



Power Surety for Enduring Operations



Dan Nolan
Power Surety Task Force
U.S. Army Rapid Equipping Force

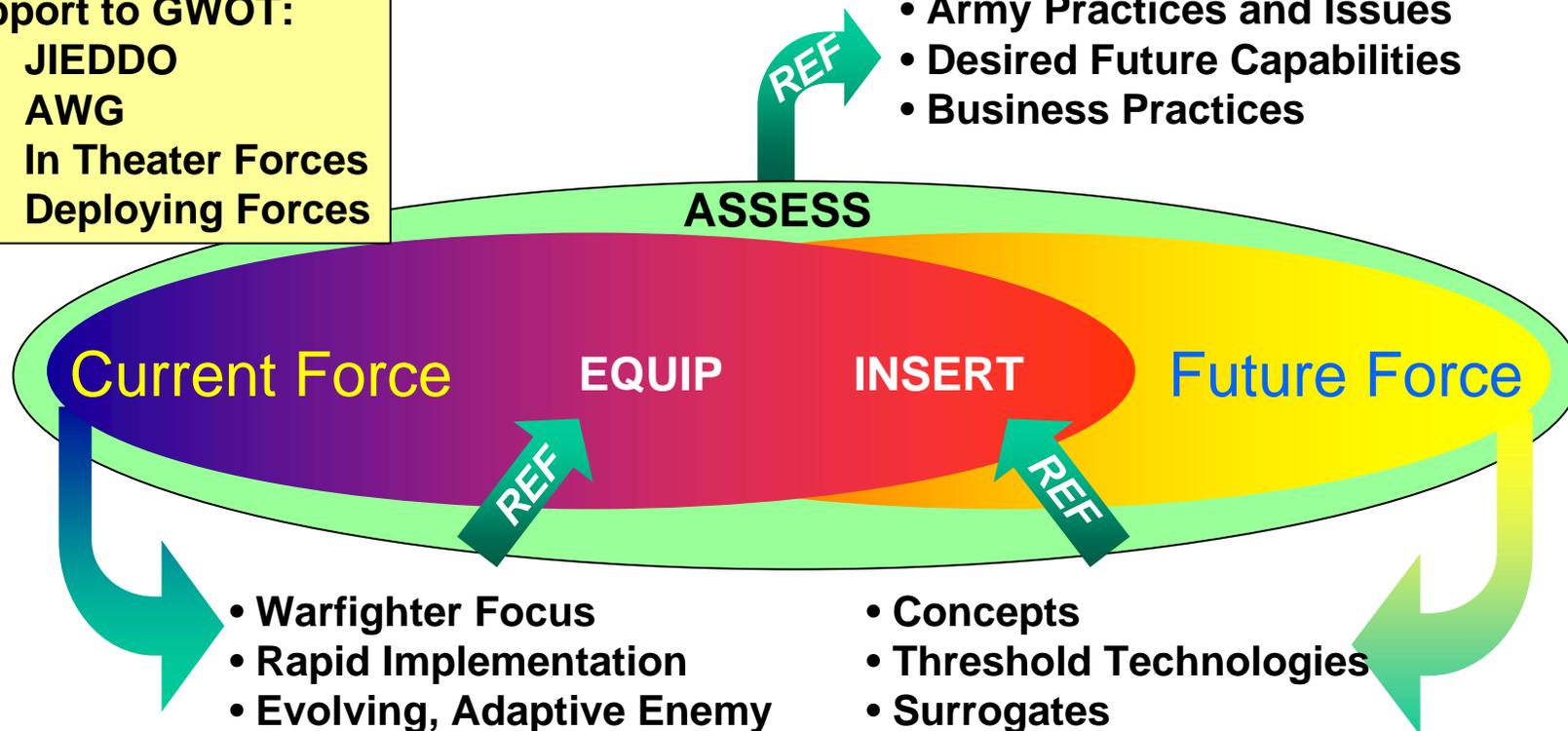


CSA's Guidance to The REF

Support to GWOT:

1. JIEDDO
2. AWG
3. In Theater Forces
4. Deploying Forces

- Army Practices and Issues
- Desired Future Capabilities
- Business Practices



- Warfighter Focus
- Rapid Implementation
- Evolving, Adaptive Enemy

- Concepts
- Threshold Technologies
- Surrogates

Mission: Assess Army business practices, desired capabilities, and acquisition techniques to effect institutional Army change; Insert future force technologies and surrogates to validate concepts and speed capabilities to the warfighter; and Equip operational commanders with COTS and GOTS solutions in order to increase effectiveness and reduce risk.



Confluence of Issues

...And the other is energy, ...It's not just an economical security issue, it's a national security issue.

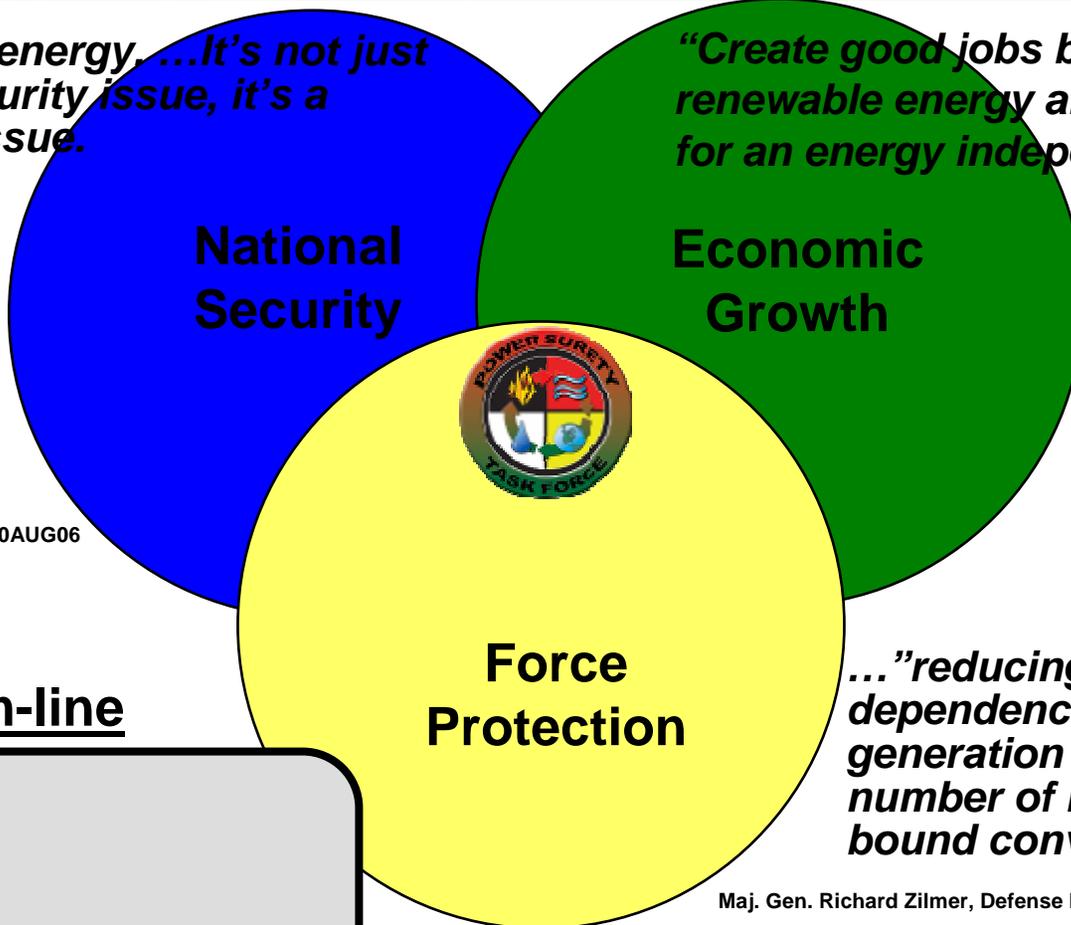


President Bush, NBC Nightly News, 30AUG06

"Create good jobs by investing in renewable energy and new technologies for an energy independent America."



Nancy Pelosi, Press Release, 28 Jun 05



Bottom-line

Power Surety

- Saves lives
- Impacts
 - Strategic
 - Operational
 - Tactical
 - Full Spectrum Contribution

... "reducing the military's dependence on fuel for power generation could reduce the number of road-bound convoys" ...

Maj. Gen. Richard Zilmer, Defense News, AUG06





Energy Security

- The Challenge -

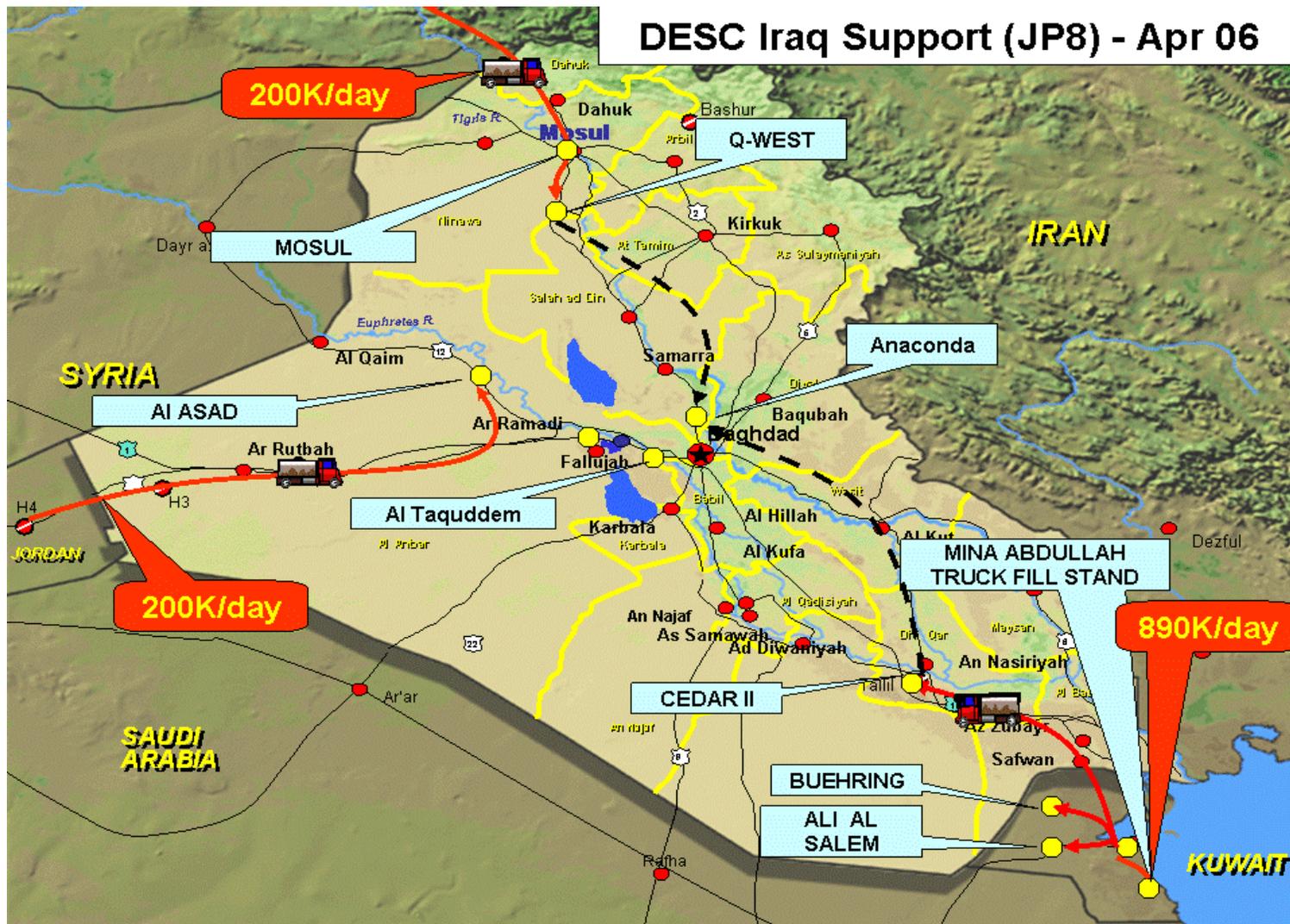
- US is world's largest oil consumer (25%)
 - **And competition for fuel is increasing, particularly from emerging far eastern countries**
- US currently imports 65% of oil
- Supply tenuously balanced with demand
 - **Volatility drives cost**
 - **\$10/barrel increase in oil increases DoD costs by roughly \$1.4B per year**
 - **Worldwide refining capacity at ~97%**
- Most current and planned platforms will use petrochemicals
- DoD consumption drivers:
 - **Jet fuel/marine diesel – 71% (mobility fuel = 74% of total energy use)**
 - **Electricity – 11%**

