



AMERICA'S ARMY:

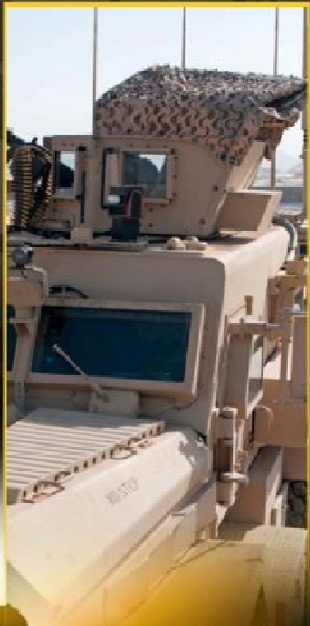
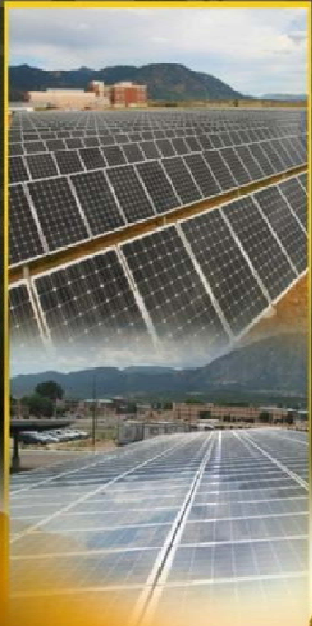
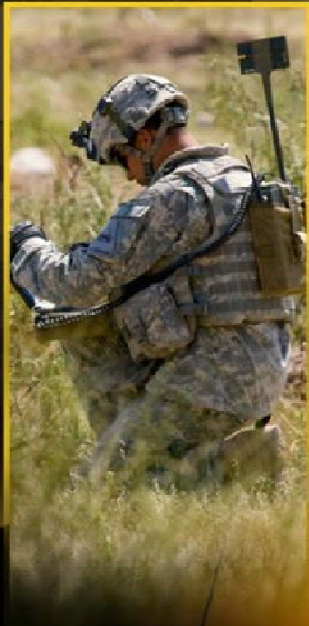
THE STRENGTH OF THE NATION

Army Energy and Water

SOLDIER

BASING

VEHICLE



Army Energy and Water

A Presentation to the National
Academy of Science Workshop
on the Energy/Water Nexus

April 3, 2013

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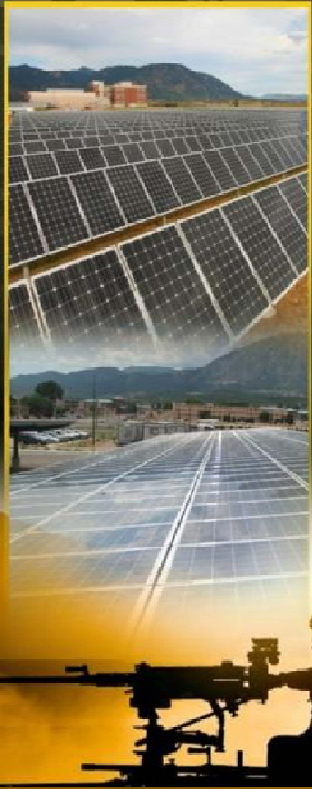
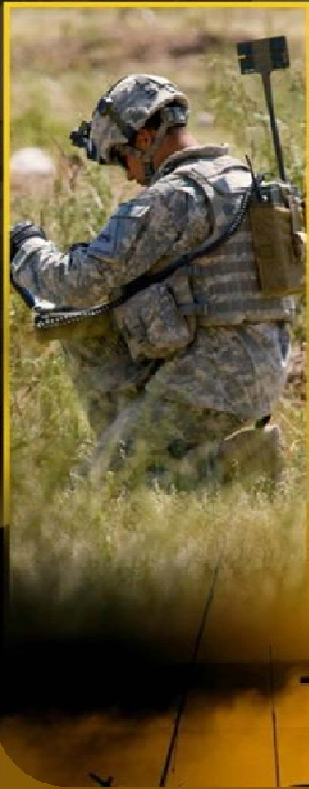
AMERICA'S ARMY:
THE STRENGTH OF THE NATION

Framing the Energy and Water Security Challenges

SOLDIER

BASING

VEHICLE



Key Questions

- *Why is energy/water security important to the Army?*
- *What is our Army doing to ensure adequate supplies of energy and water, now and into the future?*
- *How are we measuring our progress to address energy/water security?*



