

A Brief Overview of Energy Storage



Energy for a sustainable future



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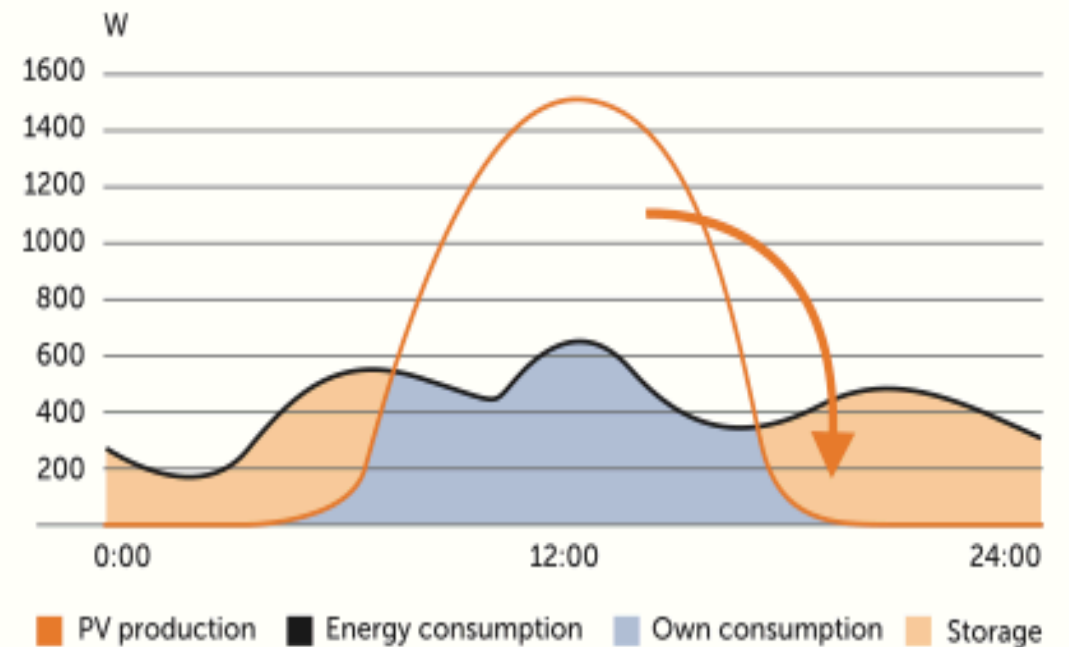
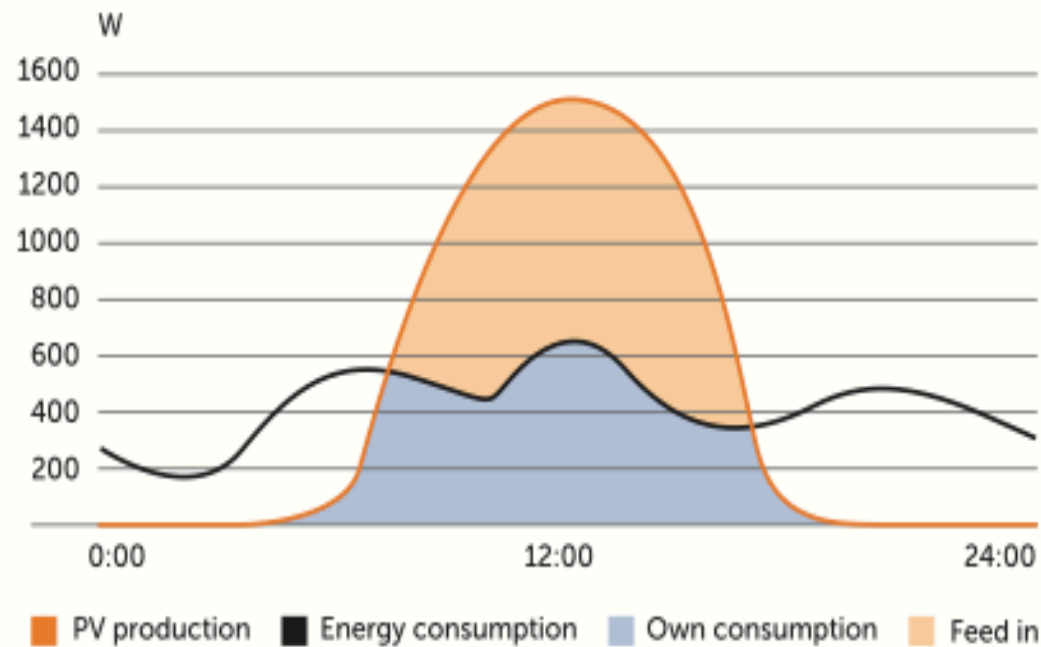
GridEdge CEO





How can the battery storage save money?

