

# National Archives and Records Administration



## Moving Towards Sustainable Operations

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# National Archives and Records Administration

## Owns and operates sixteen separate facilities

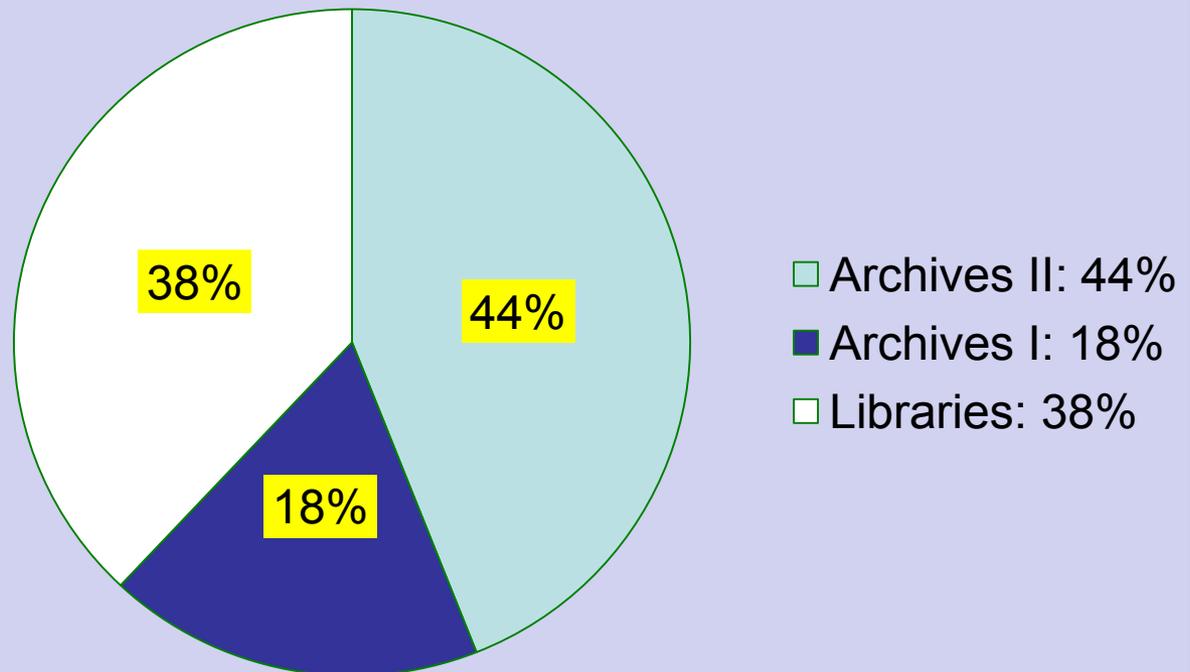
1. National Archives II at College Park (College Park, Maryland)
2. National Archives I (Washington, DC)
3. Herbert Hoover Presidential Library (West Branch, Iowa)
4. Franklin D. Roosevelt Presidential Library (Hyde Park, New York)
5. Harry S. Truman Presidential Library (Independence, Missouri)
6. Dwight D. Eisenhower Presidential Library (Abilene, Kansas)
7. John F. Kennedy Presidential Library (Boston, Massachusetts)
8. Lyndon B. Johnson Presidential Library (Austin, Texas)
9. Richard Nixon Presidential Library (Yorba Linda, California)
10. Gerald R. Ford Presidential Library (Ann Arbor, Michigan)
11. Gerald R. Ford Presidential Museum (Grand Rapids, Michigan)
12. Jimmy Carter Presidential Library (Atlanta, Georgia)
13. Ronald Reagan Presidential Library (Simi Valley, California)
14. George Bush Presidential Library (College Station, Texas)
15. William J. Clinton Presidential Library (Little Rock, Arkansas)
16. Southeast Regional Archives (Morrow, Georgia)

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## Summary Agency Energy Consumption

- Archives II is the largest consumer (44%) of energy in the agency.
- Archives I is the second largest consumer (18%) of the agency energy.

