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Village of Hope

Construction teams build more than just infrastructure

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One of the largest photovoltaic arrays in the Americas is in operation at Nellis AFB, Nev., providing more than 14 megawatts of electricity toward the base's energy needs.
(U.S. Air Force photo)

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Energy Awareness: Everyone's Responsibility

Energy has received a new concentrated focus, both nationally and internationally. Not just from the prices we are paying at the pump, but because of a convergence of issues. First, and most obviously, energy affects our national economy; it is a significant determinant of our competitiveness in the marketplace. To secure economic stability, the nation must conserve our natural resources, become more efficient, and be a leader in the application of new technologies and innovative energy solutions. Second, energy production impacts the environment. Many current energy processes release harmful emissions into the atmosphere, affecting air quality and climate change. Third, energy has become a national security issue. As a nation, we need to attain energy independence to protect our borders and develop global solutions to assist other countries in doing the same.

What is the Air Force's role this daunting task? We begin by attaining energy independence and security on our own installations. For example, by pursuing renewable energy sources — such as solar or wind power — as an Air Force, we not only conserve vital funding and reduce our impact on the environment, we can also achieve the ability to sustain mission capability throughout periods when public service–provided utilities suffer interruptions.

Making energy awareness a part of our culture is critical to our nation and the Department of Defense. On our installations, civil engineers manage utilities and maintain and operate aging infrastructure on a day-to-day basis. We need to lead the way in aggressive energy management, making conservation and awareness the cornerstone of how we conduct business. We also need to set an example in our personal lives. We are all part of the energy solution. The answer to the problem truly starts with each and every one of us being personally accountable. Our culture must evolve to where everyone believes it is their job to conserve.

To ensure the Air Force recognizes this critical need to become more aware, the 2008 Air Force Infrastructure Energy Strategic Plan was recently published to provide guidance and structure to our efforts. The plan not only focuses on the traditional "built" infrastructure, it also addresses natural infrastructure, vehicles, and ground fuel initiatives. As leaders in making the Air Force the most energy conscious service, civil engineers must read and understand this plan. We have already taken the lead as the first service to publish a holistic infrastructure energy plan to support the Office of the Secretary of Defense Strategic Plan and White House Executive Orders.

The time is now to take action. In the past, energy did not receive the consideration it needed within the President's Budget Cycle, and sparse funding of initiatives limited significant progress. Now energy is a national priority. Energy-related funding increased in FY08 and is predicted to be steady through the Five Year Defense Plan. With a plan in place, supported by required resources, it is now up to each and every one of us to identify energy requirements, develop creative solutions, plan and program appropriately, and, most importantly, execute to achieve the desired effect. The time is now for civil engineers to accept the challenge and truly make a difference for our Air Force and our nation.

Del Eulberg
Major General, USAF
The Air Force Civil Engineer

Meeting Our Energy Challenges

Maj Gen Del Eulberg
The Air Force Civil Engineer

Our country is going through one of the most challenging times in recent history, with the ongoing Global War on Terror, and the economic and environmental pressures created by our growing demand for imported fossil fuels.

This is compounded by an expanding national interest to reduce greenhouse gases. The Air Force plays a critical role in meeting our nation's challenges. We paid $1.1B in 2007 for facility energy and the Air Force is the single largest consumer of liquid fuels in the United States, spending a total of $7B annually on all energy sources.

The Air Force has a long history of meeting virtually all energy challenges it has faced, beginning with 1973's oil embargo brought on by the Yom Kippur War. We immediately set a 7% reduction goal from the previous year, met that goal, and have met — or exceeded — every mandated goal starting with the Energy Policy Act of 1975. That tradition continues as we routinely lead the federal government in facility energy reduction and renewable energy use.

We recently published the 2008 Air Force Infrastructure Energy Strategic Plan to guide the Air Force as we continue to make energy conservation and awareness a part of our culture. As civil engineers, we can no longer just be energy "storekeepers" for our installations; we must become managers, overseeing all aspects of energy for the Air Force's infrastructure. The key to meeting our energy challenges is rooted in our asset management transformation philosophy. We must look beyond the confines of our bases and actively engage with our local energy suppliers, regulators, municipalities, state agencies, private organizations, and local businesses to develop bold and innovative energy solutions that benefit all stakeholders. We have to embrace a forward-looking concept of operations for energy management, a completely new way of thinking about construction standards, space utilization, and sustainable design for the entire life cycle of our facilities.

I have established the Air Force Facility Energy Center, or AFFEC, at HQ AFCESA, Tyndall AFB, Fla., to implement a centralized approach to the way we manage our energy and water use. The center is charged with researching and identifying funding strategies and technologies that will carry us across the 2015 energy goal line established by Congress through the Energy Independence and Security Act of 2007. High-level energy management duties also reside at AFCEE, Brooks City-Base, Texas, for new construction, and at AFRPA, also at Brooks, for large enhanced-use lease energy-generation projects.

Our Energy Strategy

We have developed a facility energy strategy that incorporates four major action "pillars": 1) Improve Current Infrastructure; 2) Improve Future Infrastructure; 3) Expand Renewables; and 4) Manage Costs. The greatest opportunity for meeting our energy goals lies in Pillar 1 — increasing our energy and water efficiency and conservation through improvements to current infrastructure. For example, we can reduce our overall energy footprint with accelerated demolition of older, "energy hog" facilities.

To ensure we have a clear way ahead on future infrastructure — Pillar 2 — my sustainable building policy mandates achieving the U.S. Green Building Council's Leadership in Energy and Environmental Design, or LEED, Silver Standard on all military construction. Recently, the execution of Military Construction and Military Family Housing Construction was centralized at AFCEE, eliminating duplication of effort previously experienced across the MAJCOMs. As the single organization overseeing all major construction, AFCEE is charged with ensuring that we can achieve LEED Silver Standard on all our new facilities.

We're currently meeting renewable energy use goals, but the targets are going to get tougher to meet. To meet these tough goals, we must expand our use of renewable energy — Pillar 3 — by building on-base renewable energy generation sources. Utility cost management — Pillar 4 — is the final piece of our overall strategy. Managing costs requires sustained vigilance and emphasis at all levels, but particularly at base level. Often-avoidable utility bill late fees that might seem small for one installation can, and do, add up to a large dollar total for the entire Air Force.

The new dorms at Shaw AFB were built to achieve the U.S. Building Council's LEED Silver certification. (photo by TSgt Josef Cole III)

Funding Our Infrastructure Improvements

Implementing this strategic energy policy and meeting our energy goals won't come cheaply: historically it's taken about $60M per year of investment to reduce our consumption by 1%. In the near future, funding to ensure that the Air Force continues to meet energy reduction and renewable energy use goals will come from several sources. One source provided over $225M in the FY08-13 Future-Year Defense Program for increased metering of our facilities; for program management resources within AFFEC; for contracting Resource Efficiency Managers at base level; and for Civil Engineer Maintenance, Inspection, and Repair Team technicians to conduct testing and air-balancing of heating and air-conditioning systems. I have asked the AFFEC team to administer the distribution and execution of these funds, based on greatest need and best return on investment. We have also convinced corporate-level Air Force leaders that energy projects with a positive return on investment are properly suited for Air Force Smart Operations 21 funds. The AFSO Process Council has funded $482M in FY09 for Pillar One projects, ESPC buy-outs, and demolition projects. Finally, the business cases that the MAJCOMs prepared enabled us to secure $250M each year, starting in FY10, for energy projects to meet our congressional and statutory energy goals.

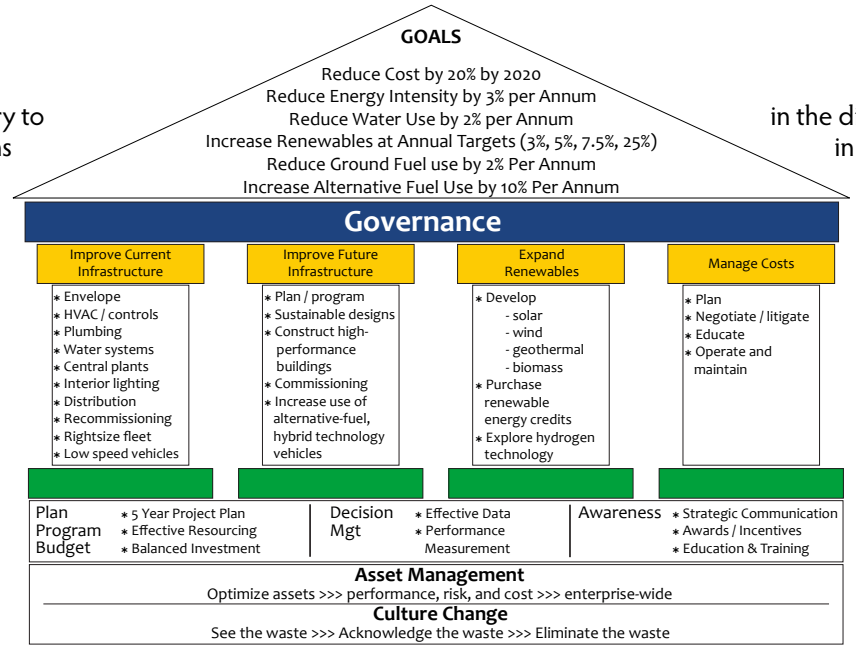
I am pleased by the great work done by our base- and command-level energy managers in building these future-year energy programs. Together you identified over $1B in solid "high-return" projects in record time. We will be building the remaining program years shortly, so it is imperative that installations use the new energy category designation (NRG) to program energy projects in ACES-PM.

As we work to meet our energy goals, another tool we'll use is third party–financed projects. I am very interested in the opportunities these type of projects offer and have asked the AFFEC experts to carefully review all Energy Savings Performance Contracts and Utility Energy Savings Contracts before they come to me for approval. We will continue to use these third-party funding sources, but only in those cases where 1) unique regulatory or other situations make them the best option; 2) we can validate the energy savings, or 3) the scale of the project makes internal funding not feasible.

Renewable Energy

The Air Force continues to lead the way in renewable energy use as well as in energy conservation. We have one of the largest photovoltaic solar arrays (14 MW) in the Americas at Nellis AFB, Nev. Wind turbines installed at F.E. Warren AFB, Wyo., and at Ascension Island can produce 4 MW of electricity, and a hugely successful landfill gas project at Hill AFB, Utah, is capable of producing 1.3 MW of electricity.

Through investigating potential EUL options, AFRPA partnered with the Department of Energy's Pacific Northwest



The Air Force's strategic plan is built on four pillars: 1) Improve Current Infrastructure; 2) Improve Future Infrastructure; 3) Expand Renewables; and 4) Manage Cost. The pillars rest on "enablers" such as our planning, programming, and budgeting processes; our data systems that guide our investments and decisions; and energy awareness to ensure that improvements in technology are integrated with a meaninfgul change in our Air Force culture.

National Laboratory to identify installations where on-site renewable development makes sense with respect to available resources (wind, biomass, geothermal, or solar), local renewable portfolio standards that provide economic incentives, and utility rates that support the economic viability of the envisioned project. Our goal is to have at least three major on-base renewable generation projects underway by the end of 2009 by exercising business case strategies that make these investments possible.

Energy Costs

We're also focusing on energy costs. Even though we've worked hard to reduce consumption, the unit cost of energy has risen. The Utility Rates Management Team at AFFEC continues to work on contract negotiation and rate case intervention, and has added two new major initiatives to their responsibilities. Under the Natural Gas Risk Management Program, a URMT engineer actively reviews market forecasts and makes recommendations to 36 installations that purchase their natural gas at current market or lock-in prices for all or part of their projected gas requirements. The URMT is also doing utility contract surveys to determine whether we have the best contracts in place to purchase our utilities. So far, the return on investment we've seen from this program has been outstanding. We've been able to identify locations that can benefit from a change to a more appropriate tariff rate, as well as bases erroneously billed by their utility company and installations paying unnecessary taxes and fees. Surveys resulted in the discovery of over $1M in avoidable late charges from just 11 locations.

Water Conservation

In the midst of our successful energy program, we can't forget our responsibilities to properly manage our water consumption. Back in 2000, we instituted a rather aggressive program, adopting Environmental Protection Agency best practices across the Air Force, and exceeded the goals in this area. We have expanded the use of gray water for irrigation at numerous locations and executed a rigorous leak location program at many bases. Although we have made great progress, many installations have plenty of room for improvement. Continued stewardship of our water resources is mandated in the Energy Independence and Security Act, which requires a 2% annual reduction from a FY06 usage baseline. Although our prior successes may make achieving this goal more difficult, I feel confident that we'll meet the challenge.

Energy must be a consideration in everything that we do. Dollars saved and costs avoided on our energy bills can be used to support other priorities, such as taking care of Airmen, winning the Global War on Terror, and recapitalizing our aging weapons systems. Our efforts to use clean, renewable energy directly affect greenhouse gas emission reductions — a vitally important national issue. As I said in my letter from the top, saving energy and resources is an important challenge for our nation, our Air Force, and ourselves. Civil engineers have an extremely important role in achieving the goals laid out in the Infrastructure Energy Strategic Plan. With all of us working together, I know we'll succeed.

Considering Energy in All We Do

Mr. Mike Aimone, P.E., and Ms. Giselle Soto Gil, HQ USAF/A4/7

Exactly thirty years ago, the Air Force established the Energy Group at the Air Force Engineering and Services Center, a direct predecessor of today's Air Force Civil Engineer Support Agency. Building on those days under the leadership of Col Bill Gaddie and Mr. Ed Wilson, today's Air Force energy engineers have aggressively driven down facility energy use, increased renewable energy applications, and spearheaded sustainable engineering designs in new construction and major facility rehabs. While these efforts are noteworthy, more can be done to meet the Air Force's energy goals. Our vision is to reduce demand, increase energy assurance, and change our culture.

Working Air Force energy issues nearly continuously since 1978, the senior author has discovered that the third element of this vision — culture change — is just as important to an energy program as technology enhancements in the built environment. To be successful, we must create a culture where all Airmen make energy a consideration in all we do.

We offer a recipe for success as you implement energy change management strategies at your installations:

- Sustain a shared vision; keep it "fresh"
- Lead by example; build consensus
- Measure and publish progress constantly
- Celebrate success vigorously
- Adamantly eliminate distractions

The new Air Force Infrastructure Energy Strategic Plan is one of our first steps in sustaining a shared vision. Adapting the Air Force–wide plan to the specifics of your installation is critical. Marketing your plan ensures that all Airmen and their families are aware of your goals and objectives. Keeping the message relevant and fresh through signboards, spots in the base newspaper and on the local cable TV station, and discussions during commander's calls, staff meetings, and newcomer briefings is hard work, and the Public Affairs professionals can be of assistance.

Sometimes the littlest things leaders do send powerful messages. "Do as I do" only works if all wing leaders practice energy conservation in visible ways. Lead by example and work hard to extend that view through the senior and non-commissioned officer teams. Arm everybody with the "whys and wherefores" to build consensus.

It's critical that all Airmen know the goal, and see the statistics on progress. We're proud of the many installations that are getting the energy word out. One base publishes energy stats by squadron and group, using their energy management system to track progress. One uses the main gate marquee to promote critical energy tips and messages, while another uses energy as an element in their quarterly awards program.

Celebrating success vigorously is essential to making the connection between individual actions and actual energy savings. One vehicle operations flight staged a competition between operators to highlight the most fuel-efficient driving habits. Another installation tracked and celebrated successes in energy conservation in privatized housing, to encourage Airmen to use the same energy-saving habits in the workplace.

It's said that one bad apple can spoil the whole bin — it's the same with energy conservation and human behavior. Adamantly eliminate distractions, such as statements like "We can't track energy used, so why do this?" or "My small contribution won't make a difference!" Armed with facts and statistics, we can challenge the status quo and pull the plug on the naysayers.

