

# Air Force Materiel Command

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## REM Sponsored Energy Initiative

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HQ AFMC/A7OS/REM  
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# Purpose

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***Provide a briefing demonstrating the benefits of Resource Efficiency Manager (REM) support at HQ Air Force Materiel Command (AFMC) by showcasing the PC Power Management initiative***



# Overview

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- **Who am I?**
- **What is AFMC?**
- **How does a REM fit into AFMC's Energy Team?**
- **Strategic Energy Initiative – PC Power Mgmt**
  - **How did it start?**
  - **Pilot Testing, Findings & Assumptions**
  - **Results and Strategy**
  - **Energy Savings by Phase**
  - **Current Status**
- **Summary**



# Who am I?

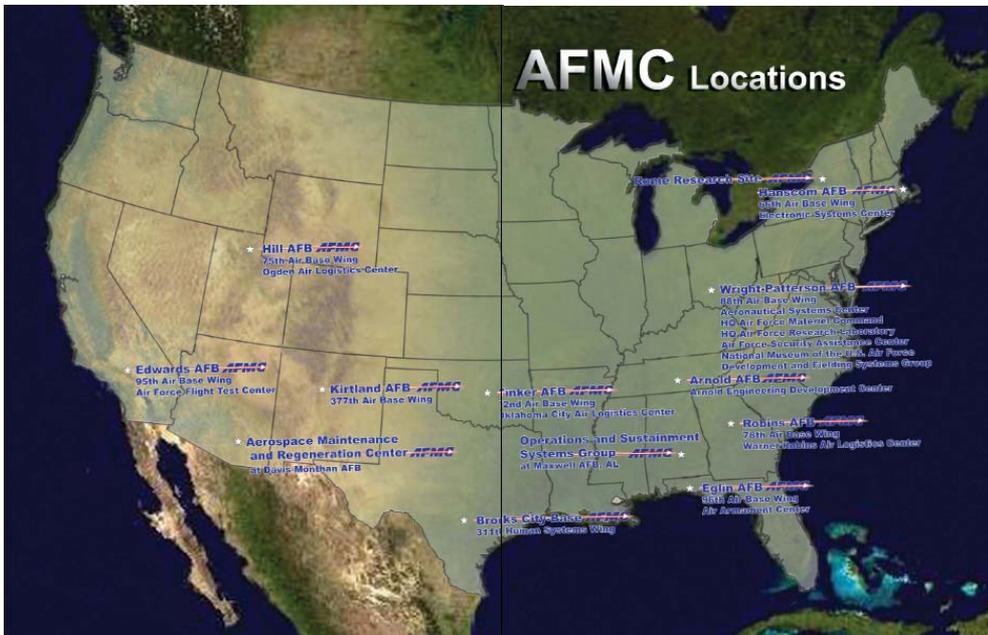
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- **Independent energy consultant**
  - Small Woman Owned business
  - Subcontracted thru CH2M Hill as HQ AFMC REM
- **Mechanical Engineer with 30 years experience**
  - Energy analysis, simulation, auditing & financed project development
  - Manufacturing and semi-conductor industries
  - Building automation & temperature controls
  - Energy program support & management
- **Passion for energy efficiency, renewables, sustainable development & policy**



# What is AFMC?

- **Air Force Materiel Command**
  - Cradle to grave weapon systems life-cycle mgmt
  - 9 primary bases – California to Massachusetts
  - 78,000+ people & > 90M square feet of facilities
  - Annual utility costs ranging from \$150M to > \$200M



## Primary Installations:

- Arnold AFB, TN
- Edwards AFB, CA
- Egin AFB, FL
- Hanscom AFB, MA
- Hill AFB, UT
- Kirtland AFB, NM
- Robins AFB, GA
- Tinker AFB, OK
- Wright-Patterson AFB, OH



# How Do I Fit into AFMC's Facility Energy Team?

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- **Major Command Energy Manager**

*Focus -- Overall program direction & development*

- **Onsite Contractor /REM – Ms. Carlene Conner-Kueck**

*Focus – technology expertise, information cross feed & support for program funding, contracting & execution*