Solar generation and battery storage

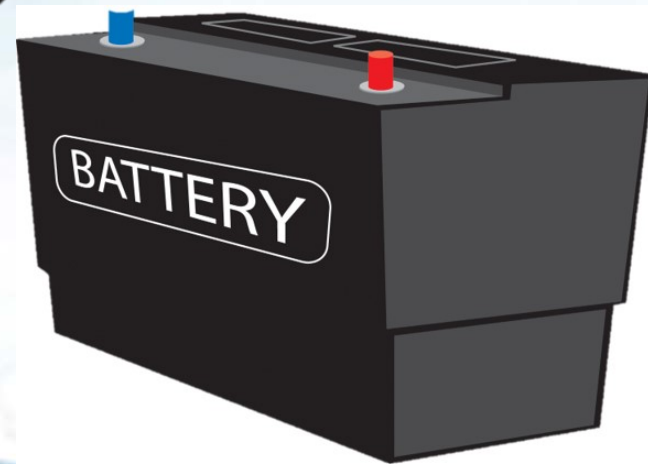




Storage of power



Gridedge





What is a battery?







Lead based batteries.

Battery Types

- ▶ Disadvantages
- ▶ Emit explosive hydrogen.
- ▶ Large and Heavy.
- ▶ Contains lead
- ▶ Low DOD
- ▶ Require maintenance
- ▶ Can't easily add capacity

- ▶ Advantages
- ▶ 1. Cheap
- ▶ 2. Proven technology.
- ▶ 3. Recyclable??





“Improved Lead”

► Disadvantages

- 1. Large and Heavy.
- 2. Contains lead
- 3. May not be recyclable
- 4. Can't easily add capacity

► Advantages

- 1. Slightly better DOD 50%
- 2. None to very little explosive gases
- 3. Proven technology.
- 4. Recyclable but not 100%,
- 5. No Maintenance

Battery Types





Nickel iron

Battery Types

- ▶ Disadvantages
- ▶ 1. Large and Heavy.
- ▶ 2. More cells needed
- ▶ 3. Requires maintenance
- ▶ 4. Not all chargers capable of charging.
- ▶ Advantages
- ▶ 1. Reasonable DOD, extremely long life.
- ▶ 2. None to very little explosive gases
- ▶ 3. Proven technology.
- ▶ 4. Fully recyclable.
- ▶ 5. No Dangerous metals
- ▶ 6. Can add capacity





Lithium varieties

- ▶ Disadvantages
 - ▶ 1. Unproven as large scale storage.
 - ▶ 2. Not recyclable
 - ▶ 3. Very poor operating temperature range 0 to 40 degrees C
 - ▶ 4. Can't be transported by plane as too dangerous.
 - ▶ Thermal Runaway risk.
-
- ▶ Advantages
 - ▶ 1. Very good DOD 80%
 - ▶ 2. No explosive gases
 - ▶ 3. Compact
 - ▶ 4. Light weight.

Battery Types





Flow batteries.

Battery Types

- ▶ Disadvantages
- ▶ 1. Expensive.
- ▶ 2. Extremely large and heavy
- ▶ 3. Mechanical pump
- ▶ 4. Solution can be toxic
- ▶ Advantages
- ▶ 1. Very good DOD 100%
- ▶ 2. No explosive gases
- ▶ 3. Replaceable cell
- ▶ 5. Can add capacity





Salt water battery

Battery Types

► Disadvantages

- 1. Very expensive.
- 2. Slow to discharge
- 3. Slow to charge
- 4. Low power availability
- 5. Extremely large and heavy

