

Green Information Technology Strategic Plan



United States Department of Agriculture
Office of the Chief Information Officer
January 12, 2009

Green IT Glossary of Terms and Acronyms

AC	alternating current	LCD	liquid crystal display
ASIC	application-specific integrated circuit	LDO	low dropout
ASSP	application-specific standard product	LED	light-emitting diode
CMOS	complementary metal-oxide semiconductor	MHz	megahertz
CPU	central processing unit	MOSFET	metal-oxide semiconductor field-effect transistor
DC	direct current	Nm	nanometer
DRAM	dynamic random-access memory	PA	power amplifier
DSC	digital still camera	PDA	personal digital assistant
DSP	digital signal processor	PFC	power factor correction
FPGA	field-programmable gate array	POL	point-of-load
GaAs	gallium arsenide	PUE	power use efficiency (PUE = Total Facility Power / IT Equipment Power)
GHG	green house gas	PWM	pulse width modulator
I/O	input/output	RF	radio frequency
IC	integrated circuit	VID	voltage identifier
IDM	Intelligent device management	VRM	voltage regulator module
IGBT	insulated-gate bipolar transistor	WAH	work-at-home
ISO	International Organization for Standardization	WFO	workforce optimization

Acknowledgments

Charles R. Christopherson, Jr.
Chief Financial and Information Officer

Christopher L. Smith
Deputy Chief Information Officer

Project Leads

Audrey Marks—OCIO
Kent Taylor—OCIO

Writers

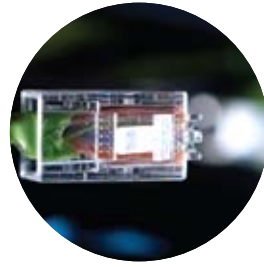
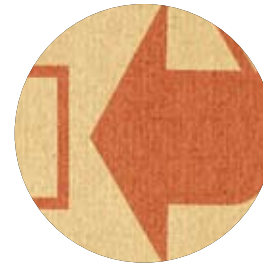
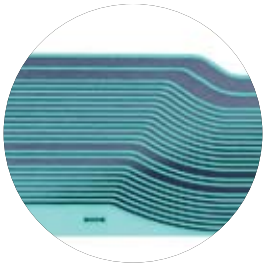
Charles R. Christopherson, Jr.—CFO/CIO
Kimberly Graham—FSA
Audrey Marks—OCIO
Raymond Pett—Gartner
Juanda Rogers—OCFO
Christopher L. Smith—DCIO
Kent Taylor—OCIO

Edit Team

Jessica Bortolini—OCFO/OCIO
Mike Clanton—OCFO
Jon Holladay—DCFO
Pauline Myrick—OCFO
Pam Pitman—Gartner
Carrie Pollard—OC

Design Team

USDA OC-Creative Services Center



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1.0



❖❖ A Letter from the Chief Information Officer

Dear Employees, Vendors, and Citizens:

In my youth, our family lived in Beaverton, a suburb of Portland, Oregon. Later in my technology career, I lived in Denver, Colorado. While the landscape and climate is different in these two areas, they have a single thing in common; the people fiercely compete in the technology world and passionately support nature. With that same love of nature, I have the honor to release USDA's first Green IT Plan.

As a leader in the Nation on renewable energy, it is important that USDA's information technology (IT) "green IT plan" is one of the best. This document establishes the first steps in supporting great environmental practices. "Green IT" equipment, methods and technology are changing daily. Therefore, USDA will update this report annually and release the document on Earth Day. Also, on Earth Day, USDA will release results comparable to the target measurements contained in this document.

As we started the development of this plan we desired two things. First, we desired a document that could be used as a template for companies around the world. Second, we believed that USDA could become the leader in the Federal Government for environmentally responsible information technology.

By following this plan, USDA will reduce several hundred tons of carbon each year, reduce harmful waste, and conserve energy. "Green IT" has another aspect that is highly important to the government; it supports the best practices in security, reduces expenses, and helps retain employees. Through environmental responsibility we all win!

Charles R. Christopherson, Jr.

United States Department of Agriculture
Chief Financial Officer
Chief Information Officer



By following this plan, USDA will reduce several hundred tons of carbon each year, reduce harmful waste, and conserve energy.

2.0

⌘ Executive Summary

"That by the best cultivation in the physical world, beneath and around us, and the intellectual and moral world within us, we shall secure an individual, social and political prosperity and happiness, whose course shall be onward and upward, and which, while the earth endures, will not pass away."

—President Abraham Lincoln, USDA Founder



ABRAHAM LINCOLN'S QUOTE from a speech on Agriculture to the Wisconsin State Agricultural Society in September 1859 is as prescient today as it was nearly 150 years ago. The Nation is focused on finding environmentally sound and more sustainable ways of carrying out its many important missions. USDA is focused on opportunities to reduce its energy consumption, reduce electronic waste, harness renewable energies where feasible, reduce its carbon footprint, and seek out sustainable alternatives as it delivers its critical mission.

The United States Department of Agriculture (USDA) is a global organization delivering more than \$96.5 billion in public services through more than 300 programs worldwide. These programs and services improve the Nation's economy and quality of life by:

- Enhancing economic opportunities for United States farmers and ranchers;
- Ensuring a safe, affordable, nutritious, and accessible food supply;
- Caring for public lands and helping people care for private lands;
- Supporting the sound, sustainable development of rural communities;
- Expanding global markets for agricultural and forest products and services; and
- Working to reduce hunger and improve America's health through good nutrition.

USDA delivers these programs and services through a vast Information Technology (IT) infrastructure supporting more than 100,000 employees. This plan sets the overall goal to foster environmentally sustainable IT operations within the Office of the Chief Information Officer (OCIO) and USDA.

The President's Executive Order (E.O.) 13423, Strengthening Federal Environmental, Energy, and Transportation Management is a key driver for the OCIO Green IT Plan. President Bush sets forth the guidance to perform within USDA's mission "in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner."

Then Secretary of Agriculture, Mike Johanns, put USDA to action in his memorandum 5500-002, implementing Executive Order 13423, where he laid out nine focus areas. The USDA plan begins by addressing each of the Secretary's focus areas in which sustainable practices should be implemented. A brief description, followed by success measures, metrics, and implementation examples are listed for each of the focus areas. The measures, metrics, and examples offer a template that any public or private organization can utilize in establishing an environmental improvement program. These program areas are meant to serve as a foundation that allow further creativity in implementing green IT practices.

The OCIO Impact Areas people, electronic systems, facilities, policies and business processes, are the focal points, designated to create the greatest green impact. Using the impact matrix, IT leaders will identify how the projects within the initiative areas, will achieve the greatest return on investment. Some of the projects include:

- USDA Farm Service Agency (FSA) Modernization Plan
- Telework Plan
- Enterprise Data Center Consolidation Plan

This plan, when implemented to its full capacity, will result in the IT community of USDA reducing its carbon footprint by 887,932 tons of CO₂. It is a mission of the Chief Information Officer to incorporate permanent "green" practices for the future.

❖ Introduction

On January 26, 2007, President George W. Bush signed and released Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management. It states that “it is the policy of the United States that Federal Agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.”



The following are the standards that have been set forth:

- Energy Efficiency and Green House Gas Emissions, relative to the baseline of the Agency's energy use in fiscal year 2003.
 - Reduction of energy intensity by 3 percent annually through the end of fiscal year 2015
 - Or 30 percent by the end of fiscal year 2015
- Renewable Energy
 - At least half of the energy consumed by the Agency comes from renewable sources.
- Water Consumption, relative to the baseline of the Agency's water consumption in fiscal year 2007
 - Reduce water consumption intensity by 2 percent annually through the end of fiscal year 2015
 - Or 16 percent by the end of fiscal year 2015
- Acquisitions of goods and services
 - Biobased, environmentally preferable, CO₂, water-efficient, and recycled-content products,
 - Use of paper of at least 30 percent post-consumer fiber content
- New Construction and Major Renovation of Agency buildings
 - Comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006),
 - 15 percent of the existing Federal capital asset building inventory of the Agency as of the end of fiscal year 2015 incorporates the sustainable practices in the Guiding Principles
- Motor Vehicles, if the Agency operates a fleet of at least 20 vehicles, relative to Agency baselines for fiscal year 2005
 - Reduces the fleet's total consumption of petroleum products by 2 percent annually through the end of fiscal year 2015
 - Increases the total fuel consumption that is non-petroleum-based by 10 percent annually,
 - Uses Plug-In Hybrid (PIH) vehicles when PIH vehicles are commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles
- Electronic products, when acquiring:
 - Meets at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product.
 - Enables the Energy Star feature on Agency computers and monitors.
 - Establishes and implements policies to extend the useful life of Agency electronic equipment.
 - Uses environmentally sound practices with respect to disposition of Agency electronic equipment that has reached the end of its useful life.

Following the President's direction USDA has taken action. The Secretary of Agriculture issued Memorandum 5500-002 in support of E.O. 13423. This order directs that "Federal Agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner," The USDA "will implement sustainable practices for:

- energy efficiency and reductions in greenhouse gas emissions;
- renewable energy, including bio-energy;
- water conservation;
- acquisition of green products and services;
- waste prevention and recycling;
- reduced use of toxic and hazardous chemicals and materials;
- high performance/sustainable design buildings;
- vehicle fleet management including use of alternative vehicles and fuels and reductions in petroleum consumption; and
- electronic stewardship."

Environmental sustainability excites passionate debates, encompassing a broad range of subjects including the mining of the earth resources, the disposal of toxic waste, and the impact of greenhouse gas emissions (such as carbon dioxide) on the world's climate.

Prudent business leadership has environmental sustainability and the "low-carbon economy" firmly on the radar screen. Agency CIOs can make a major contribution to our responsibility for the environment. Drawing on insights from some of the world's greenest enterprises, this strategic plan sets out a systematic approach to assist CIOs in tackling their enterprise-wide environmental sustainability responsibilities.

USDA is taking a practiced, quality based continuous improvement approach to "Green," a summary of this approach (Gartner) is presented as a continuous improvement cycle. In each iteration of this cycle, there are two critical questions that the CIO and other executives must answer: What impact is going green likely to have? And, how are we going to respond? As with any business problem or solution, USDA uses a holistic systematic approach, green is no

different. USDA will approach this with the same systematic methodology and rigor. (Fig. 1)

Green issues will affect different parts of the enterprise in different ways, influencing strategy, business operations, and IT. Dealing effectively with green-inspired changes requires a sound management structure to understand impacts, prioritize actions, and manage the enterprise's response. The management structure applied to the USDA IT Green Plan comprises three parts, which you will see reflected throughout the document. The following explains the structure that is the backbone of the plan's layout:

■ **Having the right roles in place**

Central coordination of green initiatives is key to their implementation and ultimate success.

■ **A systematic approach to environmental improvement**

"Going green" requires ongoing attention: it is not a short-term project; it requires an approach that recognizes the open-ended nature of its initiatives.

■ **A measurement system focused on the right things**

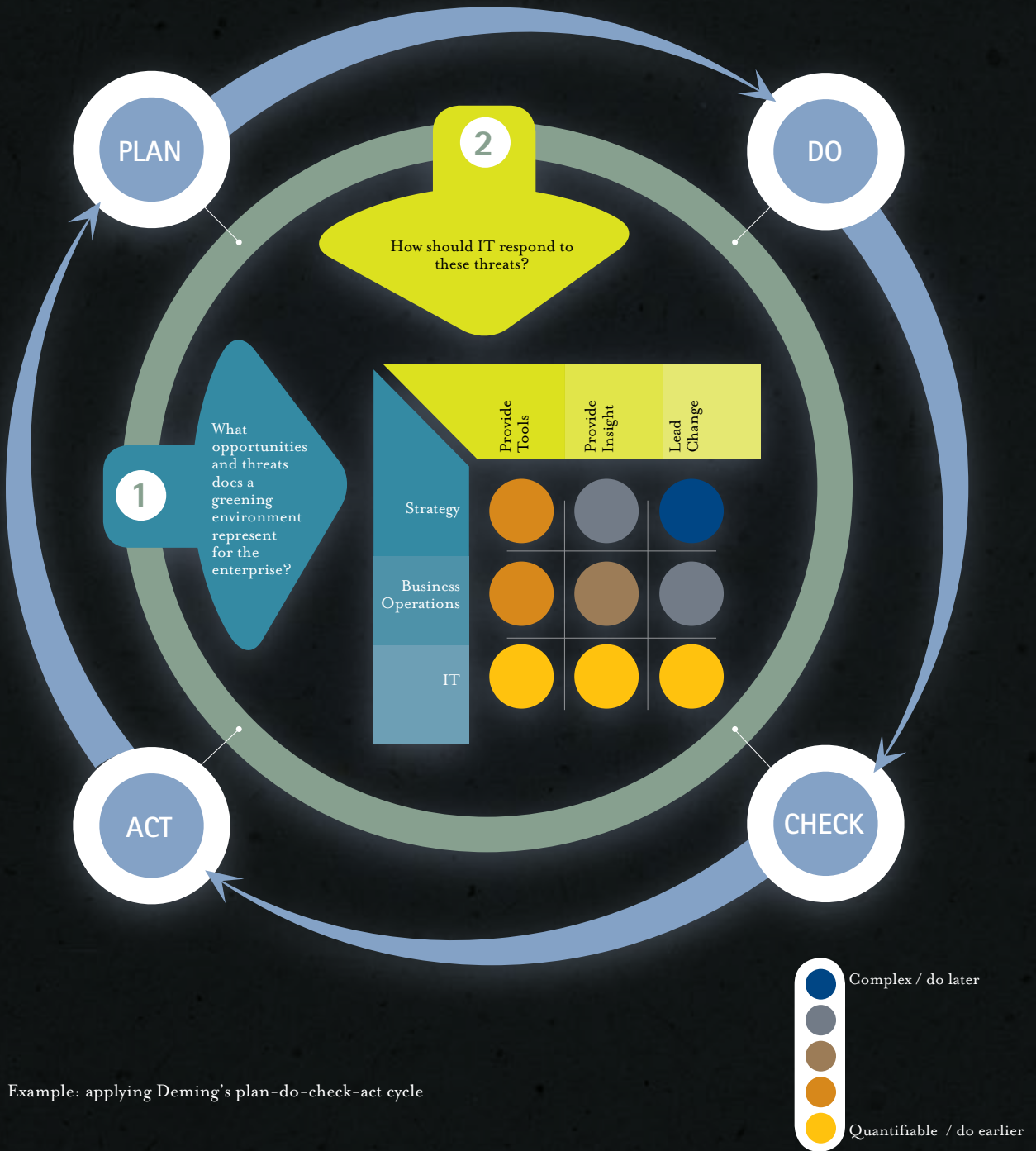
Guidelines come in the guide of International Organization for Standardization (ISO) 14001, a management standard aimed at improving environmental performance, and The World Business Council for Sustainable Development (WBCSD). Measurements have two elements: 1) the measures themselves and 2) the boundaries around the enterprise to set the scope for initiatives.