- Promote energy efficiency & renewable energy technologies
- Project development w/emphasis on investment & financing programs
- Energy awareness, strategic initiatives & program/information sharing
  - AFSO21 Innovation Projects - > \$50M for FY09
  - FY10/11 ECIP Projects - > \$19M
  - Germany Plan - > \$3M
  - Temperature Management Initiative - > \$3M for Admin Facilities
  - PC Power Management Initiative - > \$2.5M

- **Offsite Energy Contractor (CH2M Hill)**

*Focus – support program planning & application*



# Strategic Energy Initiative – PC Power Management

- **Implement no/low cost PC power management**
  - Automatically initiate “sleep mode” in both personal computers and monitors when not in use
  - Reduce energy consumption, cooling load & utility costs
- **Heighten energy awareness by everyone**
- **Utilize existing tools & off-the-shelf systems/software**
- **Modify & improve command-wide policy for PC use**
- **Execute Air Force & DoD Energy Strategies**
- **Comply with Executive Orders & Energy Legislation**
- **Create agency-wide “best practice”**

**Command-wide Initiative with No Mission Impact!**



# How Did This Get Started?

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- **Apr 2006** -- article published in AFMC Strategic Energy Management (SEM) Program newsletter on low/no cost energy conservation measures
- **Jun 2006** – presented to AFMC Communications/IT integration organization (A6) as cross-functional team initiative with A7 (Civil Engineering Operations)
- **Sep 2006** – chosen by HQ AFMC A6/7 leadership as 2006 Energy Awareness effort
- **Oct 2006** -- pilot test started to determine command-wide savings potential & deployment strategy
- **January 2007** – phased strategy proposed & accepted by Command leadership
- **March 2007** – Initiative launched



# Pilot Test

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- **Researched existing PC settings, policy, plans, energy rates and 3<sup>rd</sup> party market offerings**
- **Obtained energy consumption data loggers from AFCESA - applied to multiple PCs**
- **Enrolled various laptop & desktop workstation users in prolonged pilot test – A6 and A7**
- **Monitored various levels of operations – with and without power management**
- **Automatically downloaded or “pushed” software at night to pilot test workstations**
- **Used results to calculate savings potential & strategy**



# Pilot Test Findings

- **Pilot Test Consumption Results:**

Workstation Type	Idling Mode	“Sleep” / Energy Save Mode	Energy Savings (%)
Desktop Monitor	32 watts/hr	3 watts/hr	90
Desktop PC Box	51 watts/hr	7 watts/hr	86
Laptop Monitor	12 watts/hr	0.7 watts/hr	94
Laptop Box	22 watts/hr	1 watt/hr	95

- **Energy Saving Assumptions:**

- 60% of monitors, 0% boxes turned off by users at end of day
- Power management –EnergyStar® features not enabled now
- Workstations enter “idle” mode 20% of time during workday
- 95% of connected workstations can be enrolled
- 15% of total connected workstations are laptops
- **> 112,000 connected workstations across AFMC**



# Pilot Test Findings Cont...

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- **Enabling “sleep” mode on monitors (Monitor Power Management or MPM) has no user impact**
- **Enabling “sleep” mode on computer box components (Computer Power Management or CPM) impedes nighttime software maintenance operations unless “wake-up” is provided:**
  - **Create a wake-up “window” with Task Scheduler (built into Microsoft Windows Server software)**
  - **Issue Wake-on-LAN (local area network) signal (requires server software upgrade, network card & setting changes at each PC)**
- **Free software from the Environmental Protection Agency (EPA) EnergyStar® program called EZGPO can be integrated into standard workstation operations to automatically enable energy save mode**
  - **MPM and CPM can be independently configured & activated**
  - **A phased approach can capture substantial energy savings until the best option (WOL) is provided and supported by Air Force**



# Power Management Savings Calculated

- **Substantial savings from automating “sleep” or energy save mode according to PC Power Management Calculator**
  - Created by EPA for the EnergyStar® program
  - Calculates energy savings, emissions reduction and trees saved
  - User adjustable input for utility rates, workday and operational profiles
  - <http://pmdb.cadmusdev.com/powermanagement/quickCalc.html>

**Calculator Inputs**

Basic | Advanced

Use the advanced calculator inputs below to estimate your energy and dollar savings from activating power management on your computer monitors and your computer boxes (CPU, hard drive, etc.). Following guidance in footnotes, enter data below or use the default settings.