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Army Energy in Perspective

- The Army manages both installation and operational energy requirements
- The Army is largest facility energy consumer in the Federal Government – \$1.25B (FY12)
- The Army spent \$3.6B on energy purchases in FY12



Fort Carson Photovoltaic Array

EXTERNAL VIEW: *“Pay attention: When the U.S. Army desegregated, the country really desegregated; when the Army goes green, the country could really go green.”* – Thomas Friedman, 2009

WHITE HOUSE VIEW: *“Now, there are costs associated with this transition. And there are some who believe that we can’t afford to pay those costs right now. I say we can’t afford not to change how we produce and use energy – because in the long-term costs to our economy, our national security and our environment are far greater.”* – President Obama, June 2010

“Operational Energy equates exactly to operational capability” - General John Allen, Commander United States Forces – Afghanistan, December 2011

“Improving our energy security directly translates to improving our national security.” - General Martin Dempsey, Chairman of the Joint Chiefs of Staff, October 2011



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Army Water in Perspective

- The Army manages both installation and operational water requirements
- The Army has to address water rights in all 50 states and 4 territories
- In FY 12, Army installations used 35.4 BG of water compared to 45.2 BG in the baseline year (2007), a 25.4% reduction
- The Army spent \$74.7M on installation water purchases in FY12
- Absence of leadership quotes on water and water security





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Energy Security

Energy Security is defined as “having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet mission essential requirements.”

- The Army has historically undervalued energy and energy security
- Treating energy as a “free good” (unintentionally) creates vulnerabilities and risks in terms of:
 - **Cost:** Waste, commodity price escalation, and volatility
 - **Operational Constraints:** Vulnerable Lines of Communication, casualties tied to supply and resupply functions, diverted combat power
 - **Organizational Reputation:** Failure to meet Presidential, Congressional, and Defense mandates on schedule
 - **Others?**





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Water Security

Water Security is defined as the capacity to ensure that water of suitable quality is provided at a sustained rate sufficient to support all current and future Army missions, as needed.

- The Army undervalues water and water security
- Vulnerabilities and risks in terms of:
 - **Cost:** Full cost pricing is not used to reflect actual costs, including opportunity costs and ecosystem needs
 - **Operational Constraints:** Vulnerable Lines of Communication, casualties tied to supply and resupply functions, diverted combat power
 - **Availability:** Failure to plan for current and future supply; how to ensure supply for installations and contingency bases?
 - **Supply chain:** Failure to appreciate water needs by Army suppliers
 - **Nexus:** Energy, water, and food





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Enhancing Mission Effectiveness

OPERATIONAL ENERGY



operational energy performance drives operational effectiveness through mobility, agility, flexibility, resilience and sustainability.



It's not just about using operational energy less, but using it best. smart energy wins the fight.



