Solar cold chain equipment vs solar facilities: where should we be going?

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Solar Electric Light Fund

Project Locations

PROJECT LOCATIONS

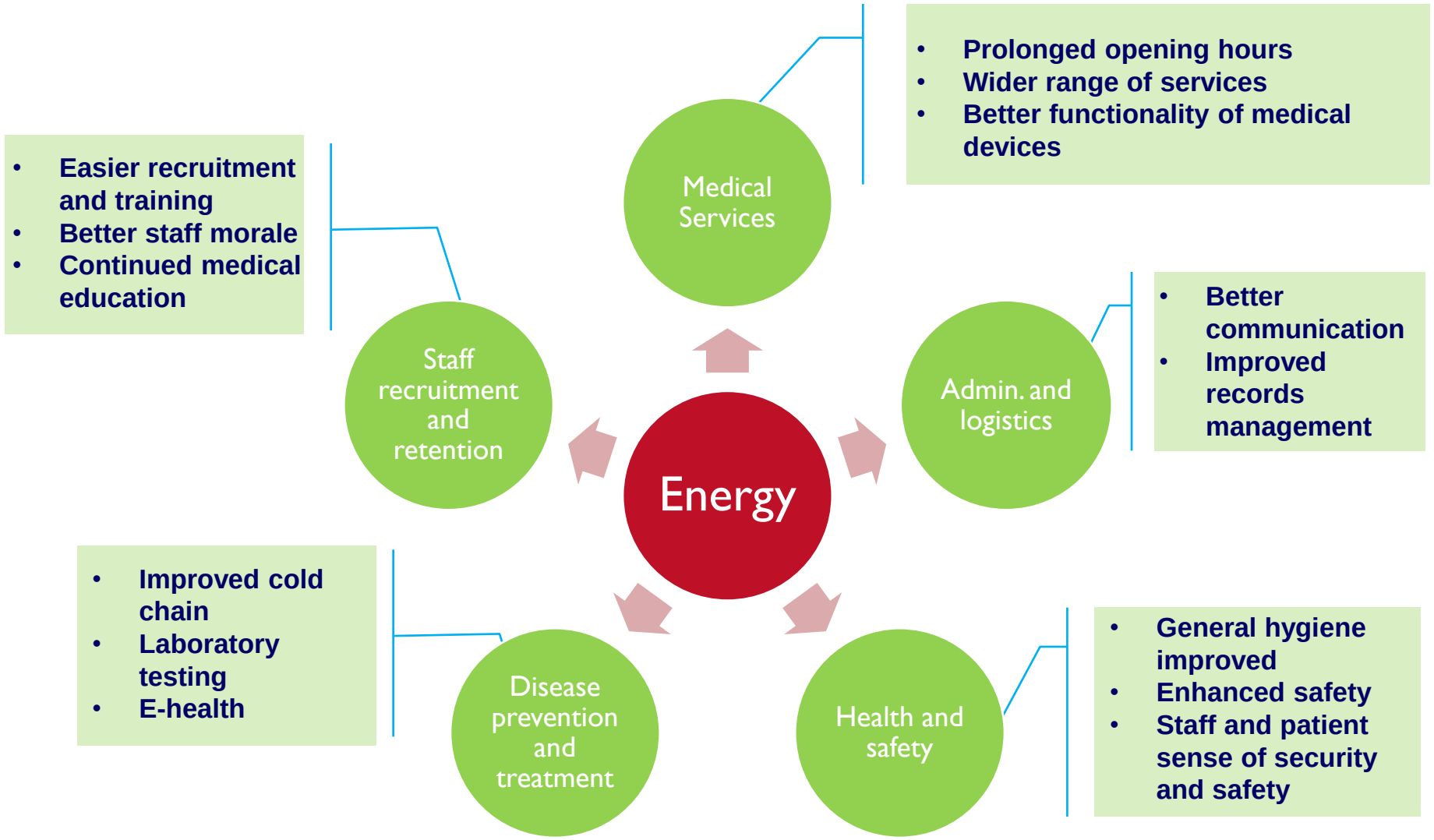
Benin*	Haiti*	Nepal	Tanzania*
Bhutan*	India	Nigeria*	Uganda
Brazil*	Indonesia	Rwanda*	United States
Burundi*	Kenya*	Solomon Islands	Vietnam
China	Lesotho*	South Africa	Zimbabwe
Colombia*	Navajo Nation	Sri Lanka	

** Includes installations for health care.*

SELF's CCE partners know energy's a problem

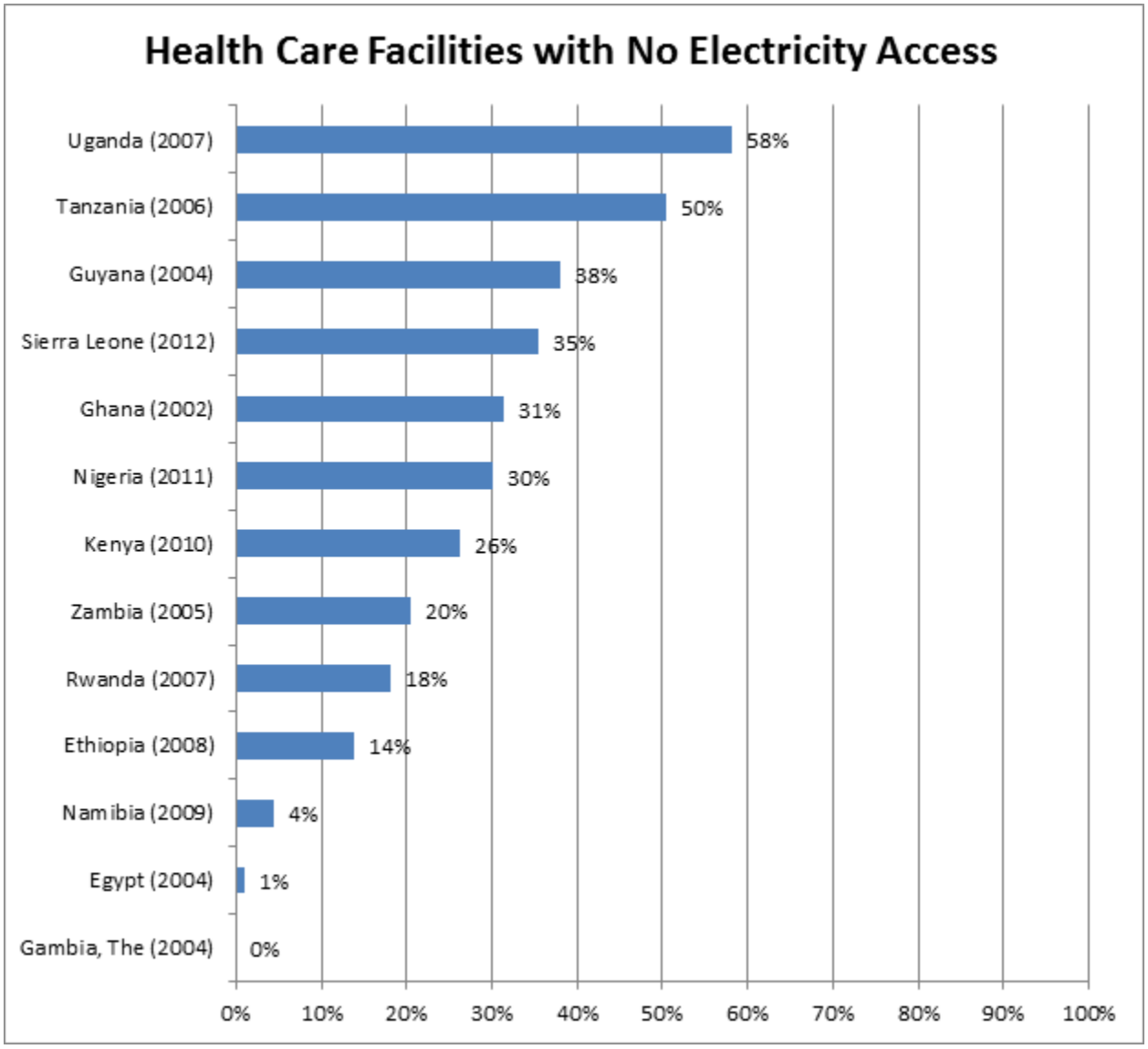
- **WHO** – advisor (PQS, Solar Guidelines)
- **World Bank/WHO** – advisor (health facility Energy Access)
- **UNICEF** – contractor (assessments, installations)
- **BMGF** – GCE awardee (SDD development)
- **AMP Logivac** – contractor (training, installation)
- **GAVI** – advisor (proposal assessment)
- **CDC** – advisor (national solar planning)
- **Partners in Health** – contractor (solar health facilities)
- **USAID** – contractor (mini grid installation)
- **Industry** – contractor (various projects)
- **Ministries of Health** – contractor (e.g. Haiti)
- **Local health workers** - across the globe.