Issues are market-driven.
(From Energy Security SSG 13 September 06)



OIF LOCs

DESC Iraq Support (JP8) - Apr 06



Mina Al Abdulla Truck Fill Stand Kuwait

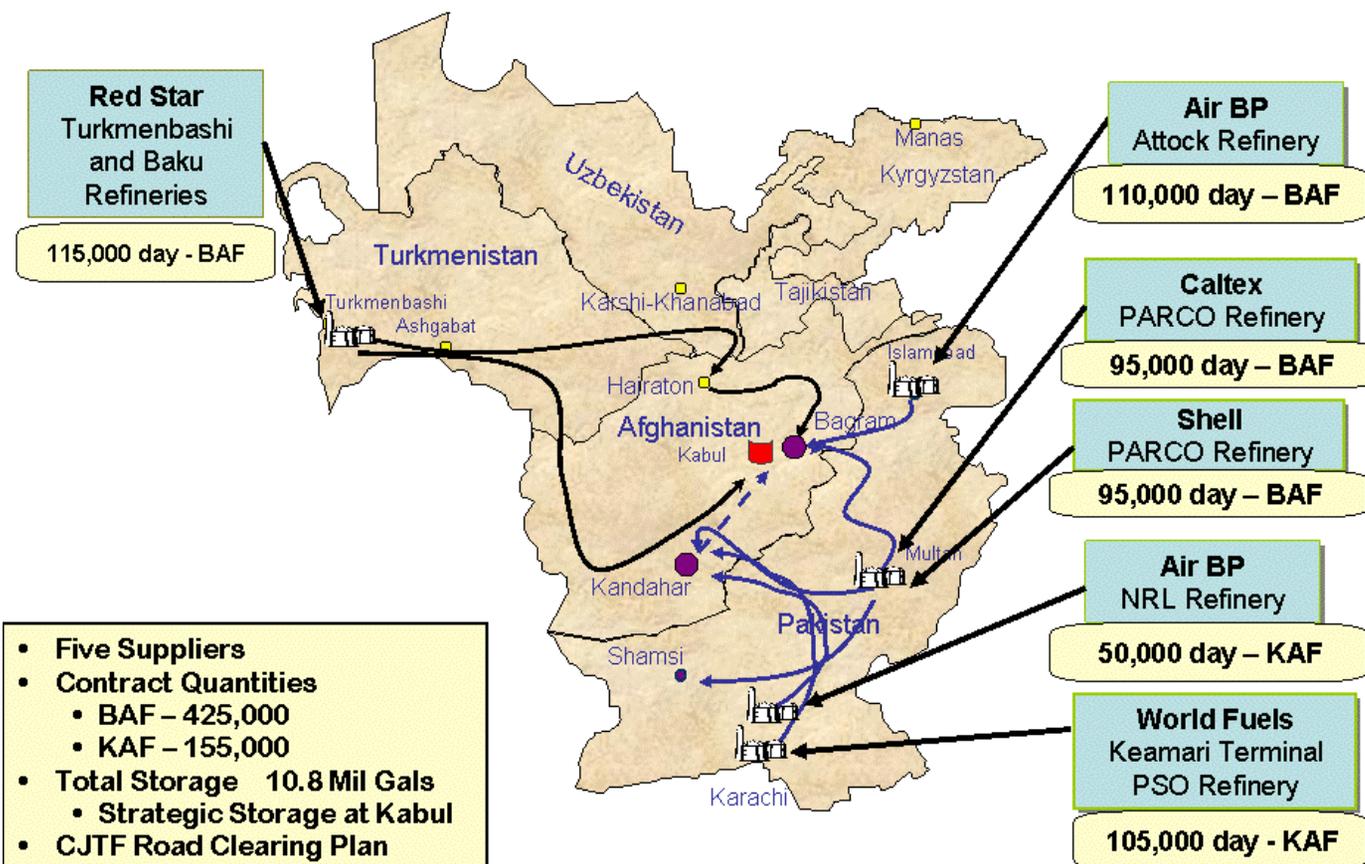


UNCLASSIFIED / FOUO



Tough Terrain Primitive Equipment

BULK FUEL SUPPORT AFGHANISTAN– APR 06



SALANG PASS AFGHANISTAN



UNCLASSIFIED / FOUO

PAKISTANI DELIVERY TRUCK



UNCLASSIFIED / FOUO

THREE-MILE BACKLOG



UNCLASSIFIED / FOUO



Assessment Camp Lemonnier, Djibouti



- Population:
- Living/Work Facilities: Tents and CLUs
- Fuel use: 10K/Day
- Fuel for Generators: 9K/Day
- Power used for Environmental Control: 90%
- Cost of Air Conditioning the Horn of Africa: Priceless!



Reducing the Burdened Cost of Fuel in Blood

Message to Garcia:

- MNF-W JUONS for Alt Energy (July 06)
 - REF engages (forms Power Surety TF)
 - REF efforts result in \$30M RDTE for Alt Energy
 - REF submits JCTD proposal (Feb 07)
- Joint Staff Supportive of JCTD approach (Apr 07)

Work Both Sides (Supply and Demand):

- Supply: THEPS (alt energy technology cited in JUONS) deploy/assess 4 prototypes June 07
- Supply: Commercial wind, solar, power demo in Kuwait (May 07)
- Demand: External Insulation for Temp Structures (EITS) at Fort Benning (Jan 07)

The Strategic Goal
Reduced Demand
Met By
Intelligent Distribution
Of Appropriate
Alternative Energy
Supplies

Demand Reduction



EITS



Monolithic Dome UNCLASSIFIED / FOUO



10-99kW COTS Wind



THEPS MEP v1.0



TGER v1.0

EITS



We are in a Crease in History...

A large, downward-pointing arrow graphic. The top part is a teal 3D rectangular block, and the bottom part is a yellow arrowhead pointing downwards.

Strategic
Importance

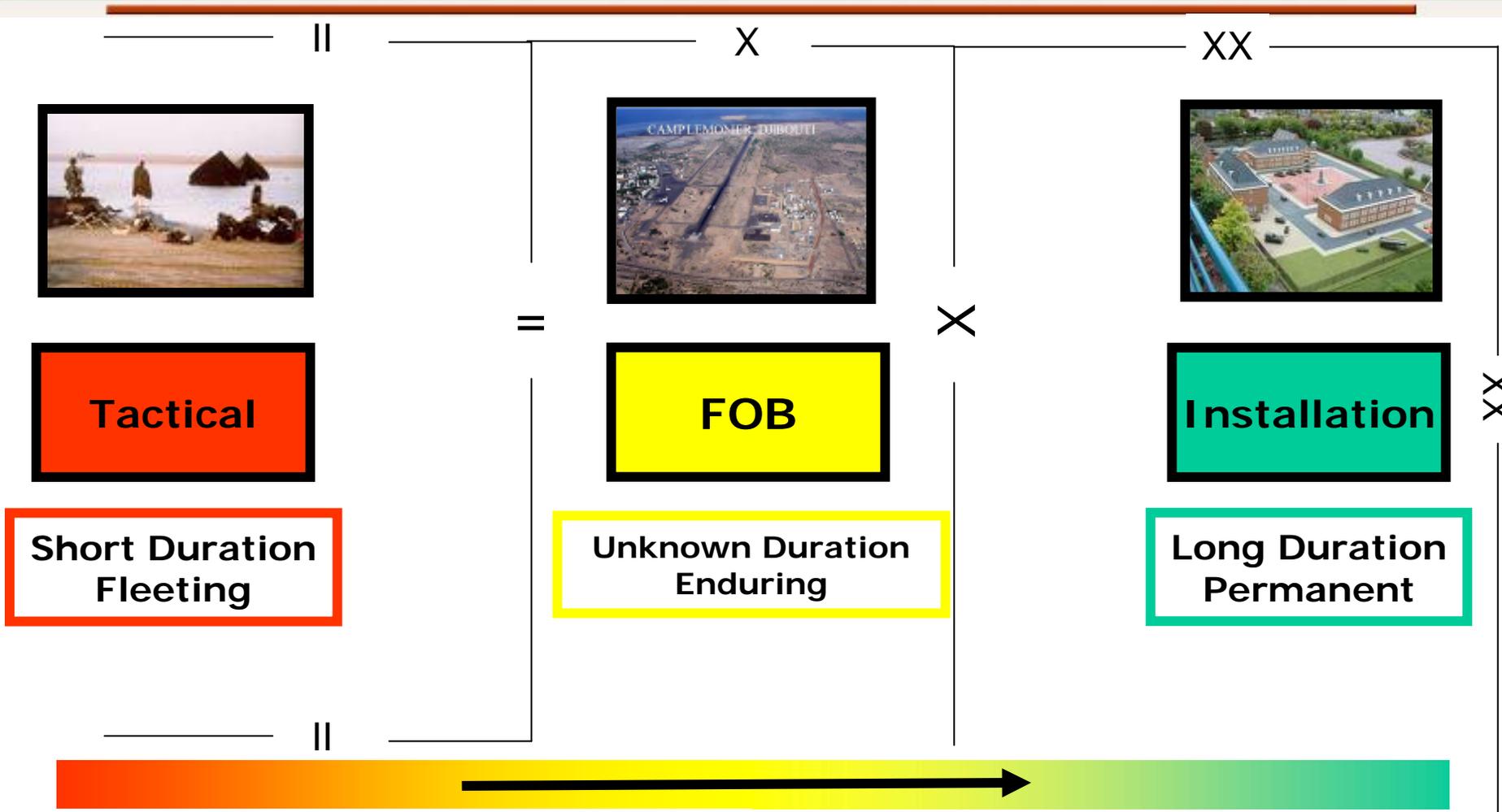
The REF will foster the development of Power Surety programs that are deployable within 18 months and that will reduce fuel use and transportation for Power Generation to committed units by 40%

A large, upward-pointing arrow graphic. The top part is a red 3D rectangular block, and the bottom part is a yellow arrowhead pointing upwards.