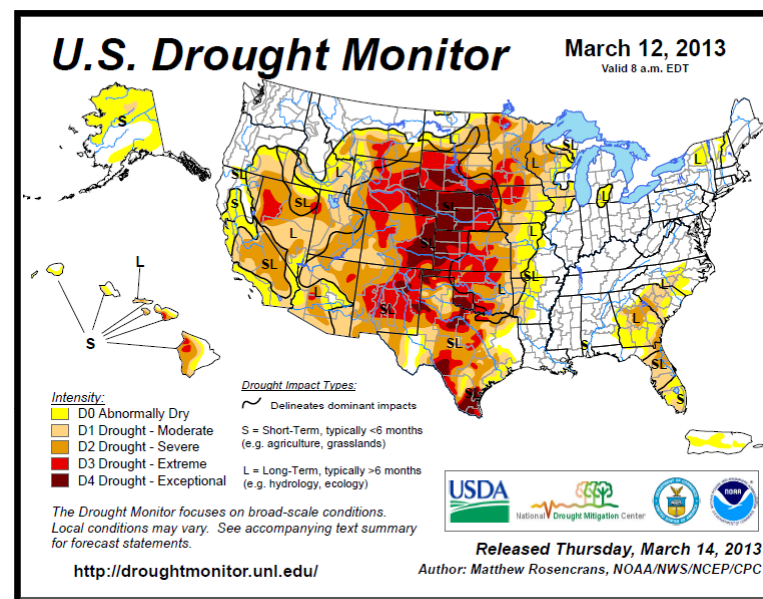
Operational Energy and Water

- The Army spent \$3.6 Billion on fuel in FY12.
- **70-80% of resupply weight in theater consists of fuel and water.**
- 18% of US casualties in OIF and OEF are related to ground resupply.
- 40% of fuel goes to produce electricity – we have the technology and know how to save between 30-60% of this amount
- ***Reducing fuel and water demand will reduce logistical burdens, save lives, and expand capability. To achieve this the Army has:***
 - Deployed 36 mini-grids, saving 50 million gallons annually;
 - Began fielding of the Shower Water Reuse System
 - Accelerated fielding of new generator (AAMPS), 21% more efficient and designed to be networked;
 - Deployed “hybrid” energy systems with solar panels, battery storage, and power management systems;
 - Working to drive behavior change across all levels of the Army



Climate adaptation

- Physical effects
 - Sea level rise
 - More intense storms
 - Drought
 - Flooding
 - Seasonal change in water availability
- Policy implications
 - Working to create framework to integrate climate change adaptation considerations into existing installation plans (FY2014 completion)
- Effects to Soldiers
 - Training options constrained
 - Increased safety and occupational health risks
 - Increased natural disasters
 - Increased humanitarian assistance
 - Increased operations