**FY2005 Energy Consumption in Btu**

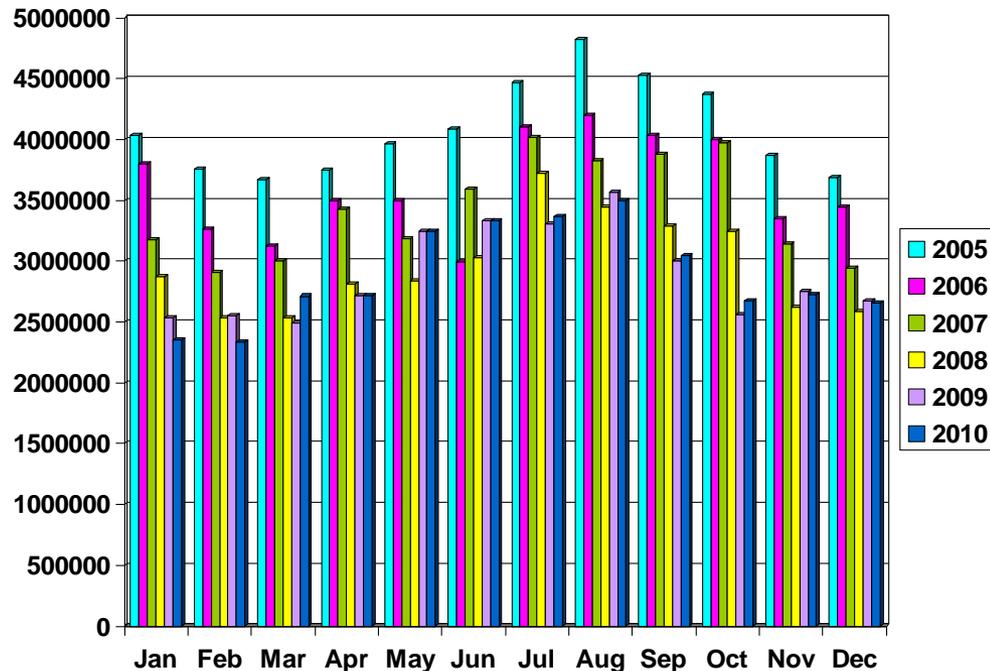


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## Where We Started

### First Baby Steps:

- 1998: Shift in Preservation Philosophy – we changed from 10 air exchanges/hour to 6 air exchanges/hour. This allowed us to shut down half of the stack air handlers at night (10 – 20,000CFM AHU's).
- 2006: After lengthy discussion and testing with our Preservation Division, we expanded the concept of shutting down half AHU's to 24/7.
- These steps resulted in significant savings with very little cost.



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## Where We Started

### Next Steps:

- **2005:** Performed a Detailed Energy Survey (DES) at Archives II with an Energy Savings Contractor (ESCO).
- **2006:** Awarded an Energy Savings Performance Contract (ESPC) project for Archives II as the result of the above DES.
- **2007:** Completed the ESPC project at Archives II.
- **2008:** Performed a Detailed Energy Survey (DES) at Archives I with the same Energy Savings Contractor (ESCO).
- **2009:** Awarded an Energy Savings Performance Contract (ESPC) project for Archives I.
- **2010:** Completed the majority of the ESPC project at Archives I.

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## Highlights of Archives II ESPC Project

There were 8 Energy Conservation Measures (ECM's):

**ECM-1:** Upgrade Energy Management Control System (EMCS).

**ECM-2:** Lighting Retrofit.

**ECM-3:** Heating System Optimization.

**ECM-4:** Reduce Steam Distribution Losses.

**ECM-5:** Rebalance Air Handling System.

**ECM-6:** Reduce Water Usage.

**ECM-7:** Re-set Condenser Water Temperature.

**ECM-8:** Reduce Bathroom Exhaust Fan Run Time.



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## Highlights of Archives II ESPC Project

**ECM-1:** Upgrade Energy Management Control System (EMCS). It contains 8 strategies. The 3 major strategies were:

- Converted pneumatic control to direct digital control and added 378 new DDC points to the system.
- Converted 260 constant volume boxes to variable volume boxes.
- Installed 38 new VFD's and inverter-duty motors on 20 AHU's



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## Highlights of Archives II ESPC Project

### ECM-2: Lighting Retrofit

- Retrofit existing T-12, 40-watt fixtures with T-8, 28-watt lamps and electronic ballasts.
- Installed occupancy sensors in offices and admin areas.
- Installed timer switches in all stacks.
- Replaced parking garage metal halide fixtures with T-8, 28-watt fluorescent fixtures.



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## Highlights of Archives II ESPC Project

### ECM-3: Heating System Optimization.

- Replaced oxygen trim control system.
- Installed new integrated burner management control system.
- Installed new VFD on boiler combustion air and feed pump.



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## Highlight of Archives II ESPC Project

### ECM-4: Reduce Steam Distribution Losses.

- Rebuilt 185 steam traps.
- Placed 389 steam traps into the preventive maintenance program with more appropriate frequencies.