Importance of energy to health services (in particular access to electricity)



Source: WHO and The World Bank (2015). Access to Modern Energy Services for Health Facilities in Resource – Constrained Settings. Forthcoming

Rationale



Source: WHO/IHE database.

Thousands of Health Facilities do not

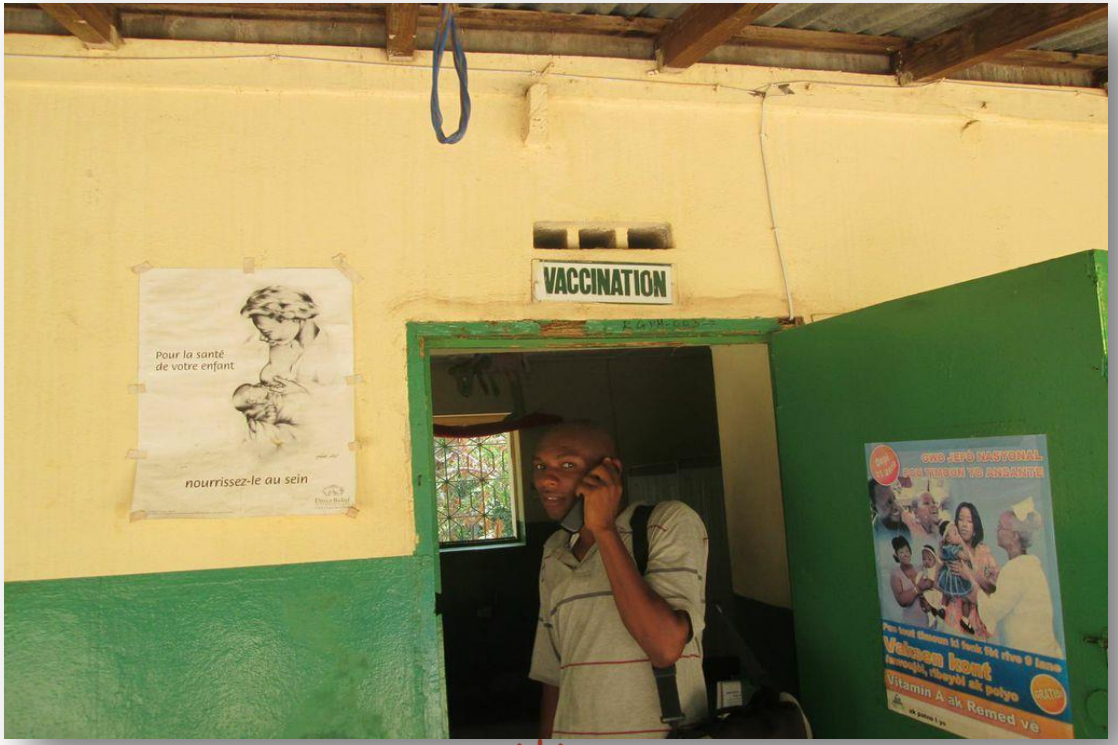
… have reliable electricity.

Thousands of Health Facilities go without

…good light, day & night.

Thousands of Health Facilities lack

…critical communications.



Questions to explore today?

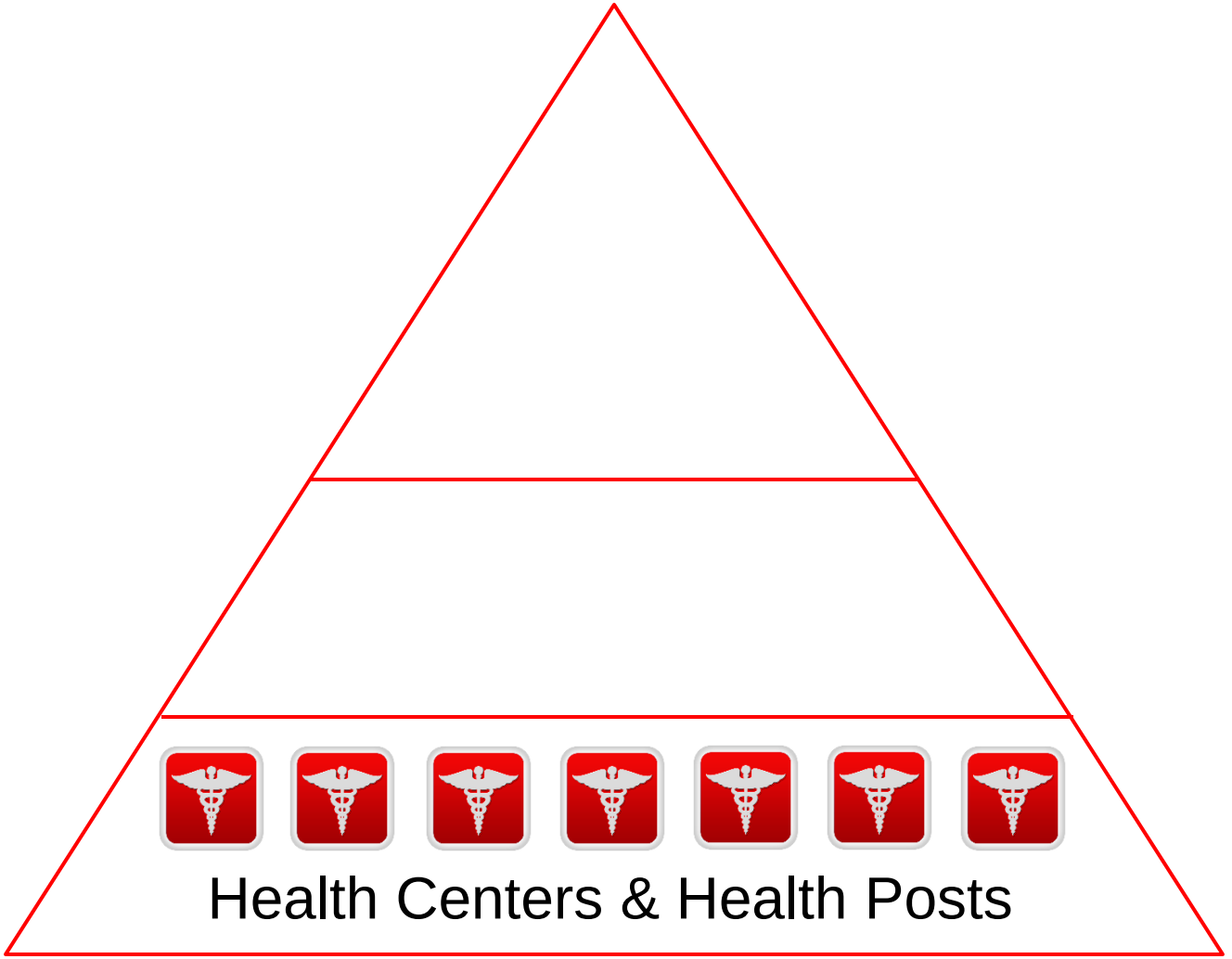
- **Should we expand solar beyond just powering Cold Chain Equipment?**
- **What are the risks of expanding solar beyond Cold Chain Equipment?**
- **If we do expand solar electricity,**
  - **What to focus on?**
  - **Where to focus?**
  - **How to implement?**

