

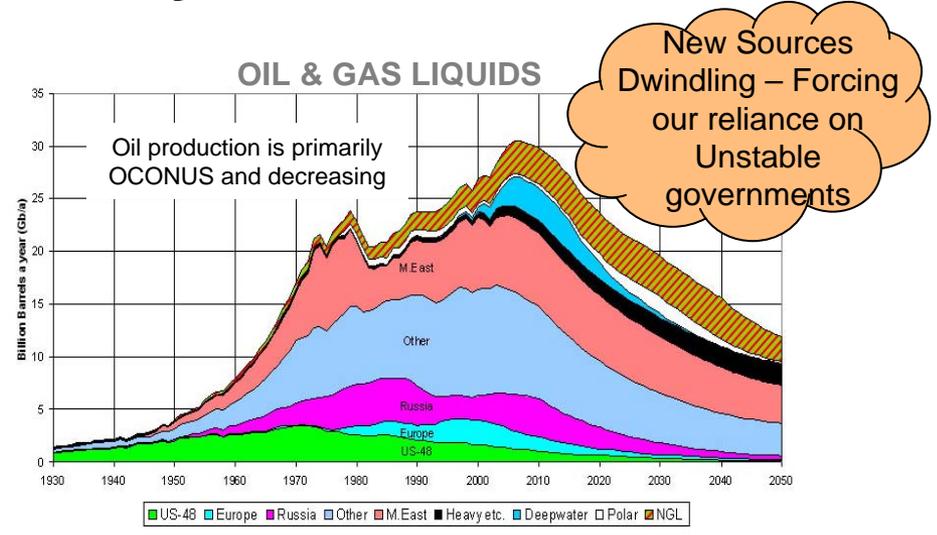
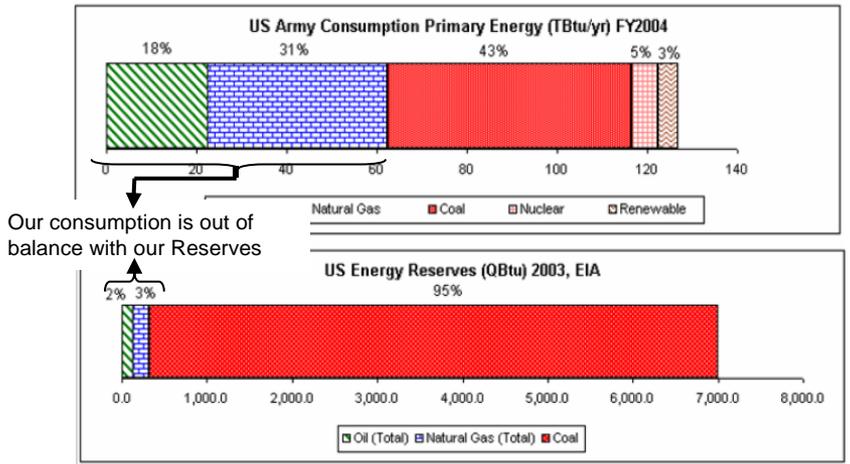
Army Energy Security – “The Way Ahead”

Don Juhasz, PE, CEM
CHIEF ARMY ENERGY POLICY

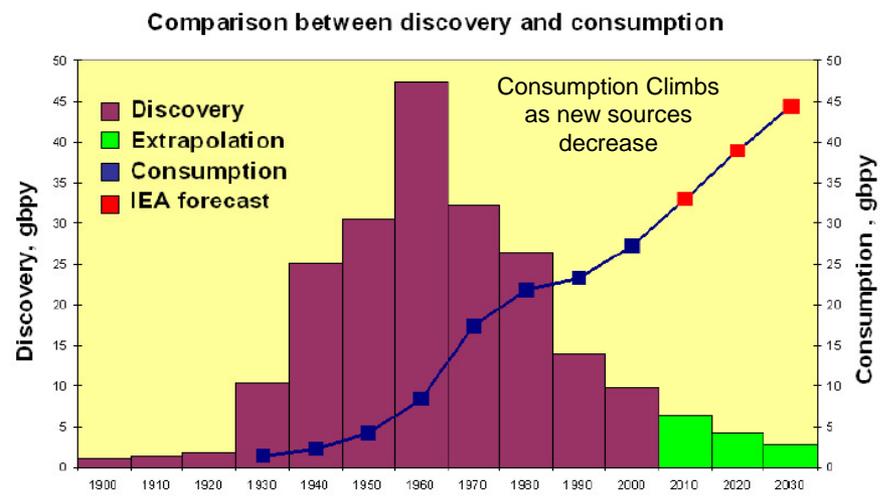
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Energy Costs Driven by Global Situation