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## Highlight of Archives II ESPC Project

### ECM-5: Rebalance Air Handling System.

- Replaced all 65% and 95% air handler filters with new filters with much lower pressure drop.
- Rebalanced the entire AHU's due to increase in air flow.



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## Highlights of Archives II ESPC Project

### ECM-6: Reduce Water Usage.

- Replaced 214 lavatory faucets with 1GPM aerators.
- Replaced all shower heads with 2 GPM heads.
- Replaced all urinal and flush valve with lower GPM.
- Replaced all water closets flush valves with new 1.6 GPF valves.



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## Highlight of Archives II ESPC Project

### ECM-7: Re-set Condenser Water Temperature.

- Lowered condenser water from existing 80 degrees down to 65 degrees (minimum allowed by chiller design).
- Every degree drop of condenser water temp increases chiller efficiency by 1 1/2 – 2%.
- Increased chiller efficiency far outweighs increased cooling tower fan energy increases.

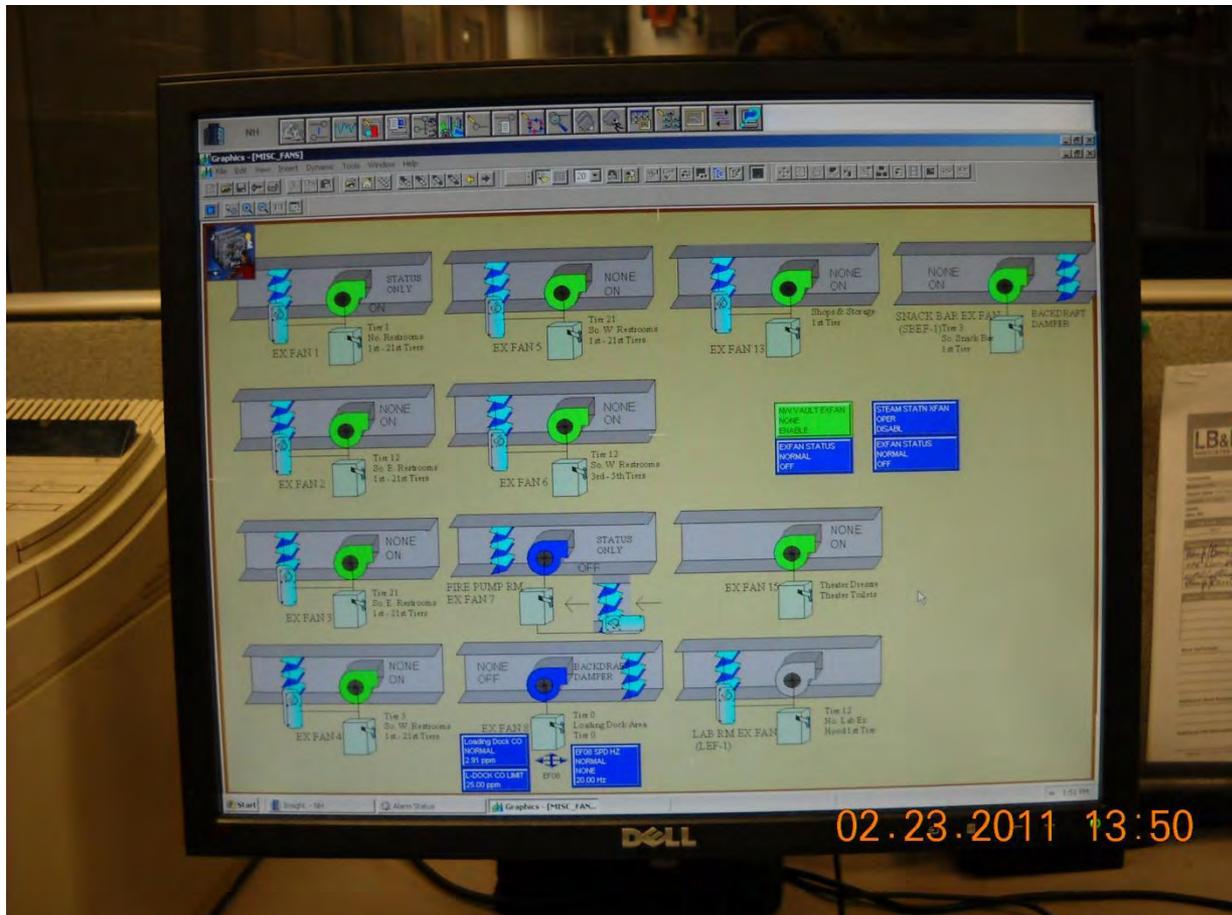


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## Highlight of Archives II ESPC Project

### ECM-8: Reduced Bathroom Exhaust Fans run time.

- Programmed the new EMCS to turn off all existing bathroom exhaust fans during unoccupied hours.