Energy supply problems

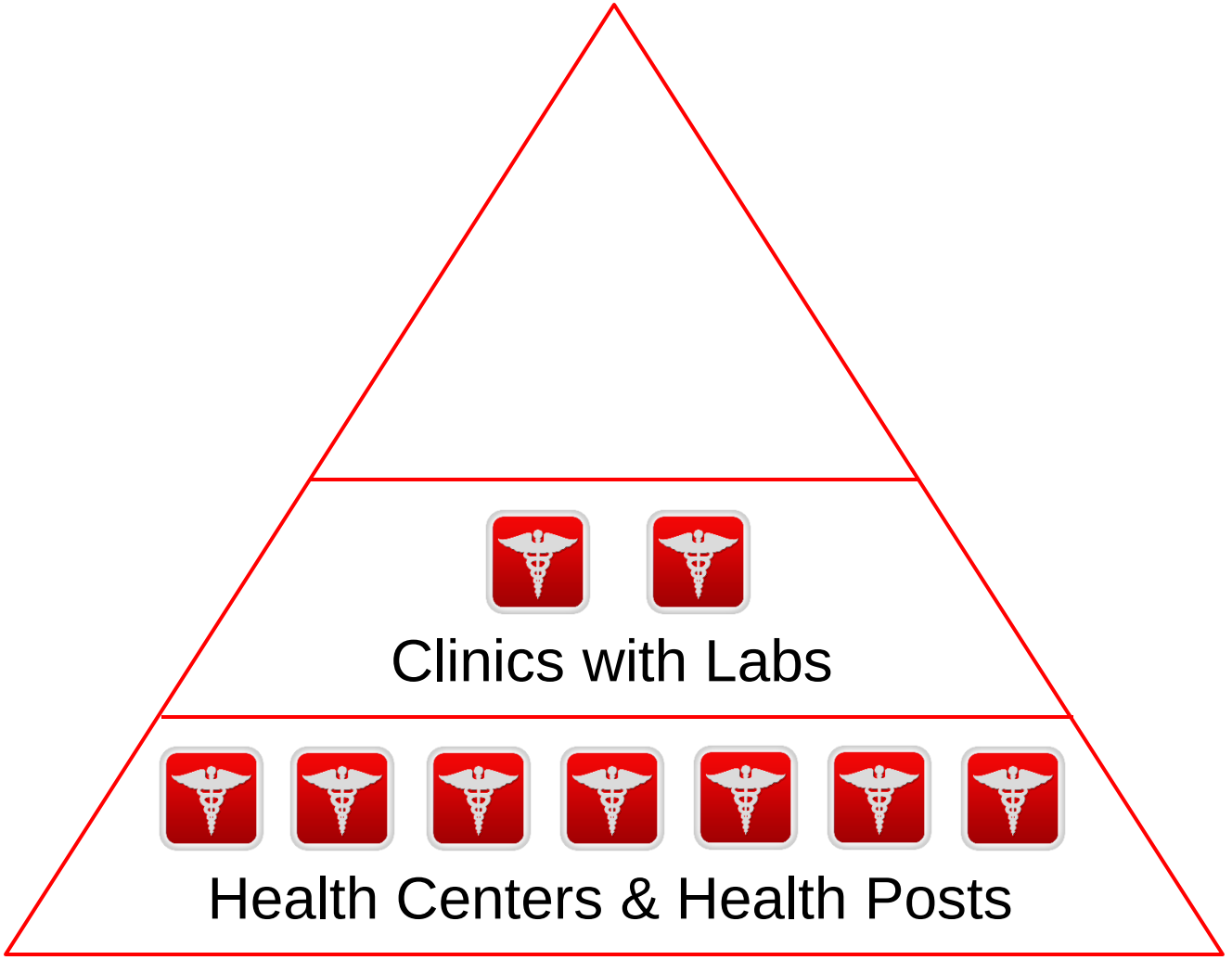
- **Facility type**
  - New construction
  - Existing

- **Energy availability/Solution(s) for needs**
  - *Not available* = requires new solution
  - *Available unreliable* = requires repair or new solution
  - *Intermittent* = backup systems
  - *Cost too high* = energy efficiency and/or alternatives
  - *Negative health/environmental impacts* = alternatives

Where is the need?



Where is the need?