Electricity Cost (\$ / kWh):  [Restore Defaults](#)

Hours in Workday:

Days in Workweek:

**Monitors:**  **Computer boxes:**

Active Power (watts):

Sleep Power (watts)<sup>3</sup>:

% Units Turned Off After Work<sup>4</sup>:

% Time Units Sleep During Workday<sup>5</sup>:

**Savings Results**

	Energy	Monitors:	Computer boxes:	Totals:
Current Use (kWh):	2,981,222	7,850,344	10,831,566	
Future Use (kWh):	976,802	2,073,268	3,050,070	
Savings (kWh):	2,004,420	5,777,076	7,781,496	
Number of Homes Lit <sup>6</sup> :	1,604	4,622	6,226	
<b>Dollars</b>	<b>Monitors:</b>	<b>Computer boxes:</b>	<b>Totals:</b>	
Current Cost (\$):	\$130,279.40	\$343,060.05	\$473,339.45	
Future Cost (\$):	\$42,686.24	\$90,601.81	\$133,288.05	
Savings (\$):	\$87,593.16	\$252,458.24	\$340,051.40	
% Saved:	67%	74%	72%	
<b>Pollution Prevented</b>	<b>Monitors:</b>	<b>Computer boxes:</b>	<b>Totals:</b>	
Lbs CO <sub>2</sub> <sup>7</sup> :	2,866,321	8,261,219	11,127,540	
Tons CO <sub>2</sub> <sup>8</sup> :	1,433	4,131	5,564	
Cars Off the Road <sup>9</sup> :	248	715	963	
Acres of Trees Planted <sup>10</sup> :	391	1,127	1,518	



# Our Three Phase Strategy

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- **AFMC implemented a phased approach:**
  - **Phase 1 - Monitor Power Management (MPM)**
    - Enter power save mode after 11 minutes of inactivity
    - **Implemented command-wide in May 2007**
  - **Phase 2 – Computer Power Management (CPM) w/Task Scheduler for wake-up “window”**
    - Enter power save mode after 1 hour of processor inactivity
    - Awaken nightly for maintenance activities during static window
    - **Implemented command-wide in May 2008**
  - **Phase 3 - CPM with WOL signal activated wake-up**
    - Enter power save mode same as Phase 2
    - Network “wake-up” signal sent to execute specific maintenance tasks only when required
    - Best solution to optimize maint operations & energy savings
    - **Planned command-wide implementation in fall 2008**



# Energy Savings Build

- Annual energy savings calculated as:
  - Electricity consumption (kWh) reduction by PCs
  - Additional 15% electricity consumption (kWh) reduction from lowering cooling loads
  - **FY2006 nominal electricity unit costs** by location

Phase	MPM	CPM (Task)	CMP (WOL)	Total
1	\$ 610,000	\$ 0	\$ 0	\$ 610,000
2	\$ 610,000	\$ 1,552,500	\$ 0	\$ 2,162,500
3	\$ 610,000	\$ 0	\$ 1,952,500	\$ 2,562,500



# Current Status

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- **Phase 1 - implemented on > 107,000 monitors**
- **Phase 2 – implemented on > 83,000 PCs**
  - **Monitoring & optimizing required in monthly PC security scanning**
  - **Sites have ability to adjust maintenance window to support local activities**
  - **78% adoption in field, A6 working to improve**
- **Phase 3 – AFMC preparing to implement as test for Air Force once software upgrade final**



# Lessons Learned

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- **REMs can provide critical energy program support (and savings) at a strategic level**
  - **Initiatives focus on policy & operational efficiency improvements rather than individual projects**
  - **Enrolling cross-functional team participation is vital**
  - **Obtaining/maintaining management support is key**
  - **Communicating challenges & success is mandatory**
  - **Benefits & results become qualitative & quantitative**
    - Heightened energy awareness also brings greater visibility
    - Increased opportunity to shape policy & program direction
    - Savings grow in scale, but so do expectations