Tactical
Relevance



The Spectrum



Tactical

Operational

Strategic



Environmental Control in Kuwait



Kuwait Naval Base



Typical Tent for Offices or Barracks



**Environmental Control on Uninsulated
TEMPER Tent**

Uninsulated Tent





Uninsulated, interior wall:
114F

Uninsulated, interior wall
w/ liner:
106F



Insulation Team applying acrylic coating to insulated Temper Tent, ASG-KU, 30 May 2007



Work performed at night to minimize heat injury and weather effects

Insulated and Coated
"American" Tent

Uninsulated
"American" Tent

Insulated, w/o coating
"American" Tent

Initial indications are that structures required at least 50% less A/C. When linked with generator shut down, significant cost savings possible.



Insulated Tent





Insulated, interior wall:
79F

Insulated, interior wall
w/ liner:
74F





Concept of Operations

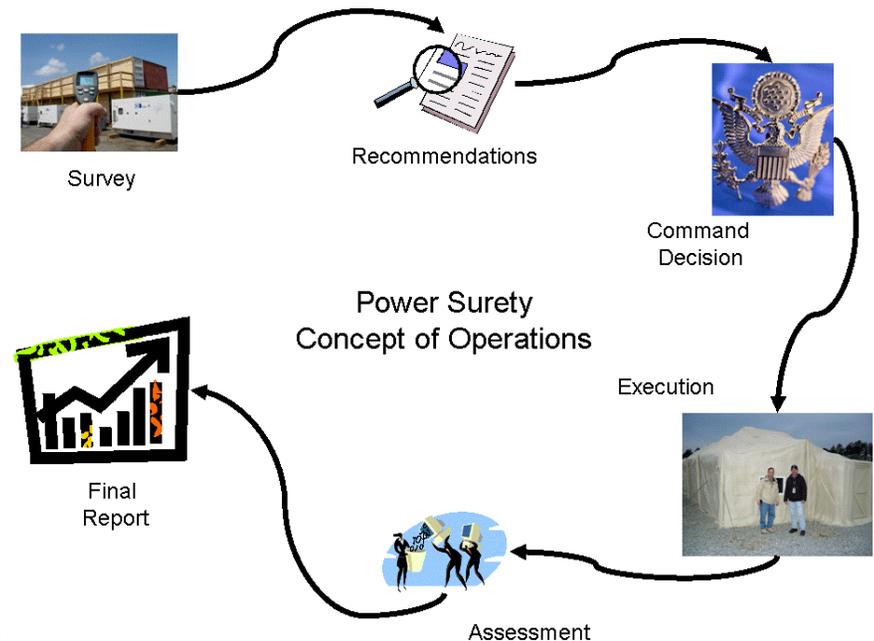


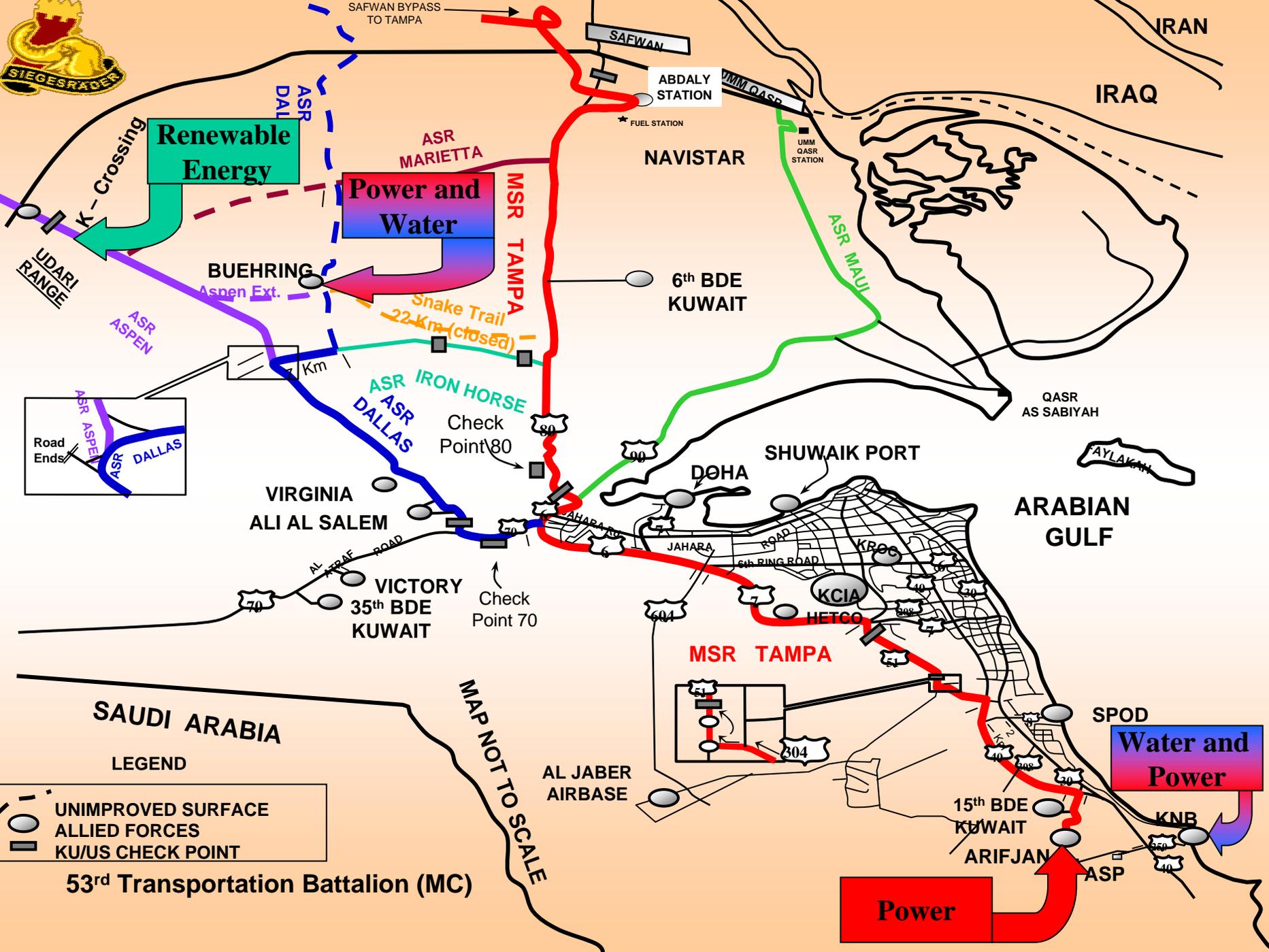
- **REF Power Surety Task Force CONOPS**

- Step 1: Initial Energy Survey
- Step 2: Survey Report & Recommendations
- Step 3: Operational Decision
- Step 4: Project Execution
- Step 5: Energy Data Gathering & Assessment
- Step 6: Final Report

- **Operational Locations:**

- Iraq
- Afghanistan
- Horn of Africa
- Kuwait





Renewable Energy

Power and Water

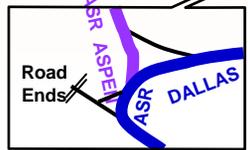
Water and Power

Power

- LEGEND**
- UNIMPROVED SURFACE
 - ALLIED FORCES
 - KU/US CHECK POINT

53rd Transportation Battalion (MC)

MAP NOT TO SCALE



UDARI RANGE

BUEHRING Aspen Ext.

VIRGINIA ALI AL SALEM

VICTORY 35th BDE KUWAIT

AL JABER AIRBASE

MSR TAMPA

DØHA

SHUWAIK PORT

ARABIAN GULF

QASR AS SABIYAH



IRAQ

IRAN

NAVISTAR

6th BDE KUWAIT

SAFWAN

ABDALY STATION

UMM QASR STATION

FUEL STATION

ASR MAUI

ASR MARIETTA

MSR TAMPA

ASR IRON HORSE ASR DALLAS

Snake Trail 22 Km (closed)

Check Point 80

Check Point 70

90

80

70

604

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SPOD

15th BDE KUWAIT

ARIFJAN

ASP

KNB

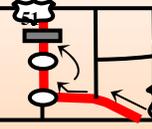
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JAHARA ROAD

6th RING ROAD

KR06

KCIA

HETCO

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2

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Small Sized Wind Turbine (10kW-99kW) Small Sized Solar Panels (array size TBD)



System Description:

- Small sized wind turbines and photovoltaic panels generate power from wind and solar to reduce the amount of external fossil fuel shipped in USCENTCOM and USSOUTHCOM
- Renewable power combines with conventional fossil fuel power to enhance mission capability while providing constant reliable power

Funding:

CONUS demonstration	\$\$.05M
Kuwait demonstration	\$.18M
Iraq/Afghanistan demonstration	\$1.08M
Total Demonstration Funding	\$1.21M

Schedule:

Discovery	Mar 07-Apr 07
Development	May 07-Jun 07
Test	Jul 07
Deployment	Aug 07-Sep 07
Assessment	Oct 07-Dec 07
Decision	Jan 08

Status:

- Delivery Status: Deploying demonstration to Kuwait in May/June 07
- Performance Feedback: Estimated date of feedback Jul 07
- Transition Plan: Transition to ASG Kuwait
- Planned Locations: various locations, USCENTCOM

Sustainment: Wind and solar will be sustained during the deployment and assessment phase of the demonstration. ASG Kuwait will assume sustainment responsibility if the demonstration is successful

NS LIN: N/A

PSTF POC: Joe Amadee, joe.amadee@belvoir.army.mil

PM POC: N/A

VENDOR(S): Bergey WindPower Co., 2200 Industrial Blvd., Norman, Ok 73069 USA



Monolithic Domes



System Description:

- Low cost and easy-to-build structure designed to for quick construction and easy maintenance
- Low energy structure minimizes air infiltration, allowing for more efficient heating and cooling
- Safe from natural disasters like hurricanes, tornados, wind and sand storms, earthquakes, and fires.