- ### Army Utilities Energy Use
- 35% of DoD consumption
 - 21% of Fed government use
 - 11% of installations' budget
 - Commodity Prices increasing 8 – 20% annually





Oil Field Forecasts

Projected Oil Production Peak Year by Oil Expert

Peak Year	Oil Expert
2006-2007	A.M. Samsam Bakhitari
2007-2009	Matthew R. Simmons
After 2007	Chris Skrebowski
Before 2009	Kenneth S. Deffeyes
Before 2010	David Goodstein
Around 2010	Colin J. Campbell
After 2010	World Energy Council
2010-2020	Jean H. Laherrere
2016	Energy Information Administration Nominal Case
After 2020	Cambridge Energy Research Associates
2025 or later	Shell
No visible Peak	Michael C. Lynch

Source: Hirsch, Robert et al. February 2005. Peaking of World Oil Production: Impacts, Mitigation and Risk Management. Prepared for the US Dept of Energy

Big Gushers: Projected output of world's top oil fields, in million barrels of oil and natural gas liquids produced daily

Oil Field	Country	2007	2010	% Chg
Ghawar	Saudi Arabia	5.6	5.0	-10.7
Cantarell	Mexico	1.7	1.2	-30.3
North & South Rumaila	Iraq	1.3	1.3	0.0
Greater Burgan	Kuwait	1.2	1.3	1.5
Safaniyah	Saudi Arabia	1.2	1.3	12.5
Sonatrach Oper. Fields	Algeria	1.1	0.9	-13.5
Daqing Fields	China	0.8	0.7	-12.9
Gachsaran	Iran	0.7	0.7	0.0
Ahwaz Asmari	Iran	0.6	0.5	-14.2
Azeri Chirag Guneshli	Azerbaijan	0.6	1.2	72.6
Samotlorskoye	Russia	0.6	0.6	0.0
Bu Hasa	United Arab Emirates	0.5	0.7	32.7
Ku-Maloob-Zaap	Mexico	0.5	0.7	42.8
Northern Fields	Kuwait	0.5	0.8	44.4
Upper Zakum	United Arab Emirates	0.5	0.6	10.7
	Rest of world	69.9	77.3	10.5

Source: Wood Mackenzie





Oil Experts: Contrasting Peak Theories

Peaking Sooner	Peaking Later
There is a growing disparity between increasing production (dues to increasing demand) and declining discoveries of new oil reservoirs.	Heavy investment in new discovery, new technology and refining capacity will increase supply.
OPEC countries are producing at near 100% capacity; spare capacity is almost nonexistent. Supply and demand are almost equally matched.	Advanced recovery technologies will extend the lives of oil reservoirs. Technology will increase supply and decrease demand.
Consumption levels are increasing alarmingly, at an unsustainable rate given the amount of oil currently estimated to be in the ground.	Non-traditional oil sources, such as oil shale, tar sands and heavy crude, are now more marketable due to advances in technology, and will increase supply.
Oil reserves data is an estimated guess at best and is unaudited. Many countries have cause to over-inflate reserve estimates in order to increase profit share.	Oil reserves data is an estimated guess at best, and can therefore not be used to determine when oil will peak.
No alternative energy source yet exists to take the place of oil.	Market forces will ensure that by the time oil peaks, viable alternative energy sources will be developed.
Oil has already peaked or will peak before 2010, and, without mitigation, the global consequences will be severe.	Oil will not peak until after 2025, and the transition from oil to alternative sources will be smooth.