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## Other Steps at Archives II

- Installed 95 KW solar panels on the roof which produced approximately 122,000 KWH of power last year.
- Installed new local AHU (3,000CFM) for Security Control which allowed us to shut down the main AHU (40,000CFM).
- Installed 3x75 KW cogeneration units.
- Installed a 5000 gallon tank to collect rain water and AHU condensate for landscape irrigation.
- Installed a new computer controlled chemical injection system to the cooling tower increasing efficiency and reducing blowdown.
- Installed 30 LED Street Lights and Bollards lights along the entrance drive.

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## Other Steps at Archives II



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## Highlight of Archives I ESPC Project

There were 5 Energy Conservation Measures (ECM's):

**ECM-1:** Heating Plant Improvements.

**ECM-2:** Building Envelope Upgrades.

**ECM-3:** Water Conservation.

**ECM-4:** Lighting Retrofit and Controls.

**ECM-5:** Building Control Optimization.



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## Highlight of Archives I ESPC Project

**ECM-1:** Heating Plant Improvements. It contains 3 strategies:

- Replaced 3 existing steam heat exchangers with 6 new gas boilers, sized 2 Million Btu/hour each.
- Replaced 2 existing steam heat exchangers for domestic hot water with a new 250 gallon domestic hot water tank.
- Installed 2 new 75KW co-generation units. The heat from these 2 cogen is more than enough to generate hot water for the new 250 gallon domestic hot water tank.



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## Highlight of Archives I ESPC Project

**ECM-2:** Building Envelope Upgrades. The contractor is currently implementing the following:

- Seal 3 roof hatches with air barrier system.
- Replace weather stripping for 12 exterior doors.
- Install weather stripping for 90 interior doors.
- Caulk all exterior and interior wall penetrations.



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## Highlights of Archives I ESPC Project

### ECM-3: Water Conservation.

- Replaced 128 lavatory faucets with 1GPM aerators.
- Replaced all shower heads with 2 GPM heads.
- Replaced all urinal and flush valve with lower GPM.
- Replaced all water closets flush valves with new 1.6 GPF valves.
- Upgrade 2 existing irrigation systems with all new spray heads and 2 new system controls.



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## Highlights of Archives I ESPC Project

### ECM-4: Lighting Retrofit and Controls.

- Retrofit existing 2'x4' lighting fixtures with new T-8, 25-watt and high efficiency electronic ballasts.
- Retrofit 2x34-watt u-tubes in existing 2'x2' lighting fixtures with 2x17-watt straight tube lamps.
- Replaced 42-watt recessed light bulbs with 26-watt light bulbs.
- Replaced 75-watt incandescent light bulbs with new 12-watt LED.
- Installed occupancy sensors in offices and admin areas.



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## Highlights of Archives I ESPC Project

**ECM-5:** Building Control Optimization. It contains 4 strategies:

1. Eliminated simultaneous heating and cooling: Installed pre-heat coil discharge air temperature sensors and re-wrote AHU control sequence so that preheat coils are modulated open based on their leaving air temperature.
2. Reset supply air temperatures for all VAV boxes.
3. Optimum start and stop of all non-critical air handling units: Allowed the existing control system to “learn” the optimum time to start to bring the spaces to comfort condition before the building becomes occupied.
4. Control System Retro-Commissioning: Performed point-to-point commissioning to ensure correct operation for each AHU. Re-wrote AHU sequences for occupied, un-occupied, warm-up, and cool-down modes of operation for all non-critical AHU's.