Funding:

CONUS Assessment (40' dia)	\$0.085M
Kuwait Demonstration (40' dia)	\$0.20M
Iraq/Afghanistan Demonstration (40' dia)	\$1.20M
Total:	\$1.485M

Status:

- **Viability:** Commercially available and proven; best insulating material available. Versatile.
- **Planned Locations:** USCENTCOM FOBs
- **Transition Plan:** If assessment is successful, construct monolithic domes for Forward Operating Bases

Sustainment: TBD

NS LIN: TBD

PSTF POC: Joe Amadee, (804) 778-7776, joe.amadee@us.army.mil

PM POC: TBD

VENDOR: Monolithic Dome Institute

Schedule:

Discovery	Apr 07 – May 07
Development	Jun 07- Aug 07
Testing	Sept 07
Deployment	Oct 07-Dec 07
Assessment	Jan 08-Mar 08
Decision (Transition/Kill/Spiral)	Apr 08



Advanced Concept Solutions



NET ZERO PLUS

DEMAND

INFRASTRUCTURE

SUPPLY

Description: Enduring Energy Efficient Structures and Technologies reduce energy consumption through minimized air infiltration, low power devices, and efficient environmental control.

Enduring Energy Efficient Structures



Monolithic Domes

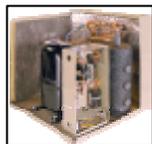


External Insulation for Temporary Structures

Enduring Energy Efficient Technology



Daylighting Technology



Geothermal Heat Pump



Solar Water Heaters



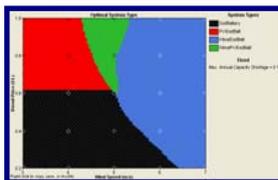
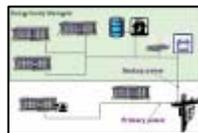
LED Lights

Description: A system of distribution that precisely measures, analyzes, and connects the flow of power between energy consuming and producing devices.

Store



Distribute, Manage and Control



Modeling and Simulation



Handheld Temperature Sensors

Description: Reduces fuel consumption by generating power through a combination of renewable, traditional and alternative power generation.



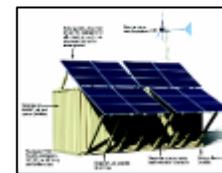
THEPS MEP v1.0



Small Wind and Solar (10kW-99kW)



Waste to Energy



THEPS TOC v1.0



Medium/Large Wind and Solar (100kw-999kW/1MW+)



