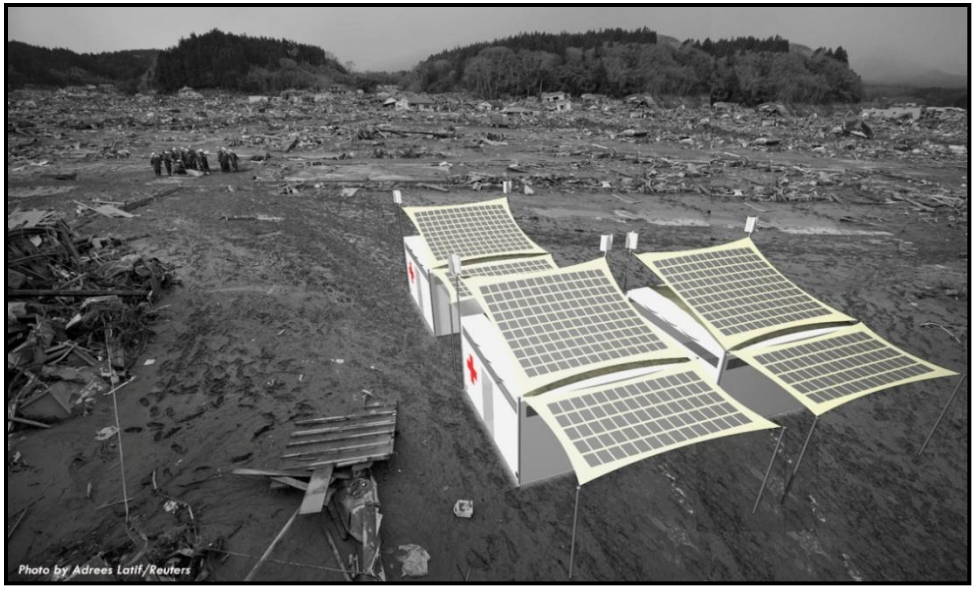

- Modularity to prevent crowding
- Transportation over short distances becomes easier
- Resources are not all concentrated in one area after a natural disaster (security)

Portabilty

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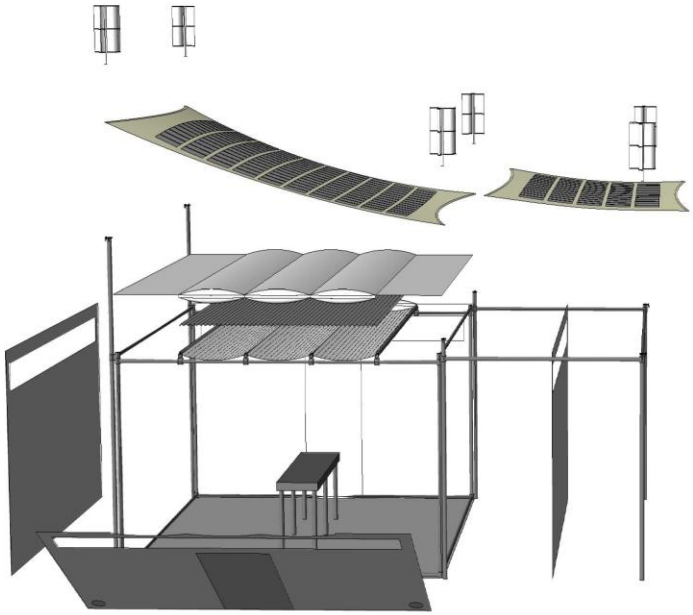
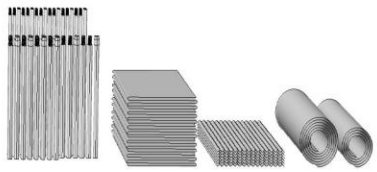
"On Average a US army soldier will carry over 91 lb. of weight" Sgt. Delgado