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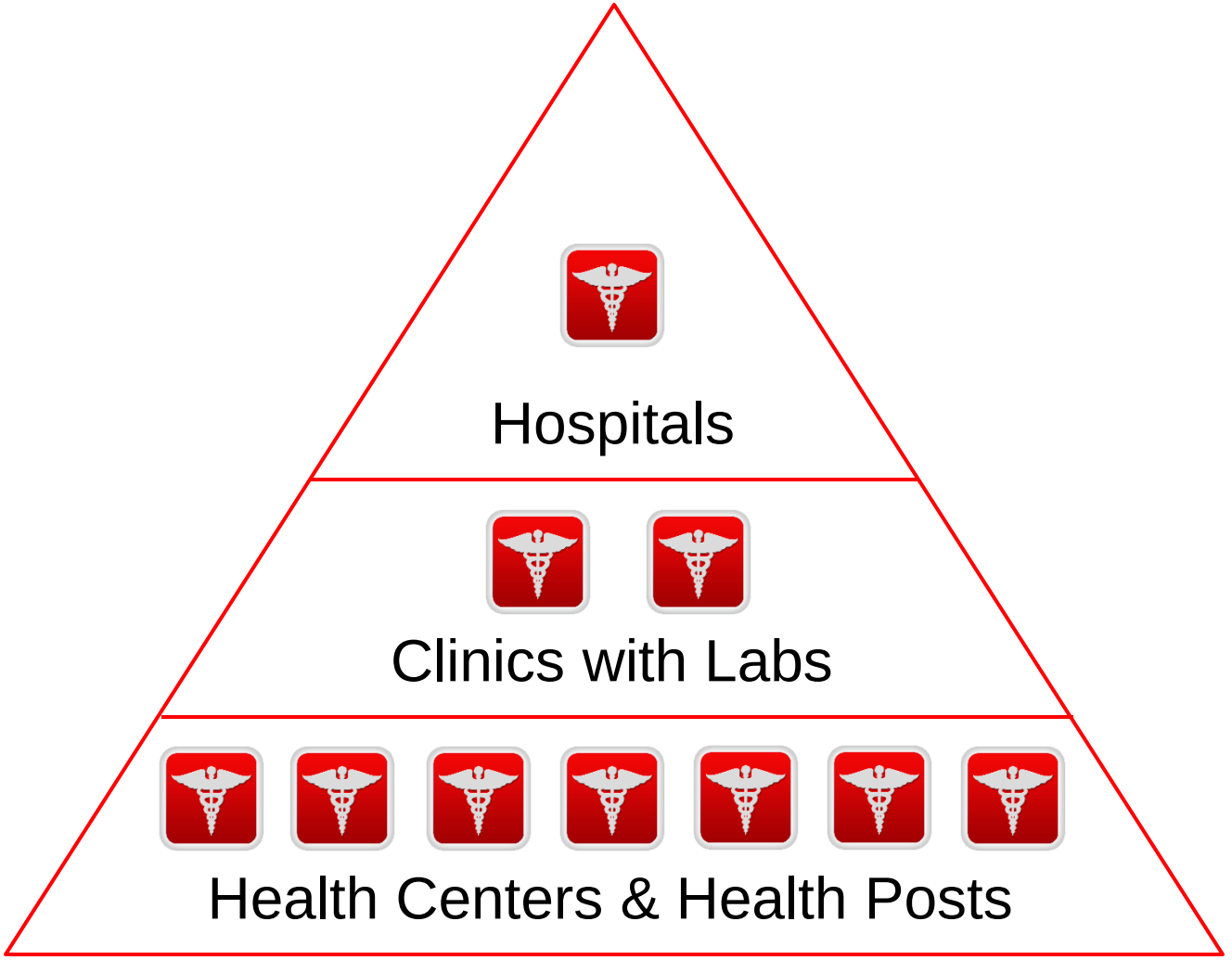
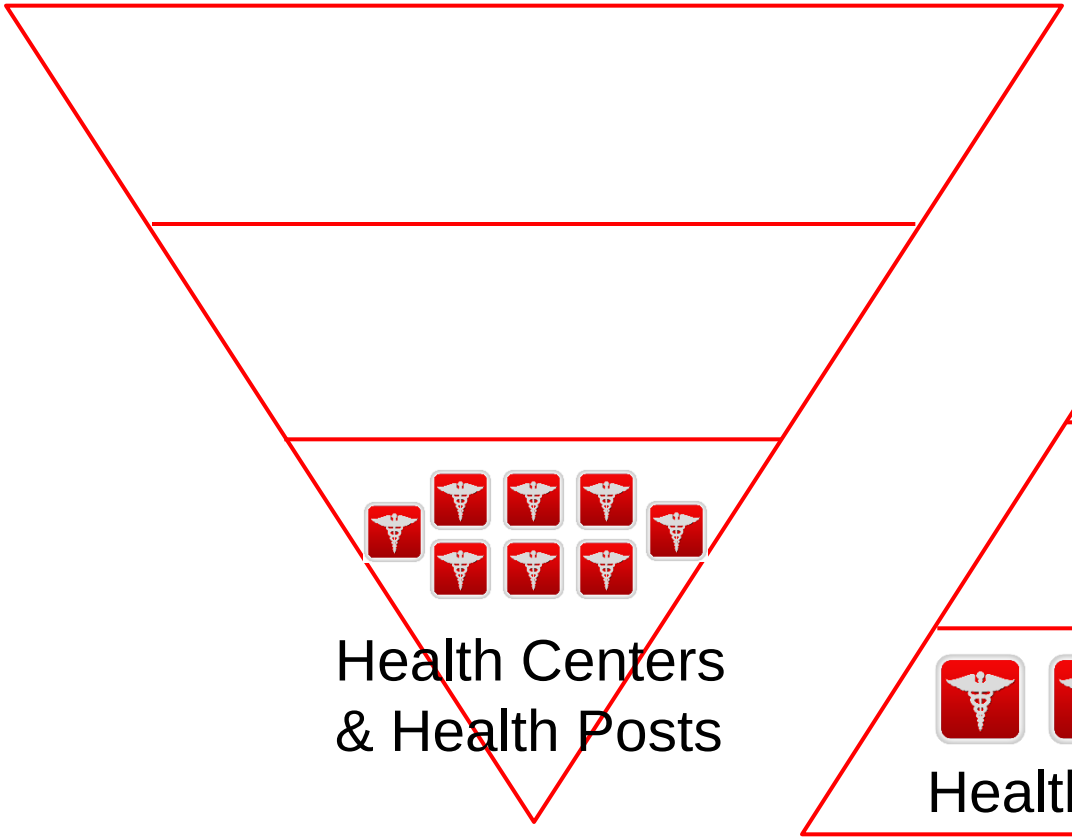
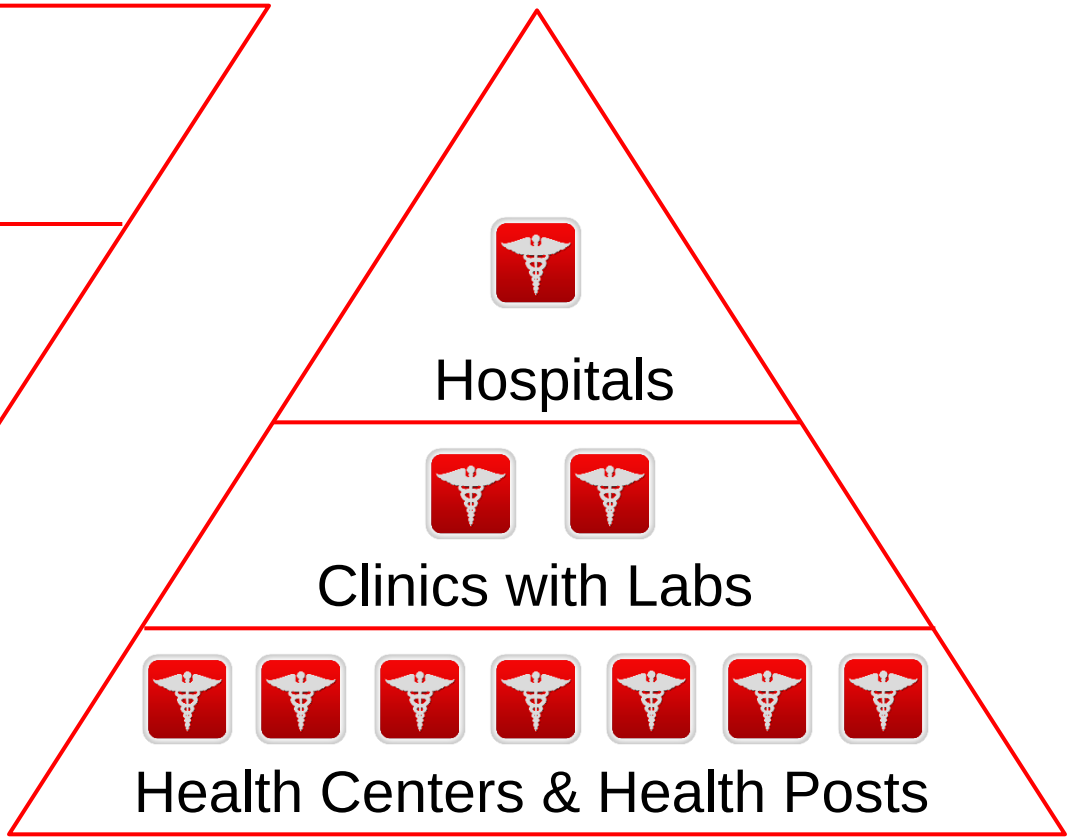
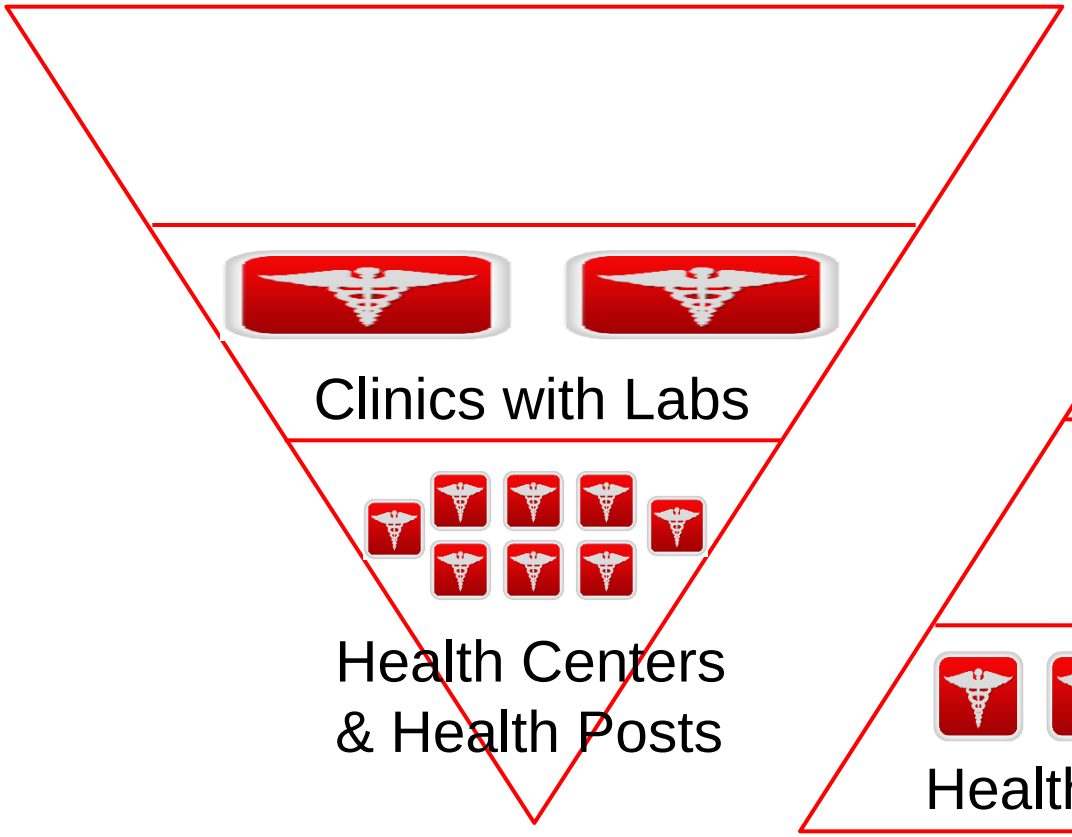