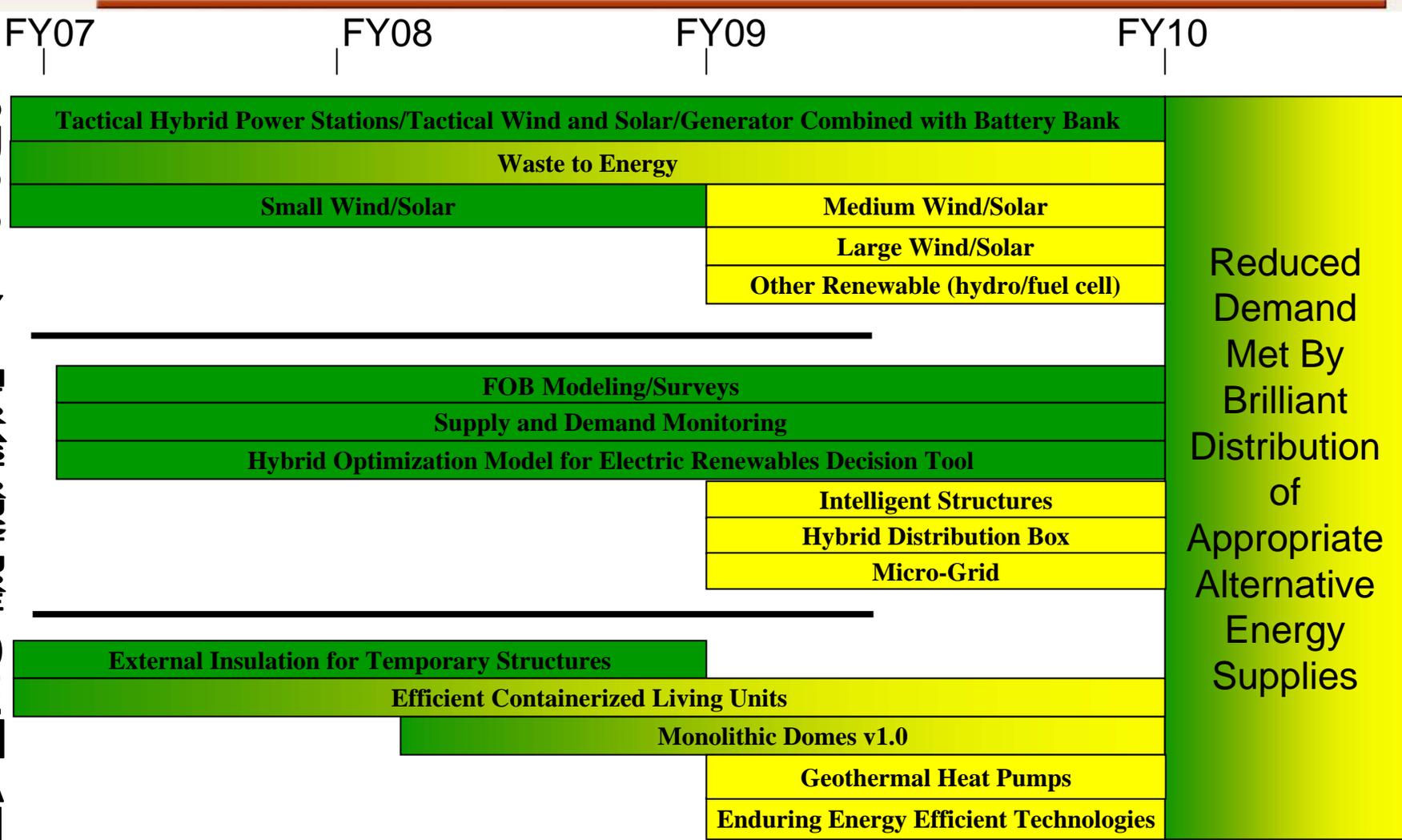
Micro-Hydro



General Integrated Schedule

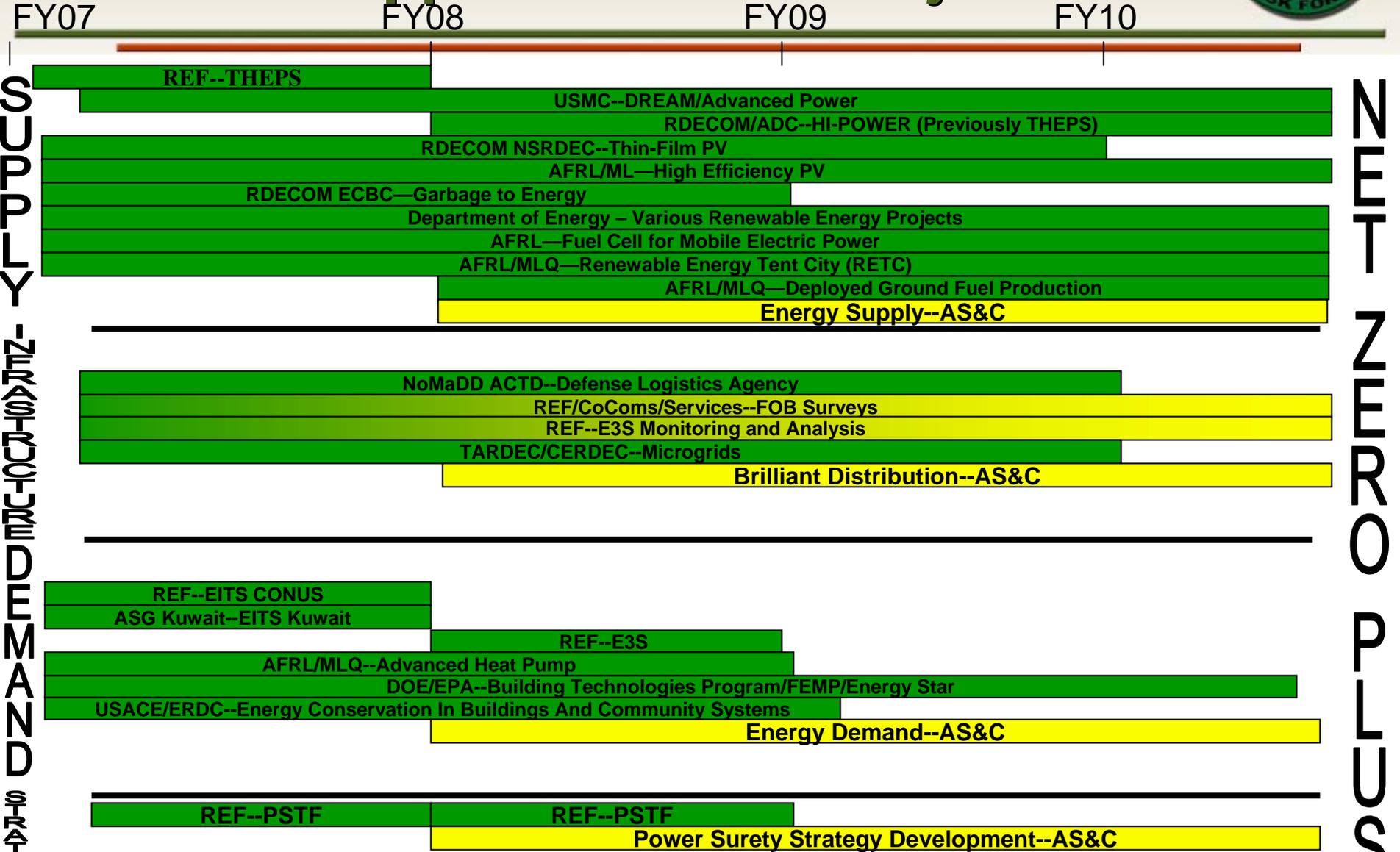
SCHEDULED - FY07 - FY10

SCHEDULED - FY07 - FY10





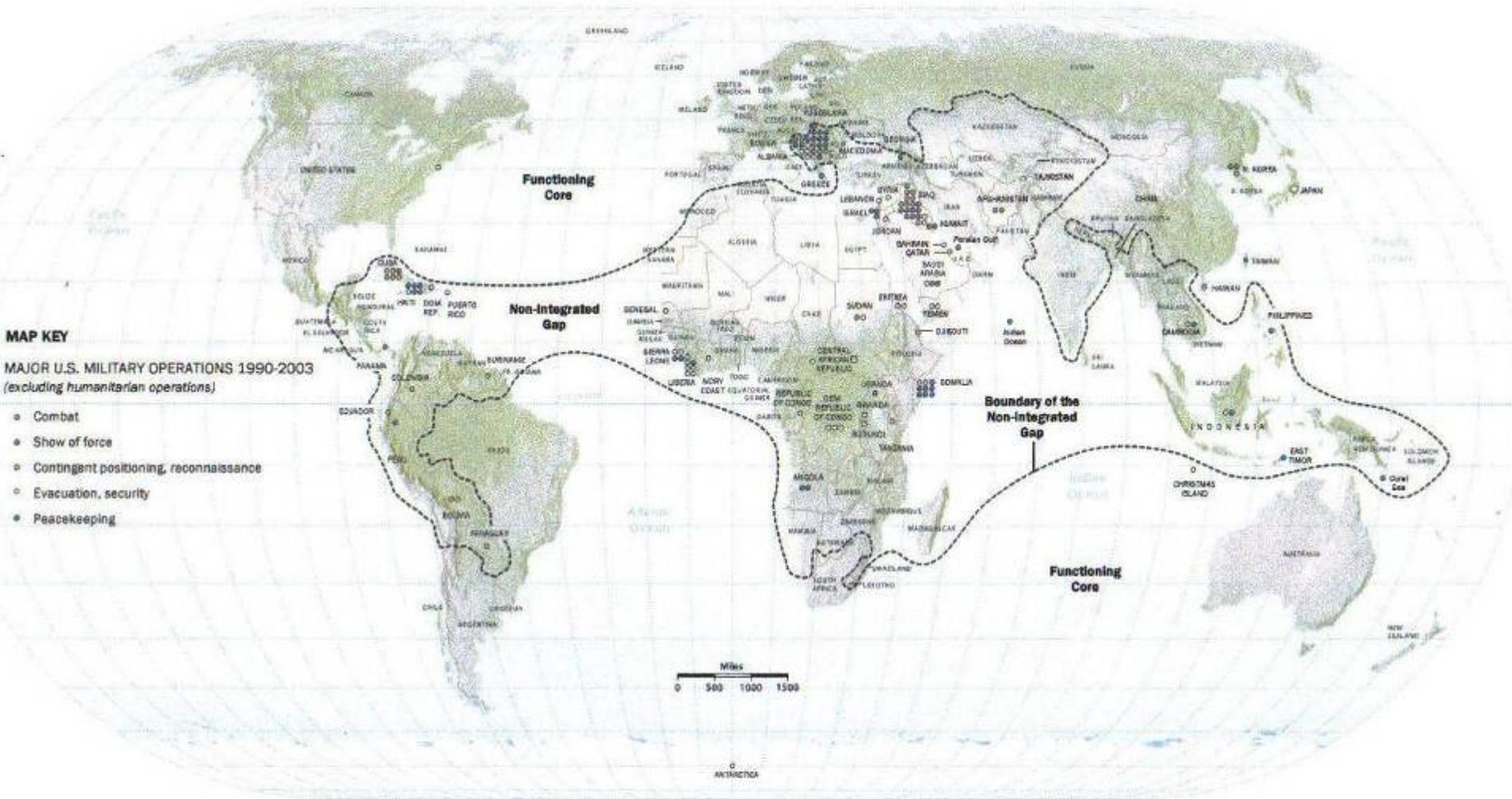
Integrated Schedule w/ Applicable USG Projects



REF--THEPS
REF--E3S
REF--EITS CONUS
REF--PSTF

USMC--DREAM/Advanced Power
RDECOM/ADC--HI-POWER
RDECOM NSRDEC--Thin-Film PV
AFRL/ML--High Efficiency PV
RDECOM ECBC--Garbage to Energy
Department of Energy - Various Renewable Energy Projects
AFRL--Fuel Cell for Mobile Electric Power
AFRL/MLQ--Renewable Energy Tent City (RETC)
AFRL/MLQ--Deployed Ground Fuel Production
Energy Supply--AS&C
NoMaDD ACTD--Defense Logistics Agency
REF/CoComs/Services--FOB Surveys
REF--E3S Monitoring and Analysis
TARDEC/CERDEC--Microgrids
Brilliant Distribution--AS&C
REF--E3S
AFRL/MLQ--Advanced Heat Pump
DOE/EPA--Building Technologies Program/FEMP/Energy Star
USACE/ERDC--Energy Conservation In Buildings And Community Systems
Energy Demand--AS&C
REF--PSTF
REF--PSTF
Power Surety Strategy Development--AS&C

The Pentagon's New Map: War and Peace in the Twenty-First Century



Response data source: U.S. Military Services via
Dr. Henry Gaffney Jr. / The ONA Corporation

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Back-ups



Power Surety Investment Strategy



Dan Nolan
Chief, Power Surety Task Force
Rapid Equipping Force

July 2007



Energy Demand: Enduring Energy Efficient Structures (E3S) and Technologies (E3T)

- Description: E3S and E3T reduces energy consumption through efficient insulation, minimized air infiltration, low power consuming devices and intelligent power management. The characteristics of an enduring structure is one that is temporary, can be constructed with minimal time and labor but withstand prolonged exposure to a variety of elements like wind, rain, snow, hail and other natural events without giving the impression of permanence.
- Near-Term Technology Investments (Quads Included)
 - External Insulation for Temporary Structures (EITS)
 - Domed Enduring Energy Efficient Structures (DE3S)
- Medium-Term Technology Investments:
 - Efficient Containerized Living Units (ECLU)
 - LED Lighting
 - Efficient ECUs
 - Enduring Energy Efficient Technology



EITS

(External Insulation for Temporary Structures)

Before



After



Spray Kits

System Description:

- Foam insulate temporary tents, containerized living units, office spaces and freezer units to decrease air and dust infiltration.
- Foam is deployed using self-contained, self powered conex transported spray kits.
- Foam is applied by experts who prepare the structure, apply foam, apply protective coating, and monitor air exchange.
- Reduces dust, heat, cold and noise
- Reduces A/C requirements by at least 50% (two unit systems)
- Reduces Power requirement by 85%
- Requires engineering survey to begin taking power sources offline.
- Dollar ROI is a function of ECU types and number, type of power (Prime or Tactical) and \$/Gal of fuel
- Reduces fuel consumption and associated convoy traffic saves lives

Funding:

Ft. Benning Demonstration	\$.025M
Djibouti Demonstration	\$.3M
Kuwait Demonstration	\$.5M
Iraq 100K sq ft Iraq Demo (REF paid)	\$ 1.24M
Afghanistan 100K sq ft REF paid)	\$ 1.24M
Total	\$ 3.305M

Schedule:

Discovery	Nov 06
Development	Dec 06-Jan 07
Testing	Feb 07-Mar 07
Deployment	Jul-Sep 07
Assessment/Decision	Jul-Sep 07

Status:

- Viability: Commercially available and proven; best insulating material available. Versatile.
- **Planned Locations:** USCENTCOM FOBs
- **Transition Plan:** If assessment is successful, foam insulate entire small, medium and large FOB.

Sustainment: Minimal with acrylic coating
NS LIN: TBD

PSTF POC: Joe Amadee, (804) 514-3291, joe.amadee@us.army.mil

PM POC: TBD

VENDOR: Gaco Western



E3S

(Enduring Energy Efficient)



System Description:

- Low cost and easy-to-build structure designed to for quick construction and easy maintenance
- Low energy structure minimizes air infiltration, allowing for more efficient heating and cooling
- Safe from natural disasters like hurricanes, tornados, wind and sand storms, earthquakes, and fires.

Funding:

CONUS Assessment (40' dia)	\$0.085M
Kuwait Demonstration (40' dia)	\$0.20M
Iraq/Afghanistan Demonstration (40' dia)	\$1.20M
Total:	\$1.485M

Schedule:

Discovery	Apr 07 – May 07
Development	Jun 07- Aug 07
Testing	Sept 07
Deployment	Oct 07-Dec 07
Assessment	Jan 08-Mar 08
Decision (Transition/Kill/Spiral)	Apr 08

Status:

- **Viability:** Commercially available and proven; best insulating material available. Versatile.
- **Planned Locations:** USCENTCOM FOBs
- **Transition Plan:** If assessment is successful, construct monolithic domes for Forward Operating Bases

Sustainment: TBD

NS LIN: TBD

PSTF POC: Joe Amadee, (804) 778-7776, joe.amadee@us.army.mil

PM POC: TBD

VENDOR: Monolithic Dome Institute



E-STAR

(Enduring Energy Efficient Technology)



LED Lights



Battery Chargers



Hot Water Heaters

DRAFT

System Description:

- **Lighting:** LEDs emit more light per watt than incandescent bulbs and have an extremely long life span.
- **Environmental Control:** Energy efficient environmental control units have high-efficiency compressors, high-efficiency fan motors, improved heat transfer surfaces, and leverage characteristics of local ecosystem
- **Battery Chargers:** Advanced energy-saving designs are now available that, on average, use 35 percent less energy.
- **Water Heaters:** mitigates standby losses of tank water heaters by heating water on demand or using solar or excess heat.

