ELECTRICITY ON TAP
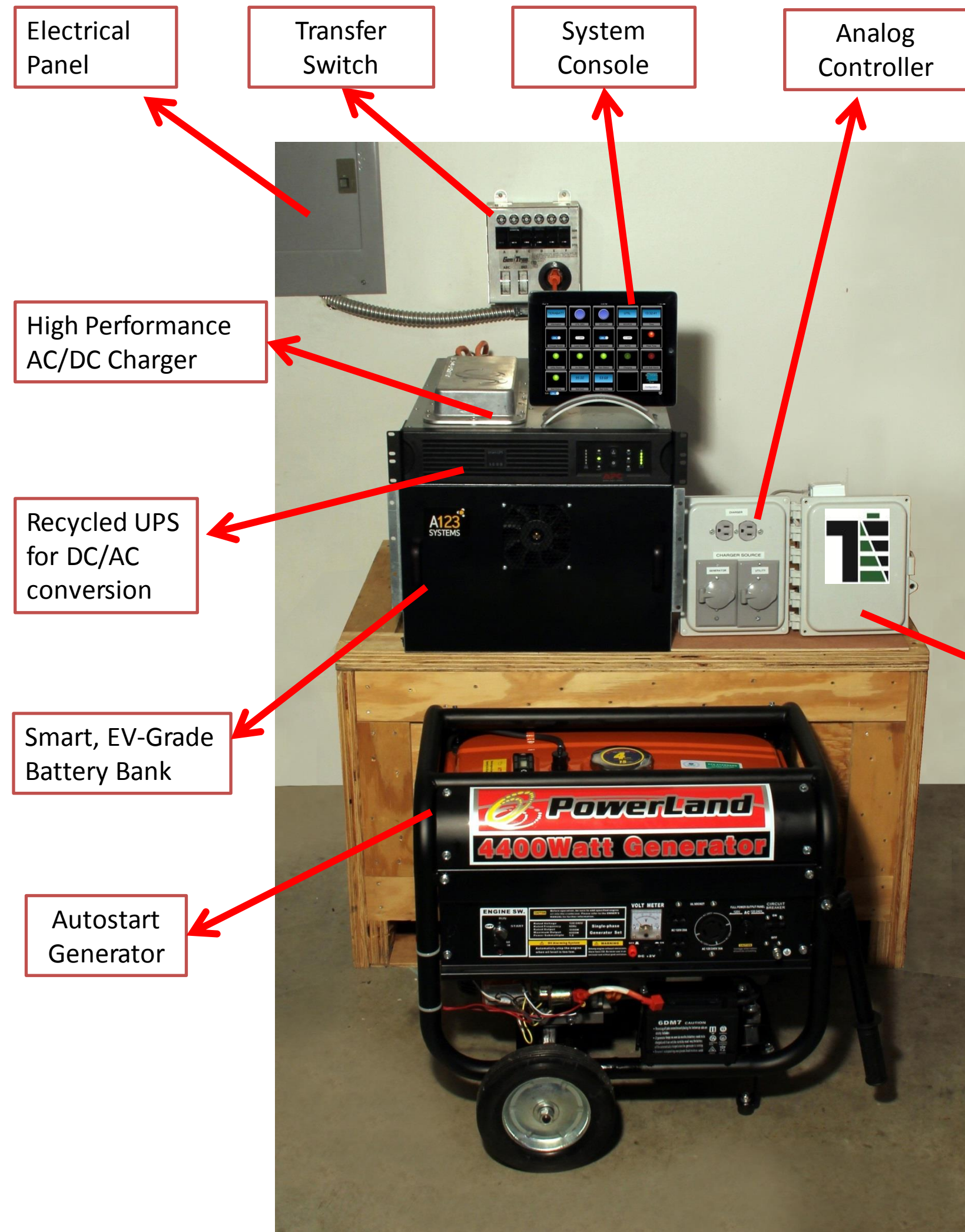
USING MODERN ELECTRICITY STORAGE
TO RE-INVENT EMERGENCY POWER

www.terabatt.com/makerscorner.html

- Electrical Panel
- Transfer Switch
- System Console
- Analog Controller
- High Performance AC/DC Charger
- Recycled UPS for DC/AC conversion
- Smart, EV-Grade Battery Bank
- Autostart Generator
- Main Controller

PROBLEM:

EMERGENCY POWER TODAY IS EXTREMELY WASTEFUL

1. Sunk cost when not used
2. Inefficient and highly polluting when used
3. Generators require frequent maintenance or are likely to fail when needed
4. Highly constrained operational model due to limitations of lead acid batteries
5. Stagnant Uninterruptible Power Supply (UPS) technology