Requirement

EPAct 2005

Sec 203: Of the total amount of electric energy the Federal Government consumes during any fiscal year, the following amounts shall be renewable energy:

- (1) Not less than 3 percent in fiscal years 2007 through 2009
- (2) Not less than 5 percent in fiscal years 2010 through 2012
- (3) Not less than 7.5 percent in fiscal year 2013 and each fiscal year thereafter

In FY 07 the Army consumed 2.1 percent of its electrical energy from renewables

EISA 2007

Sec 523: At least 30 percent of hot water demand in new or substantially modified federal buildings be met using solar hot water heaters

Sec 806: Domestic sources of renewable energy should provide 25 percent of energy consumed in the United States by 2025. (Codification of prior DoD goal).



Army Energy & Water Strategy for Installations

Five Goals in a 25 Year Plan

- 1) Eliminate energy waste in existing facilities
- 2) Increase energy efficiency in renovation & new construction
- 3) Reduce the dependency on fossil fuels by increasing the use of clean, renewable energy, reducing waste, increasing efficiencies and optimizing environmental benefits.**
- 4) Conserve water resources
- 5) Improve security and reliability of our energy and water systems in order to provide dependable utility service.**





Wind Turbines

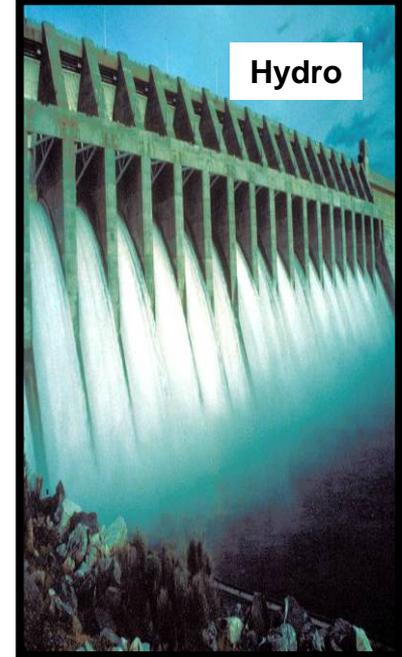


Renewable Energy Options

Solar Voltaic



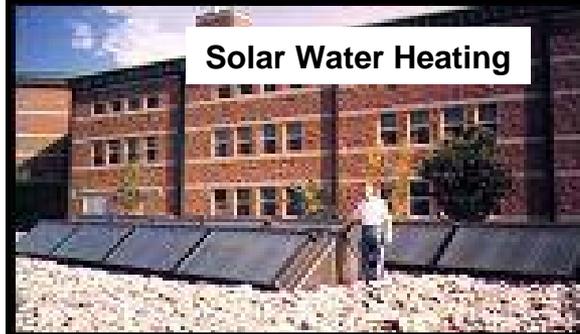
Hydro



Solar Walls



Solar Water Heating

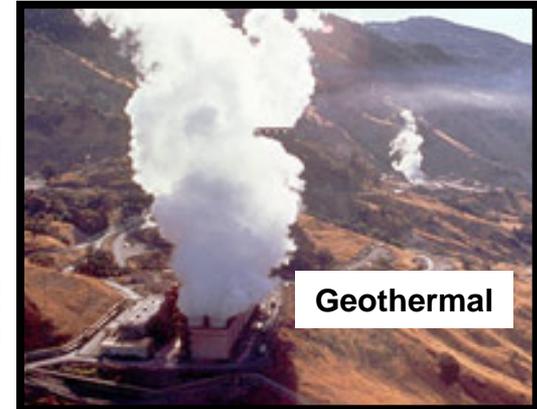


Biomass



Ground Source Heat Pumps

Geothermal



Leadership



Partnership



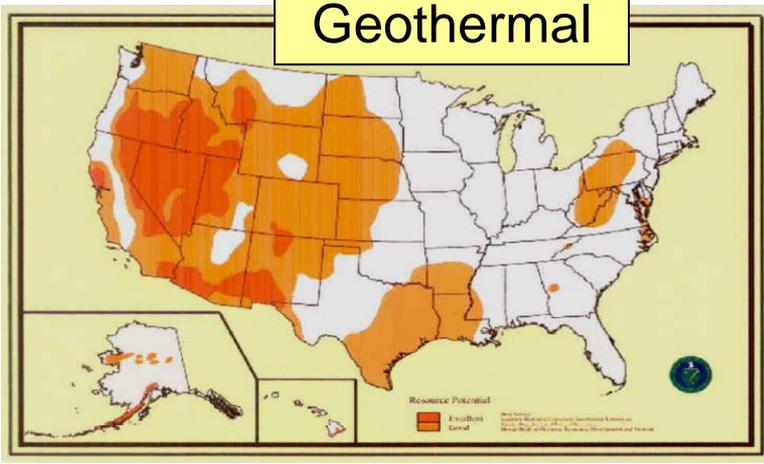
Ownership



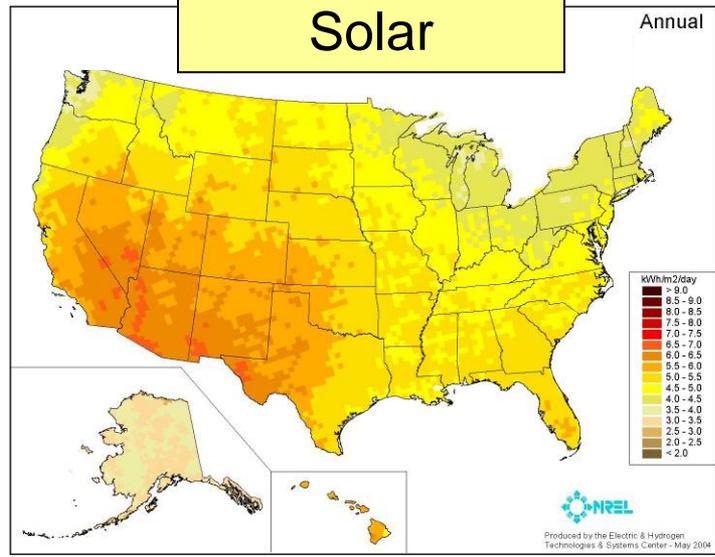
Renewable Resources

National Renewable Energy Lab
<http://www.nrel.gov/gis/>

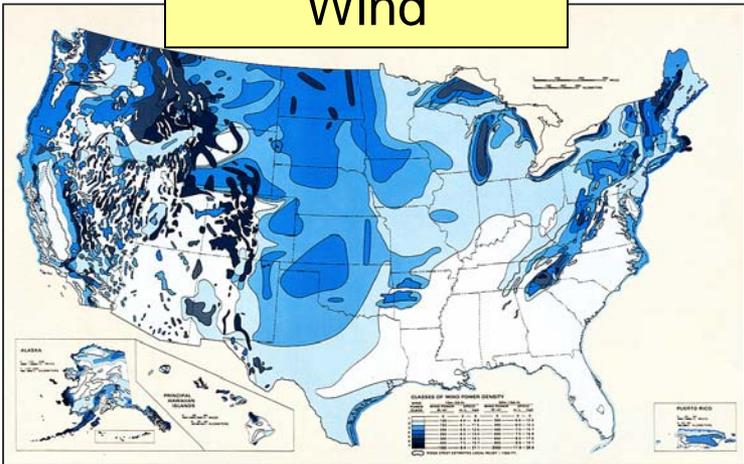
Geothermal



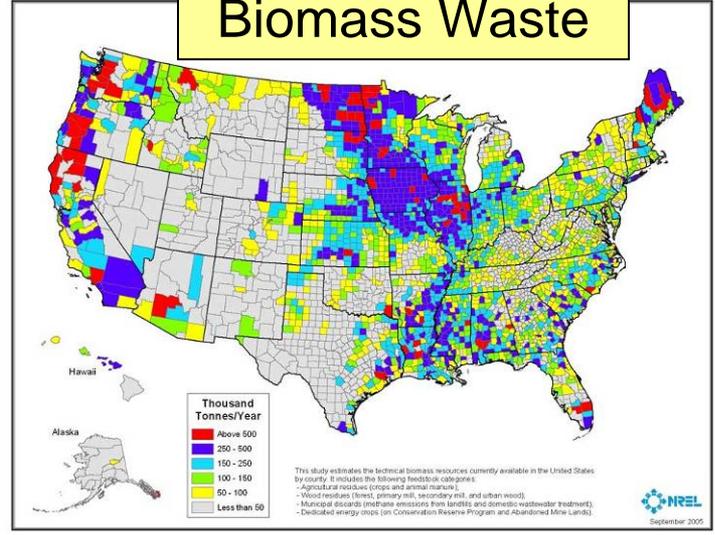
Solar



Wind



Biomass Waste



Leadership



Partnership



Ownership



FY09 ECIP Projects (Renewable Energy Projects Only)			
INSTALLATION	DESCRIPTION	PA	BARRELS SAVED (Per Year)
