



Overview Briefing

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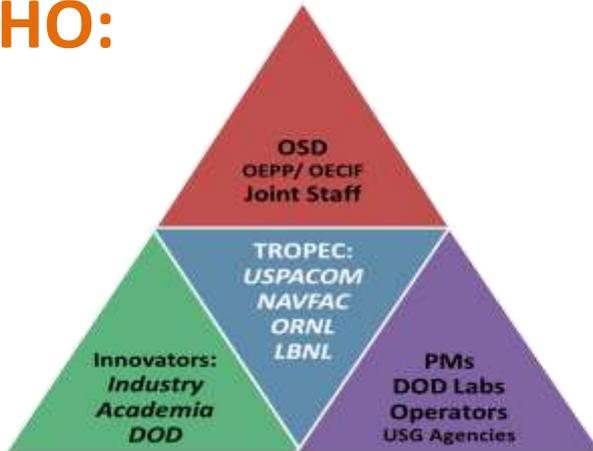


5 W's and an H



TROPEC is an assessment platform for expeditionary camp solutions.

WHO:



WHAT:

Identification and assessment of contingency basing material / non-material solutions to reduce op-energy consumption in tropical regions.

WHERE:

- Controlled laboratory environment
- Operational field environment in the PACOM AOR

WHEN:

Engaged in multiple exercises and events, offering timeline flexibility to fee payers.

WHY:

Reduce risk and increase mission capability by enabling greater contingency base sustainability.

HOW:

- Query innovation marketplace
- Integrate into ops/exercises to assess impact
- Provide direct access to operators
- Coalesce DOD and DOE expertise
- Develop diverse partnerships to ID and transition promising solutions
- Provide feedback to USG decision makers



Unique Value Provided by TROPEC



For Whole of Government

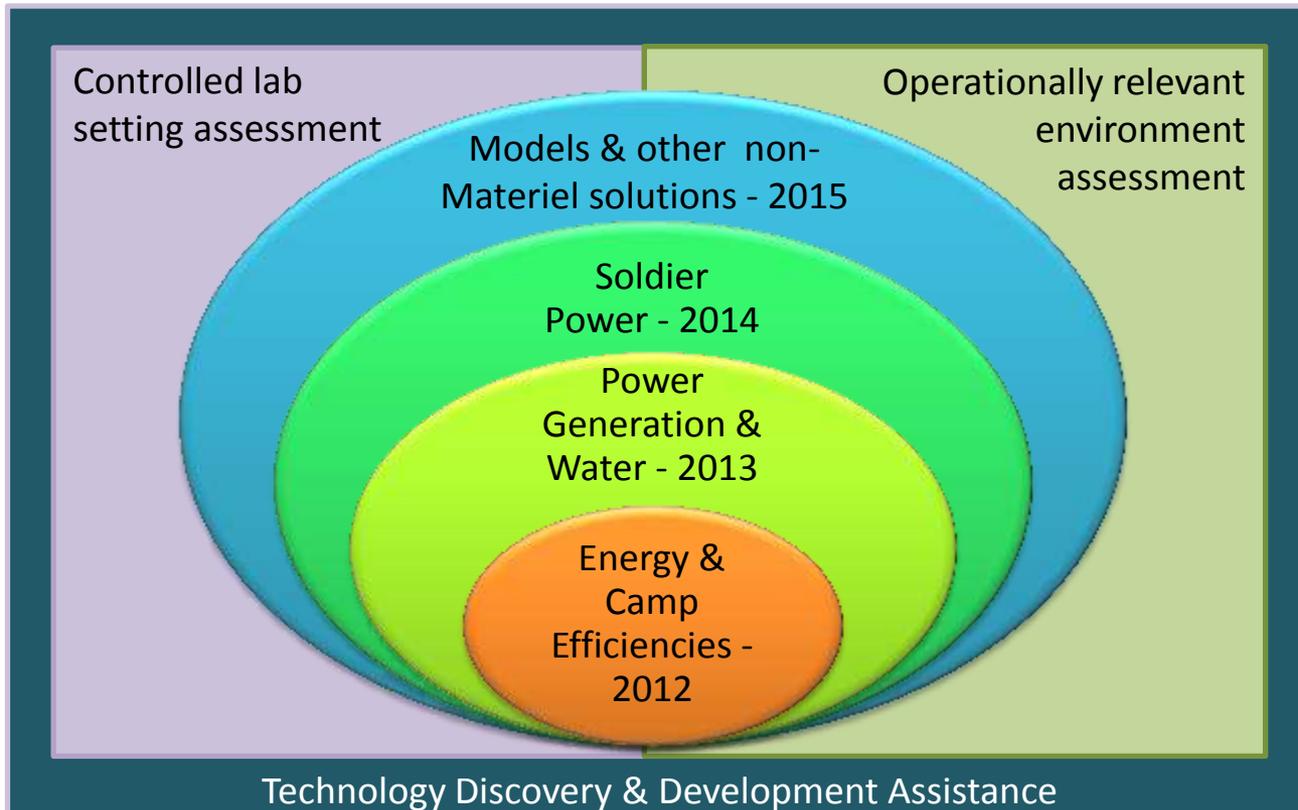
- Integration with USPACOM exercises and operations OCONUS
- Warfighter and technical feedback
- Tropical environment utility focus
- Joint environment
- DOD and DOE expertise
- Assessment and solution-search platform available to decision makers