Conserving infrastructure energy is one of Civil Engineering's responsibilities, but it's everyone's business. We need our entire workforce working together to truly make energy a consideration in all we do.

Authors' note: More good ideas and energy savings tips can be found by visiting the Department of Energy's Web site at http://www.doe.gov/4308.htm#tip.

Mr. Aimone is the Assistant Deputy Chief of Staff for Logistics, Installations and Mission Support, HQ USAF, Washington, D.C. and was a charter member the Air Force Energy Group. Ms. Soto Gil is on an internship with HQ USAF/A4/7 from the Department of Chemical Engineering, University of Puerto Rico, Isabela, Puerto Rico.

Energy Savings Performance Contracts

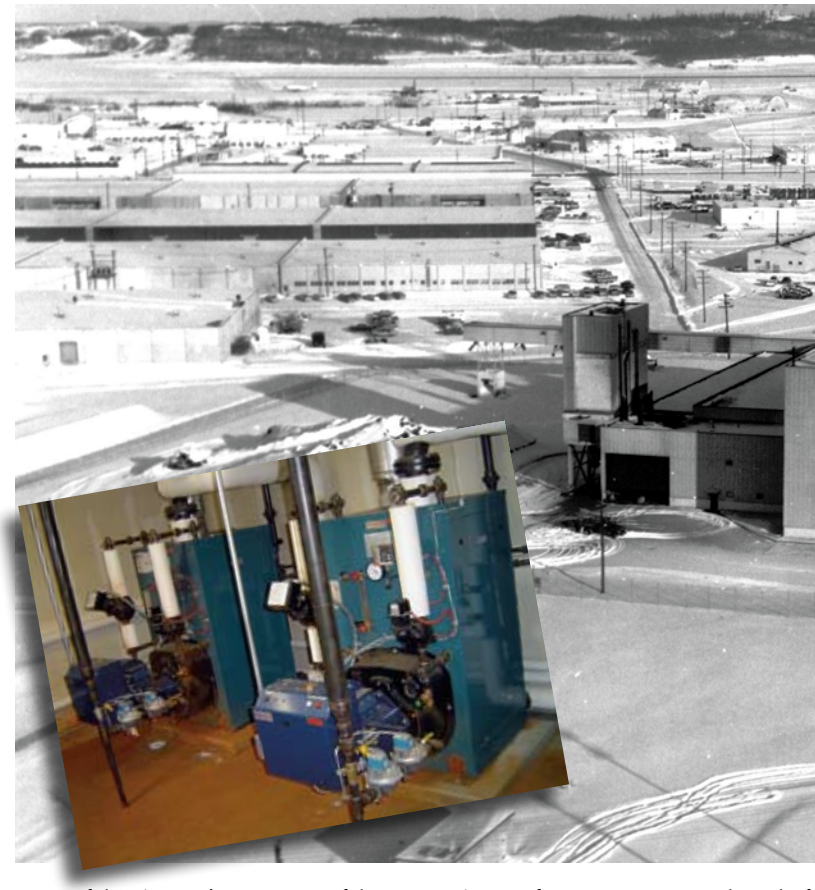
Mr. Gary Hein and Ms. Linda Sisk, HQ AFCESA/CENF

The Air Force energy vision is to reduce demand through conservation and efficiency; increase supply through alternative energy sources; and create a culture where all Airmen make energy a consideration in all we do. As part of the Air Force's comprehensive energy strategy, the Civil Engineering and Logistics communities developed the 2008 Air Force Infrastructure Energy Strategic Plan, which addresses conserving energy resources and reducing energy costs in managing the Air Force's infrastructure, vehicles, and ground equipment. The strategic plan highlights tools, methods, and resources available to accomplish infrastructure energy goals. Energy savings performance contracts, which capitalize on third-party financing rather than government-appropriated funding, are an important tool that the Air Force is using to meet energy reduction mandates and improve infrastructure.

The Air Force Civil Engineer established the Air Force Facility Energy Center at HQ AFCESA to centrally manage and champion Air Force facility energy and water conservation program initiatives, including ESPCs. The center is staffed by experts in engineering, utilities, law, financial management, and contracting. This expertise and centralized management is important because reviewing and approving these large ESPC contracts often requires specialized knowledge and experience that most base-level or MAJCOM engineers may not have.

ESPCs typically have a 15- to 25-year term with complex financial aspects. An energy service company, or ESCO, proposes and finances infrastructure or equipment system modifications that will reduce Air Force energy costs or consumption. The ESCO recovers its investment — plus overhead and profit — from monies made available by lower utility and operations and maintenance costs. ESPCs are also available to installations overseas, but special restrictions may apply.

During the earlier years of ESPCs, several General Accounting Office and Air Force audits found that some Air Force projects did not properly validate or document savings, or use the most economical methods to reduce energy consumption. Specifically, other financial methods to reduce energy consumption were not considered or made available. Energy conservation measures included in some ESPC proposals were not cost-effective, either because of high interest rates or unjustified pricing. In other cases, measurement and verification plans were not in place for validating project performance.



In one of the Air Force's most successful energy savings performance contracts, Elmendorf electrical grid and installing 233 boilers in 125 buildings. In its first year of operation, the new

To address these issues, new policies, discipline, and accountability were implemented to provide management oversight. In October 2007, the Office of The Air Force Civil Engineer established an ESPC governance policy to monitor execution and approve projects. This new policy requires bases to forward projects to their major commands for technical review and consideration for appropriated funding, as well as validation that an ESPC task order is the only remaining available execution option. The projects are then sent to HQ AFCESA for technical assessment before forwarding to The Air Force Civil Engineer for approval. The key element of an ESPC proposal is a solid business case analysis that supports valid requirements, reduces energy, and is economically reasonable with debt-to-cost ratios no greater than two-to-one.

The availability of other funding sources allows the Air Force to make smarter decisions about when to use ESPCs.

AFB's half-century-old co-generation plant was replaced by switching to the local system exceeded the guaranteed consumption savings by 27%.

The AFSO21 program has placed an emphasis on energy projects and a solid funding line is forecast in the FY10 POM. Energy initiatives have also been identified and budgeted in the Five Year Defense Plan to implement energy projects; this allows the government the flexibility to self-invest in energy where the return on investment and cost avoidance are immediately recovered by the Air Force. Requiring a justified business case before making the decision to use an ESPC, or other third-party financed option, ensures the Air Force identifies and receives the best value and product. With these new funding options and business requirements in place, ESCOs are working harder to develop competitive projects that save energy and meet Air Force needs.

The Air Force Facility Energy Program has made tremendous progress in the last 40 years while responding to changing technologies, world events, and ever-increasing energy reduction goals. The Air Force has awarded three ESPC task orders since the new approval policy was established. They were rigorously reviewed to ensure that we received the most cost-effective product and best possible value. We continually strive to lead by example and to implement and institutionalize efficient energy management, so the Air Force can achieve valuable savings.

ESPC Contracting Sources

Although installations may pursue their own ESPCs (with assistance from the Air Force Facility Energy Center), the Air Force, Army, and Department of Energy each have established contract vehicles for ESPC projects available to Air Force installations.

Air Force: Six Regional Energy Savings Performance Contracts, or RESPCs, are available to installations within their own region. They are all indefinite delivery/indefinite quantity contracts. Installations request ordering authority through AFFEC at Tyndall AFB, Fla., which supports regional contracting officers in managing these contacts and assumes much of the administrative overhead.

Army Corps of Engineers: The COE at Huntsville offers two options for the procurement of RESPCs. Under Option A, COE delegates ordering authority to the Air Force installation requesting the RESPC. The installation handles contracting and engineering responsibilities and AFFEC ensures that personnel working on the RESPC are properly trained. Option B is a full-service agreement and requires a memorandum of agreement; COE acts as both the contracting officer and the engineer.

Department of Energy: The DOE's Federal Energy Management Program offers two types of ESPCs. Regional Super ESPCs allow Air Force installations in any region, state, or U.S. territory to place delivery orders against any of the six established IDIQ ESCO contracts. Super Technology-Specific ESPCs allow Air Force installations worldwide access to financing venues for advanced renewable energy technologies such as geothermal heat pumps, solar photovoltaics, solar thermal, and biomass projects.

Mr. Hein and Ms. Sisk are support contractors at the Air Force Facilities Energy Center, HQ AFCESA, Tyndall AFB, Fla. Mr. Hein is a facility energy contract manager, and Ms. Sisk is an energy contract analyst.

Renewable Energy in the Air Force

Ms. Kim Holmes, HQ AFCESA/CEN

Did you know the Air Force is number one in the federal government for renewable energy use? This is in line with the goals of the Air Force Infrastructure Energy Strategic Plan to increase the use of renewable energy sources as well as produce more of it on Air Force bases.

In FY07, 54 Air Force bases purchased renewable power, and two of the 54 — Dyess in Texas and Minot in North Dakota — purchased 100% renewable electricity. In that same year, 9.6% of the energy consumed by the Air Force came from renewable or "green" energy sources.

Roof-mounted PV system at Luke AFB (U.S. Air Force photo)

Landfill gas-to-energy plant at Hill AFB (U.S. Air Force photo)

According to the Environmental Protection Agency's Green Power Partners list, the Air Force purchased more than 899 million kilowatt-hours of green energy, making it number three in the nation.

Green power comes from energy sources considered environmentally friendly and non-polluting. In addition to using solar, wind, biomass, and geothermal sources of green power, the Air Force also promotes renewable energy by purchasing renewable energy credits.

Solar

Solar power technology converts sunlight directly into electricity using photovoltaic panels. Grouped into arrays, PV panels can generate large amounts of electricity during daylight hours, when peak usage occurs, and excess power is stored or distributed into the power grid.

Solar power is economically feasible where there is a substantial amount of available land, the cost for electricity is higher than average, and there is a higher than average number of days of sunshine. At Nellis AFB, Nev., one of the largest PV arrays in the Americas (see front cover) — built with no investment by the base — produces 14.2 MW of power (enough to power 6,000 homes) on 140 acres. PV cells at March ARB, Calif., generate 417 kW power.

Building-integrated photovoltaics — incorporated or retrofitted into buildings — are one of the fastest growing segments of solar power. At Luke AFB, Ariz., the base exchange roof has built-in solar panels that produce 374 kW of power. The local power company paid $1.5M in rebates in support of the project. Over 66,000 facilities on Air Force installations have potential for roof-mounted PV.

Solar energy has other uses as well. Various forms of solar hot water systems are in use at Hickam AFB, Hawaii; Lackland AFB, Texas; RAF Mildenhall, U.K.; and Moron AB, Spain. Warehouses and aircraft hangars are excellent candidates for high-tech skylights that amplify natural light and reduce artificial lighting requirements.

Biomass

Biomass is a natural renewable material, such as sawdust and wood chips, waste paper, cow manure, corn stalks, corn cobs, hemp, switch grass, waste cardboard, and everyday garbage, used to create electricity. Biomass used for energy production offsets the need for fossil fuels, thus decreasing the amount of methane entering the atmosphere and reducing greenhouse gases.

At Hill AFB, Utah, methane gas from decomposing garbage at the local landfill fuels three generators that produce 2.3 MW of electricity — enough power for nearly 800 homes. The project required no initial capital investment from Hill and has an annual savings of $400K.

Wind

Wind power — the conversion of wind into electricity using turbines — can potentially be created 24 hours a day at a cost competitive with conventional power generation. Wind turbine farms require large areas of unobstructed space, but since the turbine foundations take up only about 1% of the land area, the majority of the land is still useable. Wind turbines installed at F.E. Warren AF, Wyo., (an existing 1.3 MW turbine and a 2.0 MW turbine that comes online in FY09) are expected to save the Air Force more than $3M in energy costs over the next 20 years.

Ground-source heat pump installation at Tyndall AFB (photo by Mr. Guy Ivie)

Geothermal/Ground-Source Heat Pumps

Geothermal power plants use heat from underground steam or hot water reservoirs to generate electricity. Only a few Air Force installations have the potential for a geothermal power plant, but nearly every installation has the potential to use another type of geothermal heating system — a ground-source heat pump. Non-polluting GSHPs use very little energy; they take advantage of the constancy of soil temperatures four feet below the surface. Liquid pumped through pipes absorbs heat in the winter and transfers heat in the summer. Since installing 1,500 GSHPs, Little Rock AFB, Ark., has reduced electricity costs by 25%. The combined electricity savings from GSHP units at Little Rock and four other bases is over $5.5M a year.

Renewable Energy Credits

RECs, also called green tags, represent the technological and environmental attributes of generated power and give owners a green power credit of 1 MWh per REC. Last year, RECs purchased by the Air Force accounted for approximately 8% of its electricity use. REC prices fluctuate based on supply and demand. The Air Force Facility Energy Center at HQ AFCESA, Tyndall AFB, Fla., in coordination with the major command energy managers, negotiates a better REC rate by making a consolidated annual purchase for the Air Force.

Advancements in Technology

The Air Force is on the leading edge of implementing new methods of renewable energy. Two advanced renewable energy technologies are the plasma waste-to-energy system and the SolarWall® (see p. 18).

Using very high temperatures, plasma waste-to-energy systems convert the organic portion of waste into a synthesis gas to feed electricity-producing generators; the inorganic portion is converted into glass-like slag used as aggregate for construction purposes. These systems reduce solid waste volume by 90% and convert the rest into recyclable material. Hurlburt Field, Fla., is purchasing a system to use at the base in peacetime and deploy in wartime.

The SolarWall® is a highly efficient and cost-effective way to heat and cool large buildings. In the winter the system attracts the sun's energy to heat air, which is then collected and distributed. In the summer, the system shields the building exterior wall, lowering the cooling load. Buckley AFB, Colo., and Edwards AFB, Calif., are using SolarWall® Systems with great results.

Renewable Energy – Today and Tomorrow

The Air Force is committed to implementing renewable energy technologies to reduce the environmental impact of conventional power generation and decrease our nation's dependence on foreign oil. Civil Engineering is leading the way to develop renewable energy supplies. The time is now for assessing what you can do at your base to incorporate renewable energy resources.

Ms. Holmes provides contract engineering support to the Air Force Facility Energy Center, HQ AFCESA, Tyndall AFB, Fla.

Sustainable Facilities: *An Air Force Tradition*

Ms. Paula Shaw, HQ AFCEE/TDBS
Mr. Tim Adams, C.E.M., HQ AFCESA/CENF

The Air Force has always been a leader in designing highly efficient facilities, earning numerous awards with its innovative approach and concepts. Now it's following the "LEED" of the private sector to meet one of the objectives of the Infrastructure Energy Strategic Plan.

LEED stands for "Leadership in Energy and Environmental Design," which is an independent third-party program that provides national standards for the design, construction, and operation of high-performance "green" buildings. Developed by the U.S. Green Building Council, LEED certification authenticates that a building is sustainable.

The Edwards AFB Consolidated Support Facility earned LEED Silver certification. (U.S. Air Force photo)

What is Sustainable?

Sustainable building has been defined as building "to meet the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable building practices minimize the impact on our natural resources and environment.

Air Force Policy

On July 31, 2007, The Air Force Civil Engineer signed The Air Force Sustainable Design and Development Policy letter. This comprehensive policy lays out the objectives, goals, roles, and responsibilities that make sustainability a fully integrated part of the Air Force facility program. Engineering Technical Letter 08-13, "Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program," was coauthored by energy experts at HQ AFCEE, Brooks City-Base, Texas, and HQ AFCESA, Tyndall AFB, Fla. This document provides design and construction strategies for sustainable and energy practices applicable to all Air Force projects.

