The Vaccine Refrigerator

By Team Orange A

Overview/Background

- Over 4.3 Million[1] deaths from vaccine-preventable diseases each year
- Current Cold Chain methods/materials out-of-date, in disrepair
- Limited funds for equipment and personnel- UNICEF 90% of vaccine purchases

[1] Estimates from WHO (Jan 2004)

Current ‘Cold Carriers’

Pros:

- No power source needed
- Portable
- Inexpensive

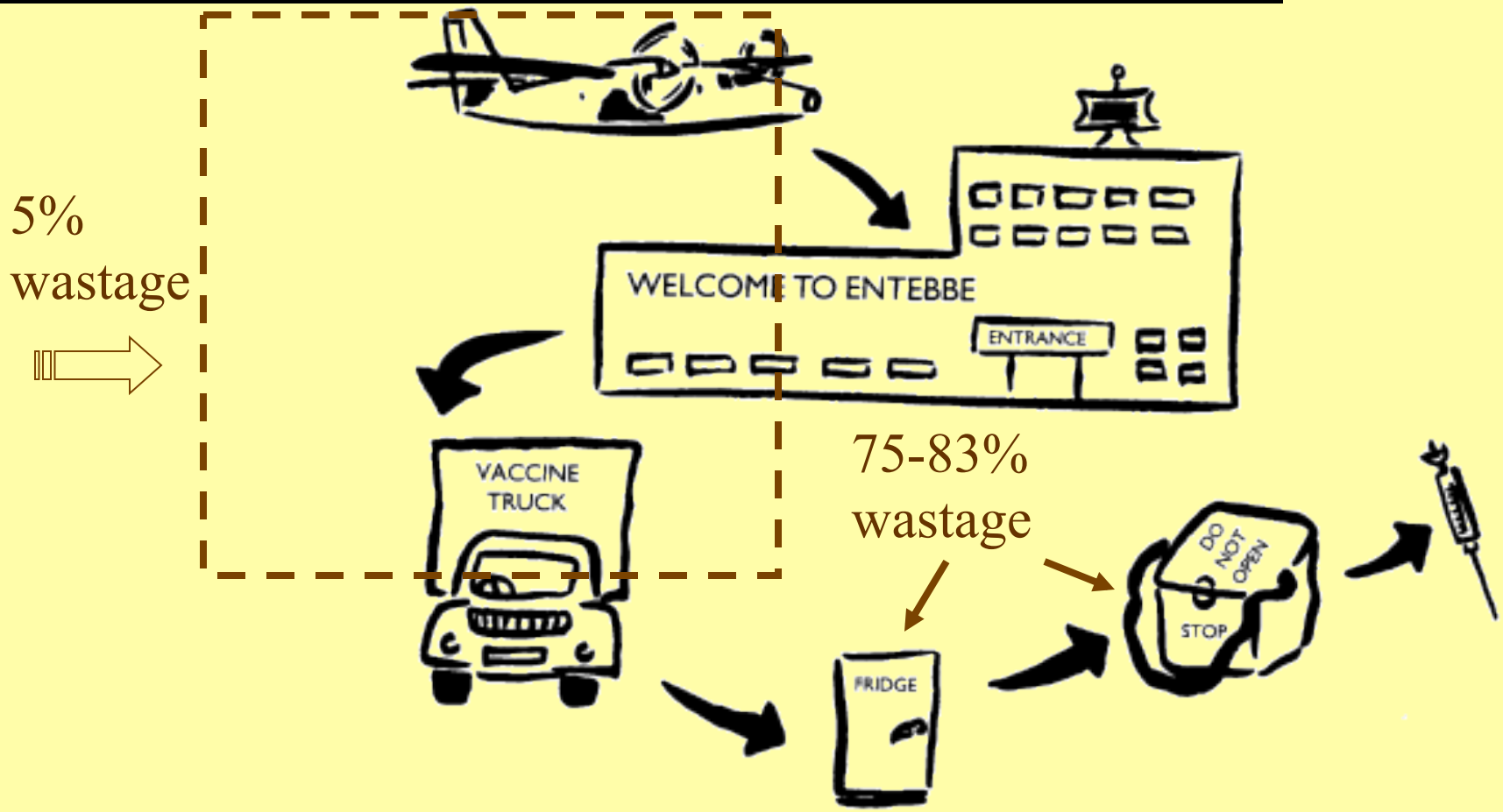
Cons:

- Insufficient temperature control
- Cannot generate cold
- Limited “cold-life”

Pros:

- Regulated temperatures
- Produces cold
- Relatively limitless lifetime

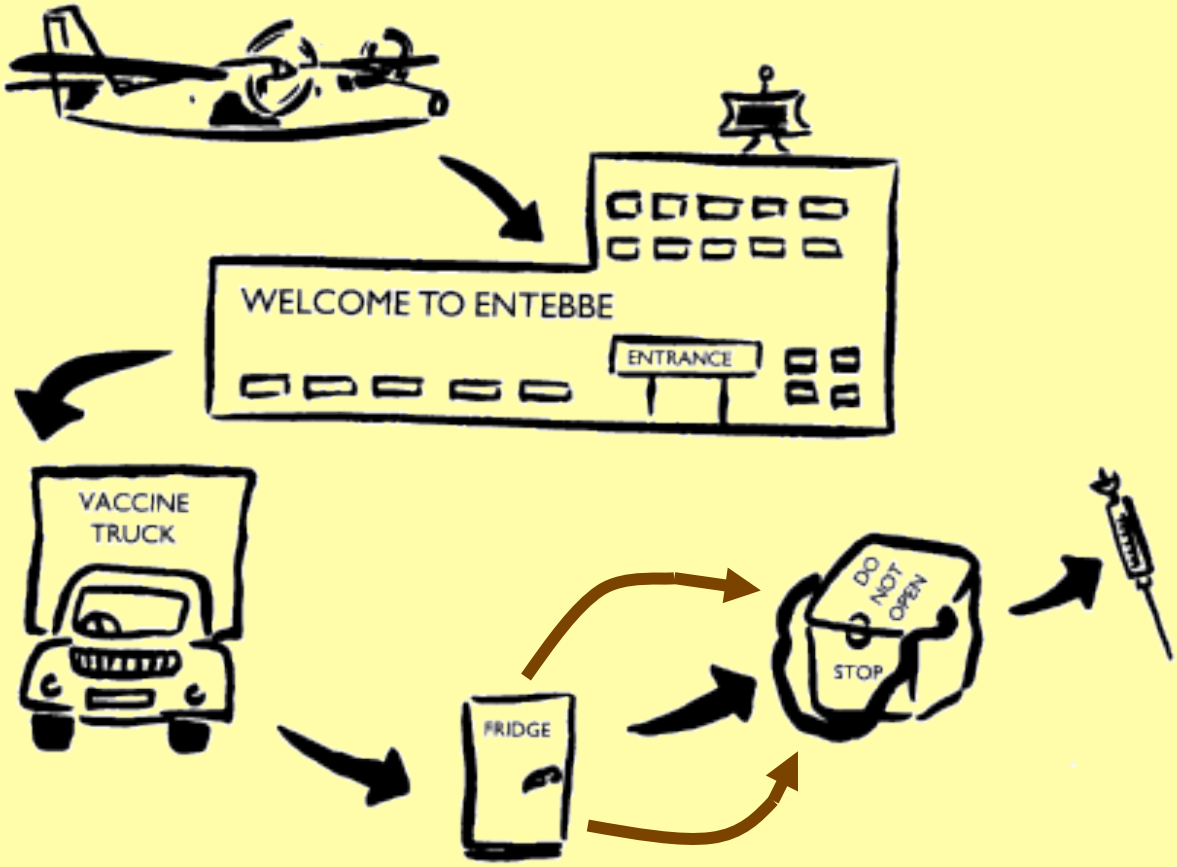
The Cold Chain



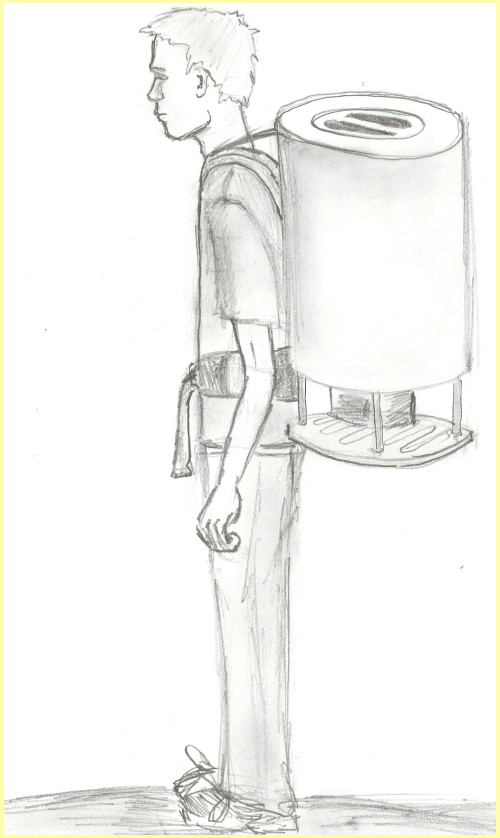
Specific Customer Needs

Customer Needs	Design Attributes	Engineering Specs
Longer outreach sessions	Longer cold life	>2 days within 2-8 C range
Affordable by NGOs	Inexpensive	Costs less than $150
Comfortable to carry	One person can carry easily	Backpack form (hands-free), <50 lbs
Doesn't need power grid	powered by alternate means	human/IC-engine powered
Flexible for different vaccines	Can accommodate different vial sizes	Can fit all 16 vial standard sizes
Doesn't freeze or heat up vaccines	Can keep vaccines in viable temp. range	Maintains 2-8 C range
Can treat many villages in a single trip	Can accommodate large number of doses	capacity of ~1500 doses