These three pieces will provide sound business structure to get the Green Plan executed and to achieve the results that will create the positive impact on the environment.

The USDA CIO has taken these business management principles and laid out a comprehensive plan to achieve the goals delineated by the President and the Secretary. The CIO Initiative areas are designed to outline the focus areas for the IT community to achieve the results required. By following the steps that have been laid forth and the case studies provided, and by enabling employees to take part in Green initiatives, USDA will lead the way in setting standards for the IT community.

fig. 1

Environmental sustainability requires a systematic, continuous approach



Example: applying Deming's plan-do-check-act cycle

Secretary's Program Areas

On September 17, 2007, then Secretary Mike Johanns signed Memorandum 5500-002 which provided the groundwork for the Implementation of E.O. 13423 at USDA. The memorandum requires USDA to “develop and implement environmental management systems (EMS) and sustainable practices that adhere to the requirements specified in the E.O.” This places emphasis on the importance of internal USDA actions to meet these requirements.



The following summaries describe USDA IT goals which support each of the environmental areas delineated in the memorandum. Following each brief description are measures which should be considered to track progress towards goal achievement. Examples of actions are also provided.

4.1

Increase Energy Efficiency

Description

As the largest energy consumer in the United States, the Federal Government has both a tremendous opportunity and a clear responsibility to lead by example with smart energy management. By promoting energy efficiency and the use of renewable energy resources, we will save energy, reduce carbon output, and demonstrate leadership with responsible, cleaner energy choices.

USDA will investigate and implement cost-effective technologies, processes, and policies to decrease overall energy consumption in delivering IT products and services to all stakeholders. Implementing an energy efficiency program must not require elimination or a reduction in services that may materially affect stakeholder productivity or effectiveness.

Success Measures

- Reduction in energy use.
- Non-compliant computers or other IT equipment replaced with Energy Star compliant equipment.
- Reduction in CO₂ emissions per employee.
- Reduction in CO₂ emissions generated by air travel.
- Reduction in CO₂ emissions generated by automobile travel.

Metrics

Collect information and baseline Power Usage Effectiveness (PUE):

- PUE can be collected by building unit or measured by end user consumption.
- Base calculations on the number of hours per day equipment are powered.
- Percent reduction in CO₂ emissions per employee.

- Percent reduction in CO₂ emissions generated by air travel.
- Percent reduction in CO₂ emissions generated by automobile travel.

Examples of "Implementing Actions"

- Devices are shut down when not in use.
- Purchase E-star equipment.
- Sensors in buildings that automatically interact with control systems to shut off lights, power, and air conditioning/heat when area is not occupied.
- Purchase products using advanced power management devices or software (e.g. ASICs, PFCs, PMICs, POLs, VRMs).

4.2

Reduce Greenhouse Gas Emissions (CO₂)

Description

Investigate and implement cost-effective technologies, processes, and policies that enable elimination or a net reduction of carbon-based energy sources. Programs that reduce CO₂ emissions may also involve replacing carbon-based energy sources with alternative energy sources that do not produce greenhouse gasses.

Success Measures

- Reduce CO₂ emissions per employee
- Reduce CO₂ emissions generated by air travel
- Reduce CO₂ emissions generated by automobile travel

Metrics

- Percent reduction in CO₂ emissions per employee
- Percent reduction in CO₂ emissions generated by air travel
- Percent reduction in CO₂ emissions generated by automobile travel

Examples

- Reduce the amount of installed IT equipment throughout USDA by consolidating components, application systems and hosting locations.
- Utilize alternatives to carbon-based fuel powered vehicles.
- Use solar or wind energy to power Enterprise Data Centers.
- Eliminate or reduce travel by implementing and institutionalizing use of technologies such as video conferencing, remote system access, and Web-based collaboration (Video Teleconferencing, Telework, FSA modernization).

4.3

Use Renewable Energy Sources

Description

Select sources of energy generated from naturally replenished resources such as wind, solar, tide, geothermal, biomass, and methane. With the environmental impacts and the limited availability of carbon-based fuels, USDA recognizes the need to shift to a more efficient, abundant and environmentally friendly approach to energy sources.

The goals for Federal Sector according to the new Energy Policy Act (EPACT) of 2005 direct the Federal Government to increase renewable energy use by:

- 3 percent or more in fiscal years 2007 - 2009
- 5 percent or more in fiscal years 2010 - 2012
- 7.5 percent or more by 2013

Success Measures

- Exceed EPACT goals by 50 percent.

Metrics

- Percent increase in GWh hours from renewable energy sources versus non-renewable sources, to determine the increase.

Examples

- Install solar electric sources in USDA facilities.
- Install solar lighting fixtures in USDA facilities.
- Install geo (or ground coupled) thermal fixtures in USDA.
- Install small wind turbines.
- Purchase electricity from suppliers that use high efficiency and low-carbon alternative energy sources.

4.4

Increase Water Conservation

Description

Protect the future of our Nation's water supply by promoting water efficiency through the use of water-efficient products, programs, and practices.

Success Measures

- Reduce water consumption by 2% annually.

Metrics

- Percent reduction of water consumed by building, facility, and employees over a specific period of time.

Examples

- Install automatic faucets in USDA facilities.
- Deploy water recycling systems and rain sensors for landscape hydration.
- Purchase WaterSense equipment.



The USDA will enforce higher levels of compliance than what is required by E.O 13423.

- Employee water conservation awareness programs.
- Use Radio Frequency Identification (RFID) and interior control systems to air condition only areas where people or heat sensitive equipment is located.
- Use bypass water cooling systems for all IT equipment hosting facilities when outside air temperature is below 65 degrees.
- Manage IT equipment hosting facility temperatures to operate near upper ranges, reducing energy used for cooling.

4.5

Increase Use of Green Products and Services Procurement and Supplier Management

Description

Maximize the usage of green IT products by implementing procurement policies.

The USDA will enforce higher levels of compliance than what is required by E.O 13423 issued in January 2007 for strengthening Federal environmental, energy, and transportation management. By adhering to the following steps, USDA will meet and exceed these goals:

- Define in the acquisition, the standard and use of green products and services;
- Involvement of a Green IT expert on technology procurement selection teams;
- Selection of technology based on the full life-cycle cost including energy consumption in the selection of the product;
- Incorporation of green purchasing requirements within Agency management systems;
- Collaboration with technology standard-setting organizations to develop standards to better define green products, practices, and services; and
- Acquisition of EPEAT-registered electronic products certified at the Gold or Silver level.

Success Measures

- Increase procurement of EPEAT Gold or Silver equipment for desktop computers, laptop computers, servers, network equipment, and other devices.
- Increase use of the percentage of certified equipment.

Metrics

- Percentage of technology suppliers and service providers meeting the enterprise environmental procurement guidelines.
- The percentage of total USDA computers complying with the United States Government's Energy Star version 4 specifications.
- The percentage of total USDA computers and equipment complying with EPEAT's Silver and Gold certification.
- The percentage of technology equipment procured that is compliant with Restriction of Hazardous Substances (RoHS) directives.

Examples

- Purchase IT Technology meeting EPEAT requirements.
- Review all existing IT procurement contracts and identify those that may require renegotiation to include environmental compliance.
- Review technology refresh programs to establish environmental compliance requirements in future purchases.



4.6

Provide Environmentally Friendly Waste Management

Description

Investigate and implement cost-effective technologies, processes, and policies to decrease use of consumable products such as paper, printer ink (toner cartridges), non bio-degradable plastics, metals, or glass products.

Investigate and implement cost-effective technologies, processes and policies to increase recycling of or reuse of IT equipment such as PCs, laptops, cell phones, and other electronic devices.

Success Measures

- Percentage of IT Equipment recycled at disposal.

Metrics

- Increase paper recycling by 2% each year, using ratio of paper recycled to paper purchased as benchmark.
- Increase percentage of toner cartridges recycled using ratio of cartridges purchased as a benchmark.
- Increase percentage of recycled content in office products purchased.



USDA will reduce the release and use of toxic and hazardous chemicals...that may result in significant harm to human health or the environment.

Examples

- Recycle existing electronic devices.
- Recycle used paper.
- Reuse envelopes.
- Recycle print/toner cartridges.
- Purchase recycled toner cartridges.
- Print 2-sided pages.
- Purchase EPEAT certified equipment.
- When recycling is not possible – ensure correct disposal.
- When purchasing paper products or support services that include the supply of written documents: to ensure they are compliant with the E.O., they must be 30 percent postconsumer fiber.

4.7

Incorporate Electronics Stewardship / Reduce Use of Toxic and Hazardous Chemicals and Materials

Description

Ensure the procurement of environmentally preferable and energy efficient equipment. Reduce the environmental and energy impacts of electronic equipment purchase, use, and disposal through continual improvements to the acquisition, design, specifications, material choices, distribution, and use of new electronic equipment, and the reuse, de-manufacturing, and recycling of surplus electronic equipment.

USDA will reduce the release and use of toxic and hazardous chemicals and materials including toxic chemicals, hazardous substances, ozone-depleting substances (ODSs), and other pollutants that may result in significant harm to human health or the environment. This can be attained through the EPEAT standards.

Success Measures

- Increase percentage of displays complying with EPEAT Silver and Gold.
- Increase percentage of PC's and laptops that comply with Energy Star.
- Increase percentage of IT equipment that comply with the Restriction of Hazardous Substances (RoHS) directives to total IT equipment quantity.
- Increase percentage of IT equipment purchases that comply with the RoHS directives to total IT equipment purchases.

Metrics

- Percentage of equipment that is compliant with RoHS directives.
- Percentage of IT equipment purchases that are compliant with RoHS directives.
- Percentage of equipment procurements that adhere to industry requirements and standards (EU RoHS, EPEAT, Europe's WEEE, etc.).
- Percentage of pc's and laptops complying with Energy Star version 4 specs.

Examples

- Follow guidelines put in place by USDA Electronic Stewardship program¹.
- Favor the acquisition of environmentally preferable equipment that reduce or eliminate the generation of hazardous waste.
- Increase procurement of green products with reduced toxic content.
- Procure IT equipment that is manufactured using less hazardous and toxic materials in production.
- Acquire more CO₂ and environmentally sustainable electronic equipment that is cost-effective, while maintaining or improving equipment quality and performance.



In the United States alone, buildings account for 38% of all carbon dioxide emissions.

4.8

Design and Develop High Performance Buildings

Description

Develop high-performance, sustainable buildings through use of the Leadership in Energy and Environmental Design (LEED) certification standard; establish strategies for sustainable site development, water savings, energy efficiency, materials and resources selection, and indoor environmental quality.

In the United States alone, buildings account for:

- 72% of electricity consumption.
- 39% of energy use.
- 38% of all carbon dioxide (CO₂) emissions.
- 40% of raw materials use.
- 30% of waste output (136 million tons annually).
- 14% of potable water consumption.

Benefits of this program are:

- Reduction in life-cycle cost of facilities' environmental and energy attributes.
- Improvement in energy efficiency, water conservation, and utilization of renewable energy.
- Provision of safe, healthy, and productive built environments.

Success Measures

- LEED Certification on all USDA buildings
- Reduce energy bills.
- Reduced CO₂ emissions generated by building.

Metrics

- Percentage of USDA buildings with LEED certification.
- Carbon dioxide emissions generated by building.
- Reduction in energy usage due to LEED implementation.

Examples

- RFID technology coupled with building control systems.
- HVAC bypass technology to cool data centers when outside temperatures are below 70 degrees.
- Employ renewable resources within the building.
- Utilize recycled materials in construction.
- Use toxic free paints, chemicals, etc.

4.9

Vehicle Fleet Maintenance

Description

This program focuses on: (1) reducing petroleum products used for the operation of USDA vehicles to perform services and/or to conduct duties necessary to achieve goals and objectives of the Department; (2) decreasing fuel consumption and increasing the use of alternative fuel technology vehicles; and (3) promoting the use of cost-efficient plug-in hybrid vehicles.

Success Measures

- Reduce vehicle miles traveled.
- Purchase higher fuel economy vehicles (smaller sized vehicles, hybrid-electric vehicles and other advanced technology).
- Employ the most "fuel-efficient" vehicle for the required task.
- Employ efficiency strategies such as procuring low rolling resistant tires, synthetic oil and other identified technologies for USDA-owned vehicles.

Metrics

- Percentage of fleet by fuel type.
- Percentage of fleet miles.
- Percent reduction in total vehicle miles.
- Percent decrease in fuel consumed per vehicle.

Examples

- Purchase fuel-efficient vehicles when procuring new vehicles for authorized business use. Agencies shall be required to provide written selection criteria for vehicles purchases.
- Continue to adopt and implement new technology as it becomes available for vehicle procurement.