Air Force LEED Examples

Edwards AFB, Calif., earned LEED Silver certification for the newly constructed Consolidated Support Facility. This 49,000-square foot building incorporates sustainable features such as thermal storage to reduce electric demand, low-VOC paint, and energy-efficient lighting (CFLs and daylighting). Edwards also developed an awareness program that uses the facility to educate visitors and personnel on sustainable features.

Designed to the LEED Silver Standard, a 144-person dormitory at Shaw AFB, S.C., will be used as an "Energy Showcase Project" to educate senior Air Force and DoD personnel about the sustainable development program. The building design exceeds ASHRAE 90.1 (1999) by 33% by incorporating features such as an efficient building envelope; ground source heat pumps to improve cooling loads and provide domestic hot water; water-cooled heat pumps with two stage unloading compressors/variable speed fans; and a hot gas reheat for make-up air reheat in lieu of electric or natural gas.

The Air Force stands ready to meet the challenges of facility sustainability. Our past successes and future endeavors will be a tribute to our folks who plan, design, build, and maintain facilities in the 21st century that meet the Air Force mission and protect the environment we live and work in.

URLs for further info:

Facility Sustainability: http://www.afcee.af.mil (enter "facility sustainability" in the search box)
Facility Energy: https://afcesasharepoint.tyndall.af.mil/CEN/Default.htm

Ms. Shaw is an environmental engineer, HQ AFCEE, Brooks City-Base, Texas. Mr. Adams, a certified energy manager, is an engineering support contractor at the Air Force Facility Energy Center, HQ AFCESA, Tyndall AFB, Fla.

Monitoring Energy Use with Meters

Mr. Larry Strother, HQ AFCESA/CEOA

As mandated by public law (EPAct 2005) and described in the Air Force Infrastructure Energy Strategic Plan, over the next several years the Air Force will go from having a few thousand meters to tens of thousands of meters, as we comply with recent laws mandating that our facilities be metered for electric, natural gas, and water.

For years we've talked about meters and how they would help us better manage our facilities to reduce our energy and water consumption, to prove that our energy projects are successful, and to have accurate accounts of any reimbursable energy charges. But meters were always on the "if funds are available" list. Now that's changed.

Requirements

The Energy Policy Act of 2005, Section 103, requires all federal agencies to install metering and advanced metering, where found to be cost-effective, by October 1, 2012, for "the efficient use of energy and reduction in the cost of electricity used in the buildings." Meters and metering devices have to provide data at least daily and measure at least hourly electric consumption. Collected data must be available to federal facility managers through a federal energy tracking system. Department of Defense Instruction 4170.11, Installation Energy Management, followed EPAct 2005 and requires that all services meet annual goals for metering (15% per year) and to be 100% metered by 2012. On April 27, 2006, The Air Force Civil Engineer published a memo supporting DoD's requirement and adding requirements for natural gas and steam plant meters. Finally, the Energy Independence and Security Act of 2007 mandates that natural gas, steam, and water meters will also be installed if life-cycle cost-effective.

Handling Metering Data

What is the Air Force going to do with the huge amount of data recorded by these meters? How will we manage it and who will review it? There will be three levels of management: the base energy manager (primary focus of data analysis); the major command energy manager (secondary reviewer); and the field operating agencies and Air Staff (tertiary reviewers).

Base energy managers will be the most affected. They will have to oversee installation of automatic meter-reading devices where cost-effective, as well as make decisions on combining new and existing systems and connectivity (base LAN, wireless, or standalone). "Cost-effectiveness" in this case is defined in AF/A7C's memorandum of April 27, 2006, as "...where the cost of the meter, installation and ongoing maintenance, and data collection and management do not exceed 20% of the yearly utility cost." The FOAs and Air Staff will have the capability to review data from the macro level (e.g., total consumption, costs, etc.) and be able to "drill down" to review base data for a particular project or audit.

All three levels will be able to move or collect data from level to level. Communication requirements are being studied to ensure that tie-ins to existing base LANs and upward channeling of data can be accomplished seamlessly and securely. Fully automated monthly, quarterly, and annual reporting will eventually become the norm in the utility data management world.

Metering Benefits

The Air Force metering mission is to ensure that all levels of command have access to facility energy consumption data through a seamless management system. The meters themselves will not save any energy, but they will provide important energy-related capabilities:

- Monitoring and collecting data on energy usage to develop strategies for effectively meeting mandated energy and emissions-reduction goals
- Recouping true costs associated with tenant or otherwise billable energy use
- Working with energy management and control systems to provide alerts and alarms, as well as manage demand, usage, and operational inefficiencies
- Measuring, verifying, and monitoring existing utility usage (trending)
- Providing commanders with current utility data to make informed energy usage decisions
- Promoting utility use awareness

Mr. Strother is an electronics/controls subject matter expert, HQ AFECSA, Tyndall AFB, Fla.

Alternative Sources

Mr. Gary Jacks, HQ AFCESA/CEOA

Water quality and quantity are national concerns. Many aquifers in the United States are being drawn down faster than they're being replenished. Surface waters are under strain as uncontrolled growth upstream affects the availability of water downstream. Along with the rest of the nation, the Air Force is looking for alternative sources and uses of non-potable water to meet their future total water needs.

Currently, the Air Force's main use of alternative water is reclaimed water used for irrigation. This use will expand as other uses and sources — gray water, captured rainwater, industrial gray water, and non-potable well water — are considered.

Sources

Reclaimed water is effluent from a publicly or federally owned water reclamation plant, treated so that it is approved and made available for non-potable use. Because of its quality and availability, reclaimed water offers the best opportunity for replacing potable water. However, using it may require construction of a corresponding water distribution system. The Air Force has had some success using reclaimed water. Edwards AFB, Calif., uses the treated discharge from its water reclamation plant for irrigation, while the U.S. Air Force Academy, Colo. purchases reclaimed water for irrigation from the Colorado Springs municipality.

Gray water (a.k.a. graywater, greywater, and grey water) is water collected from bathroom sinks, tubs, and showers and clothes washers for treatment and reuse. Gray water is primarily used for sub-surface irrigation or, when highly treated, for toilet and urinal flushing. The Air Force does not allow the use of untreated gray water as an alternative water source for installations. To date, treated gray water systems have been confined primarily to single family residences, but the Air Force will be installing gray water systems in facilities.

Captured rainwater is rain harvested before it has a chance to soak into the ground or run off. Rainwater harvesting is classified as either land-based (collected in ponds or basins before reaching a storm water collection system) or roof-based (collected before reaching the ground). Free of salts and other harmful minerals, captured rainwater may not have to be treated and is often used in landscaping.

Industrial gray water is water discharged from equipment or industrial processes (e.g., reverse osmosis; cooling towers) that is not recycled back into the system. Water from industrial processes may contain chemicals, minerals, and solids and is treated to reduce contamination to a level that is acceptable for its intended reuse.

Non-potable well water comes from two sources: from a formerly potable well that has become contaminated or deteriorated so that it no longer meets primary drinking water standards, or from a well specifically developed to produce non-potable water.

Uses and Benefits

There are several reasons to consider using alternative water sources to replace the use of potable water with non-potable water: security, water conservation, and wastewater and storm water issues.

Any circumstance that affects the availability of water is a direct threat to the Air Force's mission and security. The Air Force needs to position itself with the optimal balance of potable water and alternative sources of non-potable water. Replacing potable water with non-potable water will contribute significantly to current goals established by national policy: reduce potable water consumption from a 2007 baseline by 2% per year for eight years (16% by the end of 2015).

The Air Force's ability to acquire and use alternative water sources will provide more options to deal with future water requirements and issues such as droughts, depleted water reserves, degraded water quality, and growth in areas surrounding bases.

Replacing potable water, where applicable, with alternative sources of non-potable water is the next logical step in achieving a safe, secure source of water to meet future water needs. For more information, please contact the author through AFCESA's Reachback Center at comm. 850-283-6995, DSN 523-6995, or afcesar@tyndall.af.mil.

Mr. Jacks is a water and wastewater subject matter expert at HQ AFCESA, Tyndall AFB, Fla.

Meeting EISA 2007 Goals

Ms. Linda Sisk, HQ AFCESA/CEN

The 2007 Energy Independence and Security Act has various provisions designed to increase energy efficiency in federal facilities. Several established contractual vehicles are available to help the Air Force meet EISA-mandated energy goals incorporated into the Air Force Infrastructure Energy Strategic Plan, including one of the more important ones: reduce annual energy use 30% by 2015, from a 2003 baseline.

Energy Savings Performance Contracts

ESPCs provide installations with a method to acquire energy conservation projects using a private sector company called an energy service company. ESCOs perform energy audits and install energy conservation projects with no initial capital investment costs to the government, and no payback if guaranteed savings do not result. (For more information on ESPCs, please see the article on p. 8.)

Utility Energy Services Contracts

Under a UESC, an installation may implement efficient and renewable energy projects through a partnership with a utility provider, who finances the capital investment costs of the project and is repaid from project-generated cost savings. Installations may have existing utility purchase agreementscovering energy efficiency projects, or may also contract with a utility provider for the sole purpose of implementing energy projects.

There are several types of contracts used as UESCs, including areawide contracts, basic ordering agreements, and model agreements. The General Services Administration has established blanket utility areawide contracts, essentially indefinite delivery/indefinite quantity contracts to purchase utility services for federal facilities around the country. Basic ordering agreements, like areawide contracts, establish general terms and conditions and any federal agency can establish one with its utility provider. Developed for civilian and DoD agencies through collaboration by federal and industry experts, model utility service agreements are templates for agencies to use in establishing their own UESCs.

Enhanced Use Leases

Using an EUL, the Air Force can lease underutilized assets to developers who finance, design, and build energy improvements that provide the Air Force with lower-cost energy for in-kind consideration. The developer must update, maintain, and operate the equipment for the life of the lease, thereby assuming liability for the infrastructure. EULs are most practical with energy plants that produce energy which can be marketed outside the host federal site.

URLs for more information:

FEMP ESPCs: http://www1.eere.energy.gov/femp/financing/superespcs.html

UESCs: https://afkm.wpafb.af.mil/ASPs/CoP/EntryCoP.asp?Filter=OO-EN-CE-A4

GSA Areawide Public Utility Contracts: http://www.gsa.gov

EULs: http://www.safie.hq.af.mil/afrpa/eul/index.asp

Ms. Sisk, a support contractor at the Air Force Facility Energy Center, HQ AFCESA, Tyndall AFB, Fla., is an energy contract analyst.

Built using an ESPC, Dyess AFB's ice plant cools 13 buildings on the Texas base by distributing water cooled by ice produced at night, when the temperatures are at their lowest. (U.S. Air Force photo)

Energy Awareness Transforms McGuire

One of the Air Force's Model Energy Bases uses awareness to achieve energy goals

Mr. Joseph Bogdan, 305th CES/CEOE

Over the last sixteen months, energy awareness at McGuire AFB, N.J., has undergone a transformation that brings it more in line with the Air Force Infrastructure Energy Strategic Plan. In January 2007, a team of industry and government experts conducted an Energy Efficiency Expert Evaluation at McGuire, which raised the base's awareness of the significance and impact of energy conservation measures. Then, in March 2007, McGuire became one of two bases selected to participate in the Air Force's Model Energy Base Initiative. Propelled by these two events, McGuire's multi-faceted energy awareness program now works to create a cultural change regarding energy and uses a variety of traditional and non-traditional initiatives to reach out to the McGuire community and beyond.

As a Model Energy Base, McGuire AFB is testing a ZENN electric car for on-base use. (U.S. Air Force photo)

McGuire's expanded traditional energy awareness program includes newspaper articles, base marquee messages, an energy abuse phone and e-mail hotline, a base energy Web site, computer pop-up messages, facility energy audits, and participation in Earth Week events and activities. Less traditionally, the base's civil engineers hosted an Air Force Sustainable Energy Conference at Rutgers University in June 2008. At the conference, Air Force leaders, state and municipal government officials, and private industry experts exchanged information and ideas about technologies (e.g., biomass, solar, photovoltaic, and geothermal) for energy conservation initiatives applicable to private and public operations and facilities.

On a more "formal" level, McGuire's Energy Management Steering Group also enhances energy awareness, providing vision and guidance to the base's CE Energy Team. A Resource Conservation Working Group, with representation from the entire base, works together to plan and implement McGuire's resource conservation and energy reduction goals. Civil Engineering leaders have established farsighted and aggressive energy reduction goals for the base that go beyond Air Force– and Department of Defense–mandated goals. McGuire's goals are to reduce overall energy consumption from a 2003 baseline by 50% by 2011 and 60% by 2013, and to acquire 5% of energy from renewable sources by 2011 and 10% by 2013. McGuire is striving to have at least one energy-neutral facility by 2011, five by 2013, and all facilities by 2015.

McGuire is currently reducing energy costs by approximately $1M per year through measures such as occupancy sensors, efficient lighting, demolition of unneeded facilities, and application of Leadership in Energy and Environmental Design, or LEED, criteria to new facility designs. The base is implementing the conversion to low-speed vehicles and acts as a test site for the operation of a ZENN electric-powered vehicle. McGuire is also a potential test site for a hydrogen sport utility vehicle and refueling station. The base spearheaded aviation fuel conservation and participated in the first test flight of a Boeing C-17 using synthetic fuel.

McGuire has already achieved significant energy savings for the Air Force. By the third quarter of FY08, the base accomplished energy savings of 18% from a 2003 baseline and a 4% reduction in total vehicle fleet size. With a transformed and "energized" awareness culture, McGuire is getting even closer to its most ambitious goal — to become an energy-neutral base by 2015.

Mr. Bogdan is the Base Energy Manager for McGuire AFB, N.J.

For Mechanical Rooms, Clean = Green

Col Michael Rocchetti, P.E., USAF/A7CAE

In the 30 years I have spent in the field of facilities management and engineering, I have found that mechanical room housekeeping is a key performance indicator. The condition of a mechanical room provides a general gauge of the efficiency, effectiveness, and quality of both the building services and the people who provide them. Since there is a direct correlation between housekeeping discipline and energy efficiency, and since energy prices are rising dramatically with increased competition for dwindling supplies, housekeeping discipline takes on a greater level of importance. So let me share with you a helpful tip: a pint of sweat can save a barrel of oil.

Energy must be a consideration in all that we do — especially in our mechanical rooms, where so much of our facility energy is consumed. Mechanical systems and equipment do not operate efficiently or effectively when neglected or when operated in a dirty, grimy, unsafe environment cluttered with debris and other contaminants.

Apathy and indifference are formidable enemies. Superintendents, foremen, and senior shop personnel should lead by example. Shop personnel should be trained to spot unacceptable mechanical room conditions, correct what they can and report conditions requiring more extensive repairs or modernizations. Personnel should clearly communicate the description and urgency of the problem and the impact if not corrected. Senior leaders should conduct periodic inspections of mechanical rooms and provide immediate feedback to shop personnel.

Integrity is an Air Force core value. The Recurring Work Program is designed to facilitate proper operations and maintenance of our building systems and utilities. This program must be executed with utmost integrity in order to provide effective operations with uninterrupted services; extend the useful life of our buildings and systems; and properly allocate the necessary resources. Shop personnel should be encouraged to suggest improvements to make the RWP more effective and to report any misallocations of man-hours or special circumstances related to the RWP.

General Considerations

Unacceptable mechanical room conditions include rust, leaks, dirty floors, trash, junk storage, inadequate lighting, puddles on floor, missing insulation, exposed wiring, missing drive guards, or unusual noises such as hissing, squeaking, grinding, banging, or thumping.

Lighting levels should be adequate for operations and maintenance activities or additional lighting should be installed through Work Order Control. Failed lamps should be replaced promptly. Lamps should be cleaned periodically as required to prevent loss of effectiveness due to accumulation of dirt.