TERABATT'S APPROACH:

ACCELERATE INNOVATION BY INTEGRATING ELECTRIC VEHICLE (EV) TECHNOLOGY AND OPEN SOURCE CONTROLS

1. Dramatically increase fuel efficiency while reducing noise and emissions
2. Extend operating life while actively using the asset
3. Improve living conditions in a more rational way
4. Support organizations in selecting the best places to deploy

SOLUTION:

1. Use the generator periodically ,and ONLY at peak efficiency, to charge EV grade batteries
2. Power the loads always from the batteries or UPS/inverter
3. Reduce the size of the generator as peak loads are handled by UPS/Inverter
4. Treat generator, charger, and battery bank as an integrated system
5. Utilize CANBus control to achieve very high reliability and safety
6. Eliminate lead acid battery constraints (temperature, cycles, durability) using modern & safe LiFePO4 batteries
7. Implement controller using open source components to accelerate adoption and identify new applications
8. Cloud enabled, iPad based, system console
9. Supports use of natural gas when deploying the solution in densely populated areas

DELIVERABLES: PHASE I

1. Reference architecture for hardware and software
2. List of components supported in the base controller software
3. Source code capable of supporting up to 4800 VAH
4. Examples of modifications required on generator and UPS
5. Support Makers in identifying sites that would benefit from the solution
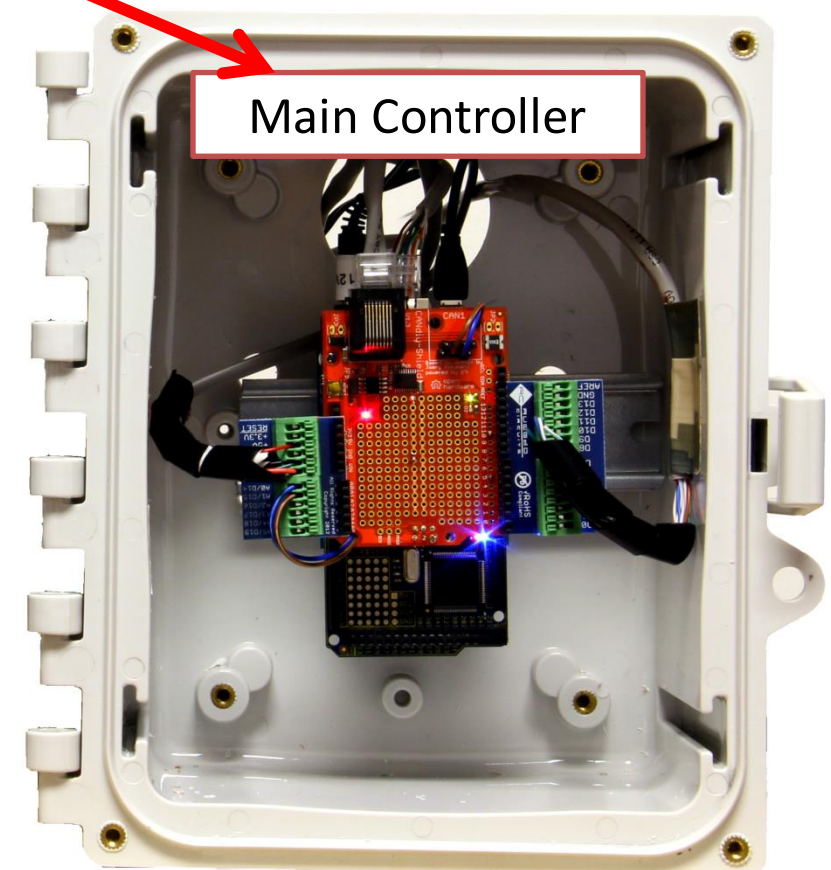
CONTROLLER
- Arduino based MEGA 2560 CPU, Ethernet, SD, CANbus, Proto area
- User interface via iOS
- DIN-rail mount
- Only 2 boards for improved reliability
- Connectivity with second enclosure (relays)
- Supports CANbus multi-device messaging and heartbeats