Fort Knox, KY	Barracks Geothermal Phase 4	\$3,500,000	2,891
Fort Drum, NY	Solar Walls & Rehab Shops	\$2,500,000	2,367
Pohakuloa Training, HI	Solar Hot Water & Day Lighting	\$150,000	103
McAlester AAP, OK	Geothermal Heating & Cooling Systems	\$2,600,000	4,289
Fort Buchanan, PR	Solar Water Heaters & HVAC Replacement	\$770,000	1,977
Adelphi Labs, MD	Install Solar Thermal Roof Tile Heating System	\$950,000	765
Aberdeen PG, MD	Install Solar Tubes & Controls	\$840,000	845
Schofield Barracks, HI	Install Solar Water Heaters & Lighting Retrofit	\$1,250,000	463
Fort Bliss, TX	Install Solar Day Lighting	\$2,250,000	1,363
Benelux, B	Install Solar Water Heating	\$600,000	447
Fort Dix, NJ	Photovoltaic Roof System 500 Kw	\$2,976,000	855
Fort Knox, KY	Geothermal Domestic Hot Water & Exit Lighting	\$1,200,000	5,243
Fort Sill, OK	Geothermal heating & cooling	\$3,550,000	2,478
Fort Sill, OK	Geothermal Heating Plant	\$750,000	228
	Total FY09 Renewable ECIP Projects	\$23,886,000	24,314





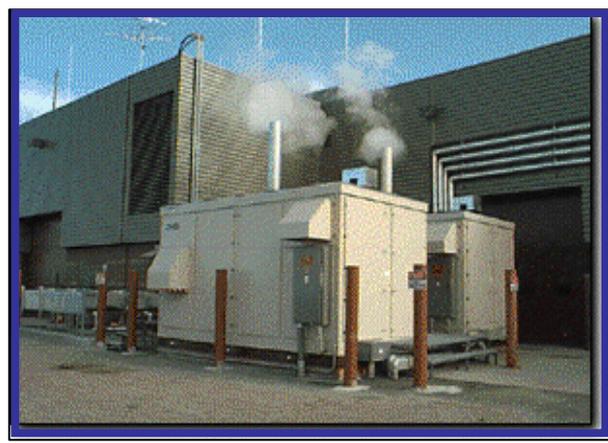
Renewable & Distributed Energy Technologies