If insulation is removed to repair or maintain ductwork, piping, valves, or other appurtenances, shop personnel should replace, reattach, or otherwise secure the insulation when finished. This especially applies to chilled water piping and valves which sweat and drip condensation during the summer months. Uncontrolled condensation damages building components and equipment, causes excessive corrosion, and creates slipping hazards when allowed to puddle on the mechanical room floors.

Shop personnel should keep accurate records of their observations in the mechanical rooms and record the dates, temperatures, pressures, flow rates, and any other readings or indications available from gauges and digital displays. Operator's Logs should be posted for all major systems and equipment such as chillers, boilers, cooling towers, pumps, compressors, and air handlers.

Finally, mechanical drawings and diagrams should be posted in each mechanical room. Equipment and piping should be labeled consistently with the naming conventions from the mechanical as-built drawings and diagrams. Foremen and senior shop personnel should use and promote this nomenclature for all written and verbal communications involving mechanical equipment and building systems.

A clean and efficient mechanical room is indicative of the quality, skill, and pride with which shop personnel operate and maintain the installed equipment and systems. But it's also an opportunity to save energy at a time when energy conservation is an imperative. Just remember: A pint of sweat can save a barrel of oil.

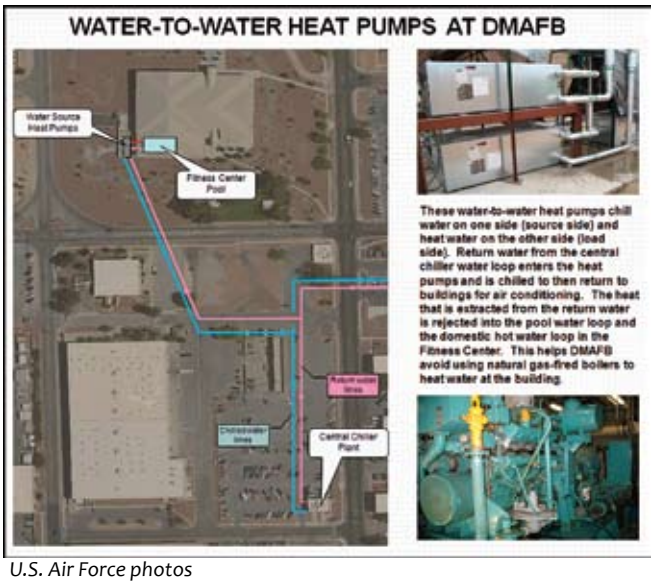
Col Rocchetti works with the Facility Energy Program in the Office of The Air Force Civil Engineer, Washington, D.C.

Davis-Monthan's New Heat Pumps "Energize" Fitness Center

Mr. Damian Rueda, 355 CES/CEOE
Mr. Steve Dumont, HQ ACC/A7OE

Davis-Monthan AFB, Ariz., estimates that five water-to-water heat pumps installed and operational in July 2007 saved the base about $150K in energy-related costs over a six-month period from October 2007 to March 2008.

Water-to-water heat pump technology uses water as a transfer medium for adding and rejecting heat from the loop using a boiler/cooling tower or using geoexchange from natural sources such as the ground, a pond, or a well.



U.S. Air Force photos

The water-to-water heat pumps began providing hot water to Davis-Monthan's fitness center in July 2007. Three of the heat pumps are dedicated to pool heating and two to domestic hot water (including showers), completely offsetting the natural gas water heaters previously used for these functions. The heat pumps are also connected to the central chiller loop serving two headquarters and other administration buildings.

At maximum capacity, the heat pumps provide 100 tons of cooling for the chilled water loop and reject enough heat to heat the pool and hot water system at the fitness center. Energy savings come from capturing rejected heat from the chilled water loop. Cost savings in natural gas far outweigh cost increases in electricity for heat pump and water pump operations.

Buckley AFB "Walls In" Warmth

Ms. Sharon Gill, 460th CES/CEOE

A solar air heating system installed by Buckley AFB, Colo., on the outside wall of a 5,000 square foot material handling facility currently saves the base $1K each year. The 1,000-square foot SolarWall® is attached several inches in front of the existing south-facing exterior wall of a metal, Morton-style building containing a few offices and an open warehouse with a partial loft. Cool air drawn into the perforated metal wall is heated by the sun. A small interior make-up fan draws the warmed air into a perforated soft duct system extending the length of the building. Ventilation holes in the duct system allow air to be directed upwards towards the ceiling to create convection currents that move warm air throughout the entire building. The SolarWall® is not presently connected to the base's Energy Management Control System; when connected, the annual savings are expected to increase to $1,800, which will significantly reduce the payback period.

photo by A1C John M. Easterling

Pope AFB "Ramps" Up Energy Savings

MSgt Robert Ernst, 43 CES/CEOIP

Implementation of an energy-saving idea by the 43rd Civil Engineer Squadron is estimated to save Pope AFB, N.C., about $150K annually. Wirelessly controlled relays installed at the base of each of 41 light poles on Pope's airfield ramps now allow tower personnel to use toggle switches to turn ramp lights on and off as needed.

photo by MSgt Vicki Johnson

Before the relays were installed, photocell-activated ramp lights were left in the on position to avoid the labor-intensive process of turning switches on and off at each pole base. Pope spent an estimated $330K a year on ramp lighting: $230K on electricity and $100K on maintenance (replacing bulbs, ballasts, and equipment rental). By simply turning off lighting on ramps not in use, Pope estimates that costs will be reduced by up to 50%. The wireless solution eliminated prohibitive costs associated with underground cable installation or alternative control equipment. Total cost of installing the wireless relays was $105K, with a pay-back of less than one year. As of August 2008, the annual savings is $196K, 31% higher than the original estimate.

By lighting ramps on an "as-needed" basis, Pope is not only saving the Air Force money, it's saving actual energy — an estimated 2.47 MWh of electricity per year.

Lackland's Fisher House Sees the Light

Ms. Meredith Canales, 37th TRW/PA

With energy conservation becoming more and more important, Lackland's Fisher House executives decided to install energy efficient light bulbs throughout all three of its houses. Fisher Houses are "comfort homes" built at major military and VA medical centers by a non-profit foundation to allow hospitalized patients to have family members staying close by at little or no expense.

Mr. Dwayne Hopkins, Fisher House Executive Director, said Lackland's houses stand out among the others in the Air Force community. "Ours will be the first three of the 38 worldwide Fisher Houses to go 100-percent light bulb energy efficient," he said.

Mr. Hopkins pointed out that not only will the light bulbs save energy, they are also going to save the Fisher House a lot of money.

"We have 642 light bulbs, and each light bulb saves $32 a year," he said. "We'll save more than $20,000 in a year. The total cost of the light bulbs was $1,500, and we'll make that up in about six weeks."

"We are all responsible to save energy, regardless of the utility," said 37th Training Wing Commander Brig Gen Len Patrick. "When we turn off lights, use only the minimally necessary water, watch the thermostat, and use car pools, we guarantee the energy needs of our grandchildren are taken care of. We are also good neighbors to our local community. We need to create a culture that is determined to conserve our scarce energy resources."

"Every little bit helps," Mr. Hopkins said. "And if everyone chips in a little bit, a little bit can equal a lot."

photo by the author

Avoiding Late Fees Makes "Cents"

Ms. Nancy Coleal, P.E., and Ms. Kim Holmes, HQ AFCESA/CENF

Utility bill late fees can quickly add up to big dollars spent by the Air Force

Very few consumers like paying late fees and, as an energy buyer, the Air Force is no different. Yet the Air Force may easily be paying more than $2M per year in utility late fees, based on information gathered by the Air Force Facility Energy Center. The Air Force Infrastructure Energy Strategic Plan stresses that we must manage energy expenditures more efficiently. From surveys of MAJCOM energy managers and reviews of selected base utility bills, Air Force Facility Energy Center, or AFFEC, engineers discovered some bases are paying more than $100K per year in utility bill late fees; one base in particular will continue paying nearly $70K a month until their contract is renegotiated.

How can we avoid the costs of utility bill late fees?

First, we must examine the terms we agree to in our utility contracts. Is an invoice due date of ten days reasonable? Not when we know that it takes up to 30 days for the Air Force to write the check. Many base energy managers do not realize that they have the resources and expertise of the Utility Rate Management Team engineers and the Utility Litigation Team lawyers at AFCESA at their disposal when negotiating their expiring utility contracts for electric, natural gas, and water and wastewater. This is the time to get AFFEC's engineers and lawyers engaged to assist with negotiating reasonable terms with their local utility companies.

Second, we must examine how utility bills are certified for payment. The Civil Engineer Resources Flight receives and date-stamps a monthly bill from a utility company, gets the base energy manager to certify it for accuracy, and then forwards it to the base Accounting and Finance Office. After certifying that funds are available, the AFO forwards the invoice to the Defense Finance and Accounting Service for payment.

Third, we must examine how and when bills are paid. In more than half of the cases, late payment by DFAS seems to be the issue. DFAS states that they pay utility bills in seven to ten days upon receipt in their office, regardless of the due date. DFAS often adheres to the "prompt payment" act (requires payment within 30 days), rather than succeeding legislation that states DFAS should pay the utility by the effective date. Your process must allow sufficient time for DFAS to make the payment.

Ultimately, base energy managers and utility engineers are the key to avoiding utility late fees. A few simple steps may alleviate most, if not all, of the late fees:

- Renegotiate a reasonable payment period in the utility contract, no less than 30 days.
- Switch from manual to electronic billing and payment.
- Read the meter(s) the same day as the utility company to shorten the usage certification process.
- Ensure that DFAS is aware of the late fee issue and that the submitted invoice is accurate; then proactively track the bill and verify date of payment.

Please contact AFFEC (affec@tyndall.af.mil) for more information on avoiding utility bill late fees. It's best to allow a year prior to contract expiration for the negotiation process. However, if your contract is expiring sooner, contact us right away.

Ms. Coleal, a professional licensed electrical engineer, and Ms. Holmes, an engineering support contractor, both work at the Air Force Facility Energy Center, HQ AFCESA, Tyndall AFB, Fla.

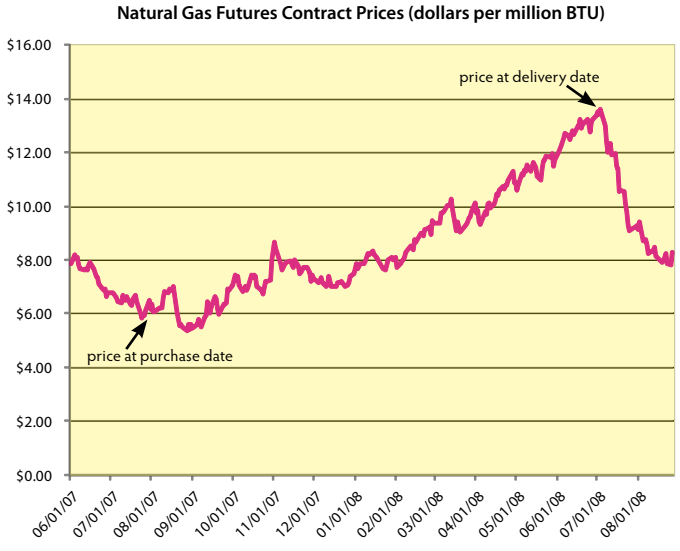
Natural Gas Price Risk Management

Mr. Richard Fillman, P.E. , HQ AFCESA/CENF

Managing energy costs is an important part of the Infrastructure Energy Strategic Plan, and natural gas is one area of concern because it consumes a large percentage of Air Force installations' utility budget. The total amount spent annually on natural gas — over $200M — makes the Air Force's utility budget especially sensitive to price increases. Futures contracts, options, and end-user aggregation are proven methods for reducing the Air Force's exposure to future price volatility of natural gas.

The natural gas market has undergone a remarkable transformation in recent years. After 35 years of rigid regulation, the natural gas industry is now free to compete on the wholesale level — and at a retail level in a growing number of states. Deregulation has enabled third-party marketers — who can function as wholesaler, broker, or aggregator — to buy and sell natural gas to large-volume users such as the Air Force. Although the Air Force can purchase natural gas from local utilities at the going tariff rates, marketers offer other alternatives, such as futures contracts, options, and aggregation of end users to obtain price discounts based on large-volume purchases.

A "futures" contract is an exchange-traded contract to buy or sell natural gas at a specific price for delivery on a specific future date. The New York Mercantile Exchange (NYMEX) is an example of a regulated financial exchange. In a time when prices are steadily climbing, a futures contract lets a buyer pay a lower price at present for natural gas that will be delivered during a time of higher market prices.



A futures contract purchased in August 2007 for delivery in July 2008 would have saved the Air Force a considerable sum. (Chart generated from data provided by the Energy Information Administration.)

An "option" is an exchange-traded contract that gives the purchaser the right, but not the obligation, to buy or sell natural gas at a specific price before a specified future date. In a volatile market, the options market provides participants with the ability to set price floors or ceilings, hedging against adverse price movements while retaining the ability to participate in favorable ones.

Aggregation allows marketers to group together a number of end users' natural gas needs into a large volume and then negotiate a lower price based on that volume. This allows end users, such as the Air Force, to obtain a discount that they wouldn't be able to get on their own.

The standard NYMEX-traded futures contract unit of purchase is 10,000 million BTUs, and the marketer's purchase price is based on delivery at the Henry Hub in Louisiana. The end user's purchase price includes delivery from there via the nexus of 16 intra- and interstate natural gas pipeline systems that draw supplies from Texas and Louisiana's prolific gas deposits. These pipelines serve markets throughout the U.S. East Coast, Gulf Coast, and Midwest, and up to the Canadian border.

Air Force installations must apply risk management analysis to their utilities in order to control their exposure to price increases and volatility. The first step is to review past purchases — in this case, of natural gas — to determine average usage during different times of the year, as well as the cost per unit trend. Those figures can help determine whether futures contracts, options, aggregation, sticking with the local utility, or some combination thereof, makes the most financial sense for future purchases.

The Department of Defense established the Defense Energy Support Center to support military installations in the purchase of natural gas using large nationwide supply contracts. For more information about natural gas purchases, contact the DESC at 703-767-8541. For assistance with the risk management process, contact the author at 850-283-6463 or richard.fillman.ctr@tyndall.af.mil.

Mr. Fillman, a professional engineer, is a support contractor for the Air Force Facilities Energy Center at Headquarters Air Force Civil Engineer Support Agency, Tyndall AFB, Fla.

The Infrared Heating Advantage

Mr. Thomas A. Adams, P.E., HQ AFCESA/CEN
1 Lt Ryan C. Miller, 314 CES/CEX

The Air Force Infrastructure Energy Strategic Plan requires the Air Force to use less energy as well as use energy more efficiently. Infrared heat may be the most effective method of heating large-volume industrial spaces such as warehouses, maintenance bays, and hangars. These facilities typically have a high energy footprint (BTU/Sq Ft) due to large infiltration loads, vehicle access requirements, poor insulation, and high ceilings. Here, forced-air heating systems are neither efficient nor effective at providing a uniform 55°F wintertime work environment for occupants.

How IR Works

About 53% of the solar energy striking the earth is in the IR spectrum, which is just above visible light (wavelength > 0.7 µm). This is the energy that heats the inside of your car even though the outside temperature may be cool. The sun heats the car which, in turn, transfers heat to the air inside. Infrared heating systems work in a similar manner.

The typical IR heating system consists of a burner, a combustion tube, zone thermostats, and a controller (below). Reflectors may be added for directional heating and to protect potentially flammable surfaces, such as wooden roofs. Thermostatic feedback through the controller maintains set-point temperature within the facility.