For Developers

- Technical and operational feedback for improvement from DOD and DOE
- Facilitated introduction to DOD and transition agents
- Feedback to help improve solutions
- Independent, government assessment
- No cost for innovators to participate



Offerings & Expertise



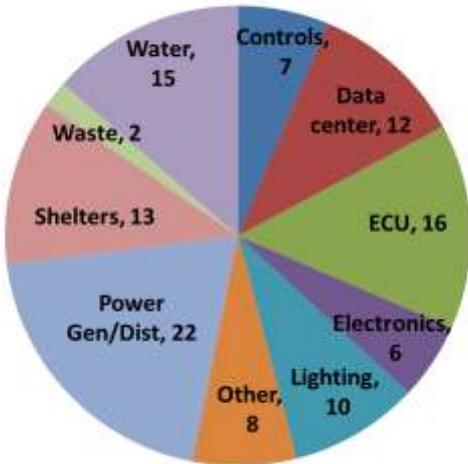
- Expanding scope of capability-set expertise ensures greatest responsiveness to DOD needs.
- Foundational ‘menu’ of activities enables partners to select assistance relevant to their needs; select from technology discovery help, lab assessment, field assessment, impact analysis, TTP/CONOP support and more.



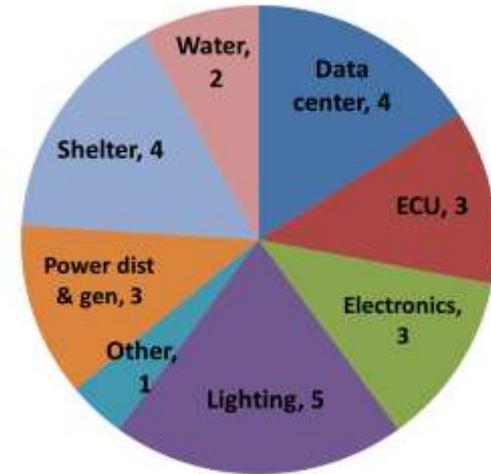
Broad Solution Sets Identified



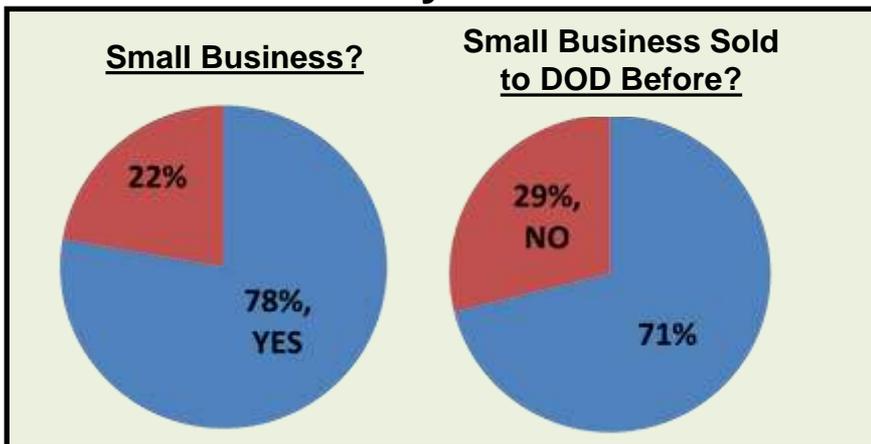
Applications Reviewed by Technology Type-111