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Army Climate Adaptation

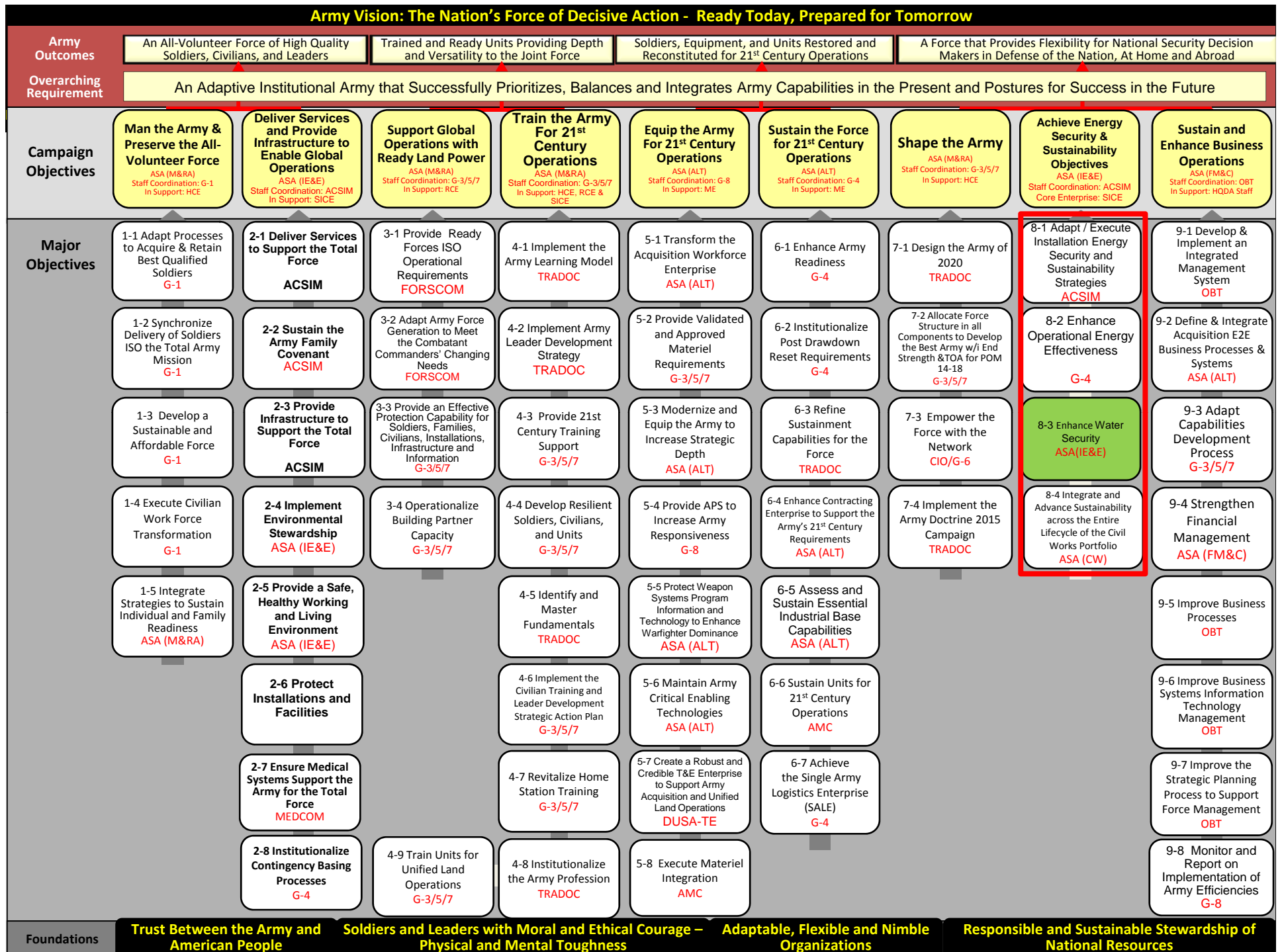


Shower Water Reuse System



***Expeditionary
Water Packaging
System***







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MO 8-3 Metrics

Sub-tasks	Candidate Metrics	Weighting	Frequency of measurement	Criteria	Value
8-3.1 Increase water efficiency	8-3.1.1: % potable water distribution System linear feet assessed for leaks	20%	Quarterly	TBD	TBD
	8-3.1.2: % of covered facility square footage that completed water evaluations			> 25% = Green 18% to 25% = Amber < 18% = Red	34%
	8-3.1.3: % of total water meters installed on Appropriate facilities and reporting to MDMS vs. total scheduled			> 95% = Green 70%-95% = Amber < 70% = Red	0%
8-3.2 Reduce direct consumptive and withdrawal use	8-3.2.1: % reduction in potable water intensity measured as total potable water consumption and sqft from FY07 baseline	20%	Quarterly	> -8% = Green -6%- -8% = Amber < -6% = Red	-10.3%
	8-3.3.2: Gallons per person per Day			TBD	TBD
8-3.3 Reduce indirect consumptive and withdrawal use in the supply chain	8-3.3.1: % Reduction in potable water consumption (supply chain)	20%	Quarterly	TBD	TBD
8-3.4 Increase use of alternative water sources	8-3.4.1: % Reduction in Irrigation, Landscaping, and Agricultural (ILA) water consumption	20%	Quarterly	TBD	TBD
8-3.5 Reduce water consumption on contingency basing	8-3.5.1: TBD	20%	Quarterly	TBD	TBD



Net Zero

- Interconnection and dependencies among energy, water, and waste
 - Need energy to move, heat, and treat water
 - Need water for cooling in power production
 - Need energy and water in the supply chain to produce products sold to the Army





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Backup



Work/Rest/Water Consumption Table

Applies to average sized, heat acclimated soldier wearing BDU, hot weather

Easy Work	Moderate Work	Hard Work
<ul style="list-style-type: none"> • Weapon Maintenance • Walking Hard Surface at 2.5 mph, < 30 lb Load • Marksmanship Training • Drill and Ceremony 	<ul style="list-style-type: none"> • Walking Loose Sand at 2.5 mph, No Load • Walking Hard Surface at 3.5 mph, < 40 lb Load • Calisthenics • Patrolling • Individual Movement Techniques, i.e. Low Crawl, High Crawl, etc. 	<ul style="list-style-type: none"> • Walking Hard Surface at 3.5 mph, ≥ 40 lb Load • Walking Loose Sand at 2.5 mph with Load • Field Assaults

Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest	Water Intake (Qt/H)	Work/Rest	Water Intake (Qt/H)	Work/Rest	Water Intake (Qt/H)
1	78° - 81.9°	NL	½	NL	¾	40/20 min	¾
2 (GREEN)	82° - 84.9°	NL	½	50/10 min	¾	30/30 min	1
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 min	¾	30/30 min	1
4 (RED)	88° - 89.9°	NL	¾	30/30 min	¾	20/40 min	1
5 (BLACK)	> 90°	50/10 min	1	20/40 min	1	10/50 min	1

- The work-rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences ($\pm \frac{1}{4}$ qt/h) and exposure to full sun or full shade ($\pm \frac{1}{4}$ qt/h).

• NL = no limit to work time per hour.

- Rest means minimal physical activity (sitting or standing), accomplished in shade if possible.

- **CAUTION: Hourly fluid intake should not exceed 1½ quarts.**

Daily fluid intake should not exceed 12 quarts.

- If wearing body armor add 5°F to WBGT in humid climates.

- If wearing NBC clothing (MOPP 4) add 10°F to WBGT.