In contrast, to satisfy heating demand, forced air systems heat the air, pump it into a space, and rely on the energy-intensive process of convective air-to-object heat transfer. IR heat bypasses the air transfer medium, thereby improving heat transfer efficiency. Because large air handlers, pumps, water control loops, and heat exchangers are eliminated, IR heating systems are desirable from a maintenance perspective as well.

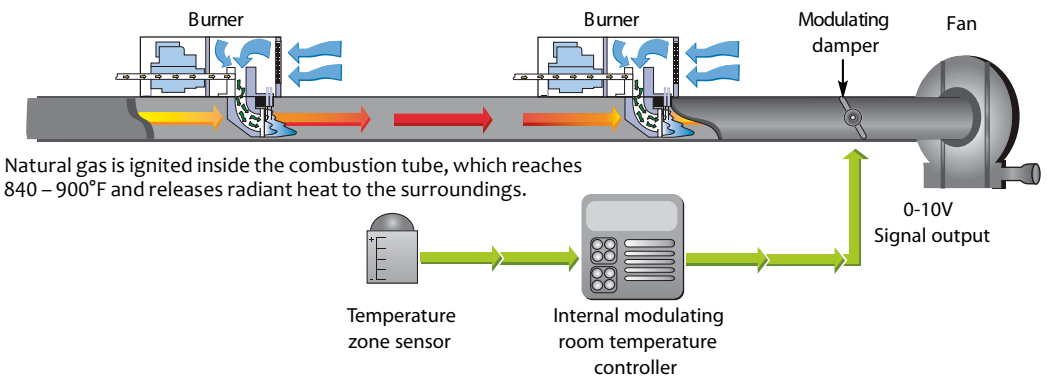
IR heat is directional, with reflectors focusing energy toward a target area. When properly installed, IR heating eliminates cold spots in large-volume facilities. Because infrared heat warms like the sun, occupants feel more comfortable at lower set-point temperatures. Since IR systems do not heat air directly, they are not subject to air stratification. They are also less affected by open doors and high infiltration or air exchange rates.

Actual Performance

Little Rock AFB, Ark., demonstrated the effectiveness of IR heat systems by installing them in three large volume facilities, including Bldg 250, a 152,000-square foot jumbo hangar. After the retrofit, the average MBTUs of natural gas used for winter heating dropped from 21,080 to 11,240, a 44% reduction when corrected for weather effects. Based on FY05 natural gas rates ($7.63 per MBTU), this project was estimated to provide the base an attractive 7.8 year payback. With FY07 rates at $9.80 per MBTU, the payback is now down to about 6 years.

IR heat has the potential to significantly reduce the high energy footprint of large Air Force industrial facilities and help meet Executive Order 13423 energy goals. It is recommended that all installations with conventional heating in large volume industrial facilities consider IR heat retrofits as replacements.

Mr. Adams, a support contractor at the Air Force Facility Energy Center, HQ AFCESA, Tyndall AFB, Fla.,is a professional engineer. 1Lt Miller was formerly the Chief, Maintenance Engineering, 314th CES, Little Rock AFB, Ark.; he is currently the squadron's Readiness and Emergency Management Flight Chief.



A typical IR heating system (graphic courtesy Advanced Radiant Systems)

Keeping Cool at Nellis

Mr. Steve Dumont, HQ ACC/A7OE

How do you cool a greenhouse in the middle of the desert?

That was the basic question about the Consolidated Support Facility at Nellis AFB, Nev. Keeping it cool had been a long-term losing battle. The facility has a structural steel frame with exterior glass walls. The exposed steel frame became so hot that occupants touching it could suffer second-degree burns. Nellis and Air Combat Command energy managers analyzed the problem and noted that the non-window areas were made of glass spandrel panels over gypsum walls, separated by a 4" air space. They theorized that infrared radiation passing through the spandrel panels was becoming trapped heat in the wall space, which was then being conducted into the occupied space through the exposed steel structure.

After some brainstorming, the team devised an 'out-of-the-box' solution that would improve occupant comfort and save significant energy. The spandrel panels were 'painted' with a highly reflective, liquid ceramic insulation, a mixture of various silicon and ceramic beads blended into a high quality acrylic polymer. Designed to provide both thermal and acoustical insulation for a variety of industrial applications, the ceramic coating provided an effective, inexpensive alternative to typical insulation systems. With 1/1,000 the thermal conductivity of glass and a solar reflectance over 80%, the ceramic coating excels at insulating structures and equipment from radiant energy gain, reducing cooling load and costs by more than 50 percent. The coating is extremely lightweight and pliable; its texture actually improved the building's look and compatibility with other base architecture.

Now, thanks to the ceramic coating, Nellis' CSF is not only cooler inside and better looking outside, it's also a quieter place to work because its chiller units now sit silent for much of the day. And that means we're helping to meet the goals of the Air Force Infrastructure Energy Strategic Plan in more ways than one.

Mr. Dumont is the Command Energy Manager, HQ ACC/A7, Langley AFB, Va.

Glass spandrels (above) on Nellis AFB's Consolidated Support Facility "helped" raise the cooling load. Painting them over with a special ceramic coating (right) reduced the load and cooling costs. (U.S. Air Force photos)

Alternate Energy Opportunities –

Col (Ret) Marshall W. Nay, USAF, Ph.D., P.E.-L.S.

Dr. Ron Hartzer, the Air Force Civil Engineer historian, recently interviewed me on my experiences as an Air Force civil engineer. One of the topics raised was alternate/renewable energy and the experimental solar-heated house my team retrofitted while I was an instructor at the Air Force Academy so long ago. He even produced a copy of an article on the effort that then-Lieutenant Bill Tolbert and I wrote for the February 1976 issue of the "Engineering & Services Quarterly" magazine.

The topic of energy is as important now as it was then, if not more so, and I began reflecting on the Air Force and energy: What did we do; what did we learn; what might we do now as an Air Force and as a nation to have sufficient access to cost-effective energy sources to support our mission needs as well as our country's economy?

A Short History

In 1972, the interruptible supply of natural gas for the Air Force Academy was in fact interrupted by gas shortages. The central boiler plants were readily converted to use fuel oil, but at a considerable additional cost. A year later, as a result of a Mideast oil boycott, oil prices rose from $3 to $11 a barrel causing gasoline shortages and much higher prices. In response, President Richard Nixon initiated Project Independence (the goal was energy independence by 1980) and Congress passed the Energy Reorganization Act of 1974 and the Solar Heating and Cooling Act of 1974.

At the Air Force Academy, a solar energy working group was formed and we quickly retrofitted a military family housing unit to a solar-heated house (space heating). The home utilized flat plate collectors and our design heat load calculations convinced us that we could not mount a sufficient number of collectors on the roof alone because of dead weight and available space. Thus, we employed two collector arrays — one on the roof and one on the ground. A liquid mixture of water and ethylene glycol was pumped through the solar arrays to collect the thermal energy which was then stored in a buried 2,500-gallon tank. Heat exchangers were used to transfer the thermal energy from the storage tank to the furnace supply plenum in the home.

For a few years, we compared performance data from the solar-heated home to that from an unmodified home of the same size and compass orientation. Overall the solar heating system performed well. Technology transfer to other potential users was accomplished and in the late 1970s and early 1980s some similar projects were done.

In Retrospect

What did we learn? First, we could mobilize and put current technology to work quickly. Secondly, the flat plate collector arrays we used required periodic — and, on occasion, emergency — maintenance. The plumbing systems could vapor lock and require quick bleeding to prevent high surface temperatures from deteriorating the collector's thin film surface. Today's thin film technology might alleviate this concern, but a decentralized and active solar heating system requiring building occupant interaction should still be avoided. A more centralized application — such as Nellis AFB's 72,000-panel solar photovoltaic array — with trained and available technicians close by seems a better approach.

I often ask myself: "Why didn't solar energy catch on faster in the Air Force and the nation?" Presidents Gerald Ford and Jimmy Carter were energy "leaders," extending target dates, setting standards, and promoting independence and solar energy use. President Carter established the Department of Energy with a broader charter to achieve energy independence than previous agencies. So, what has kept us from more aggressively commissioning solar and other alternate energy sources? Perhaps a lack of economic incentives measured in the cost of oil per barrel. In 1981, oil peaked at $37 per barrel and in the mid-to-late 1980s, declined $14 per barrel. As I write this article today the cost of oil has almost doubled in a year and is now hovering around $129 per barrel, a staggering amount. Perhaps we now have the economic incentive we need to more abundantly develop and commission alternate energy sources.

Energy Independence vs. Less Dependence on Foreign Oil

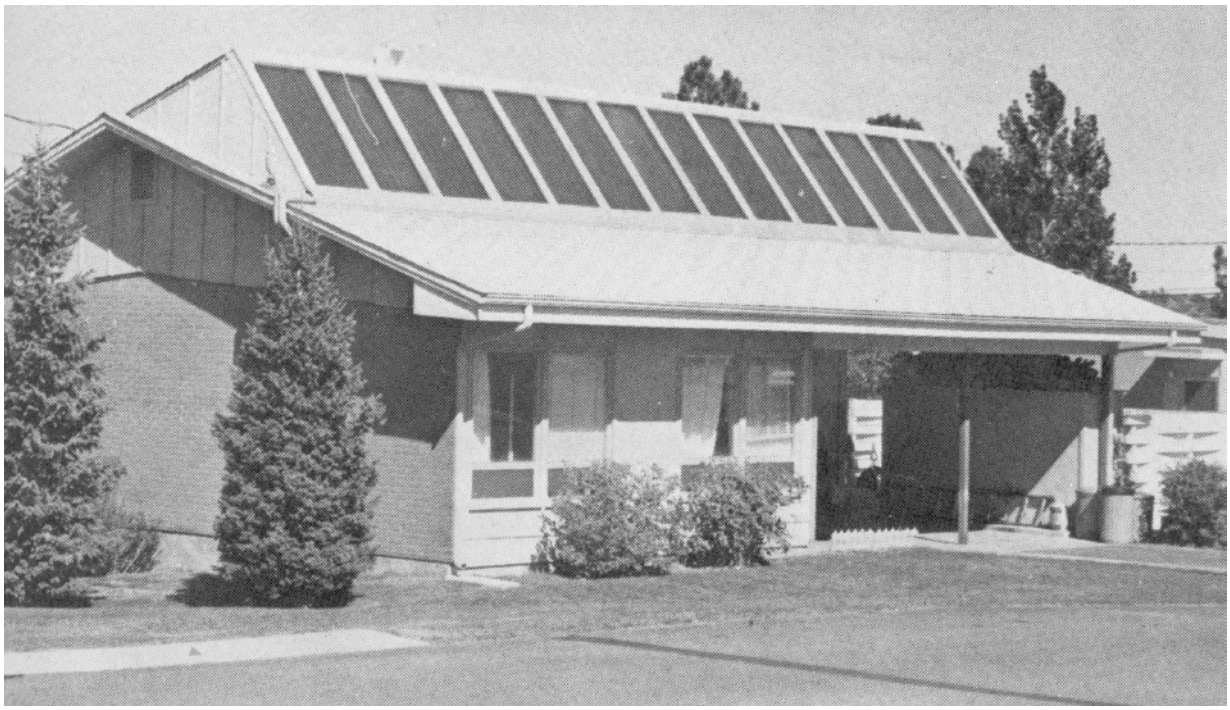
I don't hear someone touting the goal of energy independence from OPEC sources as often as I used to. Now, I more often hear promulgation of a national energy strategy of less dependence on foreign-sourced oil in order to minimize our potential vulnerability to supply and price fluctuations. We are participants in a global economy

today and have a huge appetite for energy, consuming 25 percent of the world's available oil and importing 60 percent of that oil. Worldwide oil production may be on the verge of peaking in the near term. Clearly we must invest heavily in a diversified portfolio of alternate energy source strategies and where possible, develop an integrated Air Force energy solution for weapons systems and facilities to generate some synergism and capital investment savings. We have many alternative energy source candidates to consider and some examples include wind; hydro; solar; biomass-derived fuels such as ethanol; ocean; hydrogen; oil shale; tar sands; geothermal; and synthetic coal-to-liquid fuel for aircraft and other uses. Considering the cost of oil per barrel today, the economics of developing other energy sources should bring them well into the range of economic feasibility.

The Future

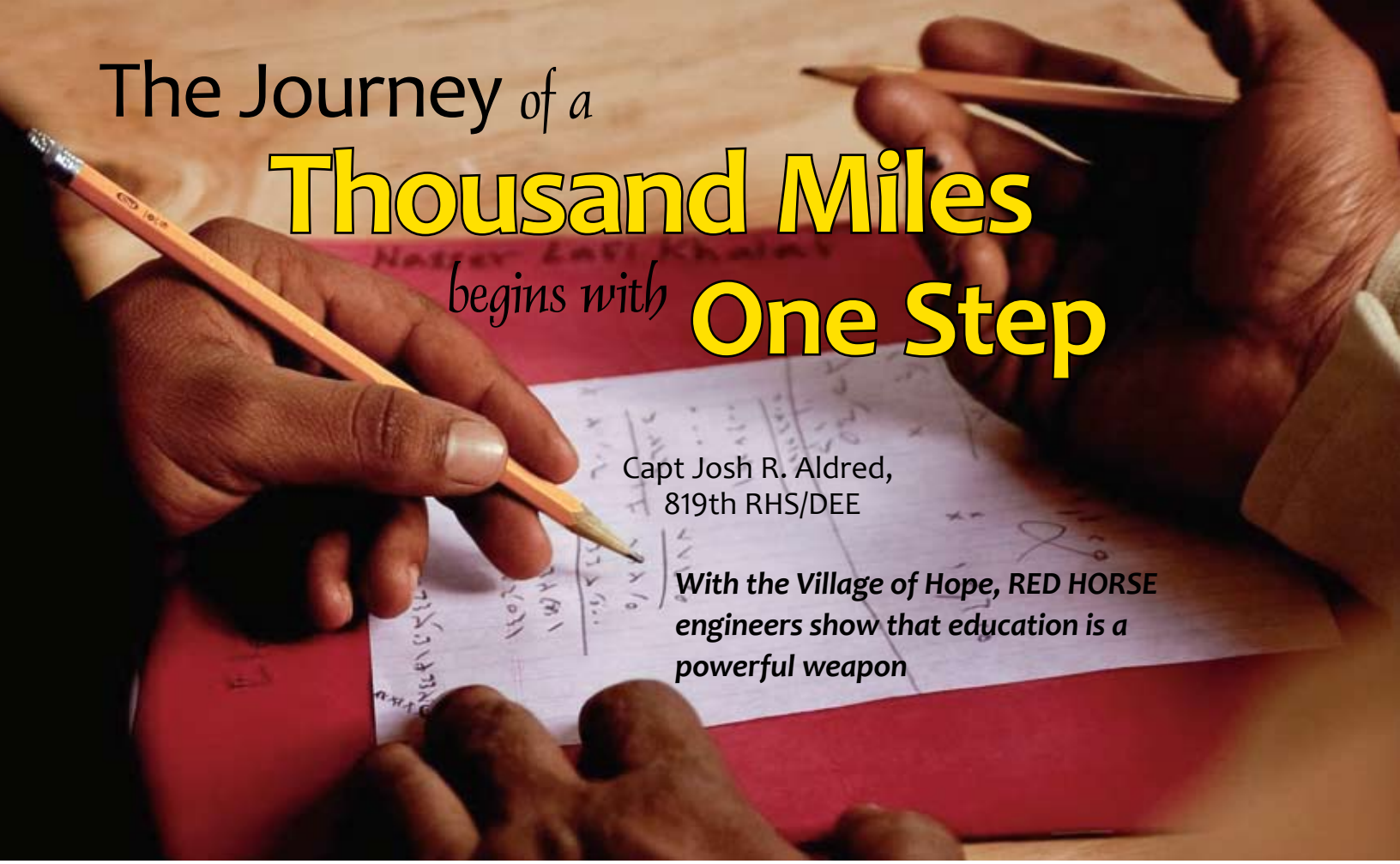
I was excited to learn that the Air Force Civil Engineering Support Agency has created the Air Force Facility Energy Center and prepared the Air Force Infrastructure Energy Implementation Plan to address current energy challenges. I seem to recall that a similar organization buried in the Operations & Maintenance Division of the former AFESC may have existed in the late 1970s and early 1980s, but may not have had the visibility required, or the mission severity we are now facing. Today, the new Facility Energy Center is much more visible and has a significant charter with corresponding responsibilities extremely important to the future of the Air Force. I know you will succeed.