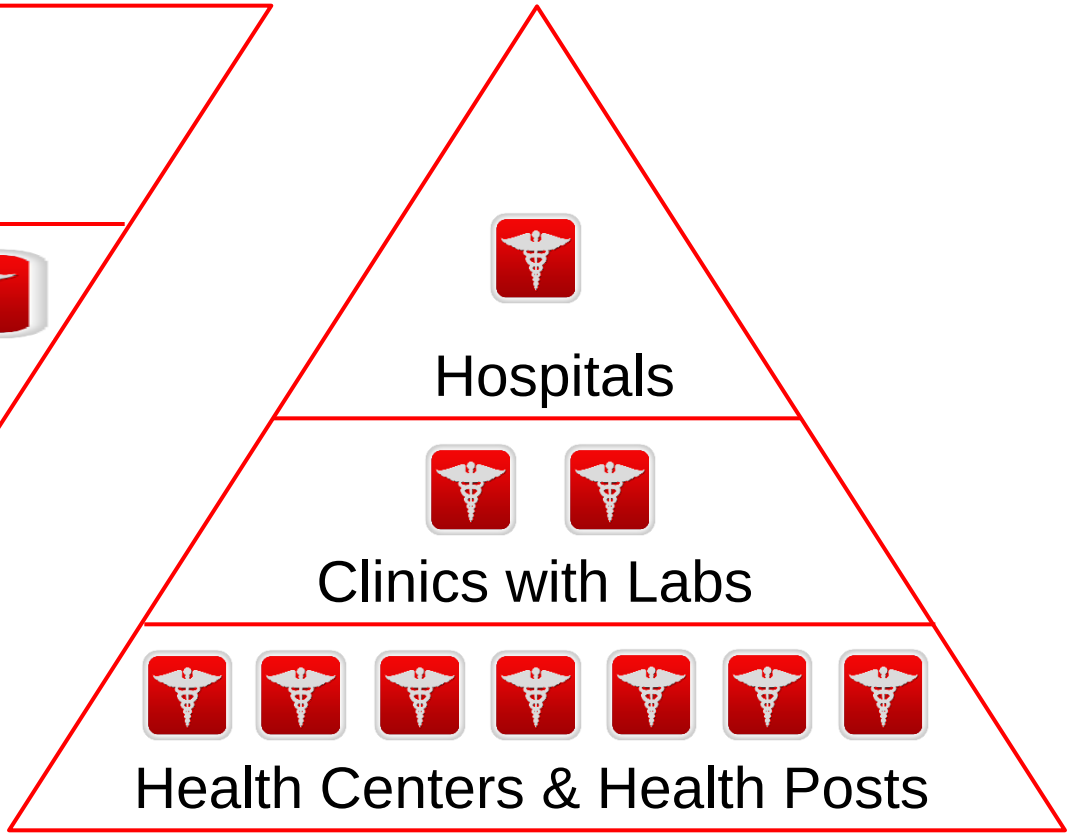
Different Energy Requirements





Different Energy Requirements





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