Applications Accepted for Lab Assessment-25

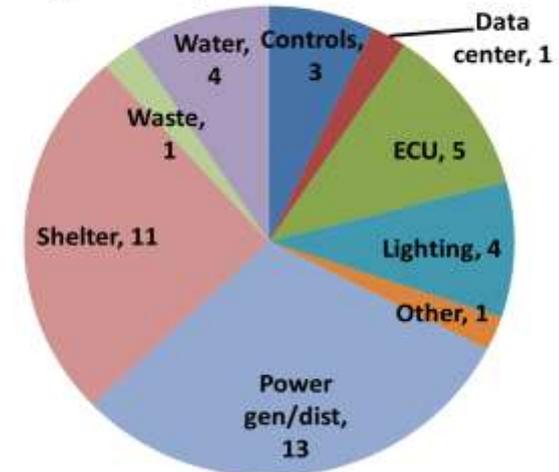


Submissions by Small Business



*Based only on "Accepted" applications

Applications Accepted for Field Assessment-43





Camp Op Energy Improvements

TROPEC-ASSESSED SOLUTIONS HAVE SHOWN WAYS TO IMPROVE CAMP ENERGY CONSUMPTION.

ECUs: Variable-capacity, constant speed

Lighting: LED

Space conditioning: Duct Tee - 2 tents/ECU

Controls: Occupancy controls

Electronics: High-temp servers

Electronics: Efficient server cooling

Assessments have covered a large range of end uses, showing savings potential across the camp structure