Col Nay, USAF (Ret) was the first commander of the Air Force Civil Engineer Support Agency. Today, he is a senior engineer at URS, Albuquerque, N.M.



In the 70s, Col Nay was the principal investigator for the Solar Home project at the Air Force Academy. (photo originally appeared in Engineering & Services Quarterly, *February 1976)*

The Journey *of a* Thousand Miles *begins with* One Step



Capt Josh R. Aldred,
819th RHS/DEE

With the Village of Hope, RED HORSE engineers show that education is a powerful weapon

A student in the Village of Hope program receives individual tutoring in a math skills class. (U.S. Air Force photo)

The Village of Hope (Karayat Al-Aman) Program

The concept for the Village of Hope was loosely based on a successful program initiated by Gen David Petraeus in 2004 in Mosul, Iraq. The Village of Hope at Hawr Rajab, Iraq was planned as a prototype that could be expanded to other sites in Iraq as the security situation throughout the country improved. Costing approximately $10M and taking nearly a year to implement, the Village of Hope's initial concept was a total green-field approach, building 100 new homes and all of the supporting infrastructure and community facilities (e.g., schools, mosque, parks, etc.). A construction training program would also be initiated to teach 200 Iraqi men returning to the village. The 557th Expeditionary RED HORSE squadron had the responsibility of developing the training curriculum from scratch, implementing it, and making adjustments on the fly to ensure it would succeed.

The Journey Begins: Hawr Rajab

When I think of my time in Hawr Rajab, I am reminded of a place of extremes. Within the borders of the village, the once-hostile Al Qaeda bastion was relatively safe. Shops and markets were open; children were playing soccer and cruising around town on newer model bicycles. Bullet holes from recent Al Qaeda attacks were being plastered over and many of the whitewashed compound walls along the main road were painted with pro-American graffiti. Restaurants were open and the vendors peddled kabobs and falafel to people passing by. Out on patrol, the most immediate "threats" we encountered were stray dogs and children begging for candy and pens. Overall, the village was bustling with activity and felt safe.

Despite this feeling, we were aware of the imminent danger around us and reminded daily of the atrocities of war taking place only a few thousand meters from our small outpost. Primarily a Sunni village, Hawr Rajab was surrounded by Shiite enclaves in the restive Arab Jabour area of Iraq — the immediate area south of Baghdad infamous as a conduit for Al Qaeda militia and arms flowing into Baghdad. The recent surge in Coalition Forces, combined with the new Sons of Iraq security program, had pushed much of Al Qaeda out of the area and into southern Arab Jabour and beyond. The threat from Shiite militias remained as Jaish Al Mahdi special groups continued to attack Coalition Forces along the Sunni-Shia fault lines around Hawr Rajab. Two to three times a week, the main convoy route into Hawr Rajab was the scene of roadside bombs credited to JAM special groups. Rockets and mortars were frequently

fired at Forward Operating Base Falcon, which was close to Patrol Base Stone. Almost every night, we could hear faint automatic weapons fire and explosions from neighboring villages pierce the darkness around us. Ironically, the distant thuds lulled us to sleep like some type of bizarre Iraqi lullaby.

Hawr Rajab was one of the first villages in Arab Jabour to fight against Al Qaeda. The villagers endured months of suffering as Al Qaeda took over their homes, killed their livestock, and punished anyone who didn't support them; many fled the area. In the summer of 2007, when the Coalition "surge" was fully in place, a Sons of Iraq program was started in Hawr Rajab to repel Al Qaeda. In late November, the SOIs repelled a final attack by Al Qaeda, losing some their own in defense of the village.

With Al Qaeda moved from the area, conditions on the ground were safe enough to begin reconstruction and counterinsurgency operations in Hawr Rajab.

Patrol Base Stone

In December, the 557th ERHS faced its first big challenge: the expansion of Patrol Base Stone. The 6th Squadron, 8th Calvary Regiment moved a company-sized element to the village to boost security and we needed to build barracks and support facilities for the additional personnel in a small area surrounded by Iraqi villagers. Initially, we used Harvest Falcon assets — tents, power plant, and electrical distribution system — then moved into the barracks as they were completed. Knocking down PB Stone's south wall of HESCO barriers and taking over approximately 50,000 square feet of recently acquired land was task number one for the expansion. We then needed to establish an expedient perimeter around our expansion. Within two days, we had excavated an eight-foot wide and deep tank trap nearly 750 feet long, used the excavated material to fill a new 11-foot tall HESCO perimeter, and installed another barrier of triple strand concertina wire adjacent to the tank trap. We moved quickly to grading and earthwork for the construction of living quarters — two 44 x 89-foot timber billets. Using pre-cut truss chords and a 25-ton crane to install the trusses shortened the construction time to approximately six weeks. We also set up an Improved Deployment Kitchen that was sitting in storage at FOB Hammer, allowing us and our Army comrades to enjoy two hot meals day. Once the IDK was operational, morale soared and PB Stone became famous as one of the nicest combat outposts in the 3rd Infantry Division's area of operations.

Training Program

Once the expansion was underway, curriculum development began in earnest. Two hundred former Sons of Iraq, released due to the improved security situation, were scheduled to participate in the Village of Hope training program.

While waiting for our assigned interpreters, we set up the framework for the low-voltage electricity course, the builder course (with a focus on masonry work), and the residential plumbing course. Many of the points of instruction were borrowed from existing Air Force training programs for civil engineering career fields. The remaining curriculum was improvised using local building customs, construction materials, and tools that we had on hand. We relied heavily upon our Bilingual Bicultural Advisor, Mr. Badia Janab, to fine-tune the curriculum in line with Iraqi construction techniques and constraints. We also partnered with the United States Agency for International Development to develop a training program for the local concrete block maker to improve the quality of his blocks, so that Coalition Forces would purchase the blocks for local reconstruction projects around Arab Jabour. With USAID paying for the raw materials and our Airmen providing hands-on instruction at the plant, the training was a huge success; quality of the concrete blocks drastically improved.

Next, RED HORSE focused on selecting prospective students. At the beginning of March, funding from the $10M Village of Hope contract was delayed, waiting on legal and contracting approval. Money for one of the

MSgt Fernando Ginette, 557th ERHS, reviews the day's classes with the instructors before students show up at Patrol Base Stone for another day of adult literacy and math instruction. (photo by MSgt Andy Dunaway)

VoH interpreter "Mike" reviews his student's basic Arabic homework in the adult literacy class. (photo by MSgt Andy Dunaway)

SOI contracts employing 200 local military age men was also expiring at the end of February. Fortunately, the 2nd Brigade Combat Team (3rd Infantry Division) released $50K of Commanders Emergency Relief Program funding to pay salaries as a stop-gap measure to keep all of the men employed until the main contract was ready to execute. We selected our first students for the training program from this pool of 200 former SOI members. We lacked a lot of the tools and building materials required to complete the training program, so we concentrated on basic math and reading skills to jumpstart the training. We started off with a brief interview process to see what type of prior experience each man had. Next, we gave them a reading comprehension exam to determine literacy levels, and then a basic math comprehension test.

During the first two weeks of instruction, we focused on basic math for two reasons: We wanted to make sure everyone understood the mathematics involved in the courses, and we were still waiting on the tools needed for the hands-on instruction. The students eventually separated into two tracks and progressed well in both. A remedial math course focused on teaching basic addition, subtraction, multiplication, and division, and determining the areas of different shapes. The advanced class focused on geometry and basic algebra.

The 2nd Brigade released additional CERP funds to purchase tools locally and keep the program running. In mid-March, we received some basic tools and materials and began the hands-on portion of the training. We used excess building materials from the patrol base expansion to fill in the gaps and proceeded to build storage bins out of masonry blocks in the training area to separate concrete materials. The plumbing class learned how to dig a trench and set drainage pipe at the correct slope, and how to install basic plumbing inside a building. The electrical class

TSgt Chris Collins teaches the Village of Hope plumbing class how to properly install drainage pipe. (U.S. Air Force photo)

learned how to wire an electrical panel and test for voltage and current using a multimeter. As the 819th RED HORSE was redeploying, more tools and materials were ordered to continue the progress we made with the hands-on training.

Focusing on Adult Literacy

It was alarming to discover that nearly 20% of the Iraqi men we interviewed were illiterate. Fortunately, one of our interpreters was a former teacher who helped us start an adult literacy course, even though it was not within the scope of our mission. We felt that if we could teach one man to read in 30 days, it would be worth the effort. The adult literacy program turned out to be a huge success. After just a few weeks of remedial instruction, we graduated seven students from the program and continued to teach an additional 20 men until the 819th left in early April. It's my personal belief that the power of education

is one of the strongest weapons we have in our arsenal to fight against terrorism. Most of our students had been stripped of their homes, their property, or lost a family member because of Al Qaeda, but knowledge and education are among the few things that can never be taken from a person. The ability to read and write gave those men an option to expand their knowledge. The success of the literacy program was, by far, my proudest achievement during my three months in Hawr Rajab.

Hawr Rajab Public Works

We also started the Hawr Rajab Public Works Program, employing an additional 120 to clean up the village. Much of the rubble from buildings damaged or destroyed in the battle between Al Qaeda and Coalition Forces was still on the ground. Over the course of about a month, the Public Works laborers removed roughly 3,000 cubic meters of trash and rubble from Hawr Rajab. One of the positive

Hawr Rajab villagers participate in the Village of Hope Public Works program, helping remove building rubble from the streets. (U.S. Air Force photo)

effects of the rubble removal was route sanitation and security along the main route into town. The Public Works Program was a win-win for everyone, providing legitimate employment for military-age males until they entered the job training program.

The Journey Continues

Through the Village of Hope Program, our efforts noticeably made a difference in the lives of our students. To quote a letter of appreciation given to us by some of our masonry students, "…in the past, we had a different feeling and a misunderstanding toward you as American people, all because of the circumstances we had gone through after the collapse of the regime. We apologize for that, but now after being close to you, we have found out that we are both the same. We both love, care, and sacrifice for other people and this breaks the fears we had before we became very good friends."

The Village of Hope Program epitomized Gen Petraeus' counterinsurgency strategy of "Clear, Hold, Build" and filled a void left in the wake of Al Qaeda's path of destruction. When I asked one of my interpreters what he thought of the progress we had made in Hawr Rajab, he recounted an ancient Arabic proverb, "to walk a thousand miles, you must start with one step." This pretty much sums up the counterinsurgency effort in Iraq — it will be a long journey, but programs like the Village of Hope are a step in the right direction.

Capt Aldred is the Chief of Design, 819th RHS, Malmstrom AFB, Mont. As a member of the 557th ERHS, he was the on-site commander for the Village of Hope Project, Hawr Rajab, Iraq.

Promoting Stability in Iraq

Lt Col Douglas P. Wise, P.E. HQ USAFE/A7PD

After completing a tour in Iraq, I wanted to pass along some of the positive progress being accomplished, not only to rebuild Iraq, but to stabilize it economically and politically, and from a security standpoint as well. I had the unique opportunity to work as part of the U.S. Army Corps of Engineers in their Gulf Region Division headquarters in the International Zone, Baghdad, Iraq. As a program manager, I oversaw the development and implementation of more than 600 projects worth $1.2B via the Provincial Reconstruction Development Committee program, the Infrastructure Security Program, and the Basra Children's Hospital.

The intent of the PRDC program is to strengthen Iraqi decentralized self-governance and provide community services to local Iraqis. This program provides allocations of funds ($700M to date) to each of the 18 provinces in Iraq. The PRDC, made up completely of local Iraqis, is part of each province's Provincial Council. These local Iraqis determine the projects and their priority and work with the Coalition Provincial Reconstruction Teams and the U.S. Army Corps of Engineers to finalize the design, cost estimate, bill of quantities, and statement of work. The U.S. Embassy and Gulf Region Division approve the project before it is contracted out for execution. Ninety percent of the division's projects go to Iraqi firms, providing a secondary effect to support their economy.

When the PRDC started in 2007, projects focused on basic infrastructure (e.g., water, electricity, sewers, roads, etc.). Subsequent projects included clinics, water compact units, and schools. Today, some of the more robust provinces are initiating projects to provide infrastructure that develops their economy, such as fish markets, meat markets, date processing plants, asphalt plants, and slaughterhouses. As this program matures, we are shifting toward service projects and self-reliance on the part of the Iraqis.

Instead of focusing solely on new starts, we are now moving toward projects to maintain previously completed infrastructure, including utilities, schools, clinics, and other facilities. As we turn over the operations and maintenance to Iraqi responsibility, these projects also involve training

Iraqi laborers hoist plaster material to the second floor in one of the buildings of the Basra Children's Hospital. (photo by Mr. Mohammed Aliwi)

the local Iraqi populace. Eventually, the entire PRDC program will shift to the Iraqis — from budgeting and project approval to execution and maintenance — to reestablish a decentralized governmental system and process that have been absent for the past 30 years.

The objective of the Infrastructure Security Program is to harden the Iraqi oil, electrical, and water infrastructure. One of the key areas of this program is protecting the oil pipelines with Petroleum Exclusion Zones, or PEZs. By simply digging ditches, placing berms, and fencing along each side of the pipelines, these PEZs have served as a deterrent to insurgents trying to blow up the lines, not to mention locals tapping into them for personal gain. The Iraqi government is working in tandem on the PEZs to repair damaged and out-of-date lines; the Iraqi Army is constructing headquarters and company battalion facilities as well as guardhouses to protect this critical infrastructure. The Bayji-to-Kirkuk PEZ project, which cost approximately $30M to construct, resulted in an immediate flow of product to the Bayji refinery and on to market. Today, the Iraqi government has tens of billions of dollars in its coffers solely due to this effort. These funds are flowing back into the Iraqi economy through increases in Iraqi wages and provincial allocations, as well as to support some U.S. programs ($300M toward the Commander's Emergency Response Program is one example).

Top: in Saqlawiyah, Iraq, an Iraqi man looks at the gauges of a solar-powered water purification unit set up by U.S. service members with an embedded provincial reconstruction team. (U.S. Marine Corps photo by Sgt. Cruz G. Sotelo)

Bottom: Iraqi construction workers operating bulldozers are participating in reconstruction projects in the Jamiat district of Basra, Iraq. (U.S. Army photo by Sgt. Tim Ortez)

The last program I oversaw was the Basra Children's Hospital, a 94-bed pediatric oncology and training hospital, the first of its kind in 28 years in Iraq. This project will fill a desperate need: The incidence of pediatric cancer in Iraq is 8-10 times higher than that of more developed countries. The hospital is one of the primary projects for the Iraqi Ministry of Health. Various agencies have supported this $160M project, including the U.S. State Department and Department of Defense, Spain's National Union for Democracy and Progress, Project HOPE, the World Health Organization, the United Nations Defense Fund, and the Iraqi government. Despite the many challenges of working in Basra, construction is moving forward with an estimated completion slated for the end of this year and a phased opening starting early 2009.