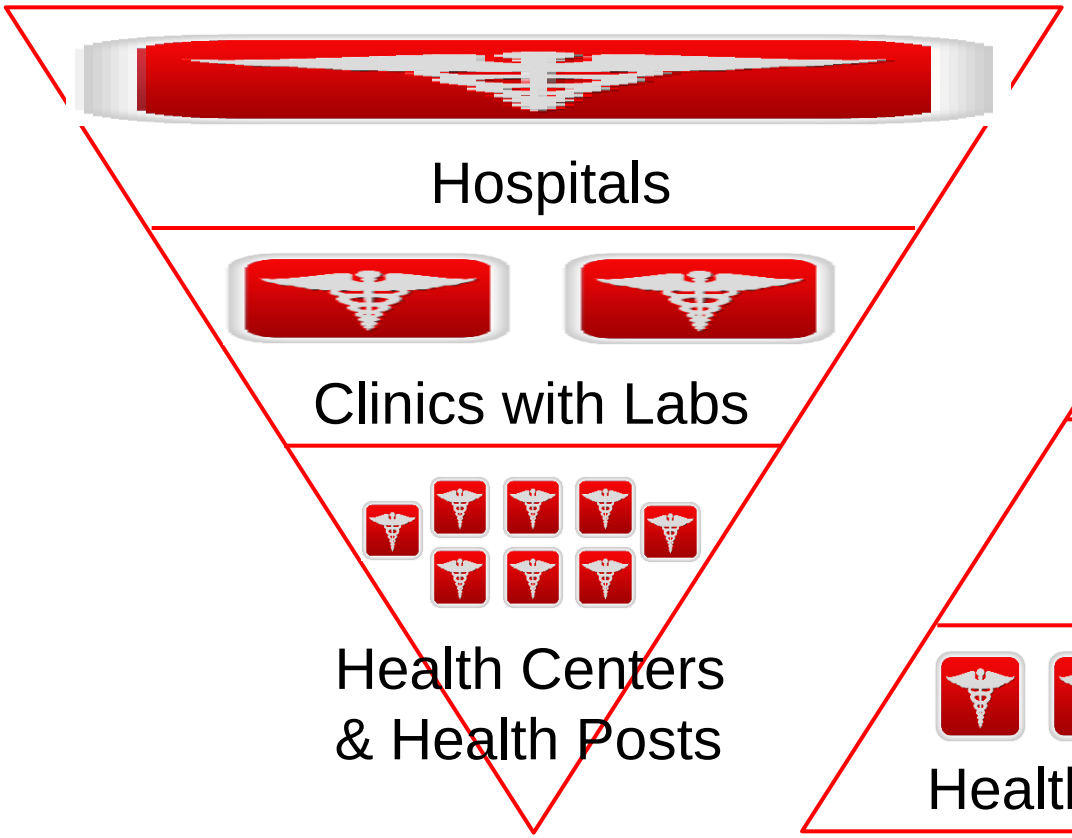
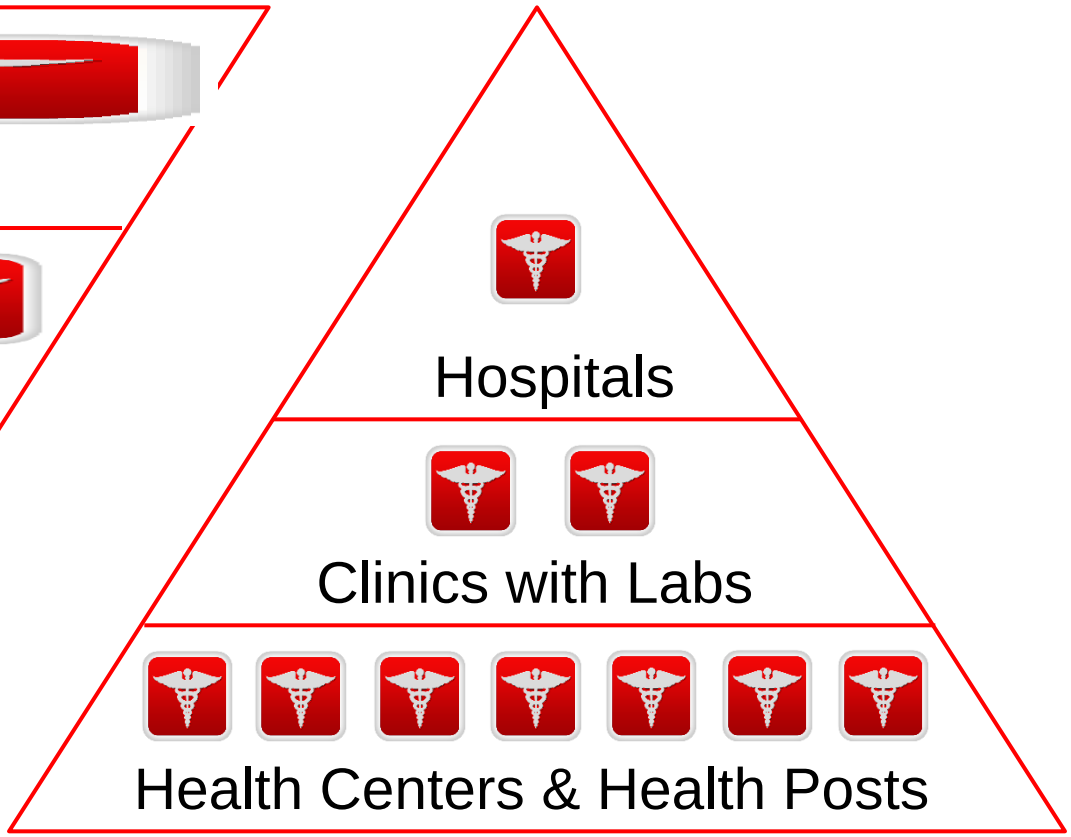
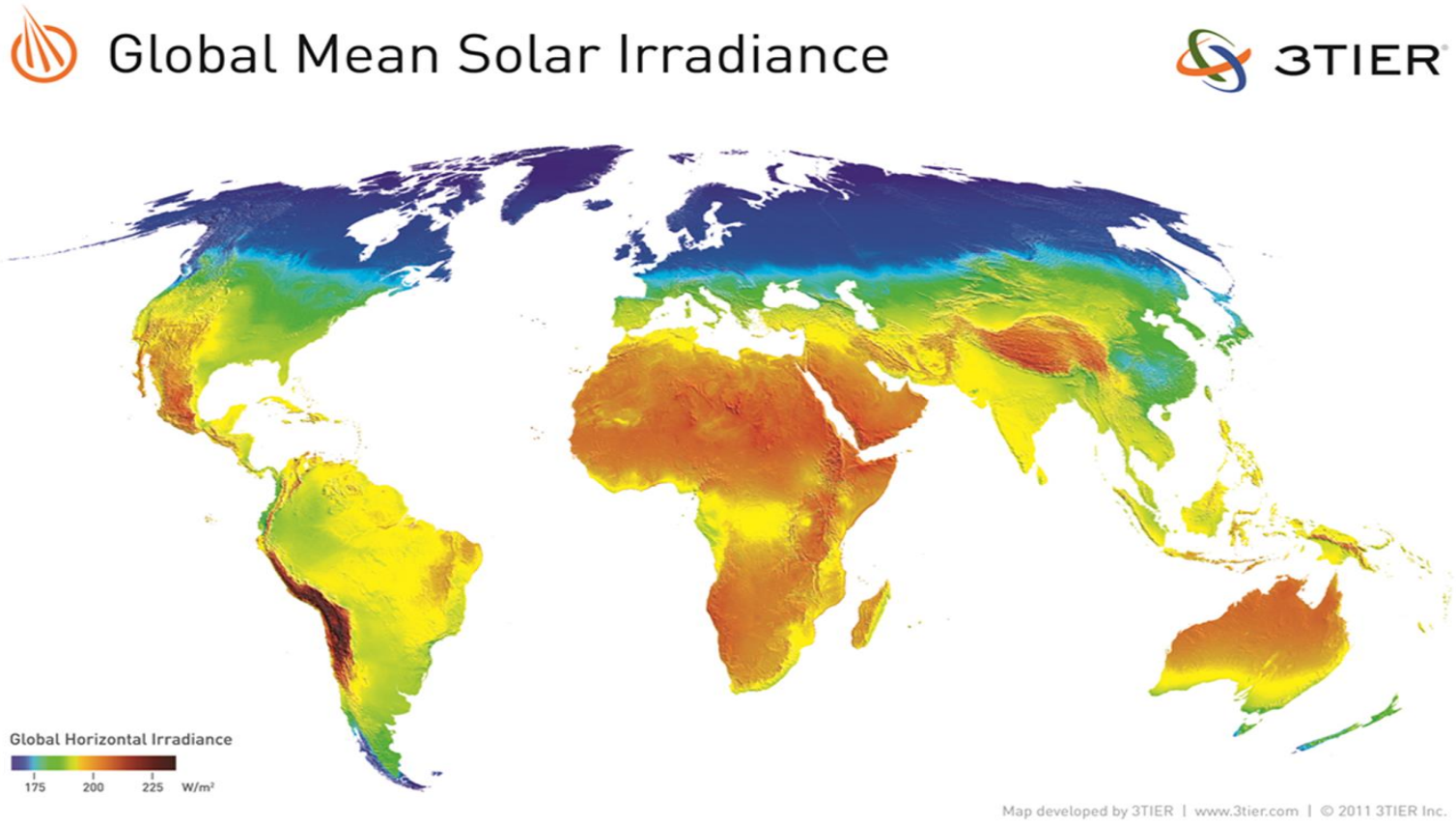




Energy supply options plentiful

- WHY FOCUS ON SOLAR?