M.O.R.E. Life Components by weight	
Component	**Weight (lb.)**
Tent Material and frame	100
Solar Panels PowerMod 1200	100
Wind Turbines	75
Gas Generator Wacker 2500	65
Batteries	100
TOTAL WEIGHT:	500

- Considerations for portability
  - Easy set-up
  - Carried in system of backpacks
  - Parachute on site
  - Stock piling (preventative measures)

Portabilty





Community Involvement

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- Limitations
  - Language barrier
  - Familiarity with product
  - Feeling of involvement

Community Involvement

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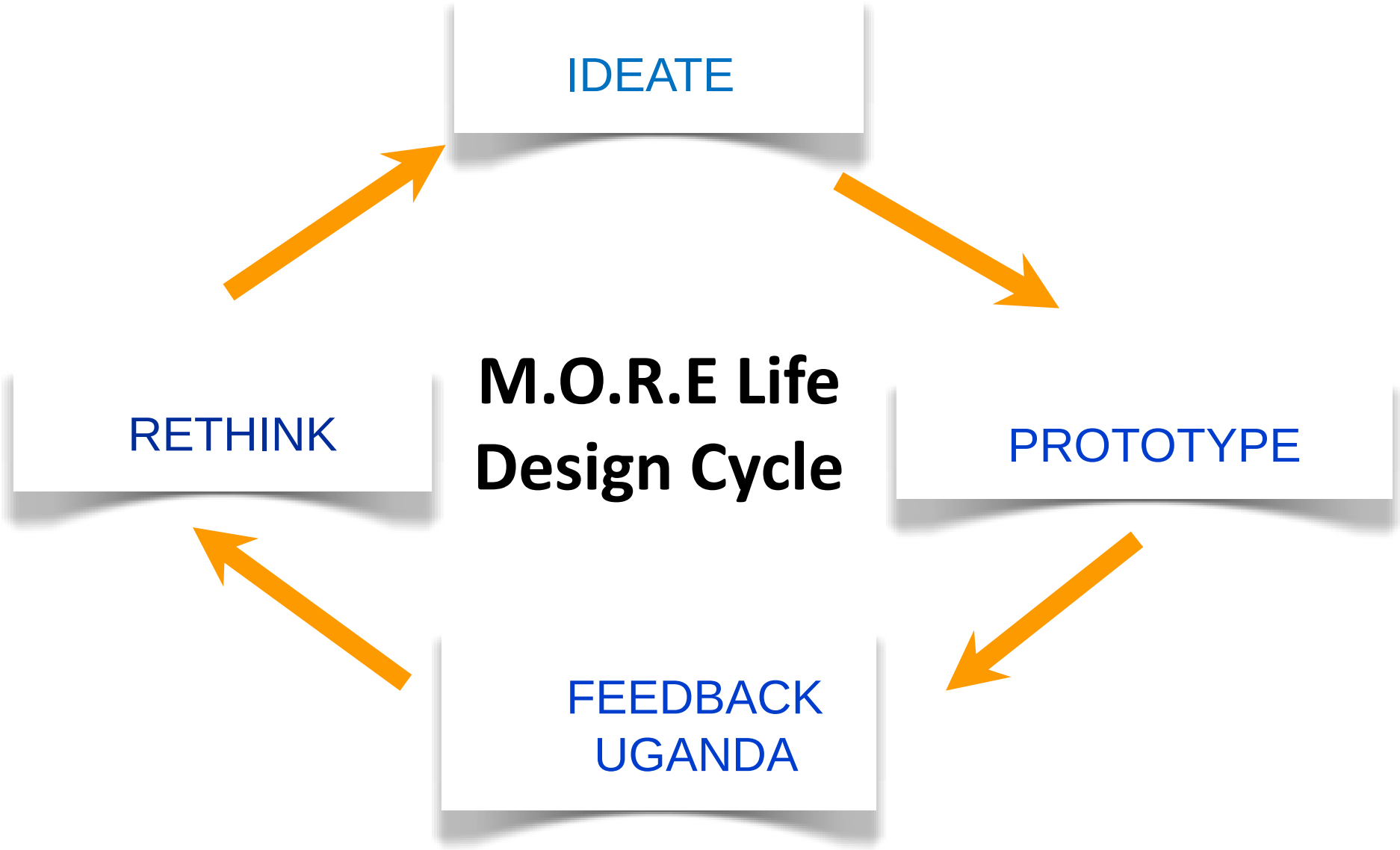
Solutions

- Picture instruction manual
- Training
  - Relief organizations
  - Local communities
- Preparation, set-up, maintenance

Swahili: Mimi ni daktari.
English: I am a doctor.