I am proud to have been part of the coalition effort to help stabilize Iraq and look forward to a bright future for the Iraqi people.

Lt Col Wise is the Base Civil Engineer, 65th ABW, Lajes Field, Azores, Portugal.

Setting Up Housekeeping in Transylvania*

Capt Gregory Orbino, 52nd CES/CEX
Capt Matthew Schroeder, 48th CES/CER

When Airmen hear the term "expeditionary experience" most think of hot sunny days and lots and lots of sand. The Airmen of the 404th Air Expeditionary Group found that it could be a cold and wet experience, as well.

In March 2008, civil engineers from RAF Lakenheath, England, and Spangdahlem and Ramstein ABs in Germany were tasked with supporting the F-15 security mission over the NATO Summit held in Bucharest, Romania, attended by several world leaders, including the U.S. president.

For the 72 engineers on a 30-day deployment, establishing a tent city in the heart of Transylvania, at Campia Turzii, Romania, was a unique experience in many ways. CEs don't often get the privilege of working with bare base equipment outside of a training environment. It was also the United States Air Forces Europe command's first operational employment of the new Basic Expeditionary Airfield Resources, or BEAR, equipment kit.

Challenges

An operation as large as this doesn't go without its share of challenges. The CEs had minimal pre-deployment information on the extent of host nation support or what and when materials and equipment might be arriving and incomplete geospatial imagery of the site. They were required to perform "brute force" logistical planning (i.e., worst scenario planning). To guarantee mission success, the 404th came in heavy, with six additional pallets of SDCs, a septic system pallet that wasn't used, numerous additional shelters, and myriad tools and equipment.

The engineers had a very short timeframe – less than four days — to bed down and support a tent city population of 360 and close to a dozen F-15s. Despite temperatures hovering near freezing and monsoon spurts of rain, the 404th AEG CEs persevered in setting up a tent city, constructing 46 tents and shelters equal to 32K square feet of floor space capable of housing up to 600 personnel, installing 1.2 miles of electrical cable, and moving 35K cubic feet of soil to create berms around two 210,000-gallon fuel bladders. Incredibly, most of this was completed in less than 96 hours.

The layout of the airfield and poor soil bearing strength required installation of the mobile aircraft arresting system using the uncommon "Dead Man" anchoring system. This system uses a combination of aluminum AM-2 matting placed into the ground and heavy chains to secure the equipment. Amazingly, this setup will secure an arresting system while catching a landing aircraft traveling up to 125 mph.

Host Nation Support

Romania and the United States partnering to form a military alliance in support of security efforts for the NATO

Recipe for success: Take one field of grass...

And a lot of palletized equipment...

*Note: No vampires or werewolves were harmed during this unique expeditionary experience.

Summit was a tremendous accomplishment. Romania's government officials remained under Communist influence as late as 1996, before being removed from power to allow Romania to become a republic. In 2004, Romania joined NATO and was accepted into the European Union in 2007.

Just one year later, at Campia Turzii, Romania, an American flag was lifted in a symbolic tribute to the friendship of Romania and the United States. At the ceremony, a Romanian solder remarked to one of the Air Force CEs, TSgt Darrain Arbogast, "We have been waiting for you for over 50 years." That sentiment paints a great picture of the support received from the Romanians from day one.

"Lessons Learned"

Engineers took away some key "lessons learned" that could be used for any beddown scenario. First, comprehending a Time-phased Force Deployment Document is an essential skill for any beddown planner. The 404th built a plan around TPFDD information indicating nearly 50 engineers available with the requirement of building a tent city for 100 personnel within 96 hours and 130 more within the next 24 hours. The plan worked — by the time the first plane arrived, tent city was complete.

The second lesson followed the advice, "When in Rome…." Finding it time-consuming and often more expensive to locate materials and equipment to do things "their way," the deployed CEs quickly learned to let the Romanians guide them to what was readily available in-country. For example, rather than using metal posts to set up a concertina wire perimeter fence, the engineers used hundreds of seven-foot wooden posts, prepared by the Romanian military in a matter of hours. We found that it was better.

The third lesson: No two bare-base beddowns will be exactly the same, so expect the unexpected and act accordingly. The camp was planned before the engineers knew that the soil was very soft, with a high clay content. Providing an adequate surface for the fuel truck and other heavy equipment took all of the 500 tons of gravel (ordered with the expectation of using very little) and then some.

Air Force civil engineers carried home one more important lesson from this unique expeditionary experience. How amazing that strangers, spanning multiple countries, can come together and, from nothing but a field of grass, construct a full-up tent city in only a matter of days.

Capt Orbino is the Readiness and Emergency Management Flight Commander, 52nd CES, Spangdahlem AB, Germany. Capt Schroeder is the Resources Flight Commander, 48th CES, RAF Lakenheath, England.

Mix with Air Force CEs and let them "cook" for a couple of days...

And there you have it: a full-blown tent city, complete with showers.
(U.S. Air Force photos)

Improving Contingency Education

Presenting real time deployment experience via distance learning

Maj Christopher Stoppel, P.E., AFIT/CEM

In September, the Air Force Institute of Technology and the Air Force Civil Engineer Support Agency teamed up to host "webinars" featuring recently deployed Civil Engineering commanders as part of a novel approach to expediting engineer "lessons learned" to the career field.

Developing sound contingency engineer education is critical to ensuring our expeditionary force is ready to deploy. The greatest challenge is maintaining current, relevant, and operationally focused curriculum. With the current dynamic operations tempo, course curriculum easily becomes outdated to engineers deploying within the next 6–18 months. This year, AFIT integrated deployed experience with existing distance learning, or dL, technology to rapidly transfer lessons learned from the field to the classroom. AFIT later partnered with AFCESA's Lessons Learned program to expand this initiative to the career field.

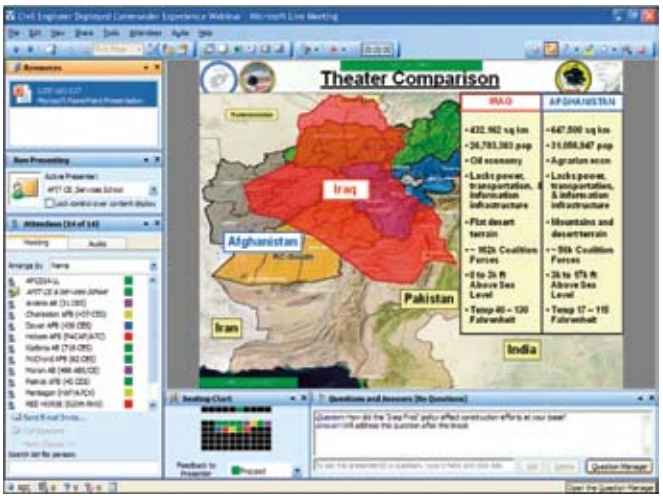
Joint Engineer Operations Course

The Joint Engineer Operations Course prepares engineers for Joint Task Force assignment by developing a broad understanding of JTF organizational structure and service engineer capabilities. Until recently, a shortcoming of the JEOC was that Air Force students had few opportunities to learn from Airmen with prior JTF experience. To remedy this, AFIT hosted teleconferences during the JEOC's dL phase between students participating from their respective bases and CEs assigned to a joint organization briefing from their deployed locations. The teleconferences featured CEs deployed to Iraq, Afghanistan, Kuwait, Horn of Africa, and the Philippines discussing their roles and responsibilities, challenges of working on a joint staff, and "lessons learned"; the conferences concluded with CEs at Air Force Central Command discussing their theater perspective on joint staff deployments. In a unique form of predeployment training, in many cases a presenter's replacement participated to learn about their future assignment.

This same learning venue was later expanded to all JEOC students as the 820th RED HORSE Squadron presented RED HORSE capabilities and current theater operations. The presentation was beneficial to the other services, particularly the Army's 555th Engineer Brigade which is currently deployed with the 820th RHS.

Deployed Commander Webinar

AFIT has teamed with AFCESA's Lessons Learned division to build on the initiative to provide current engineer experience and "lessons learned" to the career field. This summer, seven previously deployed CE commanders participated in the first Deployed CE Commanders Experience Webinar. AFIT and AFCESA share a common interest in hearing deployed engineers' "lessons learned." AFIT can incorporate their experiences into courses such as MGT 101 Air Force Civil Engineer Basic and MGT 585 Contingency Engineer Command, ensuring that these courses remain current and relevant. AFCESA can mine the same information to validate existing or identify new engineering lessons learned for the Joint Lessons Learned Information System, and work these issues to closure. These webinars also enable anyone within the CE community to participate in real time, all at no additional TDY expense.



Top: During the Joint Engineer Operations Course, Maj Andy DeRosa (USAF) discusses how best to allocate engineer resources to specified tasks mentioned in the exercise Engineer Support Plan with CPT Darcy Jones (USA), MAJ Barrett Emenheiser (USA), and MAJ Juan Mendez (USA). Bottom: A screen shot from a live webinar with a deployed commander. Far right: Maj Madison Morris (USAF) and LCDR Russell Linck (USN) read through a Practical Exercise scenario. (U.S. Air Force photos)

AFIT broadcasted the presentations via satellite and internet to broaden the audience and maximize student participation. Most engineers chose an internet/phone option utilizing Microsoft Live Meeting. Live Meeting is a dL tool that allows participants to see presentation slides in real time and easily interact with presenters in a virtual classroom setting. AFIT recorded the presentations and later posted them to AFCESA's Lessons Learned Community of Practice, giving future deployers the ability to download and view as part of their predeployment training.

Other venues for dL contintency education exist. The Society of American Military Engineers began the "Project Management in the AOR" webinar earlier this year, which targets all service engineers preparing to deploy. Subject Matter Experts from each service, including AFIT and AFCESA, participate in the 1-day webinar on topics such as base camp development, contingency funding, and service center reach-back capabilities. Over the past two offerings, 64% of total participants submitting a post-course critique were Air Force CEs.

A Look Ahead

Integrating dL technology with contingency education is a promising supplement to in-residence courses and offers four distinct educational advantages.

First, AFIT stays more connected with the deployed engineer community and can react faster to educational needs. The webinars also allow the school to perform comprehensive analysis to identify commonalities and best practices that can be later presented in the classroom. Based on the JEOC teleconferences and student feedback from SAME's webinar, AFIT is improving its contingency project programming curriculum.

Second, the webinars allow students more flexibility. The one-day webinars minimize time away from work while still allowing participation in a collaborative, classroom-like forum from virtually any location with internet and phone connectivity.

Third, dL eliminates travel and per diem costs and saves students and presenters significant time.

Finally, it enables deployed engineer participation either as student or guest speaker. This instantly increases relevancy and adds a certain realism that cannot be duplicated in the classroom. During one JEOC teleconference, students could actually hear mortar attack warning sirens in the background, reinforcing the significant challenges combat imposes on completing the mission.

AFIT and AFCESA are considering future webinars as part of the continuing effort to rapidly transfer engineer "lessons learned" to the career field and classroom. Webinars featuring Facility Engineer Teams or Provincial Reconstruction Teams are potential candidates for upcoming forums. AFIT is also planning a webinar similar to SAME's course specifically tailored for CEs (details in the next Prime BEEF newsletter).

Maj Stoppel is a JEOC facilitator and an instructor at AFIT's Civil Engineer and Services School, Wright-Patterson AFB, Ohio.

EOD Facility Dedicated to Lost Comrade

TSgt Gloria Wilson, 354th FW/PA

MSgt Brad Clemmons' family attended the dedication of an EOD facility named for him at Eielson AFB, Alaska. (U.S. Air Force photo)

In 2006, the family, friends, and extended military family of explosive ordnance disposal civil engineer MSgt Brad Clemmons gathered to mourn his death and celebrate his life in a memorial service at Eielson AFB, Alaska. Exactly two years after his life was tragically cut short on Aug. 21, people gathered again at the base for MSgt Clemmons, this time for an EOD facility dedication ceremony honoring the man many describe as a hero.

MSgt David Teague, 354th Civil Engineer Squadron EOD superintendant, formally introduced Eielson leaders and distinguished guests, including MSgt Clemmons' family – his wife Rebecca, daughters Isabelle and Gabrielle, sons Nicholas and Zachary, and father David.

Eielson's EOD squadron created a memorial that stands in the new facility, a silent testament to MSgt Clemmons ultimate sacrifice. Before the unveiling, Brig Gen Mark Graper, 354th Fighter Wing commander, commented on the reason why everyone was there.

"We gather here on this beautiful morning to honor bravery, to salute dedication and sacrifice to memorialize the uncommon valor of Master Sergeant Brad Clemmons and in so doing to celebrate his service to our nation," said Brig Gen Graper. "We are here to dedicate the EOD building to an American Airman."

As the Clemmons family viewed the memorial for the first time, four-year-old Isabelle ran her fingers over the white letters etched on black marble honoring the father she lost when she was only two. One of the phrases on it, John 15:13, reads, "Greater love has no one than this, that he lay down his life for his friends."

Nicholas and Zachary said they liked the memorial and the building. "Our dad did what he loved; he served his country," said Nicholas.

Mr. David Clemmons said the memorial was beautiful and he hoped it would be beneficial to the EOD Airmen that pass through the doors of the building

"It's important to remember his sacrifice and when we're long gone, this will help people remember," said SSgt Teague. "This will always be the Brad Clemmons facility."

Air Force Beefs Up RED HORSE Capabilities

SSgt Drew Nystrom, HQ AFRC/PA

Starting this year, Air Force Reserve Command will give the Air Force a larger RED HORSE force by converting some positions and moving others.

To meet the Air Force's need for more RED HORSE support in the Global War on Terror, and to support the Total Force, AFRC will create 446 RED HORSE authorizations.

"The combatant commanders requested more RED HORSE capability," said Lt Col Joe Ballard, chief of Readiness Division at Headquarters AFRC. "A lot of the work going on in Iraq and Afghanistan is reconstruction and force beddown."

In October, the command will start converting Prime BEEF squadrons to RED HORSE squadrons at Charleston AFB, S.C., and Seymour Johnson AFB, N.C. Reserve CEs at Charleston and Seymour Johnson AFBs will receive advance training to meet RED HORSE requirements. Reservists displaced by Base Realignment and Closure actions will have an opportunity to join the new units. The new RED HORSE units will not associate with active-duty RED HORSE squadrons. Instead, the reservists will associate with Airmen in active-duty Prime BEEF units at their respective bases, said Mr. Clyde Wilkins, a member of HQ AFRC Civil Engineer Plans and Initiatives Branch.

The Air Force Reserve will move its 556th RHS from Lackland AFB, Texas, to Hurlburt Field, Fla., where the squadron will associate with the active duty RED HORSE unit, a move in keeping with Total Force Integration initiatives.

In another TFI initiative, the Reserve's 555th RHS at Nellis AFB, Nev., will formally associate with the active duty 820th RHS, also at Nellis.

The Reserve's 307th RHS will remain at Barksdale AFB, La., available to augment the 554th RHS at Andersen AFB, Guam, in case of contingency operations.

Lt Col Ballard said that through the associations, the Air Force expects to improve readiness and efficiency by sharing equipment, facilities and resources that will in-turn get Airmen trained and keep them proficient with fewer resources.

Reserve RED HORSE units frequently participate in humanitarian efforts in Central and South America, such as this one in Guatemala. (U.S. Air Force photo)

A RED HORSE Rises in Ohio

MSgt Mike R. Smith, NGB/PA

Airmen from the Ohio Air National Guard's 200th RED HORSE squadron stand in formation during the new 200-person detachment's flagging ceremony July 20 at Mansfield Air Guard Base, Ohio. (photo by the author)

The Air National Guard's RED HORSE squadron set itself anew here July 20 with the historic activation of a new 200-person detachment, 37 years after the squadron's inception.