Shelters: Shade/radiant barrier/insulation

'Soldier' Power

Lighting: High efficiency area lighting + solar power

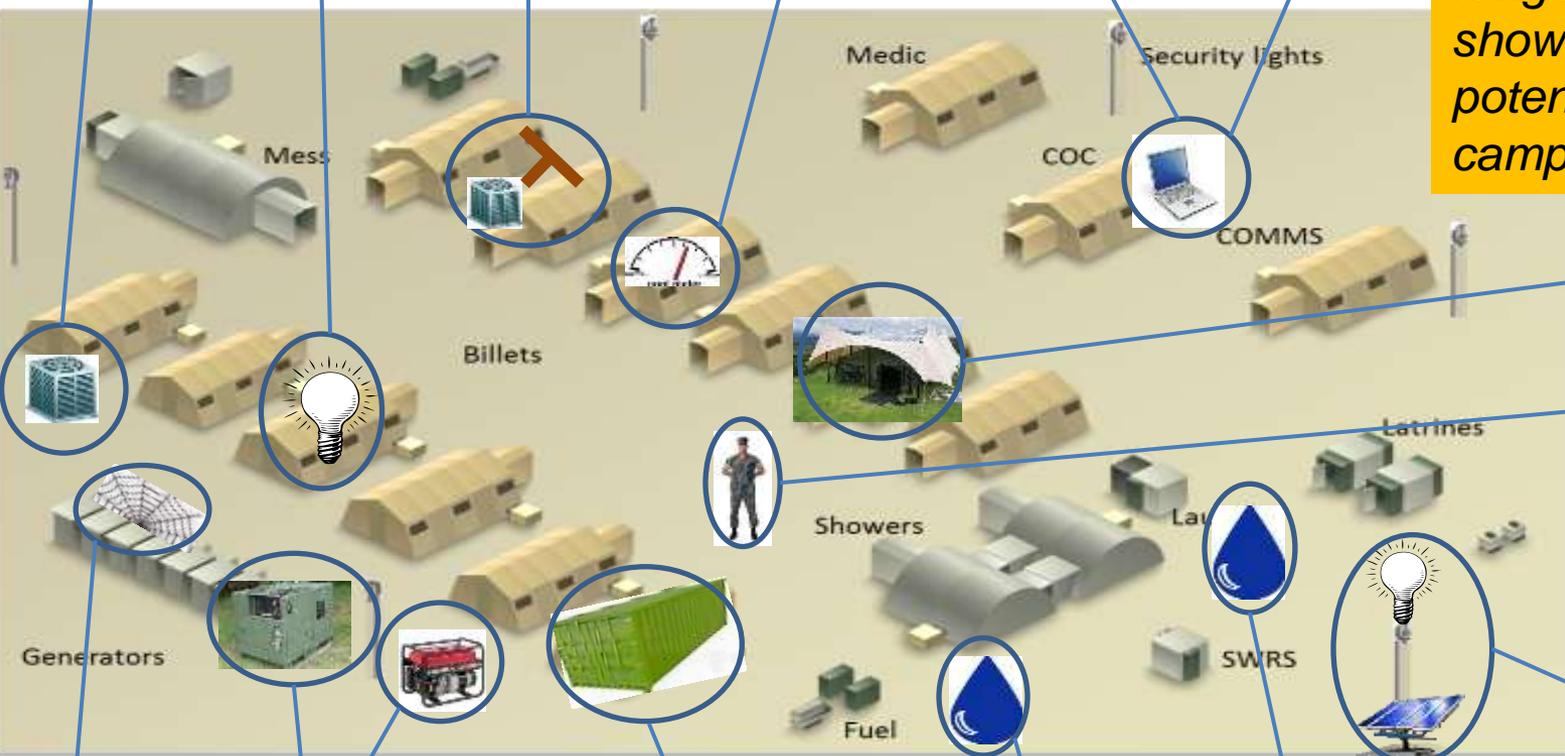
Generators

Generators: More efficient & flex fuel

Shelters: Rigid-walled

Water: Water generation

Water: Water reuse





Camp Op Energy Improvements



Experiments combining select energy-improvement systems have identified a few system-of-system improvement opportunities.

Example

Tech Area	Impact Technology	SOS Solution Set						Assessment
		1	2	3	4	5	6	
Shelters	Insulation	X	X	X	X	X	X	Field
Shelters	Reflective barrier	X	X	X	X	X	X	Field
Shelters	Tents-Tandem		X					Lab/Field
ECUs	ECU-2 stage	X					X	Field
ECUs	ECU-Split			X			X	Lab
ECUs	ECU-Small capacity				IP			Lab
ECUs	ECU-Tandem					X		Lab
Controls	ECU-Occupancy control						X	Field
Base JP8 reduction (%):		31	21	36	TBD	26	>31	

IP: In progress

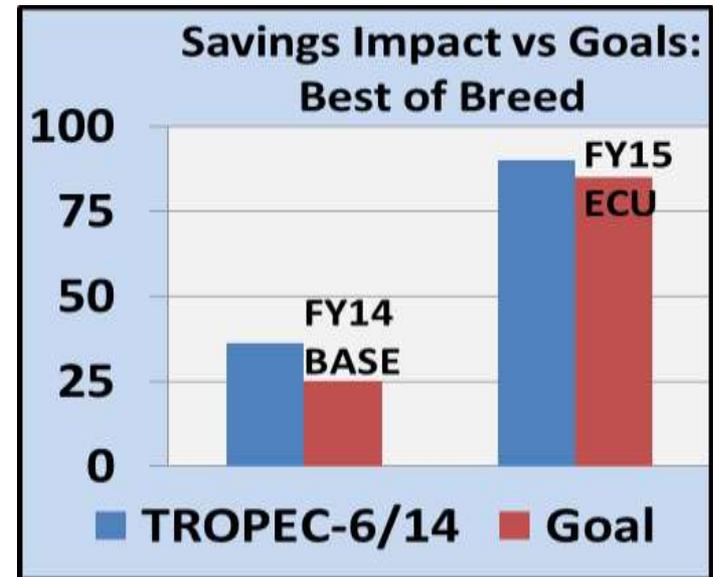
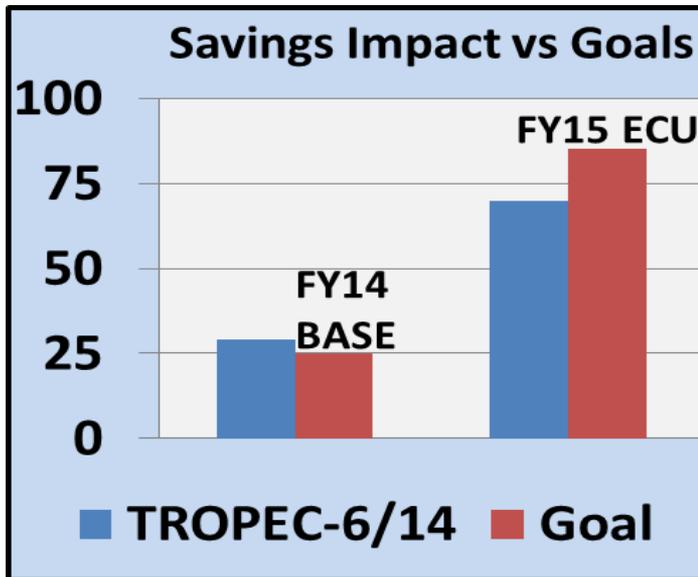