Ample solar is widely available



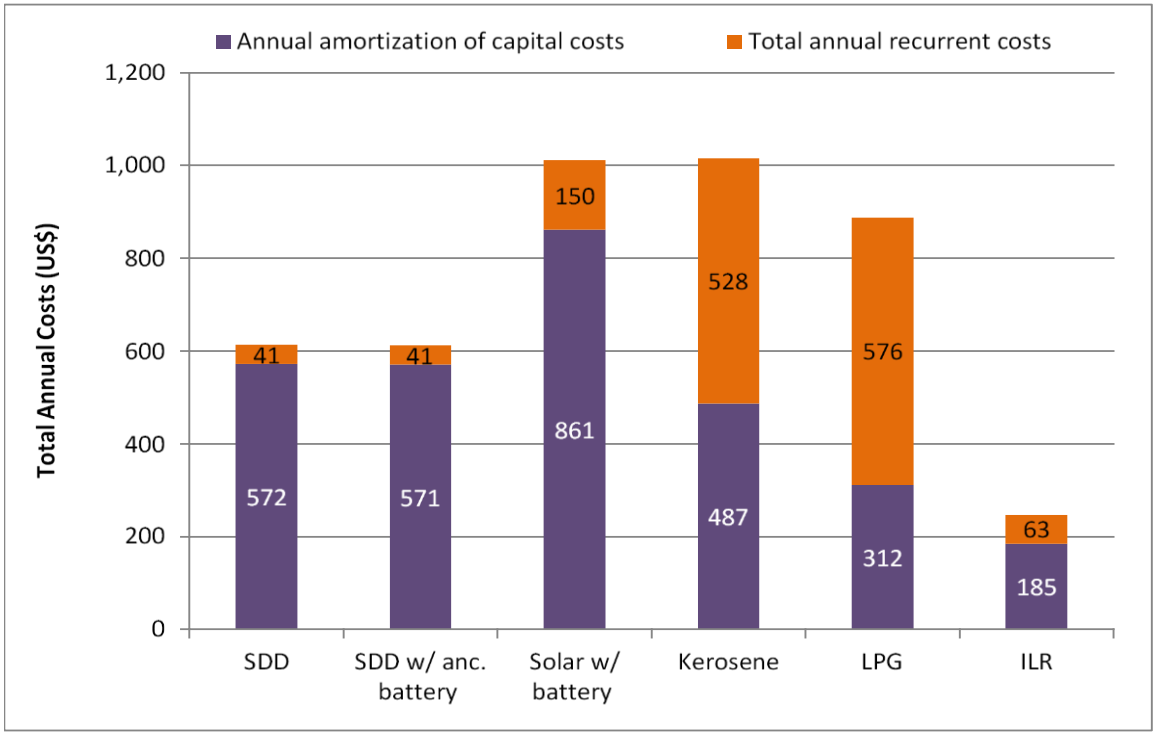
Reliability, Quality, Continuous, Clean

…as an example, consider solar fridges

- Recent advances have improved reliability
- Quality of electricity is not an issue.
- Continuous energy for operation even in hottest climates.
- Solar has less environmental impacts, is cleaner than many other widespread options.
- Better temperature control than absorption.

Life cost of solar better than fuel

Figure 1. Example average estimated annualized cost for purchase, installation, operation and maintenance of PQS-prequalified refrigerator types



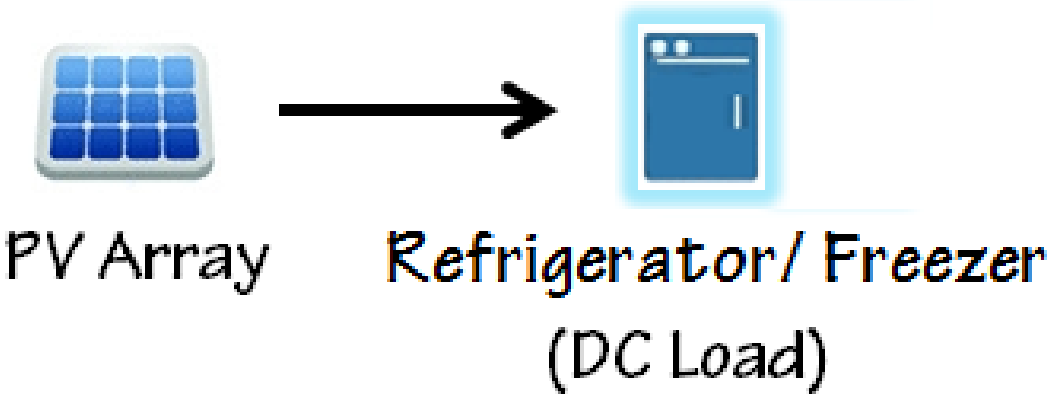
Acronyms: LPG – liquid petroleum gas; ILR – ice-lined refrigerator; SDD – solar direct drive.

Source: Cold Chain Refrigeration Life-Cost Model, 2014. PATH.

Example power need differences

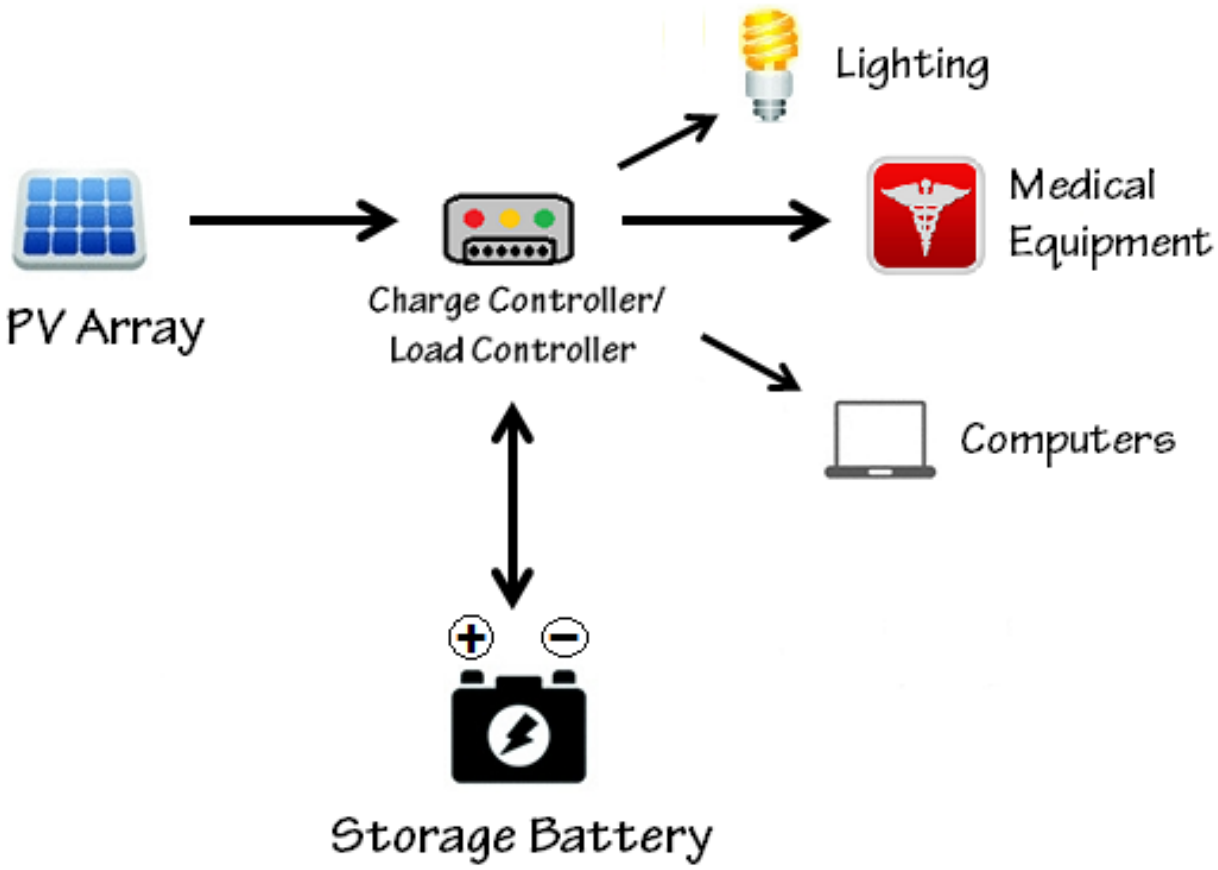
Service	Loads	Ave. Consumption	Solar power system (3.5 pk sun)
Immunization only	Refrigerator/freezer	700 Wh/day	400 Watts, no battery (SDD)
Health Post	Add lights, cell phone charging, RTMD, laptop	1,000 Wh/day	400 – 600 Watts, battery needed
Health Center with basic lab	Add lab/medical devices, internet	10,000 Wh/day	2400 Watts, large battery, inverter
Clinic with standard lab	Add more internet, lab/medical devices, and staff housing	25,000 Wh/day	6000 Watts, battery & inverter (generator?)