Although a morning storm at Mansfield Air Guard Base shortened the activation ceremony for Detachment 1 of the 200th RED HORSE Squadron (RHS), hundreds of its red-capped civil engineers were still able to witness their unit's new flag unfurled outside.

"It's not very often you get to see a flag going up anymore," said Maj Daniel Tack, detachment commander, who had ducked inside from the pouring rain with nearly 400 others. "It's nice to stand up a flag."

Officials said it was a historic moment for Air Guard civil engineering because the detachment now makes the 200th a fully-manned, 404-person RED HORSE and one of only two such National Guard squadron-detachment combinations within a single state.

The National Guard has deployed its RED HORSE squadrons for wartime and homeland missions since 1972. With the addition of Mansfield's detachment, there are now eight RED HORSE units in the Air Guard — six of these Guard units form three, full RHSs, while two others, the 219th RHS in Montana and the 254th RHS in Guam, are associated with active-duty units.

For the last three months, Airmen from Camp Perry and Mansfield joined in their first deployment together in Arizona. There, the squadron poured nearly a mile of concrete roadway, installed 5,700 feet of guardrail and setup more than 21 miles of electrical lines, their connections, and light-poles.

"Every job they tackle, they get it done," said MSgt Thomas E. Cullen from the squadron's Structures shop in Port Clinton, an hour's drive north of Mansfield. He has deployed with RED HORSE since 1993 including recent deployments to Iraq and Arizona.

The expanded RED HORSE has also brought changes in Port Clinton, including new additions in Cullen's 30-man shop, which can pour concrete, erect vaulted "K-Span" buildings made from coiled steel, and fabricate various items from wood, metal and other materials. "Everything is coming together real good, and I like it," he said.

The new detachment was manned with a mix of Camp Perry's Airmen, civil engineers from across Ohio and neighboring Pennsylvania, and nearly 120 new recruits.

"They are very young," said CMSgt Rick Bressler, squadron operations manager, about his sister unit. "For them, the whole RED HORSE mission and our special capabilities are new. And their focus right now is to get as much training as they can in the next two years."

Although the squadron at Camp Perry is the main headquarters and where its support offices are located, the detachment will be equally equipped, including typical heavy equipment like backhoes, bulldozers and dump trucks. Officials said the only difference is that the Mansfield detachment will have an additional air insert (helicopter) team.

Maj Tack said another accomplishment was in manning the new detachment to 95 percent capacity within a year. He credited much of that to the recruiters at Mansfield's 179th Airlift Wing, of which the detachment is a tenant.

Maj Tack and CMSgt Bressler both said their challenge now is preparing the entire RED HORSE for an Operation Iraqi Freedom deployment in 2010. The detachment is also working with the city of Mansfield to secure a 60-acre plot across the runway from the Mansfield Air Guard Base, where they said they will have more room for their equipment and training.

Firefighters Contain 2-Alarm Blaze at Balad

SrA Thomas Trower, 332nd AEW/PA

Air Force and Army firefighters worked full force in the searing sun to contain a fire that engulfed six closely situated structures at Joint Base Balad, Iraq. A call to the Joint Base Balad Fire Department set into motion a finely tuned emergency-management response of firefighters and civilian volunteers.

No one was seriously injured in the blaze, which caused approximately $1M in damage, said MSgt David Clifford, 332nd Expeditionary Civil Engineer Squadron assistant fire chief. However, three firefighters were treated for heat stress–related symptoms and later released.

More than a dozen personnel arrived within minutes, in two fire engines, a tanker, and the deputy fire chief's vehicle. They quickly realized they needed help to contain the fire and sounded a second alarm, MSgt Clifford said.

Assistance arrived moments later and continued to flow in waves. "I arrived on the second run-engine and tried to enter the rear of the fire before pulling back to a defensive position," said SrA Dennard Miller, a JBB Fire Department firefighter deployed from Andersen AFB, Guam.

"We were calling in vehicles from throughout the fleet, including the west-side fire department across the flightline," said MSgt Clifford, who is deployed from Tyndall AFB, Fla. "(Volunteers) even diverted water trucks to the scene to replenish the trucks as they hosed the flames."

"The response by our joint firefighting unit was incredible," said Col Sal Nodjomian, 332nd Expeditionary Support Group commander and senior officer on-scene during the incident. "Their textbook performance allowed us to minimize the damage caused and prevent any serious injuries. "

The JBB Fire Department comprises specialists from Air Force and Army fire departments across the United States. "We receive the same training, but when we're deployed, we really get to see the services come together," said Army Staff Sgt. Joshua Nordstrom. "The Army is completely integrated into the Air Force chain of command."

The Soldiers and Airmen contained the two-alarm fire before any operational facilities were impacted. The cause of the incident is currently under investigation.

Joint Base Balad firefighters SSgt Andres Steevens, deployed from Misawa AB, Japan, and Mr. Jimmie Gazay, a civilian volunteer firefighter, work to contain a $1M fire on the base. Air Force and Army firefighters extinguished the two-alarm fire, limiting the damage to six closely situated buildings. (photo by TSgt Richard Lisum)

Keesler Leads with LEED Home

SSgt Tanya Holditch and 1Lt Nick Plante, 81st TRW/PA

Keesler AFB, Miss., received its first certified Leadership in Energy and Environmental Design, or LEED, home on August 28.

The new "green" two-unit home is the first of more than 700 to be built at the base that will incorporate smart design, technology, construction, and maintenance features that both reduce the impact on the environment and make it a healthier place for the base members.

For a green home to become LEED-certified, it must be inspected by an independent third party, who rates its performance in such categories as the home's indoor air quality, its energy efficiency, the use of water-conserving plumbing, the durability of its building materials, and the sustainability of the building site. Credit for LEED certification also considers whether there are open spaces to encourage walking and other outdoor activities that lead to better overall health for its residents.

"LEED encourages sustainable green building and development. LEED buildings cost less to operate and maintain, are energy- and water-efficient, and will reduce dependence on foreign oil," said Mr. David Horner, 81st Civil Engineer Squadron project management office.

Keesler's new green homes will be Energy Star compliant, which means they will follow Environmental Protection Agency guidelines. According to the Energy Star Web site, this will make them 20 to 30 percent more energy efficient than standard homes. The development of green homes at Keesler AFB is the largest LEED-certified project in the nation, and makes Keesler the first Air Force installation to have LEED-certified homes, base officials said.

"We are very proud of this accomplishment and the projection of future LEED certifications that will be provided in the Air Force," Mr. Horner said.

Does the Air Force Have a Water Storage Tank Program?

Mr. Gary Jacks, HQ AFCESA/CEOA

This is a simple question with a not-so-simple answer. The short answer would be no. A more considered response would be that we have an ad hoc water storage tank program, directed by regulations and standards and programmed, budgeted, and executed using ACES and Interim Work Information Management System.

For this particular case, UFC 3-230-02 requires a complete inspection (draining, cleaning, repairing, and disinfecting) of steel water storage tanks (elevated and non-elevated) every three to five years. Further guidance on how to conduct the inspection can be found in American Waterworks Association M42, "Steel Water Storage Tanks." The requirement to perform the inspection would be included in the Recurring Work Program and any projects identified from the inspection would be tracked in ACES.

These ad hoc programs will be getting a more visible face as we transition to an asset management approach. This portfolio-structured management scheme will allow Air Force managers to start viewing and evaluating water storage tanks in total, just as they will be able to do for production wells, pipe segments, or any other water assets. So in the future, if asked if we have a water storage tank program, you can answer, "Yes, it's part of our asset management program."

AFMC receives $50 million for energy projects

Ms. Michelle Eviston, AFMC/PA

Air Force officials recently have awarded more than $50M to Air Force Materiel Command to fund energy projects under Air Force Smart Operations for the 21st century.

Members of the AFMC Communications, Installations and Mission Support Directorate submitted 80 ideas in response to a call for energy projects from The Air Force Civil Engineer.

"The projects are a combination of initiatives from within AFMC and those from coordination with other energy offices," said Maj Jack Wheeldon, the AFMC Infrastructure and Facilities chief.

Out of the 80 project ideas, 30 were submitted for AFSO21 funding and 26 were approved. Another 26 projects were approved under FY10 Energy Program Objective Memorandum funding.

The majority of the approved AFSO21 funding will be used to buy out 15 Energy Savings Performance Contracts to avoid further interest costs.

The remaining 11 AFSO21 projects are considered fast payback items, a key requirement to receive AFSO21 funds. To be considered, the ideas had to be construction projects with savings that will pay back initial investment costs in less than seven years. The approved projects range from installing simple money-saving upgrades to the total replacement of conventional systems.

Key Personnel

Ms. Rita Maldonado retired September 1 as Chief, Resources Division, The Office of the Air Force Civil Engineer, Headquarters U.S. Air Force, Washington, D.C.

Col Robert E. Moriarty replaced Brig Gen Dave C. Howe as the Deputy Director of Installations and Mission Support, HQ USAFE, and The USAFE Civil Engineer. Col Moriarty was formerly commander, 6th Mission Support Group, MacDill AFB, Fla.

Colonel Mark A. Correll is now the Civil Engineer, Headquarters Air Education and Training Command, Randolph AFB, Texas, replacing Col Mark A. Pohlmeier, who is now the Associate Civil Engineer, Headquarters U.S. Air Force, Washington, D.C. Col Correll was formerly Commander, 72nd Air Base Wing, Tinker AFB, Okla.

Colonel Max E. Kirschbaum is the new Commander, Headquarters Air Force Civil Engineer Support Agency, Tyndall AFB, Fla. He was formerly Commander, 18th Mission Support Group, Kadena AB, Japan. Col Kirschbaum replaces Col Richard A. Fryer, Jr., who retired.

Lt Col Deborah McMurtry is now the Executive Assistant to the Vice Chairman, Joint Chiefs of Staff, Washington, D.C. She was previously The Civil Engineer and commander, 10th Civil Engineer Squadron, U.S. Air Force Academy, Colo.

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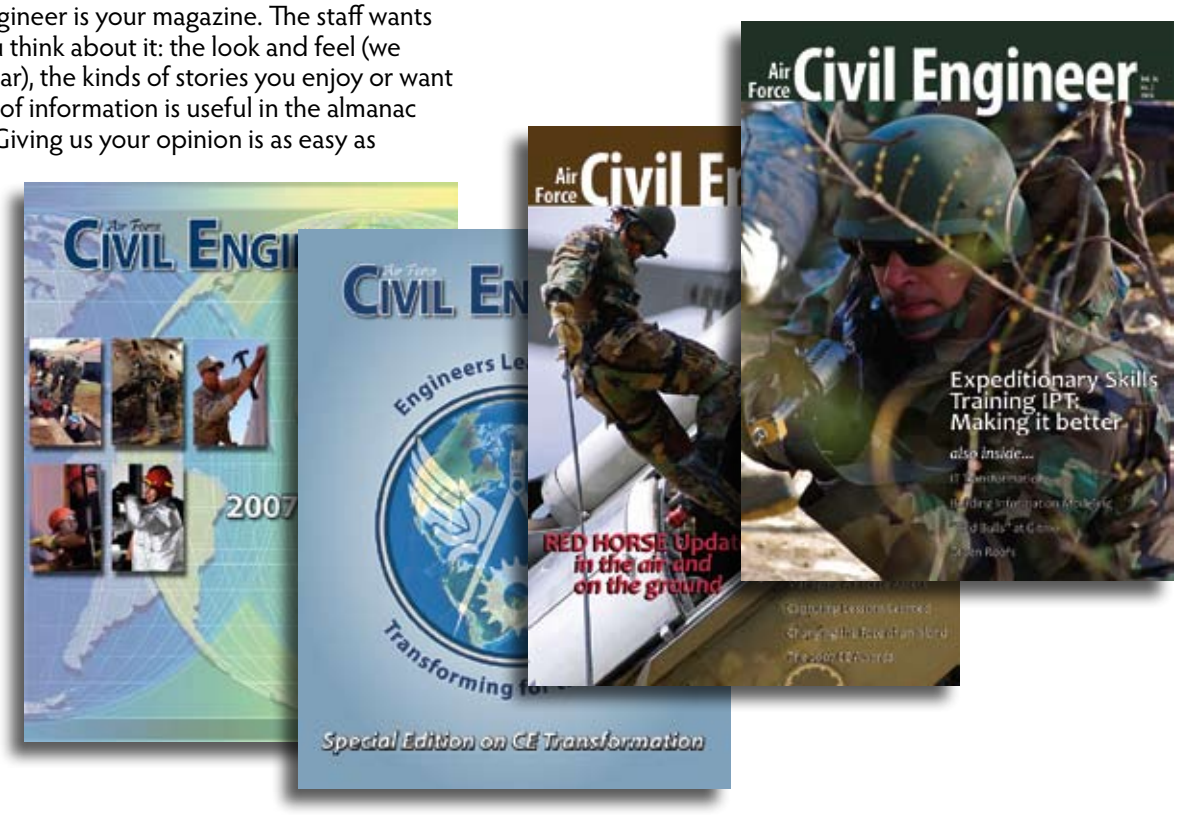

SAME/USAFA 2008 Engineering and Construction Camp

Mr. David Pratt

The ninth annual Society of American Military Engineers and U.S. Air Force Academy Engineering and Construction Camp was held this year from June 27 to July 3. Sixty high school students from all over the U.S., as well as Korea and Germany, were led by 13 motivated mentors representing industry and military services, seven outstanding Academy and Coast Guard cadets, two Air Force and Army Reserve non-commissioned officers, and two Air Force officers. The camp's mission was to encourage high school students to pursue a career in engineering, particularly military engineering, and to also encourage enrollment at USAFA, another military academy, or a civilian institute through the Reserve Officer Training Corps.

In flights of 10, the students competed in activities such as building the highest load-bearing balsawood beam, constructing a catapult to throw a five-gallon bucket the furthest, building the best-performing water purification system, and constructing the lowest-cost sprinkler system that would cover a designated area. Campers worked together to construct three sheds that will be used at the USAFA Field Engineering and Readiness Laboratory site. In keeping with the camp's motto, "Build then Design," students first experienced hands-on construction, and then learned about the engineering concepts involved. The students toured the Academy, including its engineering facilities and laboratories, as well as several architectural-engineering firms and their associated construction project sites.

High school students learn about construction and the civil engineering career field at the SAME/USAFA 2008 Engineering and Construction Camp. (photo by Mr. Andrew Gayley)

Several distinguished visitors came to the camp to share their perspectives on engineering careers, including Maj Gen Del Eulberg, The Air Force Civil Engineer; Rear Admiral Richard Barror, the Chief Engineer of the U.S. Public Health Service; Brig Gen Bud Martin, U.S. Army National Guard; and Brig Gen Timothy Byers, the Air Combat Command Civil Engineer.

When the week was over, the students even competed on which flight could disassemble the cover of their general-purpose medium hardback tent — their home for the week — the fastest. They all took home a better understanding of a career in engineering and the opportunities of a military-sponsored education either at a U.S. military academy or through ROTC.

Mr. Pratt is an engineer providing contract support as a BRAC Project Manager for Headquarters Air Education and Training Command, Randolph AFB, Texas. He was a mentor during the most recent SAME/USAFA Engineering and Construction Camp.

Break it up.

TSgt Chris Bohrman, 380th Expeditionary Civil Engineer Squadron, attaches a hose to a jackhammer that he'll use to break up asphalt in the vehicle search area on a base in Southwest Asia. He is attempting to locate a faulty water supply line and evaluate the pipe.

(photo by TSgt Christopher A. Campbell)