Swahili: ambapo ni mhasiriwa?
English: Where is the victim?


IDEATE
PROTOTYPE
FEEDBACK
UGANDA
RETHINK
M.O.R.E Life
Design Cycle

IDEATE


IRHA

PROTOTYPE

FEEDBACK & RETHINK

Future Goals:

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- Functional prototype.
- Feedback from Uganda
- Partner with Post Disaster Relief Organizations.
- Collaborate with similar IPRO projects

Acknowledgements:

- Linda Pulik
  Institute of Design, Illinois Institute of Technology
- Dr. David Gatchell, Ph.D
  Senior Lecturer, Illinois Institute of Technology
  Assistant to the Director, Pritzker Institute
- Dr. Gum Ephrem Grace Gengmoi, MBChB.,M.Med.
  Anesthesiologist, Lecturer Dept. of Anesthesiology,
  Mbarara University of Science & Technology
- Sergeant Delgado, FFC
- Christopher Lee, Surgical Technician
- Engineers Without Borders
- Engineering World Health
- Alexian Brothers Medical Center

IPRO 362 Team

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Elena Slavcheva
Andrew Trevor
Blake Wolfe
Shin Young Park

QUESTIONS?

MATERIALS

COMMUNITY

FILTRATION

POWER

STRUCTURE

Materials

BACK

Brand of Fire Resistant Coatings	Material	Shelf life	Coating life	Resistance to Bacteria	Resistance to Fungus	Resistance to Insects/Rodents/ Mold	Water	Odor	Color	Toxic	Affect	Quantity /cost
Dendamix	In compliance with specs mentioned on webpage	unlimited shelf life	n/a	no	Good	no	n/a	no	No	n/a	Does not affect the feel of fabric and retains flexibility	n/a
Flame Stop I	natural and synthetic fabrics	Three years	Treated fabrics may not be wet washed, but can be dry cleaned up to 15 times before reapplication is necessary	Good	Good	Excellent	Solution not water resistant	no	no	no	Does not affect the feel of fabric and retains flexibility	n/a
Flame Stop I-C	100% natural fiber	Three years	Treated fabrics may not be wet washed, but can be dry cleaned up to 15 times before reapplication is necessary	Good	Good	Excellent	Solution not water Resistant	No	No	No	not to change the color or hand (feel) of fabric that contains 100% natural fibers	n/a
Flamex PF	Porous fabrics.	Three years	Indefinite as long as fabrics are not wet washed, they may be dry cleaned up to 1 time without reapplication	n/a	n/a	n/a	n/a	no	no	no	not to change the color or hand (feel) of fabric that contains 100% natural fibers	coverage per gallon on fabric is 300 sq feet (5 gallions= $mO180
FS I-DS Fire Retardant Spray	Tents, fabric awnings and other porous fabrics (not used on water proof materials)		2-3 year exterior durability	no	no	no	Solution not water Resistant	n/a	n/a	n/a	not to change the color or hand (feel) of fabric that contains 100% natural fibers	125 sq ft per gallon (5 Gallon= $245)
SafeCoat FR 31	100% cotton, 100% polyester and 65/35 cotton/polyester blend (does not substantially alter the feel of the fabric)	n/a	Until washing of fabric	no	no	no	Solution not water resistant	no	no	slight	Does not affect the feel of fabric and retains flexibility	1 pound of fabric requires 1 pound of solution

STRUCTURE

BACK