Overall Program Findings to date



TROPEC initial goals

- 25% reduction in total energy use by 2014
- 85% reduction in HVAC energy use by 2015



**ECU savings for FY15 ECU goal is preliminary (initial test complete)*



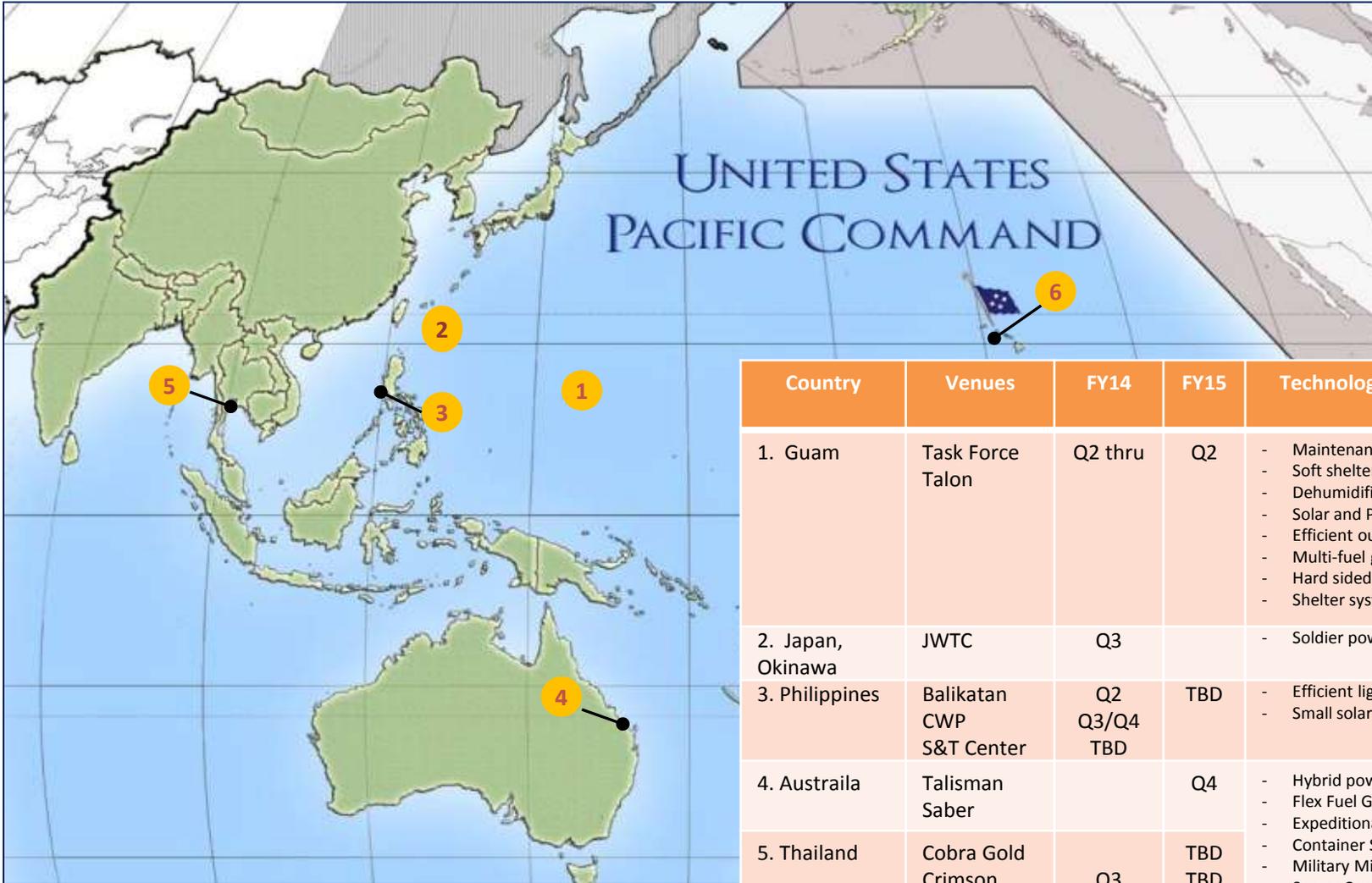
FY14 and Beyond



- Offer DoD customers up to 50% discount on all TROPEC services, with declining discount percentages in FY16 and out years.
 - Services include:
 1. Field assessments
 2. Lab assessments
 3. Targeted technology identification/research & development assistance
- Work to facilitate cost-share opportunities among and between partners to leverage resources and establish a Joint working relationship.
- Targeted outreach to other USG Agencies to use TROPEC.