❖❖ OCIO Impact Areas

The OCIO Impact Areas are the areas in which the OCIO can institute environmentally sustainable IT practices to achieve the greatest environmental impact. By focusing OCIO efforts on people, electronic systems, facilities, and policies/business processes, the OCIO Green IT Plan will have a more holistic focus, greater implementation success, and will cultivate a lasting legacy of environmental sustainability through community participation.





USDA's large presence in rural America, where its county offices provide a direct interface to farmers, ranchers and rural communities, provides the grassroots connection to enable USDA to live out this vision.



5.1

People

The area in which the OCIO can create the greatest green impact is through the people it employs and the people it serves. The United States Department of Agriculture (USDA) is a diverse and complex organization with programs that touch the lives of all Americans every day. More than 100,000 employees deliver more than \$75 billion in public services through USDA's more than 300 programs worldwide, leveraging an extensive network of Federal, State, and local cooperators. By incorporating OCIO Green IT programs within USDA that interface with USDA employees, our country's producers, with the American population, we are able to create exponentially larger green results. Keeping people off of busy roads and enabling people to work and live in new ways will infuse environmentally sound principles throughout the United States.

5.1.1 Employees

USDA employs more than 100,000 people across the United States and abroad. The OCIO Green IT Plan will directly impact these employees through new initiatives and IT innovations that change the way USDA employees do business. As environmentally sustainable IT practices and solutions shift the way USDA employees do work, employees outside of the IT community will begin to understand the benefits of functioning in a more environmentally conscious manner. This ripple effect will hopefully carry over into other aspects of employees' lives and lead to a culture that strives for green solutions to problems.

5.1.2 Customers

USDA's vision is to be a dynamic organization that is able to enhance agricultural trade, improve farm economies and quality of life in rural America, protect the Nation's food supply, improve the Nation's nutrition, and protect and enhance the Nation's natural resource base and environment. USDA's large presence in rural America, where its county offices provide a direct interface to farmers, ranchers, and rural communities, provides the grassroots connection to enable USDA to live out this vision. Currently, our Nation's producers and rural families must drive to these county offices in order to take advantage of the many programs available to them. The USDA OCIO sees this as a

Efforts by OCIO will also enable America's producers and rural families to operate in an environmentally responsible manner.

tremendous opportunity to not only deliver a better service and make our customers' lives more convenient, but also as a way to enable our customers to have a positive environmental impact. By offering online access to county office programs such as grants, loans, and entitlements, USDA can prevent its customers from taking multiple trips to the county offices, making it possible for our customers to save on fuel costs, time, and effort. These efforts by the OCIO will also enable America's producers and rural families to operate in an environmentally responsible manner.

5.1.3 Other Stakeholders

Other stakeholders can be classified as consumers, taxpayers, suppliers, and the general American population. USDA is a diverse and complex organization with programs that touch the lives of all Americans everyday. The USDA OCIO has the responsibility to further enable Web-based programs and push the content of our research to the American public via the Internet in order to reduce waste and increase efficiencies

that can be passed on to the general population. The OCIO can also have a positive green impact on its vendors and suppliers by holding them accountable for providing products that are green in nature and constructed using green methods. By doing so, an environmentally responsible culture is created and green practices engrained in all programs in which USDA OCIO is involved.

5.2

Electronic Systems

The OCIO has primary responsibility to supervise and coordinate within USDA the design, acquisition, maintenance, use and disposal of Information Technology (IT) by USDA Agencies. A major part of this responsibility falls into the purchase and use of electronic systems throughout USDA and interface with the American public. More than ever, electronic systems enable people to work remotely from anywhere in the world. Another benefit to the advancement in electronic systems is the reduction in waste. As programs are continuously moving to an online medium, the need to print, sign, and fax documents is fading. Internet expansion into many rural areas permits more and more USDA programs to be placed online. The OCIO can also conserve energy, reduce waste, and reduce cost with enterprise applications that create efficiencies USDA-wide and eliminate hardware and software redundancies across the Department.

5.3

Facilities

The USDA has more than 100,000 employees working out of over 25,000 USDA owned and operated facilities worldwide. USDA is responsible for funding a vast amount of utility services to keep these buildings operating. By incorporating green IT innovation in USDA buildings, the opportunities to achieve a high green standard are endless. Simple steps such as incorporating power management, water conservation technologies, consolidation and acquiring alternative energy sources can be implemented to conserve numerous natural resources.

5.4

Policies and Business Processes

USDA has the opportunity to drive the Department-wide Green IT Strategy to success by instituting sound policies and business processes. Reinforced with a strong governance structure, these policies and procedures will enable future USDA endeavors to begin with a focus on green metrics as a measure of success.

Initial policy development areas will focus on the following:

Procurement – Implement the provisions of E.O. 13423 issued in January 2007 for strengthening Federal environmental, energy and transportation management. Specifically:

- Preferred acquisition of green products and services.
- Involvement of environmental and energy experts on integrated procurement teams.
- Incorporation of green purchasing requirements within Agency management systems.
- Development and implementation of a formal affirmative procurement program.
- Execution of pilot projects to measure the results from green purchasing.
- Acquisition of EPEAT-registered electronic products.

Culture - Establish goals, processes, and responsibilities, targeting energy efficiency, as well as waste management, asset management, capacity management, support services and facilities management.

Create an employee charter for all stakeholders, which address personal responsibilities and outlines expected behaviors.

Create a work environment that includes subtle reminders, such as removing desk-side trash bins and providing tips for recycling.

Processes – Develop and implement more stringent Waste Disposal strategies. Specifically:

A rigorous decommissioning process that physically removes equipment once it becomes redundant.

The IT organization must also identify low-utilization devices and consider consolidating and decommissioning them. Examine devices that are plugged in and drawing power for no purpose.

Disposal strategies. Organizations should comply with directives and legislation — Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) — as well as go further by developing processes for disposal/breakup/ smelting and the recovery of metals.



CIO INITIATIVE AREAS

6.1

USDA Impact Matrix



Business Processes/Electronic Support

- Grants
- Loans
- Customer Invoices/Vendor Services
- Geospatial
- Insurance
- Research
- Entitlements
- Logistics



Tenant Technology

- RFID systems
- Smart Buildings
- Flex Office



Consolidation

- EDC



Technology Change and Improvements

- Virtualization of Lan
- Virtualization of Storage
- Modern Low Power Processors
- VoicelP
- Virtualized Windows on Mainframe
- Virtualized Linux on Mainframe
- VideoIP - Telepresence
- VideoIP - MS360
- VideoIP - Eyeball Camera



Reduction of Desktops and Laptops

- Thin Client
- Laptop



Employee Enabled Programs

- Telework
- Flex Schedules / 4-10 Schedules
- On-line Collaboration



Department-wide Systems

- FMMI ERP
- Human Resources - EmpowHR
- Human Resources - webTA

By providing more USDA employees with the ability to use flexible schedules, greenhouse emission caused by USDA employees commuting to and from their office can be significantly reduced.

6.2

Initiative Areas

The USDA OCIO has delineated IT focused initiative areas, where USDA can make impacts towards accomplishing the goals set forth in the Executive Order and the Secretary's Memo. The detailed descriptions provide examples of initiative area programs that can be enabled to provide results in a greener USDA.



6.2.1 Employee-Enabled Programs

Telework

New IP telephony is driving the Work-At-Home (WAH) trend by enabling employees to be deployed anywhere that can be reached by a broadband network, and enabling the blending of voice and data services. All these activities are reducing operational costs and reducing the amount of GHG emissions.

TECHNOLOGY:

CALL CENTER, SHIFT-MANAGEMENT, WORKFORCE OPTIMIZATION (WFO).

MEASURE:

REDUCTION IN CARBON EMISSIONS BY REDUCING THE NUMBER OF EMPLOYEES COMMUTING.

TECHNOLOGY:

IP TELEPHONY AND PRESENCE TECHNOLOGY FOR WAH EMPLOYEES.

MEASURE:

ALLOW WAH SOURCING MODELS.

Web Collaboration / Wiki's / File Sharing

Collaboration tools that enable file sharing, Web conferencing, instant messaging, chat and video conferencing, and electronic, interactive whiteboards are a valuable way to close the gaps between physical venues and virtual meeting places, encouraging the continuance of creativity and team building.

A wiki enables documents to be written collaboratively, using a Web browser. A wiki is a database for creating, browsing, and searching through information which allows for communication to occur without having to be in the office.

E-learning is a critical part of this as it reduces class-based training and/or the travel costs of trainers to staff courses. Utilizing tools such as Web collaboration tools, e-learning and problem resolution, and a system enabling the employee to walk through the problem resolution process rather than sending out an engineer helps avoid the need to travel to a site.

TECHNOLOGY:

WEB COLLABORATION AND ADVANCED PROBLEM RESOLUTION.

MEASURE:

REDUCE UNNECESSARY TRAVEL WHILE PROVIDING FOR RICH INFORMATION AND IDEA SHARING.

Flexible Work Schedules / 4-10 Schedules

Flexible schedules are reducing the need for employees to be on the road to and from work. These schedules take on numerous forms that vary from programs known as Alternative Work Schedule (AWS), Flex Work Schedule (FWS), and Compressed Work Schedule (CWS). Originally designed for the purpose of increasing valuable at home time and affording the opportunity for many people to further their education or participate in volunteer services, these programs have now become the backbone for many Green Strategies. The principal purpose of these programs is for employees to work a standard 40-hour week, but finish the week in a reduced number of days.

By providing more USDA employees with the ability to use flexible schedules, greenhouse emission caused by USDA employees commuting to and from their office can be significantly reduced. For instance, a USDA employee commutes from his or her home in Warrenton, VA, to the USDA headquarters in Washington, DC, using a car with medium fuel efficiency. On a daily basis, this commute generates 0.049 tons of CO₂; and on a monthly basis 0.98 tons of CO₂ on a monthly basis.

TECHNIQUE:

FLEX WORK / 4-10 POLICY.

MEASURE:

REDUCE NUMBER OF EMPLOYEES TRAVELING TO SITES, DECREASING CO₂ EMISSIONS FROM AUTOMOBILES.

**6.2.2 Tenant Technology****Intelligent Device Management (IDM)**

Advances in monitoring buildings and other structures are taking place. Intelligent devices reduce unnecessary inspections, improve preventive maintenance, and reduce interruptions in facility services. Installation of IDM software enables monitors to feed diagnostic information about the state of the unit or machine assembly rather than perform standard maintenance on units or structures that may not require inspection. The equipment or device generates a call via email alert or telephone call, creating a trouble ticket when a printer, imager, or engine breaks down or requires unanticipated repair.

TECHNOLOGY:

IDM SOFTWARE TO MONITOR THE HEALTH OF ALL EQUIPMENT IN ITS ENVIRONMENT.

MEASURE:

REDUCE UNNECESSARY TRAVEL FOR MAINTENANCE INSPECTIONS

RFID Employee Chip Coupled with Smart Control Systems

Radio Frequency Identification (RFID) technology is being used in coordination with smart cards, allowing for the storage of personal information on a card carried with an employee at all times. This technology can be leveraged to create office spaces that will function as an adapting environment for human interaction.

Employee access cards can be coded with a nondescript identification number that correlates to an employee (not



Smart Buildings utilize technology that understands the “typical” work schedules for the majority of employees and distributes the power and energy management around these schedules.

using any means to access their actual identity), and then digital sensors throughout the facility can track the location and personal needs of the employee as he or she travels through the course of a day.

TECHNOLOGY: RFID TECHNOLOGY TO MONITOR EMPLOYEE MOVEMENT AND NEEDS.
MEASURE: REDUCE UNNECESSARY ENERGY IN UNOCCUPIED SPACES.

Smart Buildings

Smart Buildings utilize technology that understands the “typical” work schedules for the majority of employees and distributes the power and energy management around these schedules. Most people that have spent a long day in the office notice that around 7 p.m. the air conditioner turns off and the room becomes stifling hot; this is smart building technology in its most basic form.

Other technologies are also in place in order to function as part of smart building technology. Distributed power is a simple principle that utilizes alternative forms of energy production in order to provide power to facilities. Instead of utilizing power from the power grid, common techniques

such as wind turbines and fuel cells, are being placed within facility grounds to generate electricity and provide power to the buildings as necessary. One of the biggest benefits of fuel cell technology is that while the building generates its own electricity, the waste heat produced during this process can be captured and then used to heat buildings and water.

There are numerous other techniques to the process of smart buildings. Refer to the Lean Six Sigma section on Green Buildings for more in-depth data.

TECHNOLOGY: SMART BUILDING TECHNOLOGY.
MEASURE: REDUCED ENERGY CONSUMPTION.
TECHNOLOGY: DISTRIBUTED POWER.
MEASURE: INCREASE IN ALTERNATIVE ENERGY USAGE.

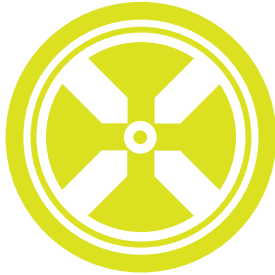
Flex Office

Flex Office, hoteling or alternative offices allows employees who travel on business or work flexible hours to use desk space at employer’s offices as needed, rather than maintaining a permanent desk or office in the building. This allows a more efficient use of office space and thus reduces power consumption; since average ratio for office space is 250 square feet per person, alternative offices can reduce average space to 100 square feet per person.

These strategies make innovative use of office space in order to accommodate the flexible schedules and work habits of employees. “Today’s worker spends less and less time in the office, using it chiefly to touch base or to interact for short periods with team members,” Sandra M. Paret explained in the Dallas Business Journal. “In a traditional office, up to 50 percent of desks, offices, and workstations are unused at any given point on a typical workday.”