CHARGER
- Capable of charging at high current under program control to reduce charge time
- CANbus control for precise operation and monitoring
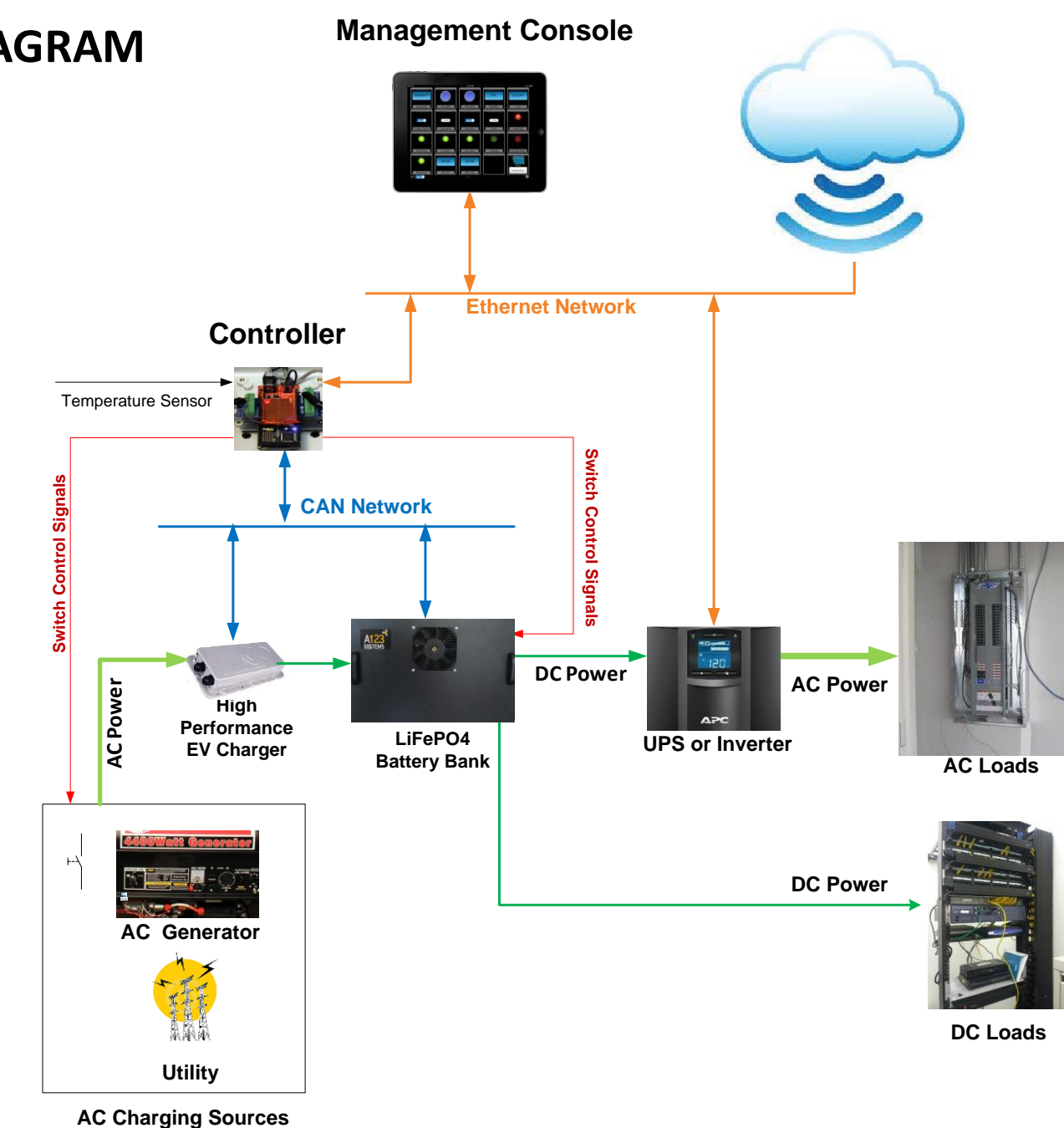
BATTERY BANK
- Accepts high AMPs during charge cycle to match generator's optimal operating point
- Operates with low degradation at temperatures up to 40C and very frequent discharges
- Long operating life even when enduring multiple deep discharge cycles per day

GENERATOR
- Wireless auto-start under program control

FUNCTIONAL DIAGRAM

TRADITIONAL VS. HYBRID GENERATION: 24x7 RURAL CLINIC SCENARIO

for illustration purposes

Legend
- Battery state of charge
- Hybrid discharge peak
- Hybrid charge
- Battery only
- Generator Only

Benefits of Hybrid Generation
- Generator operates ONLY 8 hours per day
- ½ Gas consumption and emissions
- 2/3 savings in operating time and noise
- High quality and reliable electric power
- Reduced maintenance
- Reduced fuel transportation costs