► Advantages

- 1. Very good DOD 80% and good life.
- 2. No explosive gases
- 3. Fully recyclable
- 4. Safe by design
- 5. Can easily add capacity





Sodium Nickel or salt battery

Battery Types

► Disadvantages

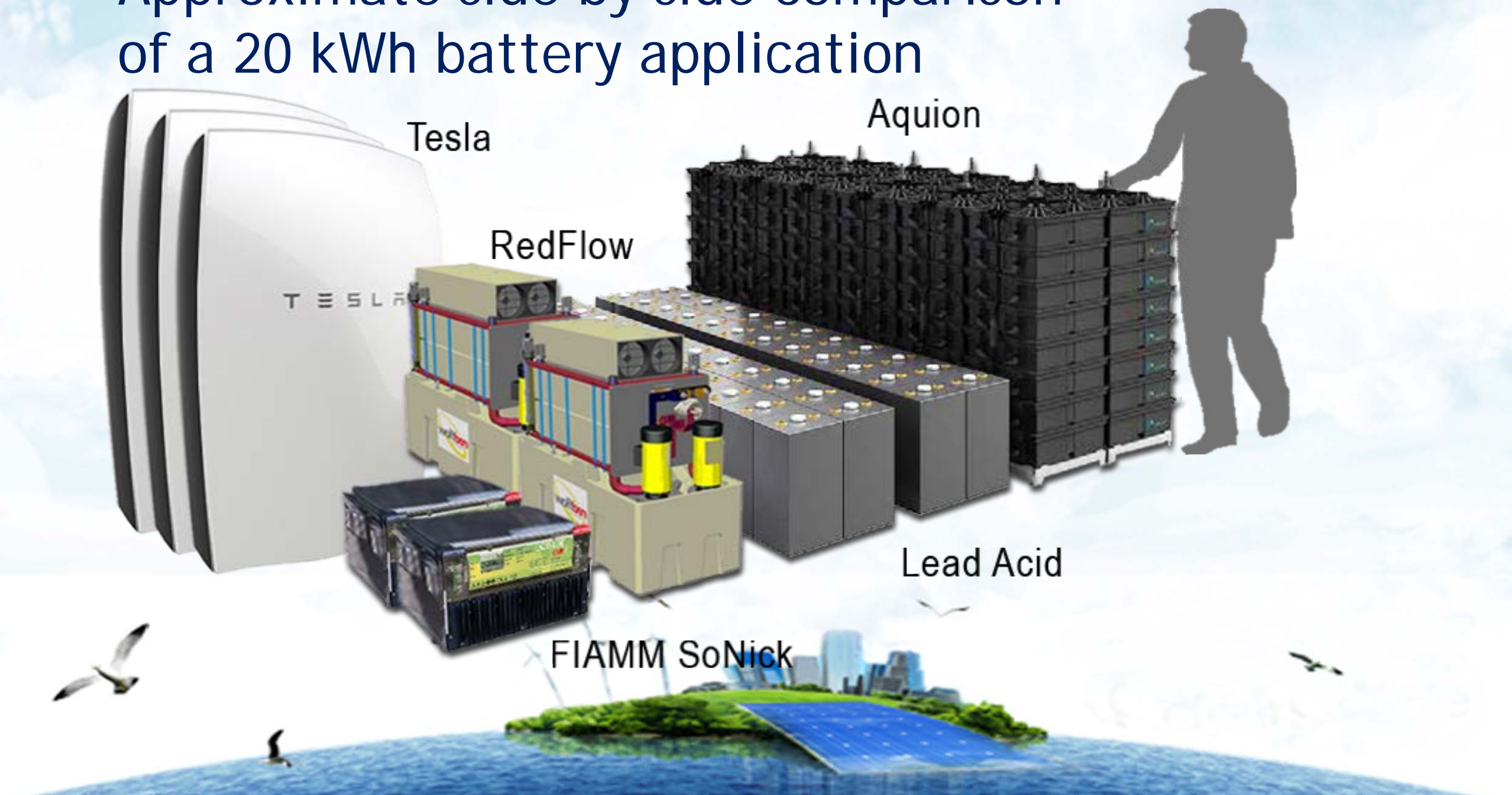
- 1. More expensive . (made in Switzerland)