The Cold Chain



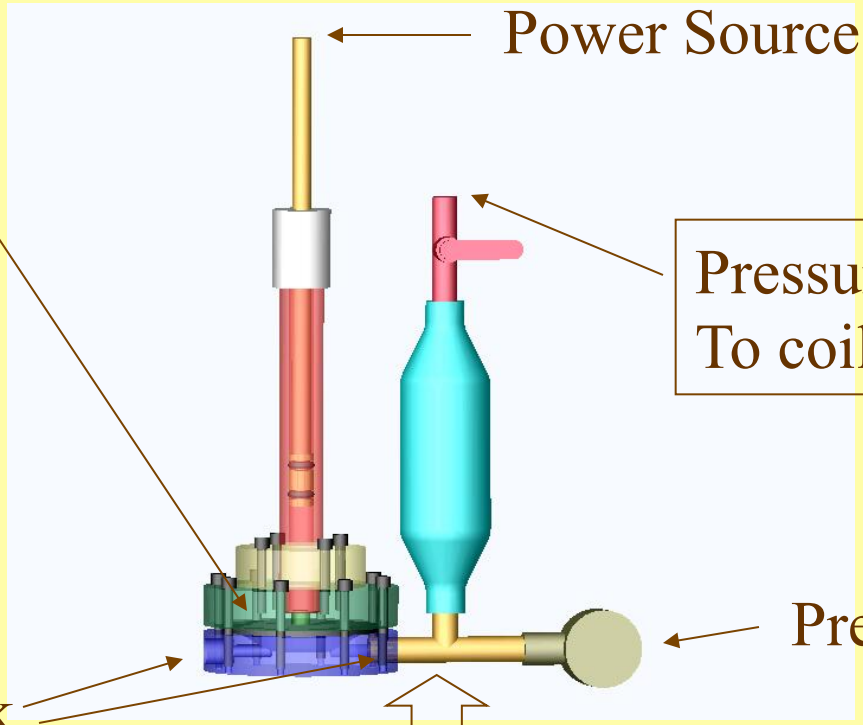
Introducing the Vacc-Pack



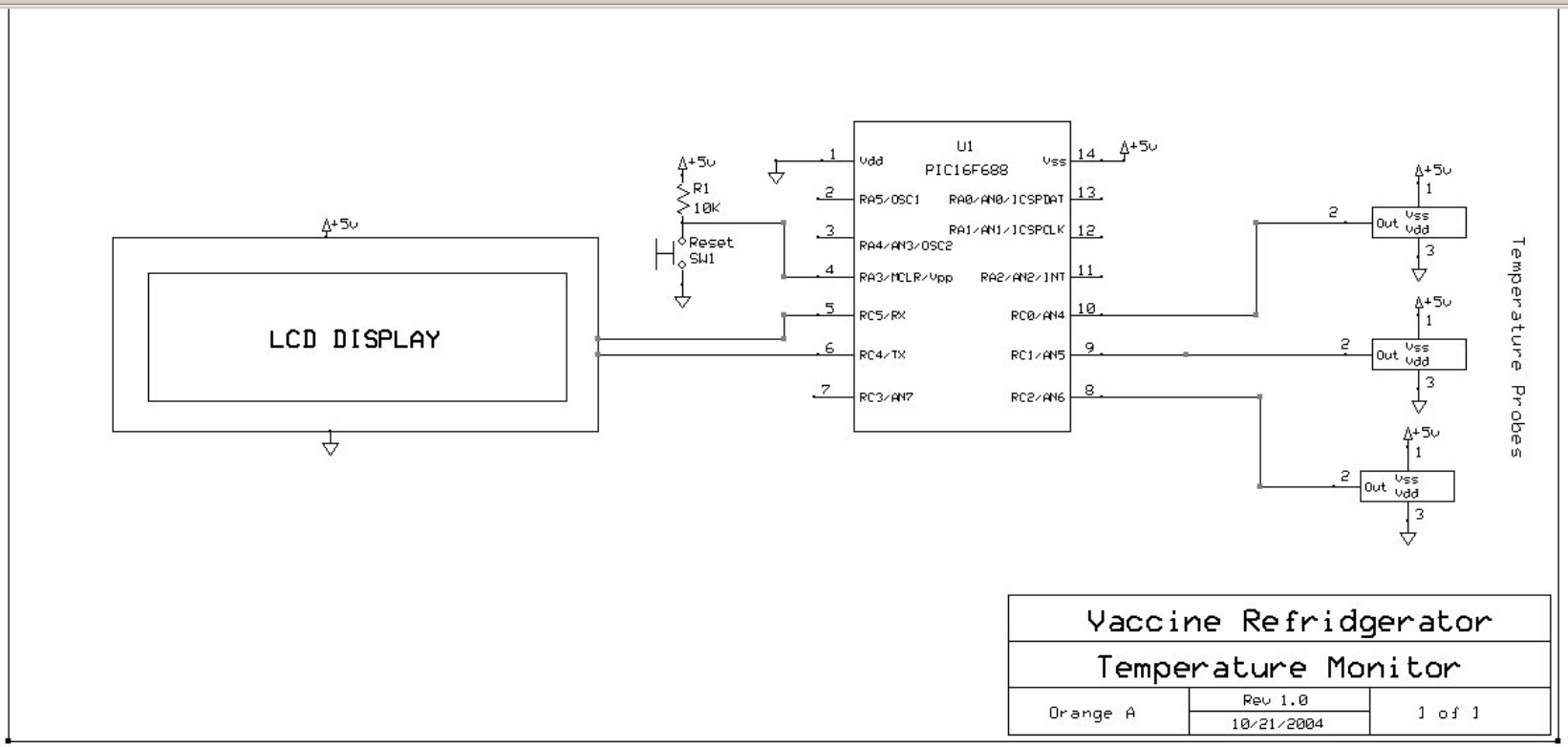
The Vacc-Pack

- Human-powered
- Well-insulated
- Ample room for vaccines
- Easy to carry
- Monitored temperature
- Motor-less
- Inexpensive
- Easy to manufacture
- Satisfies WHO specs
- Minimal moving parts

The Compressor



Temperature Monitor Circuit



Why not an IC motor?

- Gasoline/oil not “renewable” resource
- Additional moving parts- decrease durability

BUT: This is *definitely* a feasible alternative