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## Energy and Water Reduction Summary

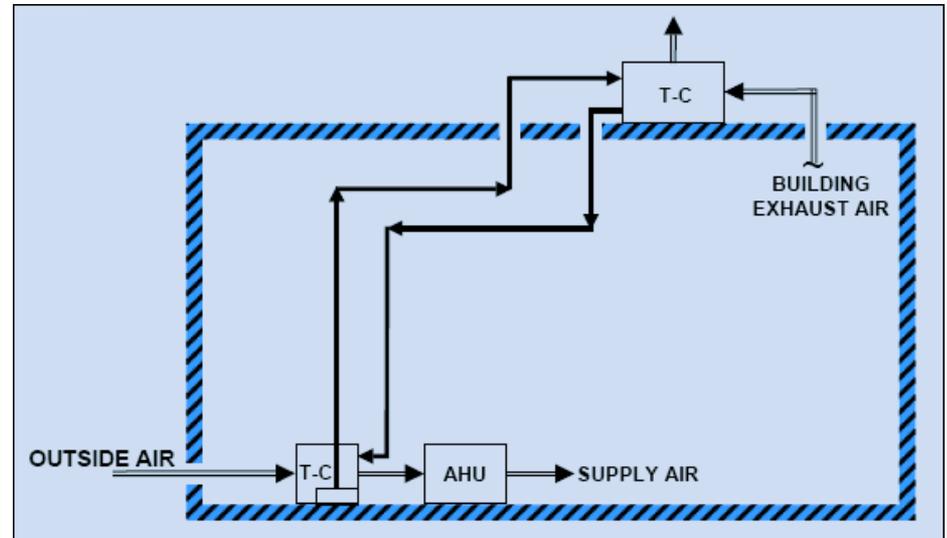
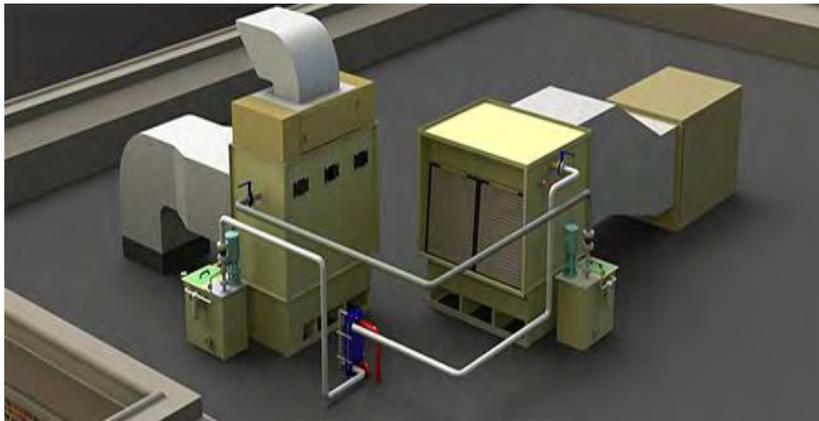
National Archives Total Agency Utilities Cost and Energy/GHG Savings								
		Executive Order 13423			Executive Order 13514			
FY	Total Utilities Costs (to include Water)	Btu/GSF	Btu/GSF Reduction vs FY2003	FY Goal Target Reduction	Site Delivery Billion Btu	Scopes 1, 2 & 3 GHG Emission (Ton)	GHG Reduction vs FY2008	GHG Saving vs FY2008 (Ton)
2003	\$7,798,163.48	<b>181,189</b>	<b>Baseline</b>					
2006	\$13,629,555.42	156,988	-13.4%	-3.0%	637.7	82,033.0		
2007	\$14,101,762.75	150,896	-16.7%	-6.0%	612.9	80,347.0		
2008	\$15,043,427.79	130,993	-27.7%	-9.0%	<b>575.4</b>	<b>76,295.4</b>	<b>Baseline</b>	<b>Baseline</b>
2009	\$14,496,452.58	127,765	-29.5%	-12.0%	561.6	75,468.6	-1.08%	826.8
2010	\$13,825,049.86	125,033	-31.0%	-15.0%	552.2	75,926.8	-0.48%	368.6

National Archives Total Agency Water Savings			
FY	Gallons/GSF	Gal/GSF Reduction vs FY2007	FY Goal Target Reduction
2007	<b>26.6</b>	<b>Baseline</b>	
2008	25.4	-4.5%	-2.0%
2009	22.7	-14.7%	-4.0%
2010	21.6	-18.8%	-6.0%

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## What's Going On Now

- Installing a new Kathabar heat recovery system at Archives II.
- Installing 25 KW additional solar at Archives II in conjunction with replacing existing roof with a white TPO roof.
- Implementing several changes at Southeast Regional Archives to reduce energy consumption.
- Begin auditing Presidential Libraries this year looking for more opportunities.



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## Bragging Rights

**FY-2008 Presidential Award for Leadership in Federal Energy Management.**



# National Archives and Records Administration

## Bragging Rights

**FY-2010 Presidential Award for outstanding achievement in building energy efficiency and renewable energy development and deployment.**



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## Questions or Comments ?

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