► Advantages

- 1. Very good DOD 80% and good life.
- 2. No explosive gases
- 3. Compact
- 4. Light weight.
- 5. Fully recyclable
- 6. Best operating temperature of all batteries -20 to 60 degrees C
- 7. Extremely safe by design
- 5. Can easily add capacity



Approximate side by side comparison of a 20 kWh battery application



Motivations for Storing power





Not all storage systems are the same

- ▶ A Grid supported system is still the cheapest form of backup.
- ▶ Not all systems work in the same way.
- ▶ Not all solar / battery systems work when power goes down.
- ▶ Solar Not essential for a Battery System.
- ▶ Pre installed solar may need upgrading for storage.
- ▶ The ultimate off grid system may need to employ a generator.



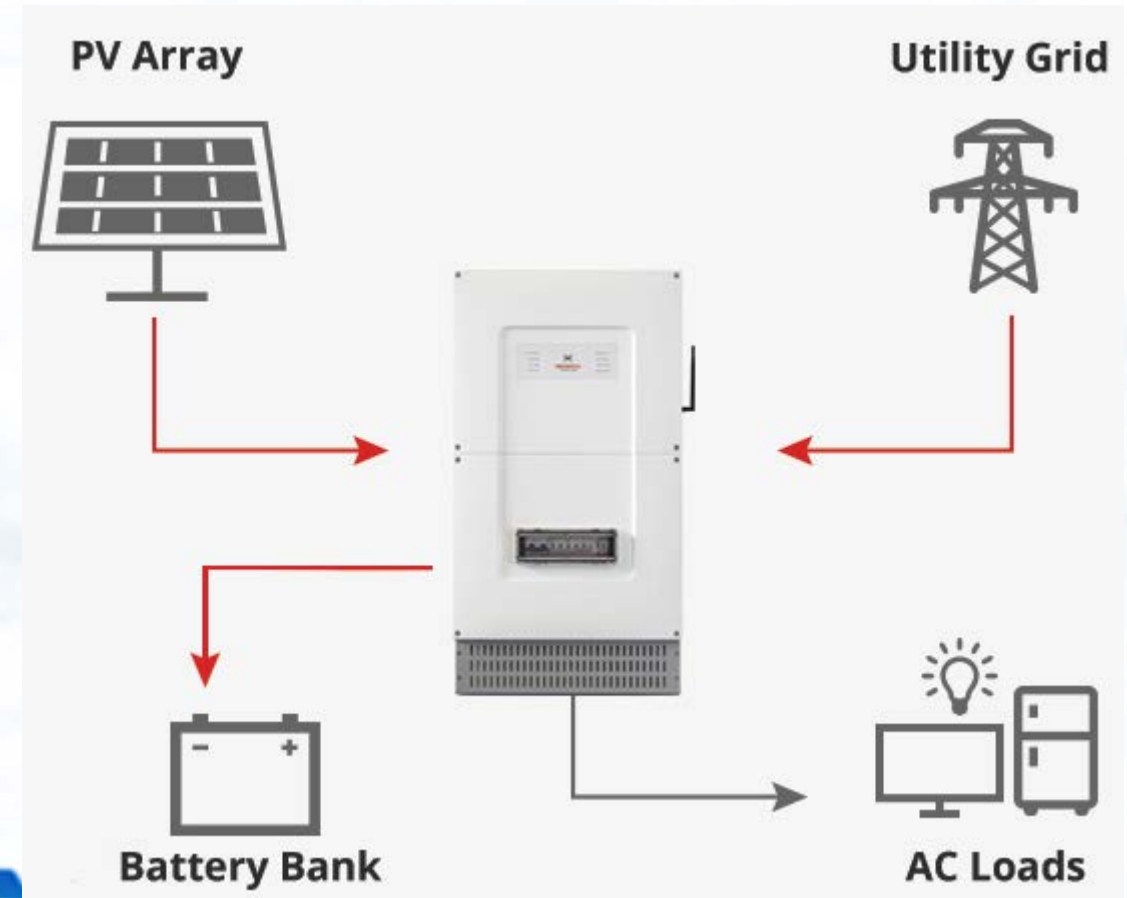


Battery add on to Existing solar inverter

- ▶ Disadvantages
- ▶ 1. No power when grid gone
- ▶ 2. Not able to support large loads in most houses
- ▶ 3. Can only be added to some Grid connected