Funding:

TBD

Status:

- **Planned Locations:** USCENTCOM FOBs

Sustainment: TBD

NS LIN: TBD

PSTF POC: Joe Amadee, (804) 778-7776, joe.amadee@us.army.mil

PM POC: TBD

VENDOR: TBD

Schedule:

Discovery	TBD
Development	TBD
Testing	TBD
Deployment	TBD
Assessment	TBD
Decision (Transition/Kill/Spiral)	TBD



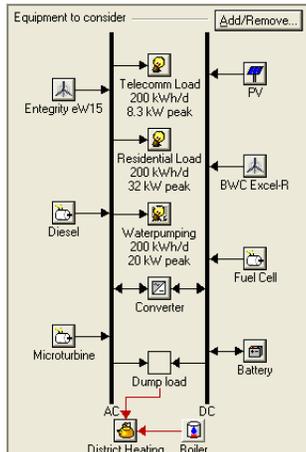
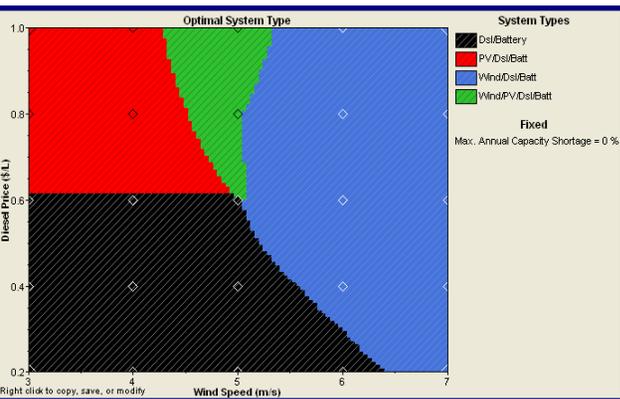
Brilliant Infrastructure: Energy Surveying, Modeling, Monitoring, and Transmission

- **Brilliant Power Distribution System:** Power Infrastructure that precisely connects power consuming and producing devices. Such a system links intelligent devices that can externally communicate to an automated power manager. This power manager will precisely match supply with demand in any weather conditions to minimize excessive production or unnecessary loss of energy.
- **Near-Term Technology Investments (0-12 months)**
 - FOB Surveys and Survey Equipment
 - Energy Demand Monitoring Sensors
 - Wind/Solar Surveys
- **Mid-Term Technology Investments (12-36 months)**
 - Micro-grids
 - Plug-and-Play Distribution Hubs
 - Intelligent Structures



HOMER

(Hybrid Optimization Model for Electric Renewables)



System Description:

- HOMER uses data about a given ecosystem to determine what combination of renewable and conventional power can be used to supply power.
- informs commanders what combination of wind, solar, and other renewable energy can be employed without experiencing mission degradation

Funding:

DOE/NREL HOMER Support

\$.1M

Schedule:

HOMER Support

FY08

Status:

- DOS funded wind and solar survey for Afghanistan and Pakistan will support PSTF/NREL support.

DOE/NREL: Peter Lilienthal, 303-384-7444, peter.lilienthal@nrel.gov

PSTF POC: Dan Nolan, daniel.nolan@belvoir.army.mil



FOB Survey and Monitoring Equipment



System Description:

- Devices and software gather environmental, and load data (demand and supply) to assess the potential for demand reduction and alternative energy supplies at Forward Operating Base.
- Data gathering will provide comprehensive understand of power and energy requirements in committed units.

Funding:

Djibouti Survey and Monitoring	\$.05M
Kuwait Survey and Monitoring	\$.1M
Iraq/Afghanistan Survey and Monitoring	\$.2M
Total Demonstration Funding	\$.35M

Schedule:

Survey Ongoing—Based on Commander needs

Status:

- Delivery Status: Deploying demonstration to Kuwait in May/June 07
- Performance Feedback: Estimated date of feedback Jul 07
- Transition Plan: Transition to ASG Kuwait
- Planned Locations: various locations, USCENTCOM

Sustainment: Wind and solar will be sustained during the deployment and assessment phase of the demonstration. ASG Kuwait will assume sustainment responsibility if the demonstration is successful

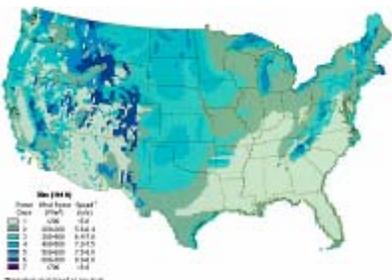
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PSTF POC: Joe Amadee, joe.amadee@belvoir.army.mil

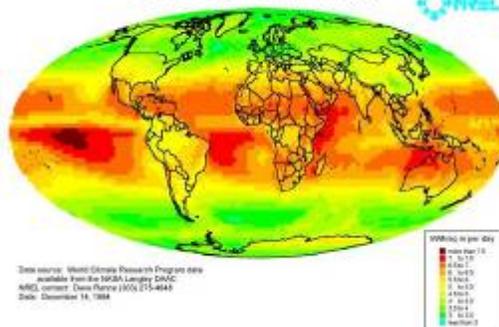


EMAPS

(Energy Maps)



Estimated Global Horizontal Solar Radiation
1985 to 1988 Annual Average



Wind Map

Solar Map

System Description:

- Wind and solar maps help determine where the best available renewable resources are in a given ecosystem.
- Additional analysis can provide other renewable features of the local ecosystem (biomass, hydropower, etc)
- Data can be input into HOMER model and calculate ideal locations and configurations for renewable energy.

Funding:

DOE/NREL Support

\$1M (estimated)

Schedule:

Discovery	May 07
Development	Jun 07-Oct 07
Testing	N/A
Deployment	N/A
Assessment	N/A
Decision	N/A

Status:

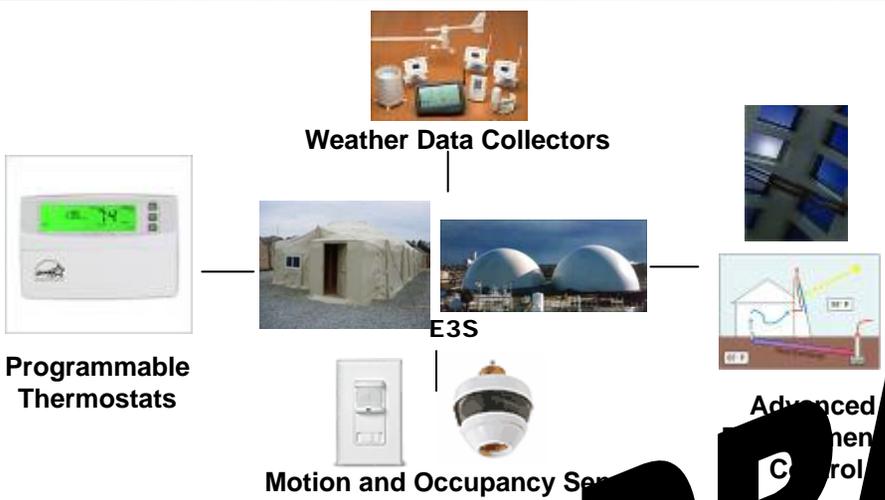
- History: In 2006, DOS funded wind and solar survey for Afghanistan and Pakistan will support PSTF/NREL support.
- PSTF requests a ecosystem maps for Iraq and Afghanistan

DOE/NREL: Peter Lilienthal, 303-384-7444,
peter.lilienthal@nrel.gov

PSTF POC: Dan Nolan, daniel.nolan@belvoir.army.mil



Intelligent Structures



System Description:

- **Programmable Thermostats:** more convenient and accurate than manual thermostats and improve a structure's efficiency — when used properly, about \$150/year are better for the environment, since using less energy helps reduce greenhouse gas emissions associated with energy production.
- **Motion and Occupancy Sensors:** Can be coupled with lighting and environmental control devices to save energy when a room or facility is not being used.
- **Weather Data Collectors:** Can be coupled with environmental control units to help minimize energy at different parts of the day and year.
- **Advanced Environmental Control:** Solar Chimneys, Electrochromic Windows, and energy star technologies can be coupled with weather data collectors, programmable thermostats, and occupancy sensors to regulate internal temperature.

DRAFT

Funding:

TBD

Status:

• TBD

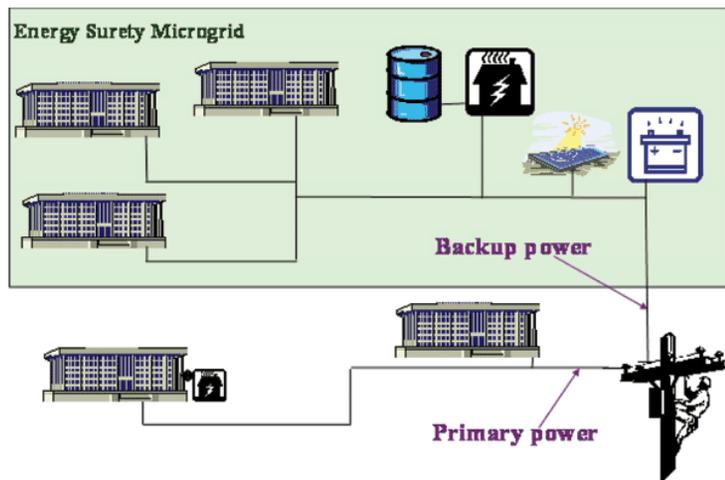
Schedule:

- Discovery
- Development
- Testing
- Deployment

PSTF POC: Dan Nolan, daniel.nolan@belvoir.army.mil



Micro-grids



System Description:

- Distributes power from conventional and renewable energy resources to energy efficient structures.

Funding:

TBD TBD

Status:

•TBD

Schedule:

TBD TBD

PSTF POC: Dan Nolan, daniel.nolan@belvoir.army.mil



Hybrid Distribution Box

System Description:

- Accepts multiple kinds of power generation devices, conditions them, and puts them into the grid.

DRAFT

Funding:

TBD

Status:

•TBD

Schedule:

TBD

TBD

PSTF POC: Dan Nolan, daniel.nolan@belvoir.army.mil



Energy Supply: Renewable and Alternative Power Generation



- Description: Reduces fuel consumption by generating power through a combination of renewable, traditional and alternative power generation.
- Near-Term Technology Investments (0-12 months):
 - THEPS/DREAM
 - TESS
 - BBIG
 - TGER
 - Small Sized Wind Turbines (10kW-100kW) and Solar Arrays (peak kW output TBD)
- Medium-Term Technology Investments (12-36 months)
 - HIPOWER
 - Medium Sized Wind Turbines (100kW-800kW) and Solar Arrays (kW output TBD)
 - Large Sized Wind Turbines (800kW +) and Solar Arrays (peak kW output TBD)
 - Micro-hydro



THEPS

(Transportable Hybrid Electric Power Stations)



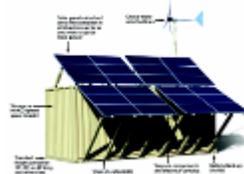
THEPS MEP v1.0



THEPS MEP v2.0



THEPS TOC v2.0

THEPS TOC
(artist rendering)

System Description:

- Utilizes wind, sunshine, diesel generator and storage batteries to provide reliable power with fewer fuel requirements.
- Wind turbines, photovoltaics, absorbed glass mat batteries and diesel generator fits inside ¾ ton trailer or 20ft connex
- Suitable for Forward Operating Bases of all sizes: Bare Bases, Observation Posts, Border Checkpoints and humanitarian efforts where JP-8 re-supply is costly.
- Power output varies on THEPS type and weather conditions, but averages 5kW constant loads.
- Two Variants:
 - THEPS Mobile Electric Power (MEP) – HMWVV towable
 - THEPS Tactical Operations Center (TOC) – Connex mounted

Funding:

THEPS Base contract v2.0 (2ea MEP & 2ea TOC)	\$1.228M
Data loggers (4ea)	\$73.2K
THEPS MEP v1.0 (NTC refurb)	\$100K
ATEC Testing	\$142.7K
NREL TSA	\$100K
BBIG Auto Start	\$80K
On-Site Vendor support	\$490.8K
Total Funding Obligated (as of 4 June 07)	\$2.235M
<i>2nd NREL TSA (from REF)</i>	<i>\$100K (Jul 07)</i>
<i>Mgmt reserve (from REF - deploy shipping, etc)</i>	<i>\$715K (adds to \$3.05M)</i>
<i>Dream (from ADC)</i>	<i>\$325K (Aug 07)</i>
<i>Dream (from ADC)</i>	<i>\$500K (Jan 08)</i>

Schedule:

Discovery (Project Initiation)	Jul 06-Sep 06
Development	Oct 06-Apr 07
Testing (ATC and NREL)	Apr 07-Aug 07
Deployment-Assessment (NTC and NREL)	Aug 07-Jun 08

Status:

- Requirement: REF Initiated + 25 July 06 MNF-W JUONS
- Planned Locations: NTC and NREL
- Performance Feedback: after 90-day assessment
- Related Information: THEPS development informs DREAM and HiPower. Transition to PM-MEP coordinated.

