



Power & Energy Focus Area Forum Ground Platform Challenges

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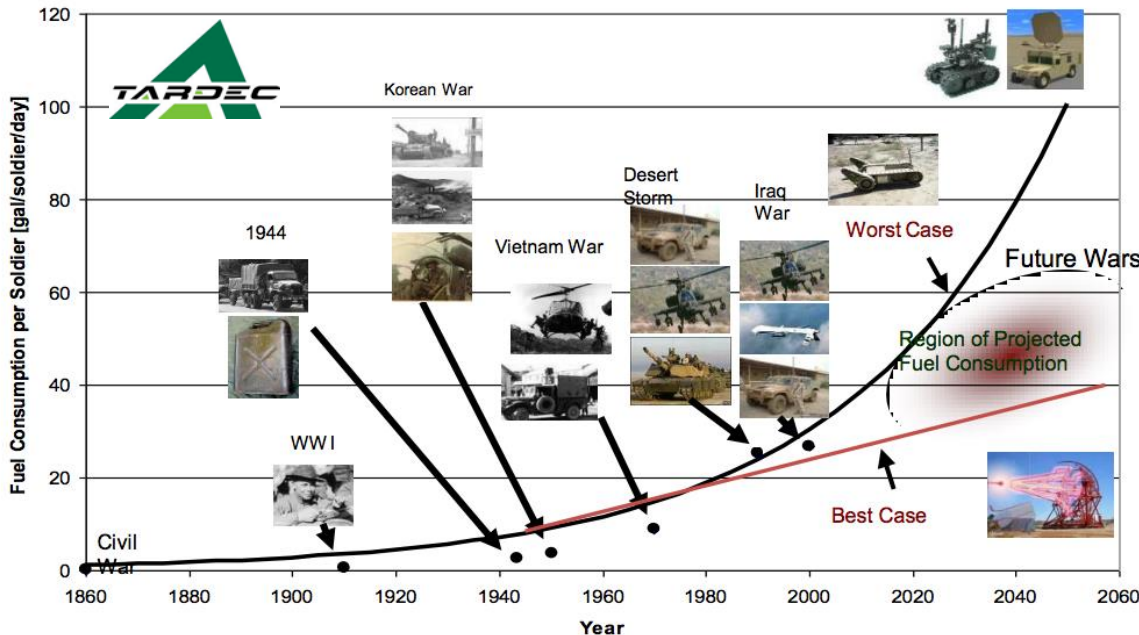
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Ground Vehicle Platform Challenges

- Ground vehicles, expeditionary bases, command and control centers, aviation, and even the individual Marines have experienced an exponential growth in power needs
- Growth expected to continue

Vehicle Example



- New C4ISR technologies
- Counter-IED jammers
- New weapons
- Future continued growth:
 - Silent Watch
 - Lasers and advanced weapons
 - Active protection systems
 - Sensors



Dismounted Marine Power & Energy Challenges

- Individual Marines have experienced an exponential growth in power needs



**PRC-153
Vest Mounted**



PTT / Earbuds



Wolfhound



Thor



**PVS-14 NVG
Head Mounted**



**PEQ-16
Rifle Mounted
aim laser**



**CMD 2.0 Mine
Detector**





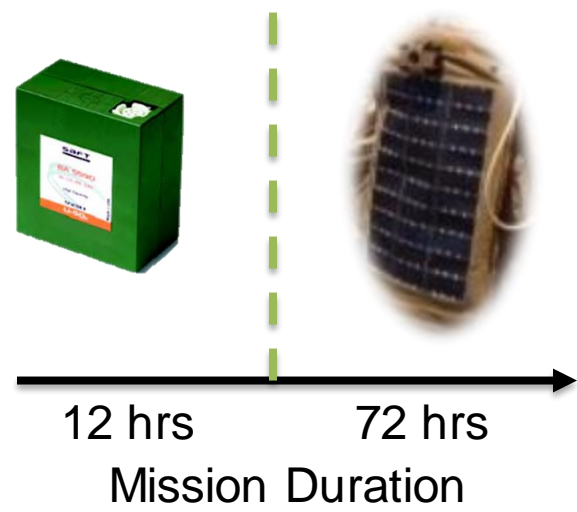
Need to Buy Your Way Onto the Back of a Marine



VS.



VS.



- Currently sustainable energy sources are only viable for extended mission durations otherwise batteries are less weight

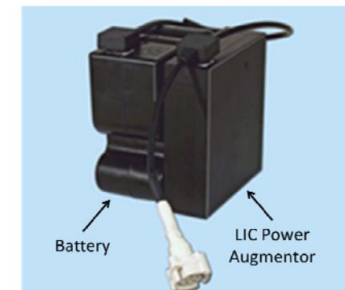
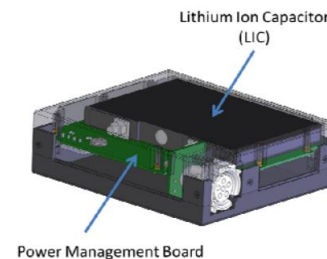


More on Batteries

- Not currently converging to a family of batteries
 - Some systems driven by energy storage needs (low power), others by high power demands
 - Many different battery formats
 - Some battery formats power >100 unique applications
- Need to address battery safety and shipboard integration like insensitive munitions; prevent but also contain



Hybrid Power & Energy Battery





The Future: Expeditionary Force 21



Advanced Base Operations Example



- *naval in character*
- *distributed operations*
- *self-sustaining under austere conditions*
- *extended or indefinite sustainment*
- *employing more efficient electrical generation and distribution systems, leveraging ground renewable expeditionary energy systems (GREENS) to maximum extent possible.*



- *Modular & scalable energy needs; flexible to support different missions*
- *Very mobile to elude threats; quick tear down and setup; get away from static forward operating bases*
- *High efficiency sources*
- *Optimize renewables when able*



Future Trends: Individual

- Wireless power transfer?
 - Share power in a squad or re-prioritize?
 - Power accessories on head (night vision) and rifle (aim laser)
 - “Bump charge” from a resupply vehicle or robotic mule supporting a squad to quickly resupply part of the energy well to extend duration
- Renewables like solar, but what about triple canopy jungles in the Pacific? Night?