Solar inverters

- ▶ Advantages
- ▶ 1. Cheap
- ▶ 2. Saves some money by shifting some stored renewable energy





Grid Support system "Grid Hybrid"

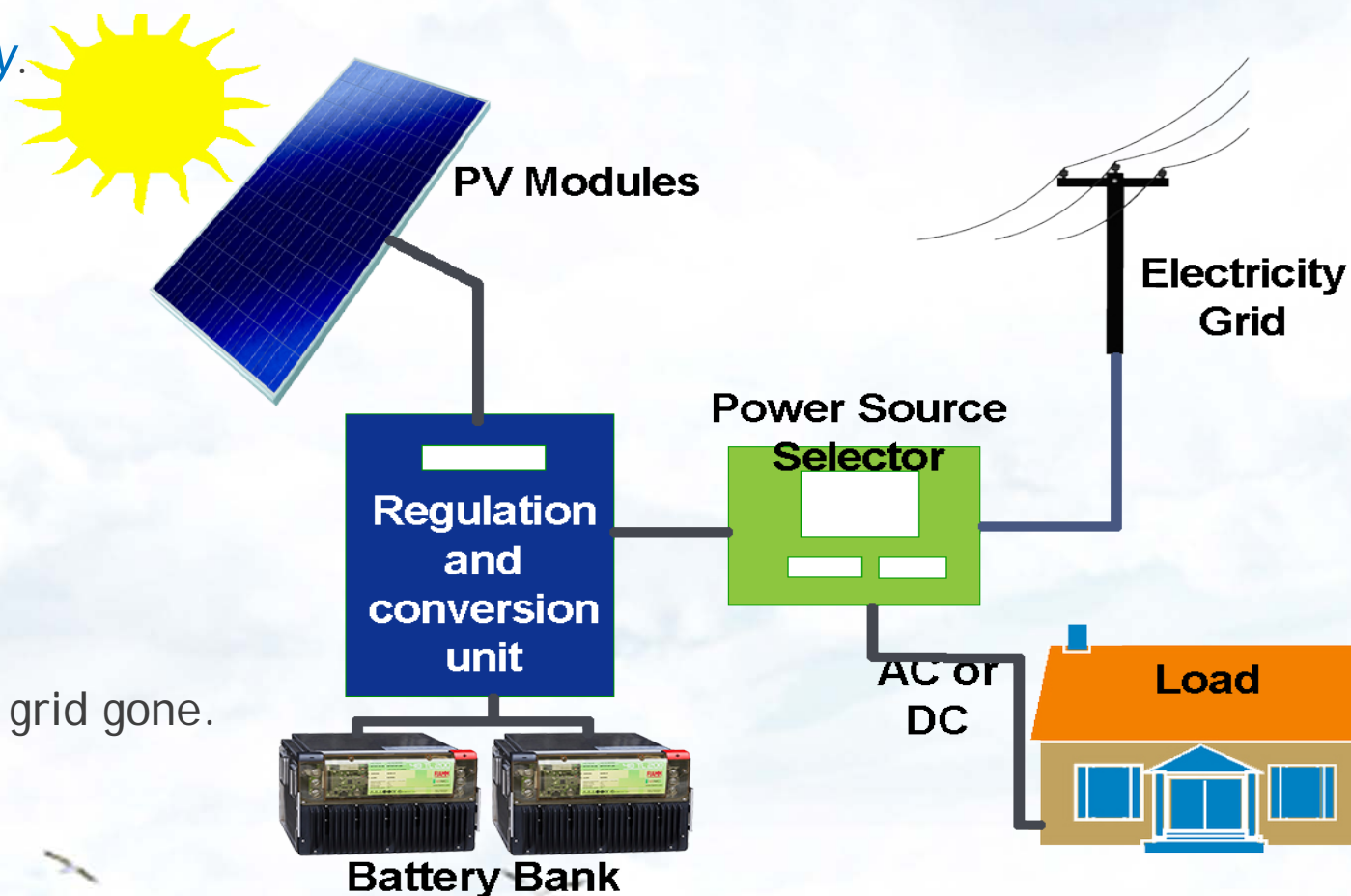
Add on inverter/charger and battery.