Sustainment: Vendor support (first spiral)

NS LIN: Will be requested

REF POC: John Spiller: (703) 704-2168,
john.spiller@belvoir.army.mil

PM POC: PM-MEP (Paul Richards)

VENDOR: SkyBuilt Power, 4449 North 38th Street,
Arlington, VA 22207



TESS (Tactical Electric Solar System)



System Description:

- **Mission:** The purpose of this project is to provide small amounts of durable, low-cost renewable power in support of Army Civil Affairs and host-nation citizens in remote locations with unavailable or unreliable grid power.
- Portable PV system has 2, 50W solar panels storing power in a 100amp-hour absorbed glass mat battery with 4, 12V DC receptacles. Total system weight is 85lbs.
- Enough power to operate 12VDC electrical devices like small refrigerator, lights, a fan, a television or computer.
- Comes with 120VAC, 60Hz. 240VAC, 50/60Hz inverter optional, or COTS component can be purchased locally.
- Can be combined to provide sufficient power for communications equipment.

Funding:

Solar Stik w/ Tripod Mount & Power Pak 100	\$6,700
@5 units	\$33,500
Padded Solar Stik Equipment Cases	\$1,675
@5 units	\$8,375
Military Discount	-\$1,000
Test and Evaluation	\$25,000
Logistics (CONUS to OCONUS)	\$10,000
Total:	\$75,875

Schedule:

Survey and Mission Analysis	July 07
Develop/Purchase	July 07
Test	Aug 07
Demonstrate	Aug 07

Status:

- **Viability:** Commercially available and proven.
- **Demonstration Plan:** US Army Civil Affairs teams in Djibouti; 489th Battalion Commander
- **Possible Locations:** USCENTCOM Civil Affair Teams. Baghdad, Iraq; Dire Dawa, Ethiopia; Garissa, Kenya; Lira, Uganda.
- **Transition Plan:** If assessment is successful, establish local nation sales representatives.

PSTF POC: Brian R. Smith, 703-704-1534, brian.smith74@belvoir.army.mil

PM POC: TBD

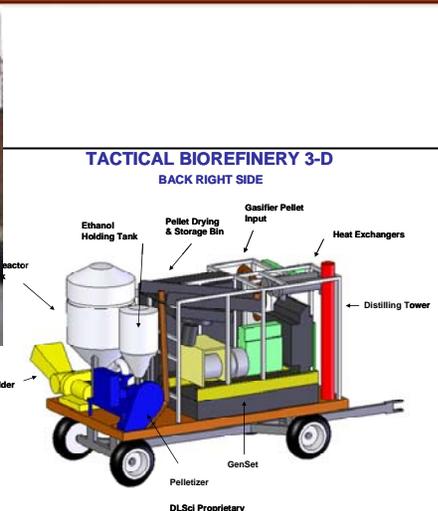
VENDOR: TBD—possibly Water to Wine Concepts, Inc; 1-800-793-4364

Possible OPS POC: Jesse Pruett, jesse.pruett@us.army.mil,



TGER

(Tactical Garbage to Energy Refinery)



System Description:

- Tactical Garbage to Energy Refinery (TGER) converts field waste (paper, plastic, cardboard and food slop – no glass or metal) into biofuel gas that is used to power a 60kW generator.
- TGER will turn 1 ton of waste into energy for
 - conserving 115 gallons of JP-8 or diesel fuel
 - excess thermal energy which can be used for field sanitation, showers or laundry use
 - avoids disposal costs of trash
- TGER will startup on JP-8 then converts to running 98% on trash derived energetics within 6-12 hours (depending on trash)
- Skid Mounted, can be employed on military 5-ton flatbed trailer
- Tare weight 7,128lbs Dimensions: 160”LX96”WX90”H

Funding:

Option A: SN#2 TBR	\$1.3M
Option B: SN#2 plus upgrade SN#1	\$2.2M (net \$1.5M)
ECBC Program/Engineering Support	\$3M
Assessment Support (6 months)	\$4M
Test	\$.75M
Deployment	\$.2M
Total:	\$2.2M

Schedule:

Order Long-Lead Items	Jan 07
Funding and Project Initiation	Apr 07
Expected Delivery 2ea TBR	Dec 07
A TEC Test/Safety Confirmation	Jan – Feb 08
Deployment - Assessment	Mar – Sep 08

Status:

- Delivery Status: Two TBR systems to theater o/a Mar 2008
- Performance Feedback: 6 month assessment in AOR (2 vendor Techs)
Transition Plan: RDECOM / JPEO CS-CSS
- Planned Locations: TBD
- Related Information: System configured with remote monitoring software and automation

Sustainment: One additional supply item required: Biocatalyst packet (1.4lb packet per day) Packet is similar to laundry packet and tossed into trash hopper at startup. Genset is civilian version of 60kW Tactical Quiet Generators so parts, maintenance and references are comparable.

NS LIN: NA

REF POC: TJ Iak or John Spiller, 703-704-2168,

PM POC: Edgewood Chem-Bio Center: Dr. Valdes (410) 436-5424

James.Valdes@us.army.mil

VENDOR: Defense Life Sciences, LLC

VENDOR LOCATION: McLean, VA



BBIG

(Battery Bank with Intelligent Generator)



Absorbed Glass Mat Battery



3 kW TQG

System Description:

- Generator set with auto-on/auto-off capability connects to a set of Absorbed Glass Mat batteries to improve load matching between generators and power consuming devcies.
- Version 1.0 modifies a 3kW Tactical Quiet Generator that automatically starts or stops when a voltage signal is sent from the battery bank.

Funding:

<u>Item Name</u>	<u>Quantity</u>	<u>Cost</u>	
3 kW Auto-Start	3 Systems*	\$80 K	* (2 for delivery;
Total:	3 Systems*	\$80 K	1 prototype for field support @ Ft. Belvoir).

Schedule: (7 Week Effort)

Project Initiation	ARO
Design & Development Complete	ARO + 7 Days
Mech & Elec Drawing Layout	ARO + 18 Days
Fabricate Comp	ARO + 28 Days
Build and Test	ARO + 35 Days
Complete Op Instructions	ARO + 42 Days
Safety Confirmation/Release (limited)	ARO + 47 Days
Deliver 2 units to REF	ARO + 49 Days

Status:

- Delivery Status: Two 3 kW TQG's have been ordered and received from PM-MEP
- Performance Feedback: Estimated date of feedback Feb 07
- Transition Plan: Transition to REF
- Planned Locations: TBD by REF
- Related Information: Leverage efforts from 5 kW Auto-Start program for JPEO-CBD.

Sustainment: TQG's are supported to the Army Inventory. One development unit will remain at Ft. Belvoir for field support and trouble-shooting purposes.

NS LIN: N/A

RDECOM POC: Dr. James Ferrick: (703) 704-2353, DSN 654-2353
email: james.h.ferrick@us.army.mil

Power Surety TF POC: Brian R. Smtih, 703-704-1534; email
brian.smith74@belvoir.army.mil

VENDOR(S): N/A – Work performed in-house by CERDEC

VENDOR LOCATION(S): N/A – Worked performed in-house by CERDEC



WTSP

(Wind Turbines and Solar Panels 10kW-99kW)



System Description:

- Small sized wind turbines and photovoltaic panels generate power from wind and solar to reduce the amount of external fossil fuel shipped in USCENTCOM and USSOUTHCOM
- Renewable power combines with conventional fossil fuel power to enhance mission capability while providing constant reliable power

Funding:

CONUS demonstration	\$.05M
Kuwait demonstration	\$.18M
Iraq/Afghanistan demonstration	\$1.08M
Total Demonstration Funding	\$1.21M

Schedule:

Discovery	Mar 07-Apr 07
Development	May 07-Aug 07
Test	TBD
Deployment	TBD
Assessment	TBD
Decision	TBD

Status:

- Delivery Status: Deploying demonstration to Kuwait in May/June 07
- Performance Feedback: Estimated date of feedback Jul 07
- Transition Plan: Transition to ASG Kuwait
- Planned Locations: various locations, USCENTCOM

Sustainment: Wind and solar will be sustained during the deployment and assessment phase of the demonstration. ASG Kuwait will assume sustainment responsibility if the demonstration is successful

NS LIN: N/A

PSTF POC: Joe Amadee, joe.amadee@belvoir.army.mil

PM POC: N/A

VENDOR(S): Bergey WindPower Co., 2200 Industrial Blvd., Norman, Ok 73069 USA



WTSP

(Wind Turbines and Solar Panels 100kW-999kW)



System Description:

- Medium sized wind turbines and photovoltaic panels generate power from wind and solar to reduce the amount of external fossil fuel shipped in USCENTCOM and USSOUTHCOM
- Renewable power combines with conventional fossil fuel power to enhance mission capability while providing constant reliable power

Funding:

TBD TBD

Status:

TBD

Schedule:

Discovery TBD
 Development TBD
 Test TBD
 Deployment TBD
 Assessment TBD
 Decision TBD

Sustainment: Wind and solar will be sustained during the deployment and assessment phase of the demonstration.

NS LIN: N/A

PSTF POC: Joe Amadee, joe.amadee@belvoir.army.mil

PM POC: N/A

VENDOR(S): Bergey WindPower Co., 2200 Industrial Blvd., Norman, Ok 73069 USA



NET Zero Plus



System Description:

- CONUS based Enduring Energy Efficient Structures (E3S) and Technology combined with local renewable resources.
- High efficient facility aims to generate more power than it consumes.