TECHNOLOGY: HOTELING TECHNOLOGY FOR SCHEDULING SPACE.
MEASURE: DECREASE IN ENERGY CONSUMPTION AND FACILITIES REQUIREMENT





6.2.3 Consolidation

USDA OCIO consolidation efforts are underway across the enterprise and can be seen as a recurring theme in many OCIO efforts. The OCIO is fully committed to consolidating physical locations and IT equipment in order to reduce duplication across USDA, increase efficiencies, and enable a service-on-demand IT enterprise. Through consolidation, OCIO plans to reduce USDA's energy consumption and carbon footprint.

Physical Data Center Consolidation

Consolidating data centers and moving scattered IT equipment to Enterprise Data Centers (EDCs) drastically lowers electricity costs and decreases CO₂ emissions. These efforts also increase IT security capabilities, reduce Information Technology and Communications (ITC) equipment, and provide more organizational flexibility. EDCs are designed and constructed according to modern infrastructure and power supply needs, optimized cooling techniques, and efficient floor layouts. Because these concepts are incorporated into EDCs, more scalability and organizational flexibility is enabled. These capabilities are important in mitigating business risk as USDA's mission-critical applications are constantly evolving. EDC's provide the platform to meet USDA's expanding processing and storage needs while reducing USDA's carbon footprint through advances in IT.

TECHNIQUE:

REDUCTION OF ITC EQUIPMENT.

MEASURE:

INVENTORY OF PHYSICAL SERVERS, STORAGE, AND RELATED EQUIPMENT BEFORE AND AFTER PHYSICAL CONSOLIDATION.

TECHNIQUE:

PHYSICALLY MOVING SCATTERED ITC EQUIPMENT FROM INEFFICIENT DATA CENTERS, OFFICE SPACES, NET CLOSETS, ETC.

MEASURE:

COMPUTE DECREASE IN ENERGY CONSUMPTION WHEN ITC EQUIPMENT HAS BEEN MOVED FROM SCATTERED LOCATIONS. TAKE THE AGGREGATE AMOUNT IN DECREASE IN ENERGY CONSUMPTION FROM ALL LOCATIONS AND SUBTRACT FROM IT THE CUMULATIVE INCREASE IN ENERGY CONSUMPTION AT THE EDC LOCATIONS.

MEASURE:

COMPUTE DECREASE IN RENT DUE TO TRANSFER OF ITC EQUIPMENT TO EDC LOCATIONS AND/OR COMPUTE THE DELTA BETWEEN USING THE FLOOR SPACE FOR OTHER OFFICE NEEDS AS OPPOSED TO USING THE SPACE AS A DATA CENTER.

TECHNIQUE:

REDUCE SECURITY SYSTEMS AND USE INTEGRATED SECURITY SYSTEM AND STRUCTURE.

MEASURE:

NUMBER OF SECURITY SYSTEMS BEFORE CONSOLIDATION TO NUMBER AFTER CONSOLIDATION.

MEASURE:

SECURITY DEPLOYMENT UNIFORMITY ACROSS DATA CENTERS.

TECHNIQUE:

UTILIZE IDLE, POWER DOWN, HIBERNATE, AND DEEP POWER DOWN ENERGY MANAGEMENT TECHNIQUES AND TECHNOLOGY TO ENSURE POWER SCALES DOWN WHEN COMPUTING POWER IS NOT NEEDED.

MEASURE:

BASELINE POWER USAGE - MEASURE USAGE AS POWER MANAGEMENT TECHNIQUES AND TECHNOLOGIES ARE DEPLOYED.

TECHNIQUE:

IMPROVE NETWORK PROVISIONING TO MEET USDA COMMUNICATION NEEDS AND BUSINESS DELIVERY BY DETERMINING THE APPROPRIATE LEVEL OF NETWORK CAPACITY FOR USDA END USER GROUPS/OFFICES.

MEASURE:

NUMBER OF END USER/OFFICE GROUPS CONVERTED TO REVITALIZED PROVISIONING STRUCTURE.



6.2.4 Reduction of Desktops and Laptops

Thin Client

The use of thin clients in the office space will afford savings not only in the Green IT spectrum, but in the areas of hardware purchasing, upgrading, and service to equipment. The cost of the average thin client is significantly less than the average desktop computer since it is used by connecting directly to the server; it is not just a financial decision that makes this the right technology. While thin client solutions require extensive investments in data center and network upgrades, the e-waste reduction measure, energy savings (3-6 times reduction on power consumption) and the extension on the life of the device to 6-8 years will be the greatest return on investment.

TECHNOLOGY:	THIN CLIENT PC
MEASURE:	REDUCE POWER CONSUMPTION AT THE END USER LOCATION.
TECHNOLOGY:	THIN CLIENT PC'S LIFESPAN
MEASURE:	REDUCE FREQUENCY E-WASTE DISPOSAL DUE TO LONGER LIFE SPAN OF THIN CLIENT PCs.

Laptops

Following simple guidelines for purchasing and use of this technology will ensure that we minimize power consumption and the environmental destruction. E.O. 13423 requires all Federal Agencies acquire electronic products that conform to 95% of EPEAT's requirements.

EPEAT is a system in which manufacturers declare their products' conformance to a comprehensive set of environmental criteria in eight environmental performance categories, 51 total environmental criteria (23 required criteria and 28 optional criteria). To qualify for registration as an EPEAT product, the product must conform to all the required criteria. The operation of EPEAT and the environmental criteria are contained in a public standard IEEE 1680. The 8 performance categories are:

- Reduction/elimination of environmentally sensitive materials.
- Materials selection.
- Design for end of life.

- Product longevity/life-cycle extension.
- Energy conservation.
- End of life management.
- Corporate performance.
- Packaging.

USDA's inventory of computer equipment, accurate as of October 2007, includes 55,032 laptops and 70,418 desktops.

TECHNOLOGY:	CO ₂ LAPTOPS.
MEASURE:	REDUCE POWER CONSUMPTION BY STANDARD CLIENT CONFIGURATION.
METRIC:	WATTS PER USER.
TECHNOLOGY:	USER PROVISIONING FOR STANDARD CLIENT CONFIGURATION.
MEASURE:	REDUCE NUMBER OF LAPTOPS BASED ON STANDARD CLIENT END USER TIER.

Power Management

Energy Star, a program jointly managed by EPA and the DOE, points out that \$25-\$75 per computer can be saved through power management features. General Electric enabled power management settings on 75,000 computers and was able to save \$2.5 million annually by enforcing these settings automatically and reducing its carbon footprint by avoiding 15.3 tons of carbon dioxide emission.

Establishing mandatory power management settings for all desktops and laptops with the exception of mission-critical equipment may require different power management configurations. Upon studying the after-hour behaviors of users, USDA established a policy that instructs users to turn equipment off or at minimum put equipment into sleep mode. For enforcement purposes, automatic power management features should be enabled by the IT community. Office equipment accounts for between 9% and 15% of an average office's power consumption; desktops and monitors consume the highest levels of energy. A Gartner study found that total PC power consumption for well managed power program for 25,000 PCs resulted in 50% less energy consumption than one that is not well managed².

TECHNOLOGY:

DESKTOP ENERGY MANAGEMENT SOFTWARE.

MEASURE:

REDUCE UNNECESSARY POWER CONSUMPTION BY AUTOMATICALLY TURNING OFF MONITORS HARD DRIVES AND PLACING SYSTEMS INTO STANDBY AT THE DESKTOP.

TECHNOLOGY:

MODELING AND MONITORING TOOLS.

MEASURE:

CONTINUAL STRATEGY FOR THE DECREASE.



6.2.5 Technology Change and Improvement

Virtualization Deployments

Virtualization is a technology mostly used in data centers to create logical environments that completely simulate the actions of the underlying hardware. Executables are performed at the logical level or in the virtual machine which pool physical resources to carry out the needed task. The physical resources themselves are no longer dedicated to a single system or function. Instead, virtualization software acts as a data manager that sends commands to physical resources based on utilization needs. Successful virtualization provides the ability to pool and consolidate physical resources, enabling less reliance on individual pieces of hardware, higher equipment utilization rates, less application downtime, and more organizational flexibility. Physical consolidation of USDA's data centers enable virtualization to be more effectively deployed across the enterprise.

LAN Virtualization

USDA plans to utilize Local Area Network (LAN) Virtualization, or VLAN, to provide better network management, higher security capabilities, and greater scalability. VLAN will allow multiple LANs to be controlled at the virtual level regardless of physical locations. Reconfigurations can be handled through the virtualization software and deployed across multiple LANs for simpler administration. The green benefits of VLAN are provided through the streamlining efficiencies achieved.

TECHNOLOGY:

VLAN SOFTWARE

MEASURE:

NUMBER OF LANs PRE-IMPLEMENTATION COMPARED TO NUMBER OF VIRTUAL LAN GROUPINGS.

Storage Virtualization

Deploying storage virtualization technology in enterprise data centers will enable USDA to pool storage resources and easily scale storage up as needed. The virtualization software acts as the management platform and performs all storage functions as the shared service operator. The ability to allocate storage resources on-demand, integrate storage products from various vendors, configure for high availability, and reduce the total cost of ownership are among the benefits that storage virtualization provides. Storage virtualization will further enable improvements in storage sizing through thin provisioning and will facilitate more efficient allocation of physical storage resources. USDA's use of these storage technologies will create savings in data center power and cooling requirements, thus increasing energy efficiency.

TECHNOLOGY:

STORAGE VIRTUALIZATION SOFTWARE.

MEASURE:

REDUCTION IN STORAGE EQUIPMENT INVENTORY POST-IMPLEMENTATION TO INVENTORY PRE-IMPLEMENTATION.

MEASURE:

PERCENTAGE OF STORAGE SPACE USED IN THE SILO OR BOX (STORAGE UTILIZATION ACROSS THE ENTERPRISE).

MEASURE:

AMOUNT OF FLOOR SPACE SAVED (SQ FT) FROM DECOMMISSIONING STORAGE EQUIPMENT.

Server Virtualization

Server virtualization software creates a virtual server that decouples applications and operating systems from their underlying hardware, allowing multiple operating systems and multiple applications to run on a single server. This drastically improves the server utilization rate because the server is no longer functioning in a single application, single server 'silo' model. Instead, the server is having work allocated to it by the virtual machine that is communicating with multiple platforms.

This technology will also scale across many physical servers, creating a pool of resources through which USDA's applications can function. It is estimated that most servers have a utilization rate in the 10-20% range, meaning that servers are operating at an average of only 10-20% of their



The USDA has seven mission areas that deliver more than \$96.5 billion in public services through more than 300 programs worldwide.

total capacity. Through virtualization technology, USDA can increase its server utilization rate from 10-20% to 50-60%. These higher utilization rates will provide the ability to use up to 75% fewer server machines, enabling USDA to decommission those servers that are no longer needed. The ability to achieve this consolidation through virtualization will decrease future e-waste, improve energy efficiency and reduce CO₂ emissions.

TECHNOLOGY:	SERVER VIRTUALIZATION SOFTWARE.
MEASURE:	SERVER CONSOLIDATION/DECOMMISSIONING AT A RATIO OF 4 TO 1.
MEASURE:	DATA CENTER KWH DECREASE POST-VIRTUALIZATION IMPLEMENTATIONS.
MEASURE:	AMOUNT OF FLOOR SPACE SAVED (SQ FT) FROM DECOMMISSIONING SERVERS.

Virtualized Windows and Linux on Mainframe

In addition to deploying virtualization to USDA's server base, the OCIO also plans to consolidate USDA's Windows and Linux platforms from servers to high-performance mainframes. The idea behind this concept is that a mainframe provides a faster and more secure environment to run mission-critical applications, yet utilizes less floor space and power that the equivalent amount of servers would require. Mainframes by nature have high utilization rates over long periods of time due to their ability to run multiple applications and host multiple operating systems inside one mainframe box. As a result of consolidating to a mainframe environment, staffing costs, energy consumption, and CO₂ emissions are reduced.

TECHNOLOGY:	WINDOWS AND LINUX ON MAINFRAME.
MEASURE:	NUMBER OF SERVERS DECOMMISSIONED.
MEASURE:	DATA CENTER KWH DECREASE POST-MAINFRAME CONSOLIDATION.
MEASURE:	AMOUNT OF FLOOR SPACE SAVED (SQ FT) FROM DECOMMISSIONING SERVERS.

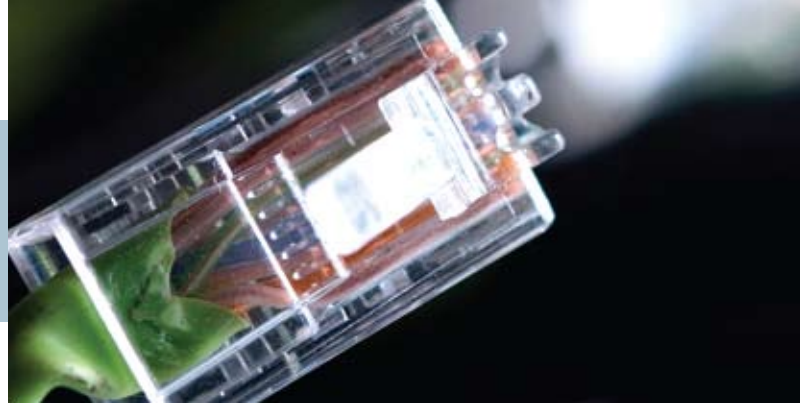
Modern Low-Power Processors

Low-power processors for servers and workstations have advanced to the point of delivering the same performance as high-powered processors while reducing energy consumption and thermal output. USDA plans to ramp up use of low-power processors in its offices and data centers as the performance-per-watt of this technology continues to improve. This is especially important for USDA's data centers, as growth in computing needs and power consumption has begun to outstrip power capacity. Gartner research suggests that legacy data centers typically were built to a design specification of about 35 to 70 watts per square foot. Current design needs can vary from between 150 to 200 watts per square foot, and by 2011, this could rise to more than 300 watts per square foot. Low-power processors will allow USDA's data centers more room to grow within its power supply capabilities, while further decreasing energy consumption from lower cooling needs, thereby reducing USDA's overall total cost of ownership.