► Disadvantages

- 1. More expensive
- 2. Requires more space.

► Advantages

- 1. Power when grid gone
- 2. Able to support most loads
- 3. Shift stored energy
- 4. Solar or battery can be used when grid gone.
- 5. Able to support diversion loads





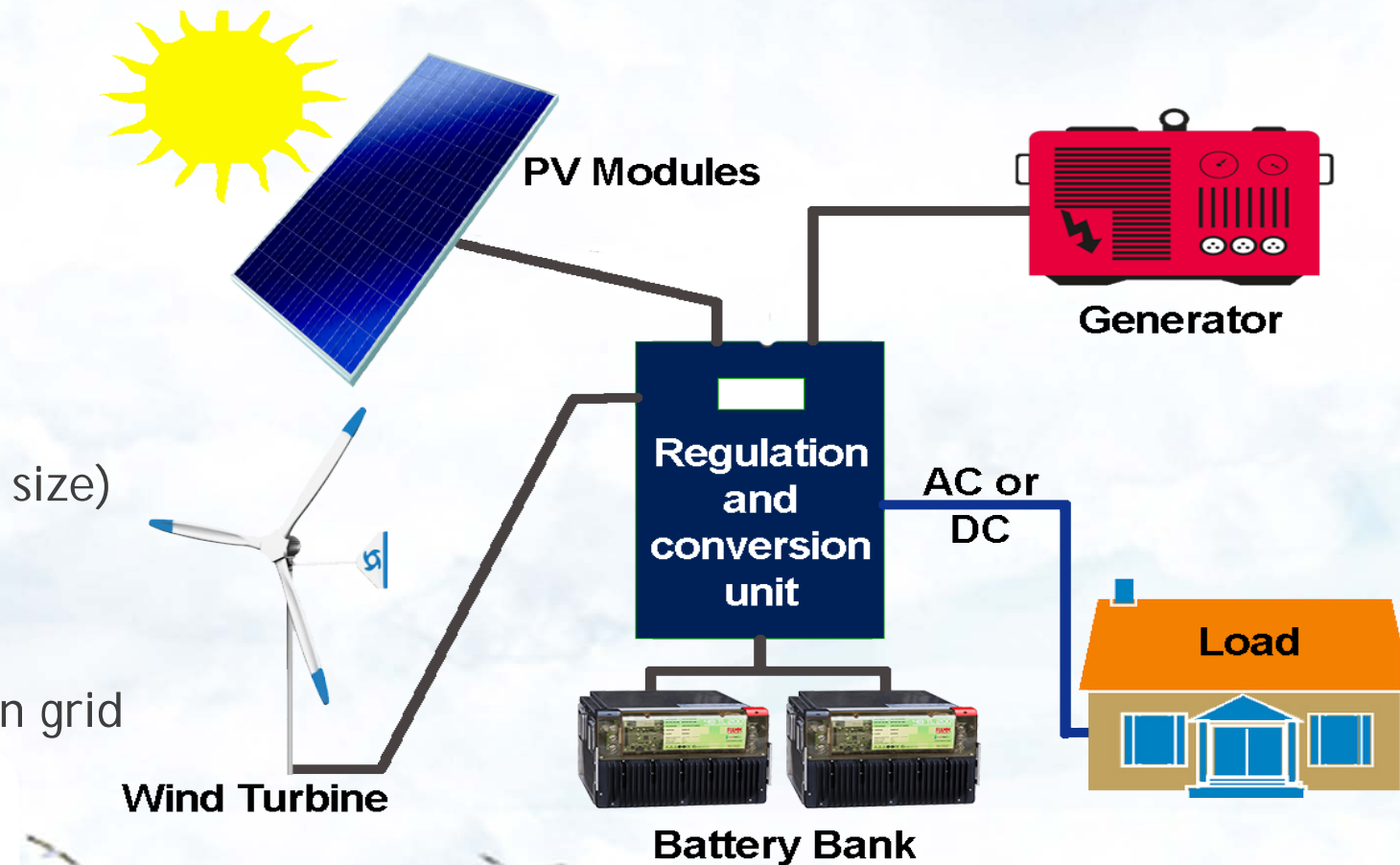
Full Grid support “Grid Hybrid/Off Grid”

► Disadvantages

- 1. More expensive.
- 2. More space.