FY 14/15 Field Assessment Plans (to date)



Country	Venues	FY14	FY15	Technologies Being Assessed by TROPEC
1. Guam	Task Force Talon	Q2 thru	Q2	<ul style="list-style-type: none"> - Maintenance Enclosure - Soft shelter w/F100 - Dehumidifier ECU - Solar and Plasma Light Cart - Efficient outdoor lighting system - Multi-fuel generator - Hard sided shelter systems - Shelter systems to include shads
2. Japan, Okinawa	JWTC	Q3		<ul style="list-style-type: none"> - Soldier power manager
3. Philippines	Balikatan CWP S&T Center	Q2 Q3/Q4 TBD	TBD	<ul style="list-style-type: none"> - Efficient lighting system - Small solar power systems
4. Australia	Talisman Saber		Q4	<ul style="list-style-type: none"> - Hybrid power systems and managers. - Flex Fuel Generator - Expeditionary Structure
5. Thailand	Cobra Gold Crimson Viper	Q3	TBD TBD	<ul style="list-style-type: none"> - Container Solar Power System - Military Microgrids - Server Cooling - Other items from TROPEC's 14-1 and 14-2 assessment rounds
6. USA, HI	RIMPAC Lava Viper	Q4 TBD	TBD	



FY14/15 Lab Assessment Plans (to date)



Technology	FY14 Q1-Q2	FY14 Q3-Q4	FY15 Q1-Q4
Shelters	“Cool” Coatings		
ECUs		High Efficiency ECUs	
Lighting	High Efficiency Area Lighting Solar Powered Area Lighting		
Server Cooling	Liquid Cooling Spot Cooling	Immersion Cooling Systems High Temp Servers - Passively Cooled	Planning
Controls	Lighting Controls		DOE Transactional Network
Power generation	Hybrid power systems		Planning

*Lab Assessment Venues: DOD/DOE labs, CONUS outdoor testbeds, vendor sites



Questions



Setting up the tents for TROPEC's Crimson Viper field test in Thailand. (7/2012)

www.TROPEC.net



Testing new water purification technologies outside the base at Crow Valley, Balkania. (04/2013)

Access the website to find:

- *Description of solution areas of interest*
- *Short summaries of field assessment findings*
- *Short summaries of lab assessment findings*
- *Contact information for TROPEC partner members*
- *Links to other DOD operational energy partners*



BACK UP SLIDES



Solution Areas of Interest



- **Space Thermal Conditioning:**
 - Efficient HVAC/ECU
 - Efficient Ducting
 - Personal cooling
 - HVAC/ECU controls
 - Efficient dehumidification (desiccant, thermally activated, etc.)
 - Cooling through air movement
 - Passive cooling (thermal mass, etc.)
 - Other
 - **Shelters:**
 - Shelter
 - Liner (insulation or radiant barrier)
 - Solar control (exterior shading or high-albedo tent surface)
 - Moisture Control
 - Ventilation
 - Other
 - **Electronics Cooling:**
 - Efficient electronics cooling systems
 - Electronics that can operate at wide range of environmental conditions
 - **Electronics:**
 - Other
 - Efficient servers or computing equipment
 - Electronics power management
 - Efficient other electronics
 - Other
 - **Lighting:**
 - Shelter lighting
 - Outdoors lighting
 - Lighting controls
 - Other
 - **Power distribution and generation:**
 - Energy savings through power distribution (e.g., voltage control, DC power distribution)
 - Hybrid or renewable generation
 - More efficient generation
 - Other
 - **Water:**
 - Water re-use
 - Water generation
 - Water purification
 - Water capture
 - Water conservation
 - Other
 - **Other loads:**
 - Kitchens
 - Laundry
 - Water heating/cooling
 - Pumping
 - Security systems
 - Other
 - **Energy monitoring and management systems**
 - **Demand response (end-device power control based on power-generation conditions)**
 - **Reduction in camp logistics energy**
 - Lighter equipment
 - Reduction in amount of equipment
 - Other
 - **Other non-materiel solutions**
 - **Other**
- Applications will be invited to select one as Primary area of impact and one as Secondary area of impact (optional).**