TECHNOLOGY:	MODERN LOW-POWER PROCESSORS AND POWER METERS.
MEASURE:	REDUCTION IN KWH CONSUMPTION AT VARIOUS UTILIZATION RATE BETWEEN CURRENT SERVERS AND SERVERS WITH LOW-POWER PROCESSORS.
MEASURE:	REDUCTION IN ENERGY CONSUMPTION FROM COOLING THE DATA CENTER BY SUBTRACTING THE KWH CONSUMPTION OF SERVERS FROM THE TOTAL POWER BILL, OR BY BENCHMARKING AND METERING THE COOLING SUPPLY BEFORE AND AFTER LOW POWER PROCESSORS ARE PUT INTO OPERATION.

Video over Internet Protocol

USDA and its Agencies are implementing video over Internet Protocol (IP) at various levels of the organization. At the employee level, small "eyeball" cameras with microphones on local computers will be installed in many Agencies to help facilitate online meetings and collaboration of policies, procedures, and implementations. For conference rooms, USDA's Forest Service and Rural Development, and other Agencies are implementing video over IP conferencing with



a 360° camera in major offices across the United States. At the executive level, USDA and its Agencies will be implementing seven High Definition Video Conferencing locations in areas where there are major USDA employee populations. These video over IP systems will improve collaboration across USDA and reduce the need for air and rental car travel, thus reducing expenses and lowering USDA's CO₂ emissions.

TECHNOLOGY:	VIDEO OVER IP.
MEASURE:	REDUCTION IN AIR MILES TRAVELED.
MEASURE:	REDUCTION IN RENTAL CAR USE.
MEASURE:	REDUCTION IN TOTAL TRAVEL DOLLARS BY AGENCY OR STAFF OFFICE.

Voice over Internet Protocol

Voice over Internet Protocol (VoIP) is a technology that enables voice transmission over the Internet as opposed to voice transmission over traditional phone lines. USDA will use VoIP in conjunction with the collaboration tools made possible by video over IP technology. VoIP will provide USDA with a more flexible, cost-effective, and secure (via USDA secure VLAN) way to communicate throughout the organization. One of the immediate benefits of VoIP is that "softphones" can be installed on computers, removing the need for a traditional telephone handset. As this technology is adopted across the Agency, USDA's future telephone equipment waste is decreased or is eliminated completely. Additionally, a VoIP phone number can be used from anywhere if the "softphone" is placed on a portable laptop, or if the phone number is coded to a VoIP handset. This is significant because in either case, telework and work from home initiatives (initiatives designed to avoid CO₂ emissions that result from commuting to and from work) are more effectively enabled and administered.

TECHNOLOGY:	VoIP.
MEASURE:	DECREASE IN TELEPHONE HANDSETS.
MEASURE:	INCREASE IN TELEWORKERS AS A RESULT OF VoIP COMMUNICATION CAPABILITIES.
MEASURE:	REDUCTION IN THE NUMBER OF PHONE INVOICES.




6.2.6 Department-Wide Systems

The USDA has seven mission areas that deliver more than \$96.5 billion in public services through more than 300 programs worldwide. Throughout the Department, duplication in processes and systems can be found, which presents an opportunity to standardize practices across the enterprise. For example, USDA has 9 general ledger systems and 13 grant making systems, which should be reduced to one system each. Additionally, USDA has many disparate systems that should be sharing information to eliminate redundancies and improve decision making. The USDA OCIO is focused on developing and integrating systems using the Service-Oriented Architecture (SOA) approach. This approach is meant to unify business processes, enable system interoperability, and allow for better decision making. The OCIO targets any areas where inefficiencies can be eliminated and standardization can be applied. The OCIO views the SOA approach as a means to interweave green IT principles into USDA's future IT endeavors, concurrently improving business agility while fostering environmental sustainability. Below are some of the areas in which the OCIO sees an immediate benefit from Department-wide interoperable systems.

Human Resources

EmpowHR is an integrated suite of commercial and Government applications that support all critical human resources (HR) functions in a single enterprise system. EmpowHR provides comprehensive employee information enabling Agencies to: (1) make critical decisions concerning workforce utilization; (2) forecast workforce turnover and placement; and (3) project future resource budget allocations on a fiscal year basis, for optimum achievement of Agency mission goals.



The National Finance Center (NFC) is in the process of working with the Office of Human Capital Management (OHCM) to orchestrate the roll-out of a commercial time and attendance system which will allow USDA to eliminate significant costs associated with timekeeping and accounting error correction.

USDA has also acted upon an opportunity to eliminate more than \$30 million of costs associated with timekeeping services while updating and modernizing existing time and attendance systems. The National Finance Center (NFC) is in the process of working with the Office of Human Capital Management (OHCM) to orchestrate the roll-out of a commercial time and attendance system which will allow USDA to eliminate significant costs associated with timekeeping and accounting error correction. The application, WebTA, also automates timekeeping and labor management processes, improves data accuracy, reduces the number of costly payroll errors, and satisfies a variety of federally-mandated compliance requirements. USDA will eliminate paper waste from manual time and attendance processes, reduce storage space from emailing timecards as attachments, and reduce IT equipment from consolidating.

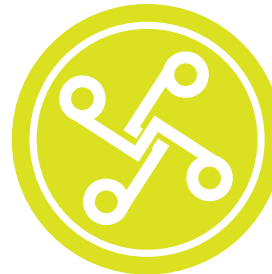
TECHNOLOGY:	EMPOWHR.
MEASURE:	REDUCTION IN IT EQUIPMENT FROM STANDARDIZED APPLICATION.
MEASURE:	REDUCTION OF PAPERWORK BY REDUCING PAPER-BASED SYSTEMS.
TECHNOLOGY:	WEBTA.
MEASURE:	REDUCTION IN IT EQUIPMENT FROM STANDARDIZED APPLICATION.
MEASURE:	REDUCTION IN PAPER WASTE FROM MANUAL T&A PROCESSES.

Financial Management Modernization Initiative (FMMI)

USDA launched the FMMI after identifying the need to upgrade aging Departmental and Agency financial and administrative payment and program general ledger systems. USDA performed a full evaluation and selection of a core financial system to replace USDA’s nine general ledger systems (which have not been supported by their vendors for three years), each of which independently requires equipment storage and data center space. The software integration services contract was awarded to an integrator to implement Systems, Applications, and Products in Data Processing (SAP) Enterprise Resource Planning (ERP) 2005. SAP ERP 2005 is an advanced, Web-based, financial-management system that provides general accounting, funds management, and financial-reporting capabilities. FMMI

will give USDA a modern, core financial-management system that will enable USDA to address challenges and opportunities in the rapidly changing financial management and technology environment. USDA OCIO has found that by consolidating nine general ledger systems down to one, servers from the old systems can be consolidated or decommissioned.

TECHNOLOGY:	SAP ERP 2005.
MEASURE:	REDUCTION IN IT EQUIPMENT (SERVERS AND RELATED INFRASTRUCTURE).
MEASURE:	REDUCTION IN FLOOR SPACE USED AT DATA CENTER.



6.2.7 Department-Wide Business Processes through Electronic Support

Farm Service Agency Modernization

USDA’s Farm Service Agency (FSA) hosts and supports the delivery of the programs to assure the Nation of a stable food supply. When the automated system for program delivery was developed, cellular telephone, Voice over Internet Protocol, telephony, and the public Internet were non-existent.

FSA is currently pursuing significant modernization of aging legacy system in order to address the challenges and opportunities in the rapidly changing technology environment. This project is known as Modernize and Innovate the Delivery of Agriculture System (MIDAS). The MIDAS project initiatives includes the acquisition of a commercial-off-the-shelf (COTS) software product that will be configurable to meet the legislated mandates necessary to deliver farm program benefits and services to our customers.

The MIDAS IT investment project will reduce the CO₂ emissions related to the delivery of farm program benefits associated with:

- Hardware/software
- Paper consumption
- Travel to and from the local offices

TECHNOLOGY:	ONE SYSTEM EXISTS FOR THE SUPPORT OF THE CUSTOMER, NATIONWIDE.
MEASURE:	REDUCED ENERGY, CO ₂ , WASTE PRODUCED BY THE CUSTOMERS.
MEASURE:	REDUCTION IN IT EQUIPMENT.
MEASURE:	REDUCTION IN ENERGY COST FOR IT EQUIPMENT.

Grants / Lean Six Sigma Grants Process (LGSP)

USDA grant programs account for over \$60 billion in annual disbursements to grantees. These grantees include: (1) state and/or local governments, (2) educational institutions, (3) non-profit organizations, (4) Indian tribes, and (5) individuals. There are approximately 137 programs, located in 16 Agencies, using seven electronic systems and an untold number of manual processes.

For the past several years, the grants management process has been deemed by the customer as complex and confusing. Grants management systems are hard to use and not well-matched to user needs, nor are they sustainable, impacting how the mission is fulfilled. Multiple confusing payment methods and systems are costly to manage and are open to abuse.

Using the Lean Six Sigma methodology, all common processes were documented, integrated, streamlined, and made sustainable in fiscal year (FY) 2008. USDA will design a method to measure and attain a customer satisfaction level by the end of FY 2010. USDA is on target to reduce 13 grant processing solutions to a SOA-based approach with interactions from two systems.

TECHNIQUE:	STREAMLINE OF BUSINESS SYSTEMS TO PROVIDE MORE PROFICIENT CUSTOMER SUPPORT.
MEASURE:	REDUCTION OF IT EQUIPMENT.
MEASURE:	REDUCTION OF PAPERWORK BY MOVING TO ONLINE PROCESSING OF APPLICATIONS.

Customer Invoices/Vendor Invoices

Collaboration with the Agencies to leverage information technology investments made by OCFO and Rural Development to implement the Lean Six Sigma Transaction Processing (LSTP) initiative. The LSTP design is to automate invoice processing to improve efficiency, shorten the time required for payment, reduce paper records, and reduce the use of mail service.

A continued partnership to process USDA bills through the Electronic Data Interchange (EDI) process will help accomplish the goals of this program. This new process will allow for the invoices to be received electronically rather than by mail in a paper invoice form. USDA also needs to focus on the consolidation and reduction of individual cellular phones, local carrier, and data line bills. More than 250,000 bills will be processed annually through EDI.

TECHNIQUE:	STREAM-LINE PROCESS FOR BILL PROCESSING AND PAYMENT.
MEASURE:	NUMBER OF BILLS RECEIVED ELECTRONICALLY VS. PAPER.
MEASURE:	NUMBER OF INVOICES ELECTRONICALLY ROUTED VS. MANUALLY ROUTING.
MEASURE:	TOTAL NUMBER OF BILLS RECEIVED.

Geospatial

A supporting program that facilitates analysis and decision-making process. The program creates viewing layers that displays where grants, entitlements, etc. are located. For example, the Common Land Unit displays where farmers' acreage is located and the size and shape of the plot.

Today USDA uses over 3,000 servers located in county offices to support geospatial farm information; and several hundred servers in multiple locations to support conservation programs. In addition, USDA has geospatial data centers in the West and South.

This old style, local network architecture is outdated and expensive to maintain. New communication networks support the consolidation of the geospatial information in a single location with a cold backup location. By adjusting the system architecture, USDA can reduce 3,000 high-end local storage devices. The removal of this hardware will reduce power consumption and cost while providing congruent information to all of USDA. USDA is also designating the primary location of the information a geospatial center of excellence. The center of excellence will have the highest trained geospatial employees in the Nation; providing the Nation with this important expert knowledge.

TECHNIQUE:

CONSOLIDATION OF COMPUTER SOFTWARE SUPPORT SYSTEMS.

MEASURE:

REDUCTION IN NUMBER OF SERVICES AND EQUIPMENT TO SUPPORT GIS.

MEASURE:

REDUCTION OF PAPERWORK BY MOVING TO ELECTRONIC SUBMISSIONS FOR PRODUCERS AND GRANTEES.

USDA grant programs

account for over

\$60 billion in annual

disbursements to grantees.

Conclusion / Next Steps

In summary, USDA is passionately moving forward to achieve the goals set forth by the President of the United States and the Secretary of Agriculture. With the dedication of USDA management and employees, the Department can reduce carbon emissions by over 100,000 tons each year for the next 5 years.