DRAFT

Funding:

CONUS demonstration
Total Demonstration Funding

Schedule:

Discovery
 Development
 Test
 Deployment
 Assessment
 Decision

Jun 07-Jul 07
 Jul 07-Aug 07
 Aug 07 -

Status:

- Locating Vendors
- Performance Feedback:
- Transition Plan:
- Planned Demonstration: Fort Belvor, USCENTCOM

Sustainment:

PSTF POC:
PM POC:
VENDOR(S):



Past and Present Spending

Item	Project	Value	On Contract	Status
Kuwait and Djibouti Acrylic and Foam	EITS	\$2,000,000	Mar-07	Complete
Kuwait and Djibouti Sprayers	EITS	\$400,000	Mar-07	Complete
Kuwait Acrylic (39 drums)	EITS	\$37,490	Jul-07	Complete
Iraq/Afghan 100K sq ft	EITS	\$2,410,076	Jul-07	In Progress
Execute 200K Option	EITS	\$2,410,076	Aug-07	In Progress
Iraq Sprayer (dbl):	EITS	\$246,800	Jul-07	In Progress
Follow On IDIQ Contract	EITS	\$77,000,000	Aug-07	In Progress
THEPS Base contract v2.0 (2ea MEP & 2ea TOC)	THEPS	\$1,228,000	Oct-06	Complete
Data loggers (4ea)	THEPS	\$73,200	Jan-07	Complete
THEPS MEP v1.0 (NTC refurb)	THEPS	\$100,000	Mar-07	Complete
ATEC Testing	THEPS	\$142,700	May-07	Complete
NREL TSA	THEPS	\$100,000	May-07	Complete
BBIG Auto Start	THEPS	\$80,000	Jun-07	In Progress
On-Site Vendor support	THEPS	\$490,800	Jun-07	In Progress
2nd NREL TSA	THEPS	\$100,000	Jun-07	In Progress
Mgmt reserve (from REF - deploy shipping, etc)	THEPS	\$715,000	Jun-07	In Progress
USMC DREAM Investment	THEPS	\$400,000	Aug-07	In Progress
USMC DREAM Investment	THEPS	\$500,000	Jan-08	In Progress
	Total	\$88,434,142		



Future Spending

Project	Description	Funding	Status
Tactical Electric Solar System	Micro Solar (1W-1kW) power a range of small devices. Primarily intended for Civil Affairs units in locations with unreliable or unavailable grid power	\$ 75,000.00	In progress
Monolithic Domes -- E3S	Energy-efficient structures; well insulated and provides some ballistic protection. MNF-I has specifically requested demo structures before 30 Sep 07; working 50' dia dome for Belvoir PSTF office and showplace for renewable energy/microgrid; after all RE	\$ 1,485,000.00	Project Proposal - draft contract package ready NLT 9 July
Geothermal Heat Pump (Energy Support)	Uses ground, surface water or underground water as a heat source and heat sink	\$ 500,000.00	Project Proposal - draft contract package ready NLT 27 July
(PSTF) Wind/Solar Maps (Energy Support)	Another NREL world-class product/service that PSTF can apply to model renewable energy projects to determine feasibility; priorities are in AOR	\$ 100,000.00	Would require Govt-Govt MIPR + modification to the TSA between REF and TSA
(PSTF) Clarity Control	Web based project management solution proof of concept	\$ 250,000.00	Project Proposal - draft contract package ready NLT 9 July. Maybe OMA.
(PSTF) Wind Turbines & Solar Panels	Renewable power combines with conventional fossil fuel power to enhance mission capability while providing constant reliable power	\$ 1,510,000.00	Project Proposal - draft contract package ready NLT 9 July (provided units provide required input). K-crossing demo is to be paid for on Synovision contract; after all REF demos, then "model" should be user pays for execution projects (REF advises and fac
(PSTF) E3T	Enduring Efficient Technologies. Efficient lighting, HVAC and appliances (Energy-Star) research and cataloging (ICW DLA) to offer unit's the best options to replace status quo; best included in Belvoir Dome project.	\$ 205,000.00	Project Proposal - draft contract package ready NLT 27 July
	Total	\$ 4,125,000.00	



Future Funding: JCTD's Funding Sources



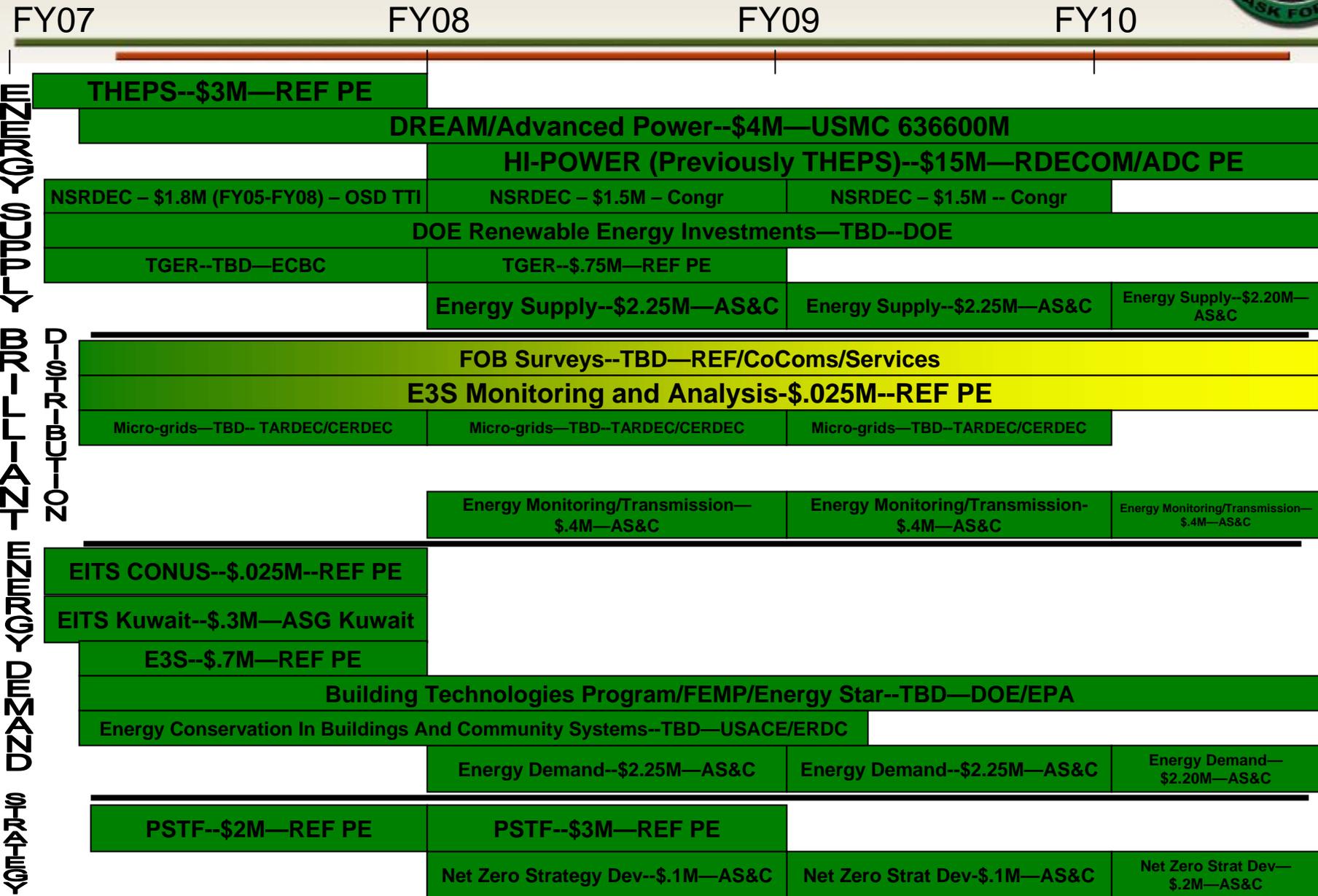
Net Zero-Plus JCTD Funding Chart								
Organization	Type of Funding	¹ Funding Description	² Program Element (PE)	Project #	FY08	FY09	FY10	Total
Army REF*	RDT&E/6.5	Cash	060653747C08		4750.00	TBD	TBD	\$ 4,750
Army RDECOM (1)	RDT&E/6.3	Cash	0603804ADG11	TBD	4000.00	5000.00	5000.00	\$ 14,000
USMC	RDT&E/6.3	Cash	636600M		1000.00	1000.00	1000.00	\$ 3,000
Other (2)	TBD	Cash	TBD	TBD	0.00	3100.00	3200.00	\$ 6,300
Total Service & Defense Agency					\$ 9,750	\$ 9,100	\$ 9,200	\$ 28,050
DUSD (AS&C) (3)	RDT&E/6.3	Cash	TBD	523	5,000.00	5,000.00	5,000.00	15,000.00
Total:					\$ 14,750	\$ 14,100	\$ 14,200	\$ 43,050
					AS&C Percent Total:			35%
					AS&C Percent Cash:			37%

- (1) RDECOM Funding for transistion of THEPS into HIPOWER; not duplicative
 (2) Follow on contract for PSTF Personnel
 (3) Funding for rapid spin out of mature technologies from on going programs

* Leverages Army REF FY07 investment of \$7M



Integrated Scheduled w/ Applicable USG Projects



NET ZERO SUCCESS



REF Points of Contact

**POWER SURETY TEAM: MR. DAN NOLAN OR MR. JOHN SPILLER
703-704-2168**



Backup Slides





JCTD Costs



Power Surety Task Force/Army REF		FY08	FY09	FY10
CENTCOM Operational Prgms/Tech Project Demo		1.75M	TBD	TBD
Personnel/Logistics/Travel		3M	TBD	TBD
PSTF/REF Total		4.75M	TBD	TBD
AS&C				
CENTCOM Operational Prgms/Tech Project Demo		5M	5M	5M
Personnel/Logistics/Travel		0M	0M	0M
AS&C Total		5M	5M	5M
DOE/National Renewable Energy Lab				
Tech Project Demo -- Hybrid Power Stations		TBD	TBD	TBD
DOE/National Renewable Energy Lab Total		TBD	TBD	TBD
Other Source (Services, Agencies, Coalition, Host Nation)				
CENTCOM Operational Prgms/Tech Project Demo (Service Earned)		TBD	TBD	TBD
Personnel/Logistics/Travel		TBD	3.1M	3.2M
USMC -- DREAM/Advanced Power Projects		1M	1M	1M
Tech Project Demos -- Hybrid Power Stations -- OSD/ASAALT/RDECOM		4M	5M	5M
Other Source Total		5M	9.1M	9.2M
	Total Funding	14.75M	14.1M	14.2M