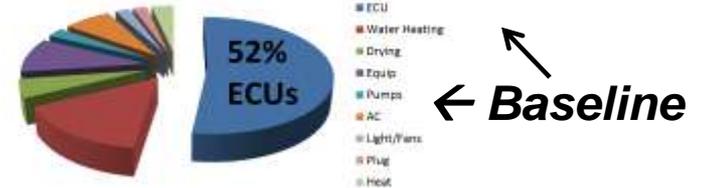
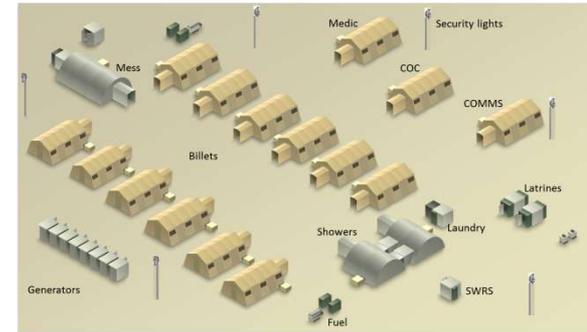
“Impact Technologies” by CY



2012

Technology Area	SoS Solution Set	Impact Area	Assessment
Shelters	Insulation	Heat/Cool	Field
Shelters	Reflective barrier	Heat/Cool	Field
ECUs	ECU-2 stage	Heat/Cool	Field
Lighting	LED lights	Lighting	Field
Lighting	Lights-Occupancy control	Lighting	Field
<i>Tent ECU JP8 use reduction (%):</i>			42
<i>Base JP8 use reduction (%):</i>			33

Assessed Solution Set (Crimson Viper)



2013

Assessed Solution Sets (added Cobra Gold, Balikpapan, lab-based assessments)

Technology Area	Impact Technology	Impact Area	SOS Solution Set						Assessment
			1	2	3	4	5	6	
Shelters	Insulation	Heat/Cool	X	X	X	X	X	X	Field
Shelters	Reflective barrier	Heat/Cool	X	X	X	X	X	X	Field
ECUs	ECU-2 stage	Heat/Cool	X					a	Field
Shelters	Tents-Tandem	Heat/Cool		X					Lab/Field
ECUs	ECU-Split	Heat/Cool			X			b	Lab
ECUs	ECU-Small capacity	Heat/Cool				IP			Lab
ECUs	ECU-Tandem	Heat/Cool					X		Lab
ECUs	ECU-Occupancy control	Heat/Cool						X	Field
<i>Base JP8 reduction (%):</i>			31	21	36	TBD	26	>31	



“Impact Technologies” by CY (cont)



2014 Assessed Solution Sets (added Talisman Sabre, Guam, lab assessments:ORNL/NSWC/LBNL)

Technology Area	Impact Technology	Impact Area	SoS Solution Set												Assessment
			1	2	3	4	5	6	7	8	9	10	11	12	
Shelters	Insulation	Heat/Cool	X	X	X	X	X	X	X	X	X	X	X	X	Lab/Field
Shelters	Reflective barrier	Heat/Cool	X	X	X	X	X	X			X	X	X	X	Lab/Field
ECUs	ECU-2 stage	Heat/Cool	X					a							Field
Shelters	Tents-Tandem	Heat/Cool		X											Lab/Field
ECUs	ECU-Split	Heat/Cool			X			b							Lab/Field
ECUs	ECU-Small capacity	Heat/Cool				IP									Lab
ECUs	ECU-Tandem	Heat/Cool					X								Lab
ECUs	ECU-Occupancy control	Heat/Cool						X							Field
Shelters	Shading	Heat/Cool							X						Lab/Field (NSRDEC)
Shelters	PV shade fly	Heat/Cool								X					Field (NSRDEC)
ECUs	ECU-DC	Heat/Cool /Power									X				Lab
ECUs	ECU-EEECU	Heat/Cool										X			Lab (NSWC)
ECUs	ECU-IECU	Heat/Cool							X				X		Lab (NSWC)
Generation	Hybrid power	Power gen												X	Lab
Data center	High efficiency servers	Heat/Cool													Lab
<i>Base JP8 reduction (%):</i>			31	21	36	TBD	26	>31	TBD	TBD	TBD	TBD	TBD	TBD	