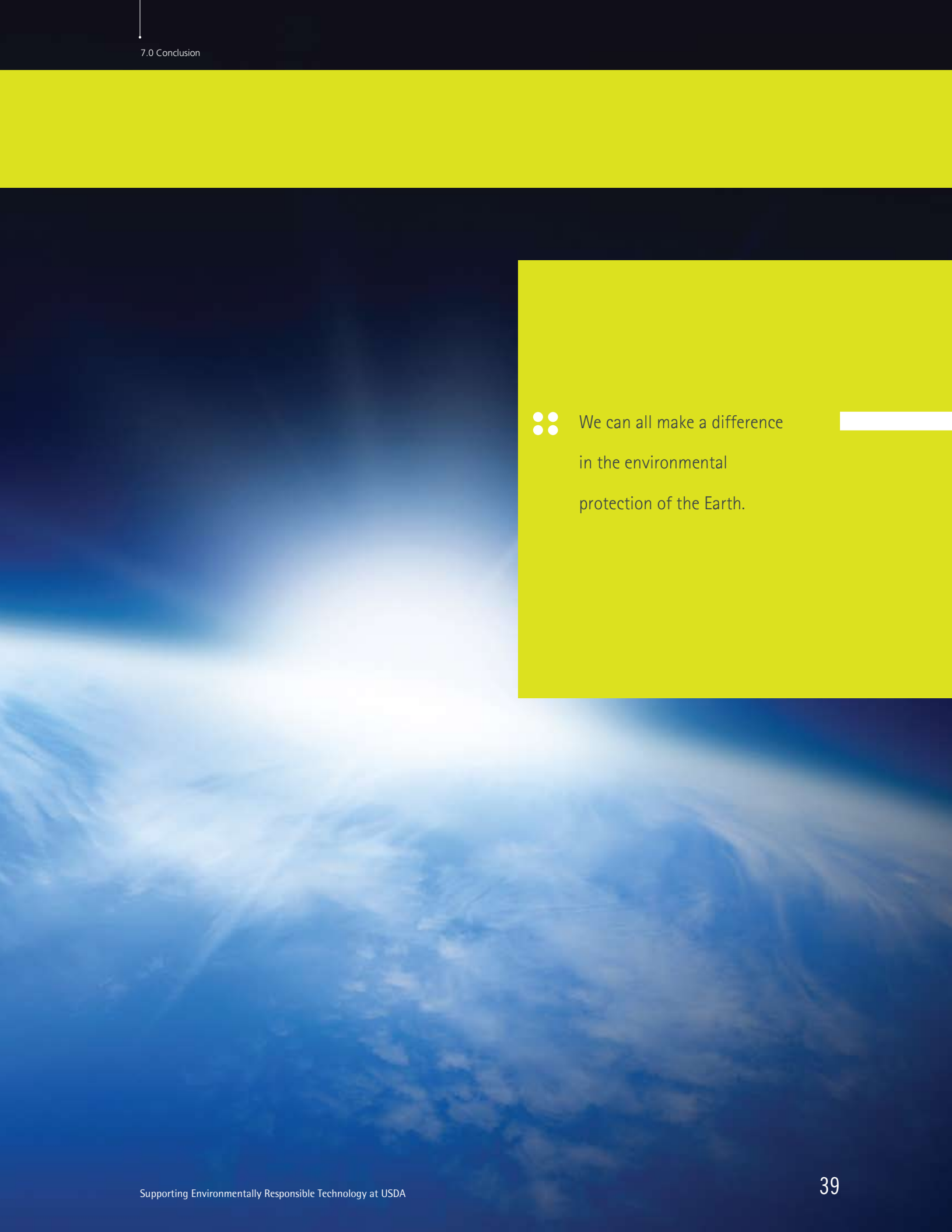
Smart technology and Green technology is an emerging science. Each month, United States businesses develop new tools to assist people in their environmental stewardship of the earth while allowing commerce and knowledge to rapidly move progress forward.



In this public document, USDA has established transparent goals. This document establishes a new pattern, a pattern which states that mission results is not the only important factor, but the methods and the process to achieve the results are also important. The methods and process must minimize the impact on natural resources and the environment.

USDA will release, on Earth Day each year, a public document with transparent goals, to include; 1) an updated Green IT Plan; and 2) achievements to the listed goals.

Through the assistance of every citizen we serve and every employee, we can all make a difference in the environmental protection of the Earth.



•• We can all make a difference
in the environmental
protection of the Earth.

❖ Lean Six Sigma Targets and Results

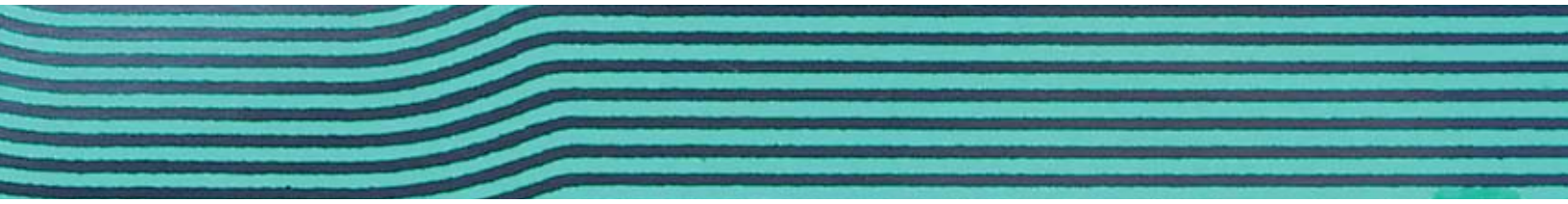
CASE STUDY



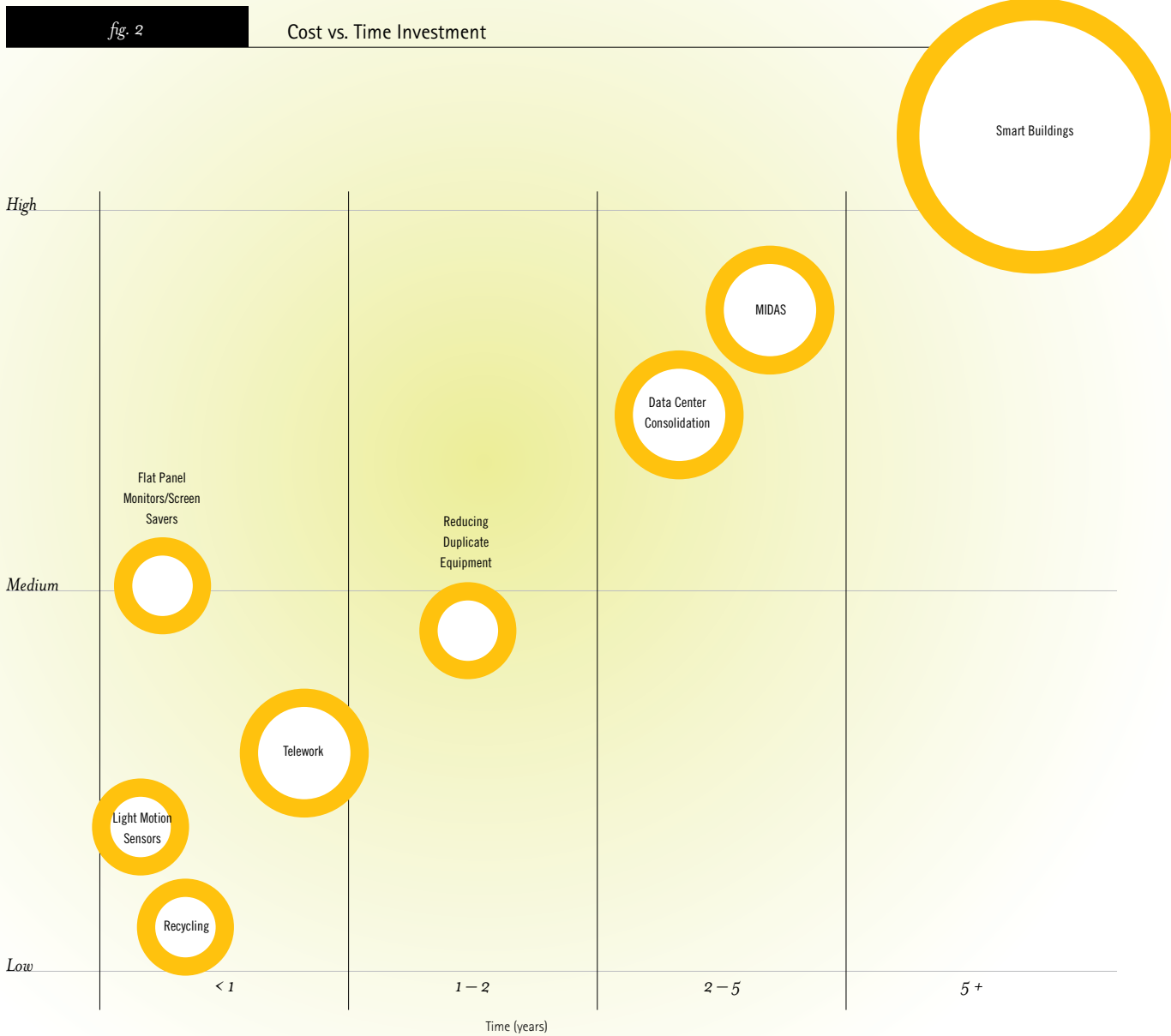
The 'USDA Unplugged event' successfully demonstrated that USDA employees can make a significant difference in reducing electric consumption and costs. Departmental Administration energy managers found that employees in the South, Whitten, and Yates Buildings were able to reduce electric use by:

- 9,000 kWh in the 24 hour period of October 17th; and
- 24,000 kWh over the weekend during the "USDA Unplugged" challenge.

To put this all in perspective, 11,000 kWh is enough electricity to power an average U.S. home for a year! USDA saved enough electricity to power approximately 3 homes for a year, and that is based only on one weeknight/weekend!



The 'USDA Unplugged event' successfully demonstrated that USDA employees can make a significant difference in reducing electric consumption and costs.



8.2 Reducing employee carbon emission – telework

SCORECARD

5 Year Targeted Carbon Reduction: **68,419 tons**

Technology Group: Equipment, Materials

4/10, Telework, Flex Schedule Carbon Reduction

Annual Targeted Reduction in Carbon Emissions: 3%

Current Status: 484,312 tonsⁱ

2009 Target: 469,782 tons

2010 Target: 455,688 tons

2011 Target: 442,017 tons

2012 Target: 428,756 tons

2013 Target: 415,893 tons

Technology Investment: Minimal

5 year target for employees on a 4/10, Telework, or flex schedule: 75%

4/10, Telework, Flex Schedule Carbon Employee Implementation

Current Status: 5,673 Employees

2009 Target: 8,720 Employees

2010 Target: 21,324 Employees

2011 Target: 36,582 Employees

2012 Target: 52,768 Employees

2013 Target: 69,187 Employees

Technology Investment: Minimal

ⁱ Estimated at 10,500 lbs of carbon per employee



If 50% of the Federal workforce teleworked 2 days per week, that theoretically could cut nearly a fourth (23%) or 944,000 tons of work trip emissions produced.

Background

The trend for teleworking began in the 1990s. Since then it has gained strength around the world and laid the foundations of a new way of working. What started as a means for senior managers to extend their working day and later moved through the ranks as a way to redress people's work/life balance is now poised to take off as a smarter, more resilient way to do business. It will enable governments and companies to capitalize on the benefits of growing residential broadband Internet access when tackling global issues regarding the environment and disaster planning. The combined need to plan for disasters and tackle problems of urban congestion, rising fuel costs, climatic change and environmental degradation is forcing governments and, in turn, businesses to find smarter ways of working.

For over a decade, laws addressing telework have been in effect for Federal employees. The § 359 of Public Law 106-346 states that each executive Agency shall establish a policy under which eligible employee may participate in telecommuting to the maximum extent possible without diminished employee performance. The legislation was expanded on August 3, 2006 (OPM-II-A-2) whereby each Agency participating in the program was mandated to develop criteria to ensure that barriers to full implementation and successful functioning of the policy be removed, and that adequate administrative, human resources, technical and logistical support be put in place to carry out the policy.

Legalization in support of telework continues to expand. The Telework Improvement Act of 2007 (H.R. 4106), is intended to allow more Federal employees to telework. H.R. 4106, would not only ensure that the majority of Federal employees have the opportunity to telework, but also would guarantee that Agencies are incorporating telework into their Continuity of Operations (COOP) planning. H.R. 4106, was passed in the House by voice vote on June 3, 2008, referred to the Senate Committee on Homeland Security and Governmental Affairs on June 4, 2008, and further referred to the Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia on June 19, 2008.



Telework, as stated in 2007 GSA report to Senate, provides the following benefits;

- Telework combined with alternative officing can enable Agencies to reduce cost and improve the utilization of existing facilities.
- Remote alternative worksites can be used to accommodate workers who need to work in a high-security environment; and to reduce the adverse effects on employees impacted by Base Relocation programs.
- Telework is a great way to enhance recruitment and retention of Federal workers and to improve work/life balance. Would you rather be stuck on the Beltway at rush hour or be done with your work in time to make the kid's soccer practice?
- The environmental impact of telework should serve as additional motivation for stronger telework participation policies. As an example, if 50 percent of the Federal workforce teleworked 2 days per week, that theoretically could cut nearly a fourth (23%), or 944,000 tons of work trip emissions produced by Federal workers who commute to work in single occupancy vehicles. Collectively, these teleworkers could theoretically save nearly 2 billion miles of vehicle travel, more than 90 million gallons of gasoline, more than \$277 million in gasoline expenses, and more than 32,000 typical work years of time.

"USDA should implement and mandate that all Agencies offer flexible schedules to include 4-day work week for all employees eligible for flexible work schedules."

Current Measurement

In the December 2007 United States Office of Personnel Management (OPM) annual report to Congress on the Status of Telework in the Federal Government it was reported that in 2006, USDA had 92,250 employees, of which 74,413 were eligible to telework. Of those eligible to telework, 5,673 (7.62%) participated in a telework program. Most participants (4,032) reported telework frequency of 1 -2 days per week. The government-wide telework participation for the same reporting period was 8.84%.

A person who commutes in a mid-size sedan 40 miles per day round trip, 5 days per week spends approximately \$7,900 on fuel, and disperses 10,500 pounds of pollutants or 5.25 tons of pollutants in the air per year. That same commuter when commuting 4 days would spend \$6,320 on fuel, and disperse 8,400 pounds of pollutants or 4.2 tons of pollutants in the air per year.

Facet/Teletrips reports that each person teleworked or telecommuted just 1 to 2 days per week then each year they would save 100 - 200 gallons of fuel and 1.5 to 5 metric tons of CO₂ / employee / year (equates from 7.5% to 25% of an individual's annual carbon footprint).