Immunization: Solar Vaccine Refrigerator



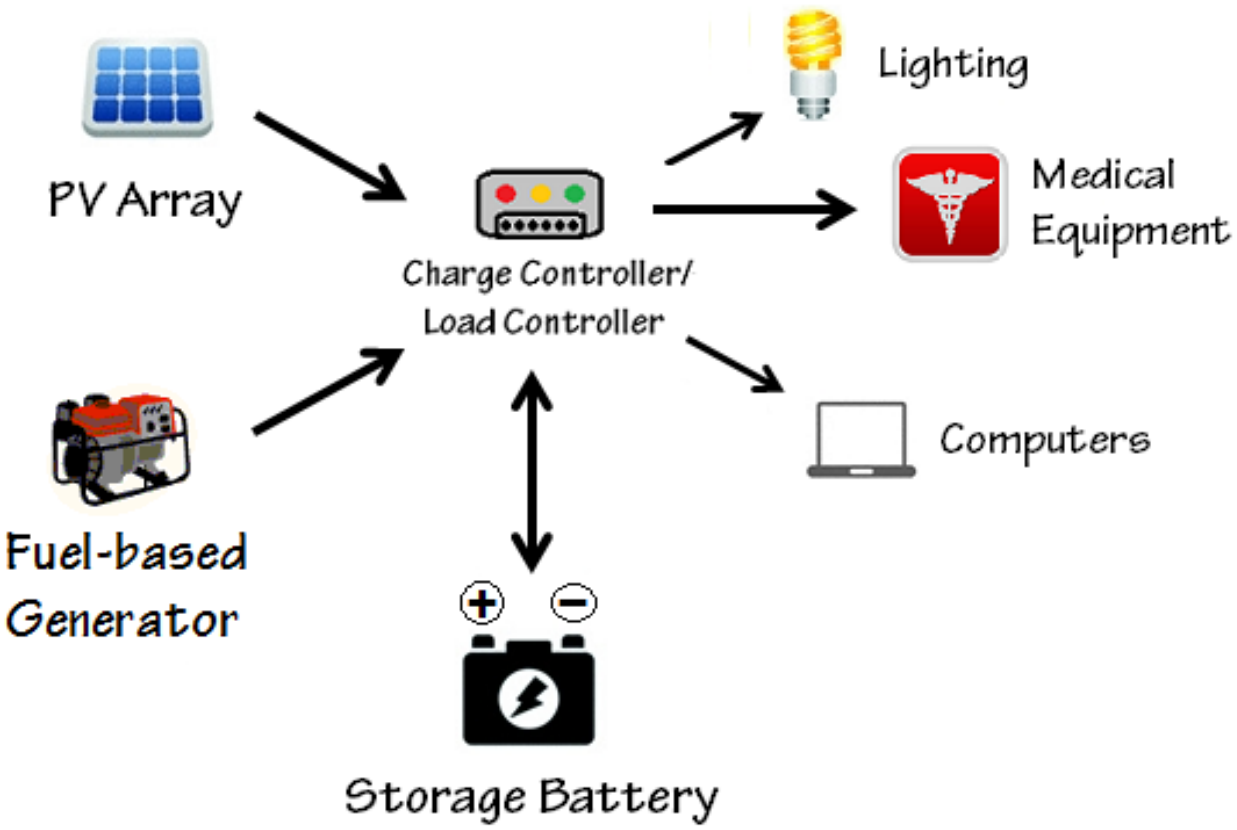
SDD = Simple systems, no large battery

Health Center with Basic Lab

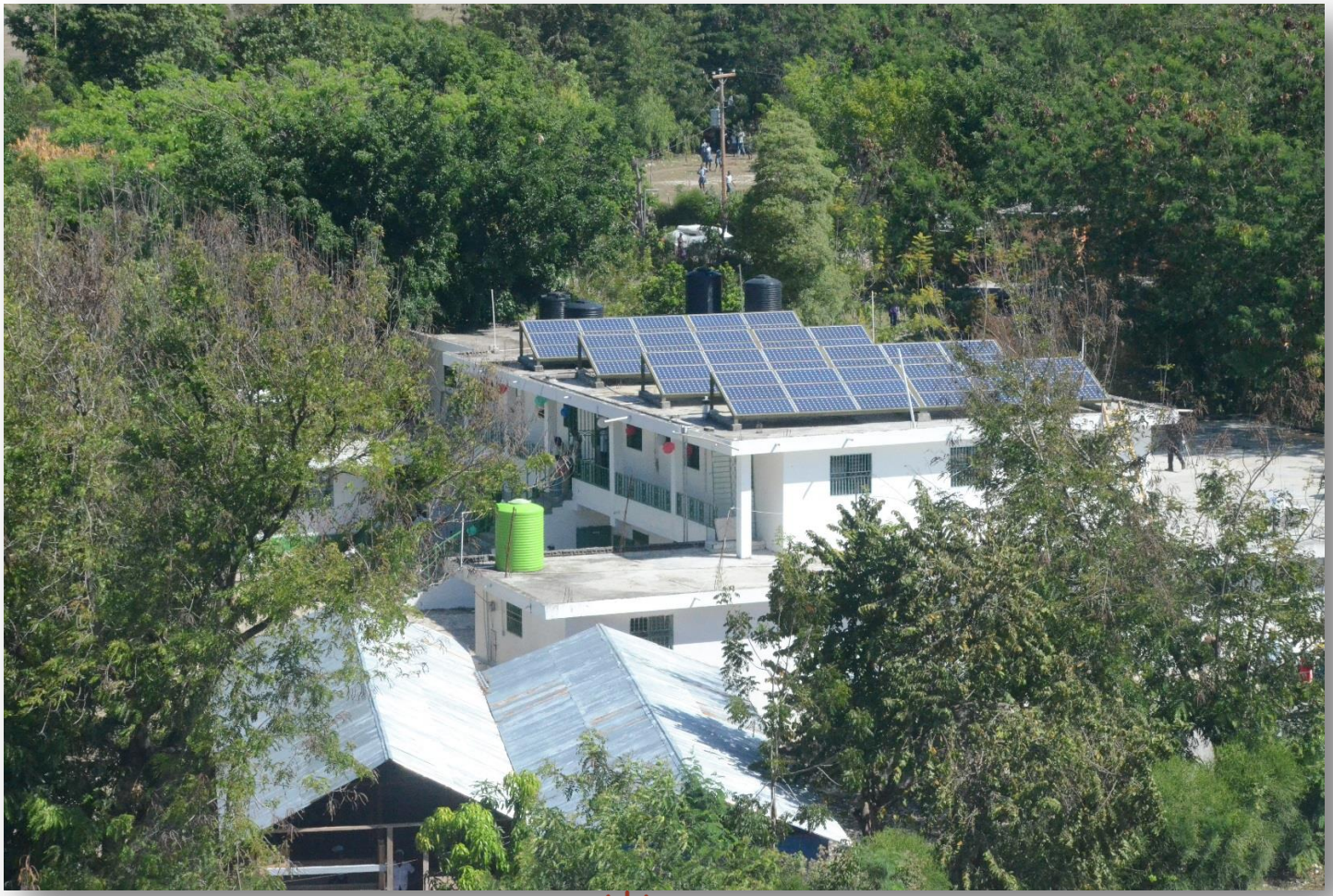


More equipment, complexity & battery

Clinic with Standard Lab & Generator



Larger systems =
more space, complexity, and capital costs



…can we agree that…

- many “functionally off grid” health facilities exist,
- energy needs range from basic to sophisticated,
- as needs increase costs and complexity increase,
- solar electricity is a widely available option,
- solar vaccine fridges are a workable solution,
- solar fridge purchases are expected to continue, so we are already going to power problem areas.

But solar power systems for vaccine fridges do not meet other electric needs. Why? Why not?

Specification barrier

- **WHO PQS E003 PV01.2** Solar power system for vaccine refrigerators.

  "No additional loads, such as lighting or pumping, are to be connected to the solar power system."

- Specification intended to protect vaccines.
- Originated with battery based solar refrigerators.
- Solar was sized just for the predictable fridge because adding other *loads* is unpredictable and can overtax the power and battery capacity.

Specification change possible

Proposed PQS change for 2017

"A system that is able to provide spare power for other approved facility electrical loads (e.g. rechargeable cold chain support devices such as temperature monitoring devices, mobile phone charging, computing, and lighting) is acceptable provided the refrigerator is always prioritized ahead of other power uses".

How? Harvest surplus electricity without compromising vaccine storage.

Your turn now!

- What do you think is the best way ahead for the Immunization community?

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- **Should we expand solar beyond just powering Cold Chain Equipment?**
- **<u>If yes</u>,**
  - **What to focus on?**
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Thanks to You!

Let’s do it!