Wind Power
Camp Williams, UT



Solar Water Heating
Fort Huachuca, AZ



Fuel Cell
Fort Huachuca, AZ



New Jersey National Guard Bureau
10 KW PhotoVoltaic Array



Renewable & Distributed Energy Technologies *Solar Applications*



Grid Connected Array – Fort Carson, CO

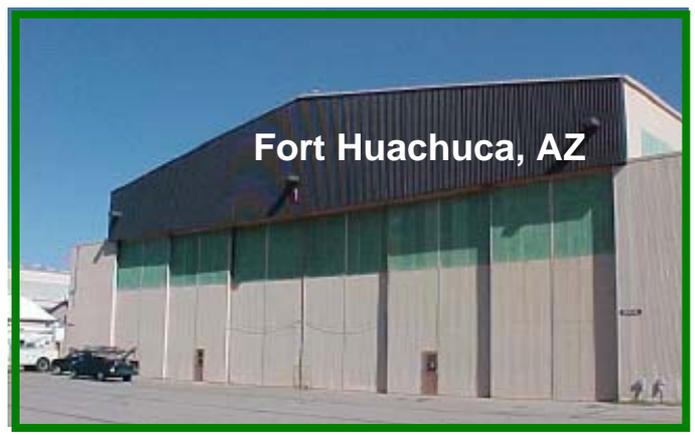


Remote Power Generation – Kwajalein Atoll



Future Concentrated Solar Fort Irwin, CA

Renewable Energy Technologies *Solar Wall Applications*



Renewable Energy Technologies

Biomass Technology- Waste to Energy

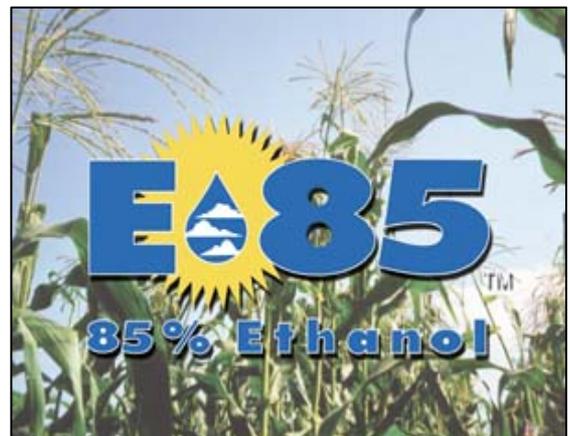


Fort Stewart, GA
Wood Chip Burning Plant



ALTERNATIVE FUELS

- **B20 Biodiesel - blends available up to 100%**
- **E85 Ethanol - blends up to 100%**
- **Fischer Trope Fuels – Liquefied Coal**
- **Algae to Fuel**



Net Zero Energy Installations

Installations produce as much energy on an annual basis as they consume.

Goal is 15 installations by 2015 (15 x 15) and 25 installations by 2025 (25 x 25).

Supports energy security.

Projects focus on building energy efficiency and renewable/local energy generation.

Large investments of third party capital.



Army Renewable Energy Program

Alternative Financing Programs

1. Power Purchase Agreement (PPA)
2. Energy Savings Performance Contract (ESPC)
3. Utilities Energy Services Contract (UESC)
4. Enhanced Use Lease (EUL)



What Can You do

- Use programmable thermostats, LED & Florescent lighting (including CFLs).
- Turn off all computer equipment, ventilation fans, pumps, radios, battery chargers, power supplies/transformers, exhaust fans, coffee pots, any appliance or equipment that is running when no one is using it and turn them off every night.
- Turn off your lights every time you leave a room.
- Point out outside lighting on during the day and have it turned off and have 24/7 inside lighting on motion sensor controls .
- Never leave a vehicle idling if unattended and turn it off if waiting more than thirty seconds for others.



Way Ahead

- As an Industry LEADERS
 - Highlight energy reduction as an Organization imperative.
 - Use leadership to change organizational actions and wasteful energy processes.
 - Ensure Major changes consider utilities support & Energy use.
 - Support Energy Report Cards for all managers at all levels.
 - Practice what you preach.
- With DoD Programs
 - Support federal policy and requirements that facilitate achieving Energy & Petroleum reduction Goals.
 - Implement energy efficiency improvements in all new projects.
 - Implement greater use of renewable energy sources in designs.
 - Require management accountability for the use of all utilities





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