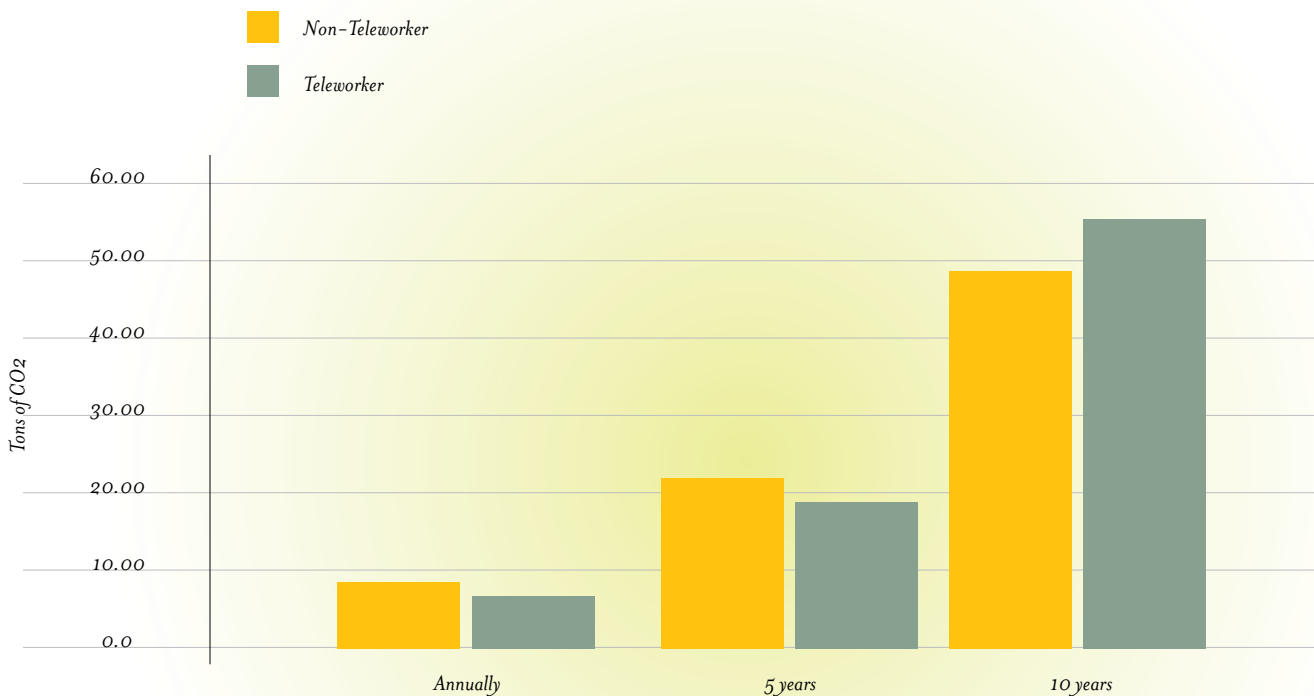
Teleworking is like giving your staff a pay raise and a reduction in hours for free. Facet/Teletrips reports that it saves them each \$2,000 - \$10,000 in after tax dollars and frees up 160 hours of their time from commuting every year.

The organization also benefits from teleworking as it can gain \$2,000 - \$10,000 in real estate and other cost savings / employee / year, and greater staff retention and recruiting.

Nine out of ten Americans drive to their jobs, and about 80% drive alone.

fig. 3

Telework Carbon Output Comparison



4-Day workweek

The advantages to a 4-day workweek are not a new concept. In Utah, 80% of the State employees began a 4-day schedule in August 2008. Lawmakers in Alaska, Arkansas, Idaho, and New Mexico are considering legislation to move State government workers to a 4-day workweek.

It is an obvious fact that reducing the number of commutes that employees must make will result in a reduced demand for oil. Short work weeks are not new ideas to employers. In America there are approximately 133 million workers, of which 80% commute to work, alone, in a car. Utilizing the average commute, about 16 miles each way, we can calculate the gasoline consumed by Americans each day³:

- 133,000,000 workers X 80% who drive alone = 106,400,000 single driver commuter cars each day.
- 106,400,000 X 32 miles round trip = 3,404,800,000 miles driven to work each day
- 3,404,800,000 / 21 mpg (average fuel efficiency) = 162,133,333 gallons of gasoline each day

A 4-day workweek would have a large effect on crude oil imports, saving 8,314,530 barrels of oil in one day. Saving gasoline is only one of numerous reasons why a 4-day work week should be promoted in order to reduce our impact on the environment.

By reducing the number of cars on the road, we would affectively reduce the number of toxins being released into our atmosphere.

Cars don't only produce carbon dioxide; there are numerous other compounds that lead to the greenhouse gases and the global warming we are facing today and in our futures. Vehicles emit carbon dioxide, carbon monoxide, hydrocarbons, sulphur dioxide, nitrogen oxides, ozone and chlorofluorocarbons. If these chemicals are not making a direct effect on the environment, they are creating higher levels of air pollution that affect the health of humans world wide. It is known that 60 – 70% of air pollution is created by vehicles on the roads⁴.

By implementing and mandating Agencies to adhere to flexible work schedules like the 4-day work week, USDA would be a government leader in attaining numerous goals the President has set forth. The primary goal attained here is the reduction of gasoline usage by 20 percent in 10 years and of course the decrease in the level of carbon dioxide released into the atmosphere.”

•• Telework

The Federal Government continues to focus strongly on telework and on various issues to enhance its viability. As Agencies move forward with recruiting a workforce that will be flexible, adaptable, and able to meet the challenges of the 21st century, our ability to offer cutting-edge workplace technologies, along with supports for work-life balance, will help the government attract needed talent. Additionally, emergency planning, particularly for longer term scenarios, requires a core workforce comfortable with remote access.

The Government Accountability Office (GAO) can be used as a benchmark for best practices in the Federal Government for an effective telework program. GAO instituted an Agency-wide telework program in 1995, and today, more than 75% of its employees take advantage of the program. Employees are able to apply to the program online, and once approved, teleworkers can securely access the GAO network remotely to carry out their work. GAO tested the strength of its Agency-wide program in October 2001 when 435 members of the House of Representatives and their key staff were unexpectedly moved into the GAO building in Washington, D.C.; due to an anthrax incident affecting House offices. Several hundred GAO employees were asked to telework temporarily and were able to quickly and effectively carry out the critical work of the Agency.

Further, in an effort to monitor the impact of telework on overall operations, GAO conducts a bi-annual survey of top management, supervisors, and staff, which captures 45 different key metrics, including benefit, quality of work/life, and importance to employees. In the most recent survey, GAO found that 88 percent of the staff believe the program increases work productivity, 93 percent believe it helps with work/life balance, and 94 percent intend to reapply to participate in the program in future years. The results show that management and staff agree the program is valuable to the Agency as it increases productivity, fosters better time management, and acts as an important recruiting and retention tool.

In the Office of Personnel Management (OPM) 2007 report to Congress, the following benefits were reported: improved morale was the top choice (25 Agencies). Human capital (21), transportation (20), productivity (20) and leave (20) were also chosen as important benefits.

Clearly, if USDA would implement and mandate that all Agencies offer telework for all 74,413 employees already deemed eligible for telework, the Department would be a government leader in the President's goal of reducing gasoline usage by 20 percent in 10 years.

Private Sector

Through Sun Microsystem's telecommute program, called Sun Open Work Practice, around 2,800 employees work home three to five days a week; another 14,219 work remotely twice weekly, according to reports. The company says its efforts have resulted not only in 29,000 fewer tons of CO₂ emissions -- but the company reaped \$63 million in the last fiscal year by cutting 6,660 office seats.

Meanwhile, AT&T reports savings of \$3,000 per office, for approximately \$550 million, by eliminating or consolidating office space; about 25 percent of IBM's 320,000 workers worldwide telecommute, saving the company some \$700 million in real estate costs, according to the CTA.

Business benefits of letting workers do their jobs remotely does not end with lower office space costs: Plenty of studies have demonstrated that telecommuters are more productive than their at-office counterparts. Conservative estimates suggest a 10-percent advantage. The Colorado Telework Coalition reports, however, that American Express's teleworkers produce 43 percent more business than employees at the office; Compaq teleworkers were found to be between 15 percent and 45 percent more productive than their office counterparts⁵.

Other Benefits

The USDA Office of Operations has advised that if USDA were to institute a 4-day workweek, and close the South Building one day per week, the savings would be in the area of \$20,000 per day closed for facility operations, and this does not include the savings for security service and telephones. While the closing of a critical facility one day per week may not be feasible, the fiscal savings to the government if every non-essential employee were to either have an alternative work schedule or telework from his or her residence one day per week, the overall savings Department-wide would be significant. Such a schedule could even result in the possibility of shared work stations for employees, thus a further saving in the reduction of actual work space supported by Federal funding being reduced.

The following benefits were also identified in the December 2007 OPM annual report to Congress on the Status of Telework in the Federal Government:

- Recruiting and retaining the best possible workforce - particularly newer workers who have high expectations of a technologically forward-thinking workplace and any worker who values work/life balance.
- Helping employees manage long commutes and other work/life issues that, if not addressed, can have a negative impact on their effectiveness or lead to employees leaving Federal employment.
- Reducing traffic congestion, emissions, and infrastructure impact in urban areas, thereby improving the environment.
- Saving taxpayer dollars by decreasing Government real estate costs.
- Ensuring continuity of essential Government functions in the event of national or local emergencies.

8.3 Video Over IP

SCORECARD

5 Year target for reducing Carbon Emissions:	10%
5 Year Targeted Carbon Reduction:	174 tons
Technology Group:	Video Over Internet Protocol (IP)

Employee Business Travel Carbon Reduction

Annual Targeted Reduction in Carbon Emissions:	2 %
Current Status:	1,740 tons
2009 Target:	1,705 tons
2010 Target:	1,670 tons
2011 Target:	1,636 tons
2012 Target:	1,601 tons
2013 Target:	1,566 tons
Technology Investment:	\$800,000 / year

Employee Business Travel Expense Reduction

Annual Targeted Reduction in Expenses:	4%
Current Status:	\$423 Million
2009 Target:	\$406 Million
2010 Target:	\$389 Million
2011 Target:	\$372 Million
2012 Target:	\$355 Million
2013 Target:	\$338 Million
Technology Investment:	\$800,000 / yearBackground

Background

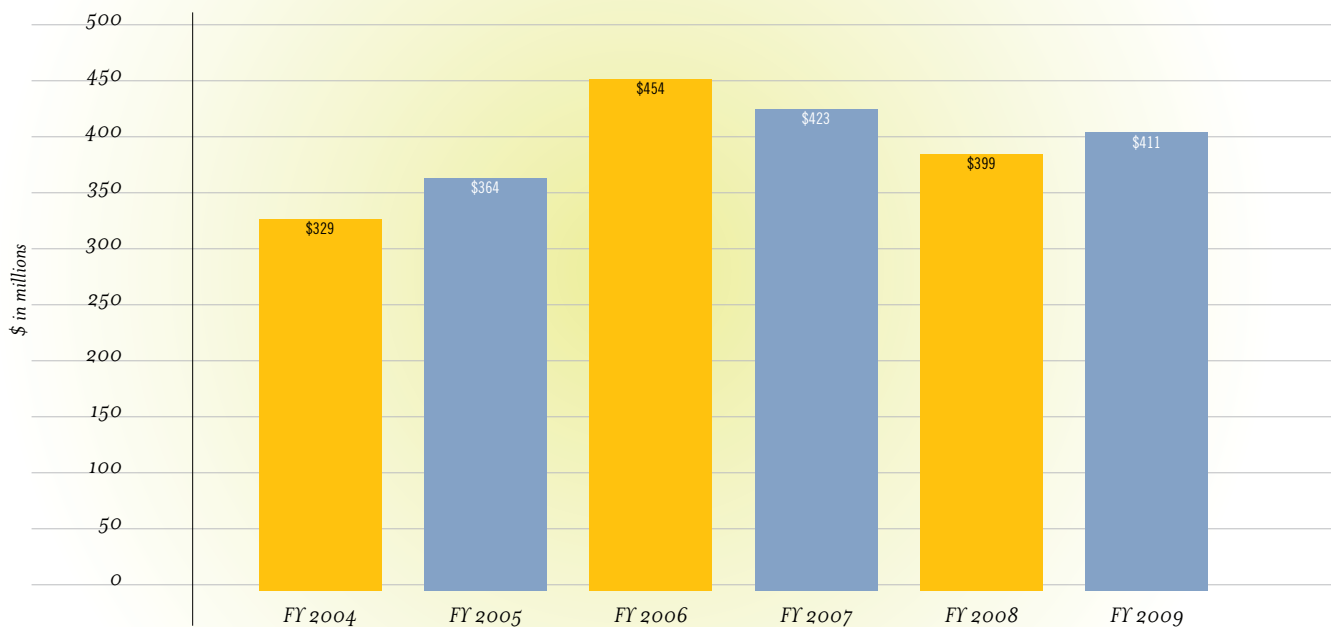
USDA uses a vast amount of travel expense to meet mission goals, provide training, and provide oversight responsibilities. To date, USDA's measurement of efficiencies in travel is based purely on travel dollars spent. Absent from measurement is the cost of the employee's time. This time includes travel to the airport, check-in at the airport, security wait and scan, boarding time, in flight time, baggage return wait, car rental wait, travel to hotel, and hotel parking and check-in. The lost time is then doubled on the return trip and does not account for airline delays.

Measurement for Carbon includes estimations for airline and rental car. Rental car usage is estimated at an average of 50 miles per rental. For ease of measurement, we did not include the carbon use for travel to and from the originating airport, airport facilities, restaurants, or hotels.

If USDA Agencies and staff offices were to remain consistent in their travel, inflation due to fuel and labor would increase the expense by approximately \$60 million and projected travel expense by \$480 million.

fig. 4

Annual Travel Cost



Current measurement:

In this category, USDA spends approximately \$420 million annually on travel-related expenses (fig.4). The general trend is increasing with an outlier in the estimate for FY08. If USDA Agencies and staff offices were to remain consistent in their travel, inflation due to fuel and labor would increase the expense by approximately \$60 million and projected travel expense at \$480 million. We estimate that the FY2007 rate is over 1,500 tons of carbon per year for airline and rental car travel.

Carbon Reduction Plan

For this measurement, USDA will only measure carbon reduction due to air travel and rental cars (fig. 5). We will not measure the impact in carbon reduction due to USDA travelers in other areas directly affected by USDA travelers including airports, personal vehicles, restaurants, and hotels.