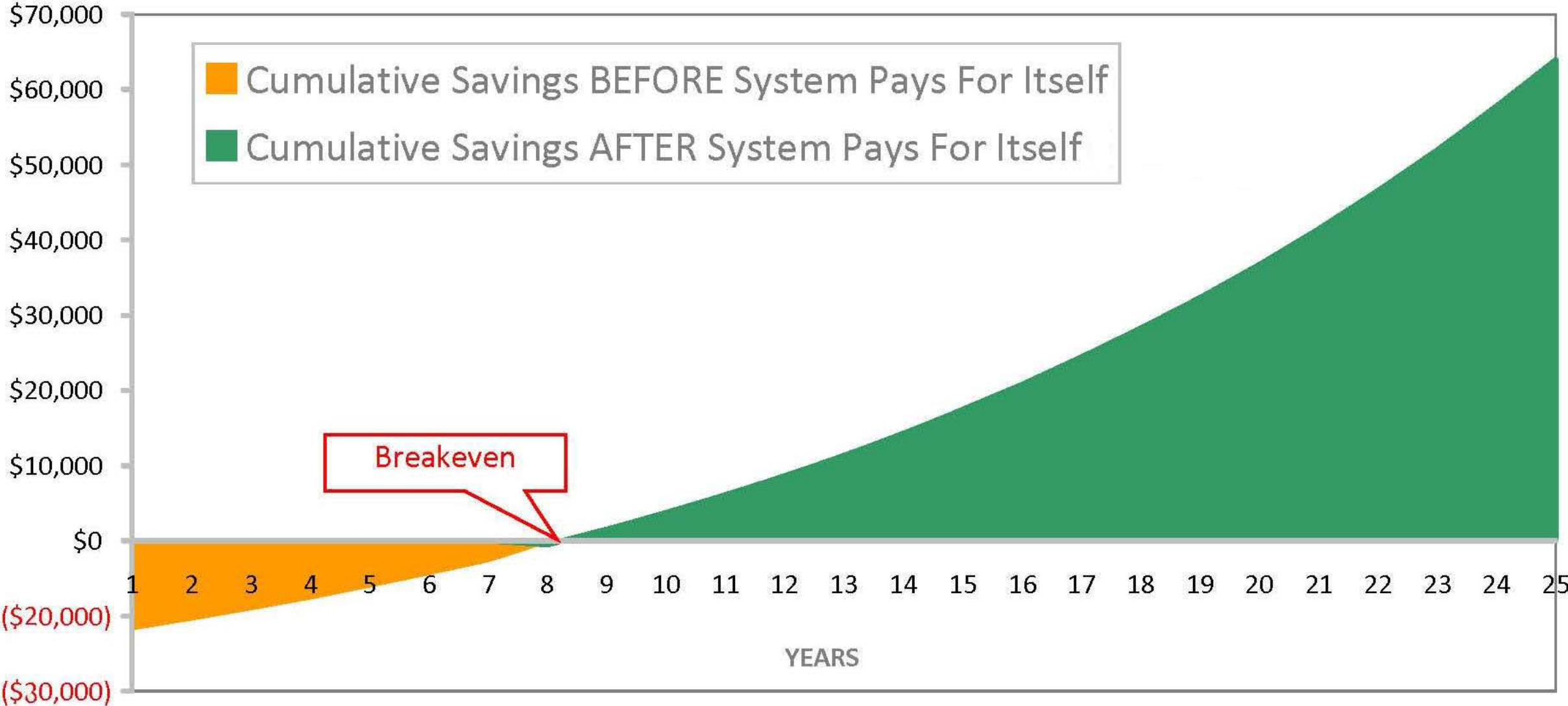
► Advantages

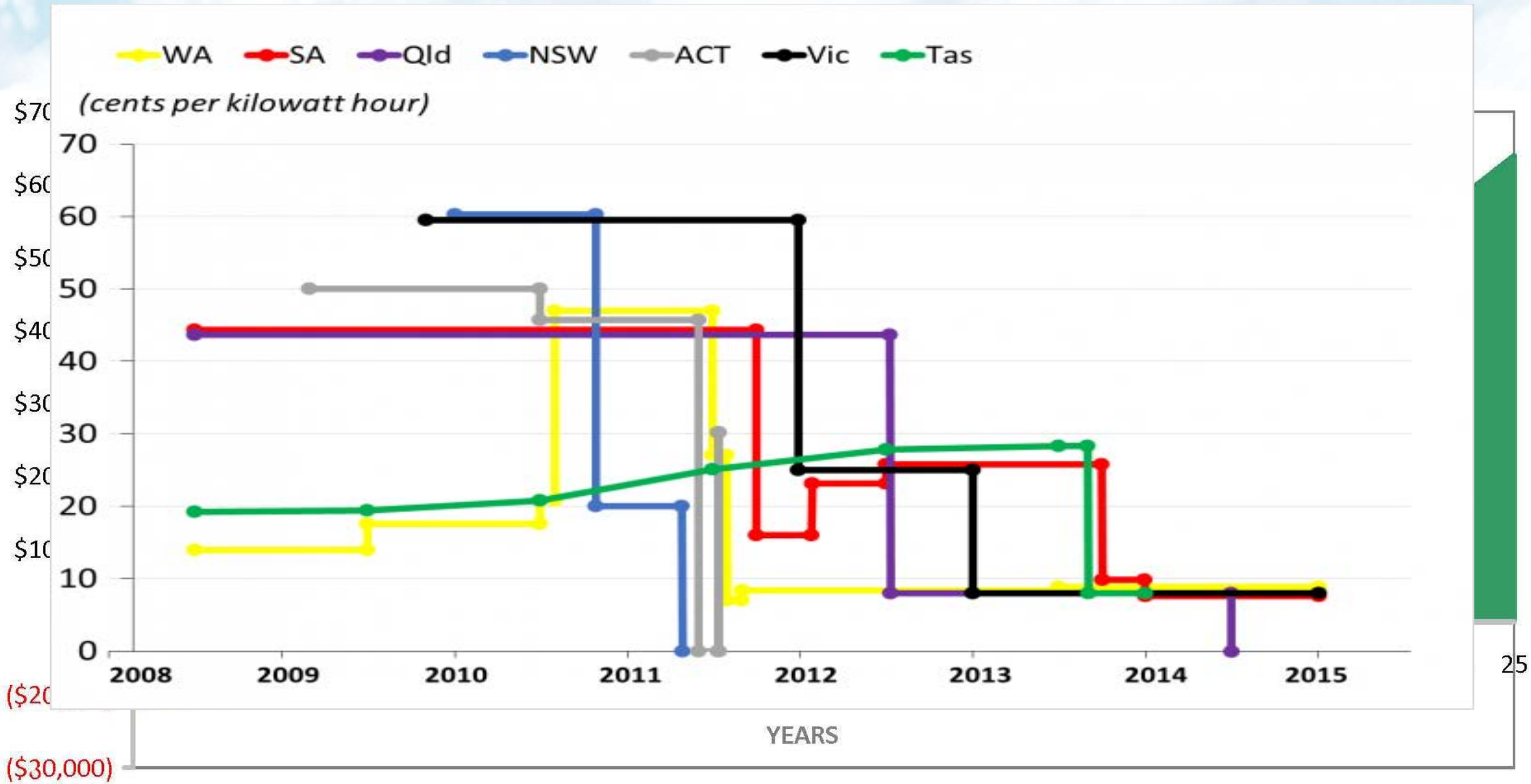
- 1. Power when grid gone
- 2. Support all loads (depending on size)
- 3. Saves money by shifting stored energy
- 4. Solar and battery available when grid gone.
- 5. Able to support diversion loads.
- 6. Full resilience





Return on investment







Do Your Homework

- ▶ A lot of misinformation around.
- ▶ Don't let people talk you into systems that aren't suitable to you.
- ▶ Use a CEC accredited installer.
- ▶ Cheap products may reflect in their quality, safety & performance.
- ▶ Currently no standards for batteries.
- ▶ Talk to more than one installer or independent if possible.
- ▶ Purchase price is not only cost
 - *consider environmental costs when making a purchase.*





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