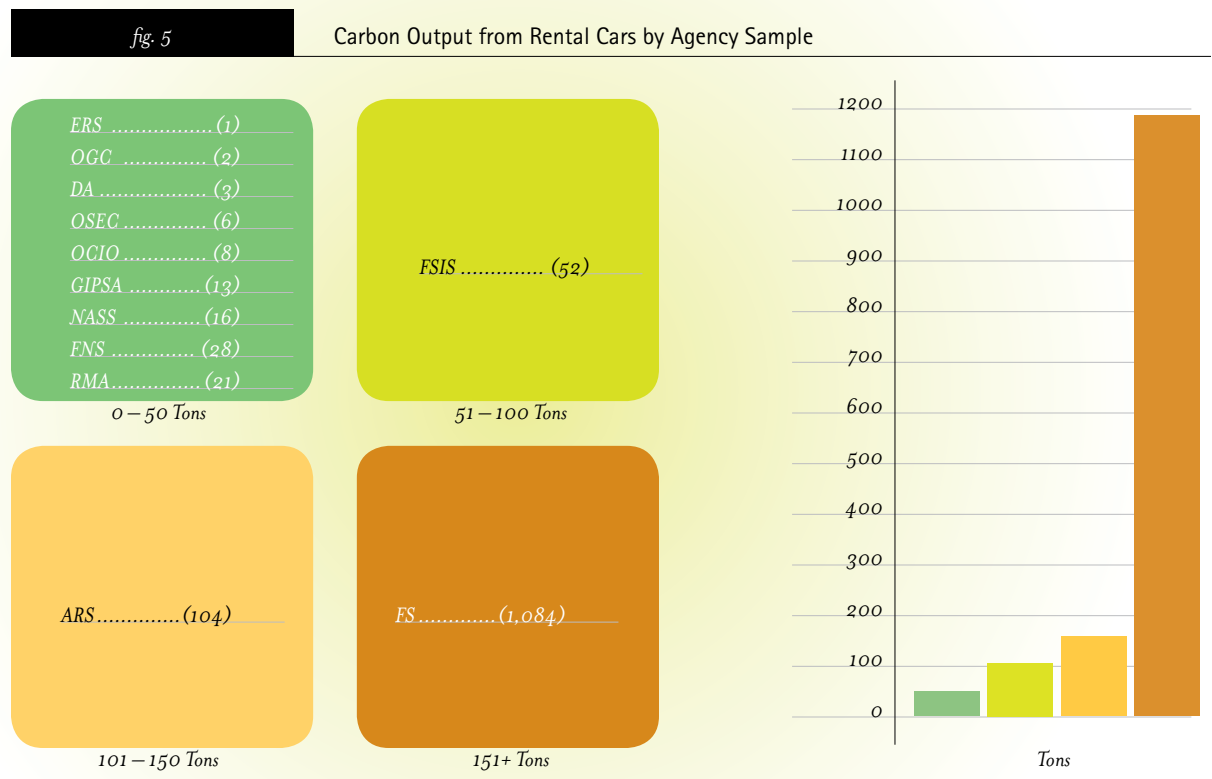
USDA and its Agencies are implementing Video over IP at various levels of the organization. At the employee level, small “eyeball” cameras with microphones on local computers will be installed in many Agencies to help facilitate online meeting and collaboration of policies,

procedures, and implementations. At mid-level, Agencies are implementing video over IP (VideoIP) conferencing in major offices across the United States. At a high level, USDA and its Agencies will be implementing seven High Definition Video Conferencing rooms in areas where there are major USDA employee populations.

–HD Video over IP

Several of the Agencies and the Office of the CIO’s International Technology Services are partnering to implement High Definition Video over IP (HD VideoIP) conference room at seven targeted locations across the United States. These locations include major operations for Forest Service, Rural Development, Farm Service Agency, Agricultural Research Service, Natural Resources Conservation Service, and Staff Offices.

HDVideoIP provides an environment that is conducive to dynamic interaction and training in meetings. The environment is designed with conference tables that penetrate the screen and give the appearance that the group conferencing into the location is sitting on the other side of the table. The high definition provides a clear life-size picture with digital sound. The digital picture and sound are communicated through the USDA Network data lines in place for information technology data transfers.



The HDVideoIP meeting rooms will be designed to accommodate eight people at the conference table and additional people can be seated behind the table. The rooms are best used for executive and management meetings, staff meetings, group collaboration meetings, single point or multi-point conference meetings, visual training, strategic negotiations, and pre-employment interviews.

To qualify to install an HDVideoIP conference room unit, the USDA location must have over 1,500 USDA employees in the geographic operating area.

The Office of the Chief Financial Officer (OCFO) and the Forest Service have two good examples for the use of the HDVideoIP units.

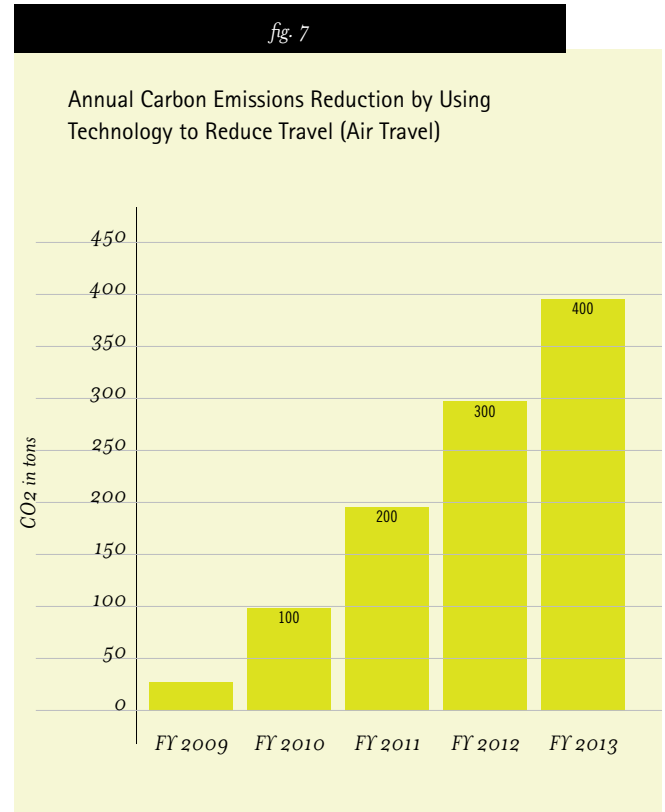
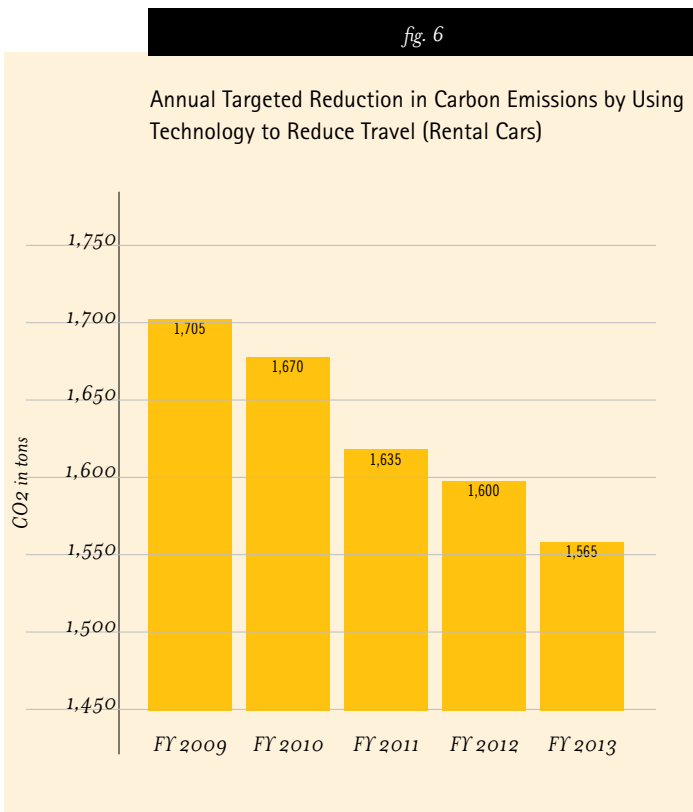


fig. 8 **EPA Estimated Carbon Usage Between Major USDA Employee Locations:**

Origin	Destination	Miles	Carbon Output
WASHINGTON, DC	NEW ORLEANS, LA	956	486 LBS
WASHINGTON, DC	ST. LOUIS, MO	716	312 LBS
WASHINGTON, DC	KANSAS CITY, MO	947	572 LBS
WASHINGTON, DC	ALBUQUERQUE, NM	1,645	867 LBS
WASHINGTON, DC	DENVER, CO	1,471	436 LBS

HDVideoIP

OCFO.

OCFO is replacing nine general ledger systems that are no longer supported by their vendor into one enterprise-wide solution. OCFO's implementation team is comprised of OCFO and Agency staff in New Orleans and other locations. During the last implementation, employees and contractors from Washington and New Orleans would travel between the two cities, each week, during the multi-year implementation. For this implementation, the team will be using video conferencing each day to communicate and collaborate on information, project status, and training. This HDVideo tool will also allow additional information gathering and information delivery meetings with the other accounting locations across the United States.

Under the old methodology, the team would travel weekly between Washington DC and New Orleans. The average number of travelers equaled five employees or consultants. The total cost of travel for the three year implementation is \$1.7 million. By using VideoIP conferencing, implementation team would save the environment 1,112 tons of carbon from air travel over the implementation of the project.

Forest Service.

The largest geographic carbon reducing resource in the United States are the public and private forests managed under the National forest plan by USDA's Forest Service (FS). In addition, FS directly manages 193 million acres of National Forest and grasslands for the American people. FS works close with USDA's Natural Resource and Conservation Service and individual State, Tribal, and local governments.

Quarterly the FS staff travels to a single location within the United States, requiring the travel of approximately 45 executives. The total annual cost of this travel is \$288,800; approximately \$88,000 more than the annual lease cost of the HDVideoIP unit. By using HDVideoIP for the quarterly meeting, FS management would save the environment 52.8 tons of carbon generated by air travel fiscal each year.

When the Telepresence unit is not in use for regional meetings, the HD VideoIP unit will be used for training and collaboration.



–VideoIP Meeting Rooms

OCIO, Rural Development, Forest Service, and many of the other Agencies are equipping office locations around the United States with low cost VideoIP systems. The systems operate with a 360° or a single point camera with a flat screen television. With the digital connection and the proper screen size, the systems can connect to multiple locations in an effective regional meeting.

BUSINESS CASE

••• VideoIP Meeting Rooms

Rural Development (RD) has reduced the Agency's carbon footprint by reducing the number of offices and supporting a mobile workforce (teleworking). The Agency has State Directors and offices to support each State's rural development needs. Under the old methodology, the team would travel to Washington DC, and other locations in the United States periodically.

The recovery of the total investment in the VideoIP system is from the airfare of one business trip across the United States. At a minimum, if RD State Directors reduce travel by one trip per year, the savings would be over \$208,000 per year. By reducing this travel RD employees will save the environment 31 tons of carbon generated by airfare per year; and 155 tons over 5 years.

Other Benefits

–Better Collaboration

Video conferencing provides employees a better experience in collaboration than a telephone call, email, or instant messaging. This becomes highly effective with employees that may have a knowledge or skill needed for a project which is not geographically located in the area of the project team or activity.

–Lost Assets

Each year government Agencies lose computers during airline travel. As noted in the press, at times these computers may contain personal or sensitive information. This is no longer a risk after reducing required travel by implementing the VideoIP system.

–Down time

Airline travel requires early check-in, security checks, and 30-minute boarding times prior to travel. The waits are duplicated on the return trip. (Total employee time for check-in, boarding, departing, and return travel with no layover is approximately 4 hours.) VideoIP meetings are often concluded within an hour. This would allow for four VideoIP meetings to be accommodated within the time a person would wait during airline travel.

–Physically and Socially Taxing

Business travel can be taxing on employees' physical health and social life. Executive and management employees often complete a full workday, fly in the evening, and work during the flight. For many people sleep outside of their normal environment is difficult. Extensive travel is difficult on families and social relationships. VideoIP can provide employees with an increase in quality of life. Telework is assisted through the use of small desktop "eyeball" cameras. Conferencing units can effectively reduce airline travel.

–Replace Satellite Video Conferencing

VideoIP provides an inexpensive replacement to high-cost satellite video conferencing while providing a better user experience.

8.4 Green Buildings

SCORECARD

Technology Group:

Equipment, Facilities

Green Facilities Carbon Reduction

5 Year Targeted Carbon Reduction:	613,828 tons
Annual Targeted Reduction in Carbon Emissions:	4.3 % ⁱⁱ
Current Status:	2,855,012 tons
2009 Target:	2,732,247 tons
2010 Target:	2,609,481 tons
2011 Target:	2,486,716 tons
2012 Target:	2,363,950 tons
2013 Target:	2,241,185 tons
2014 Target:	2,118,419 tons
2015 Target:	1,995,654 tons

Buildings Utilizing RFID Technology

Current Status:	0 buildings
2009 Target:	11 buildings
2010 Target:	22 buildings
2011 Target:	33 buildings
2012 Target:	44 buildings
2013 Target:	55 buildings

Employees with RFID LincPass Cards

Current Status:	25% employees
2009 Target:	100% employees
2010 Target:	100% employees
2011 Target:	100% employees
2012 Target:	100% employees
2013 Target:	100% employees

ⁱⁱ In order to meet 30% reduction by 2015 in accordance with E.O. 13423 Directives, annual reduction will be 4.3%.



Based on case studies conducted in 2003 and 2007, 67% of New York City's non-residential CO₂ emissions were created by office buildings.⁹

Background

USDA's building facilities and offices house and service over 120,000 employees, making it the second largest Department in the U.S. Government. Based on the numbers alone, the daily consumption of resources will inevitably get out-of-hand.

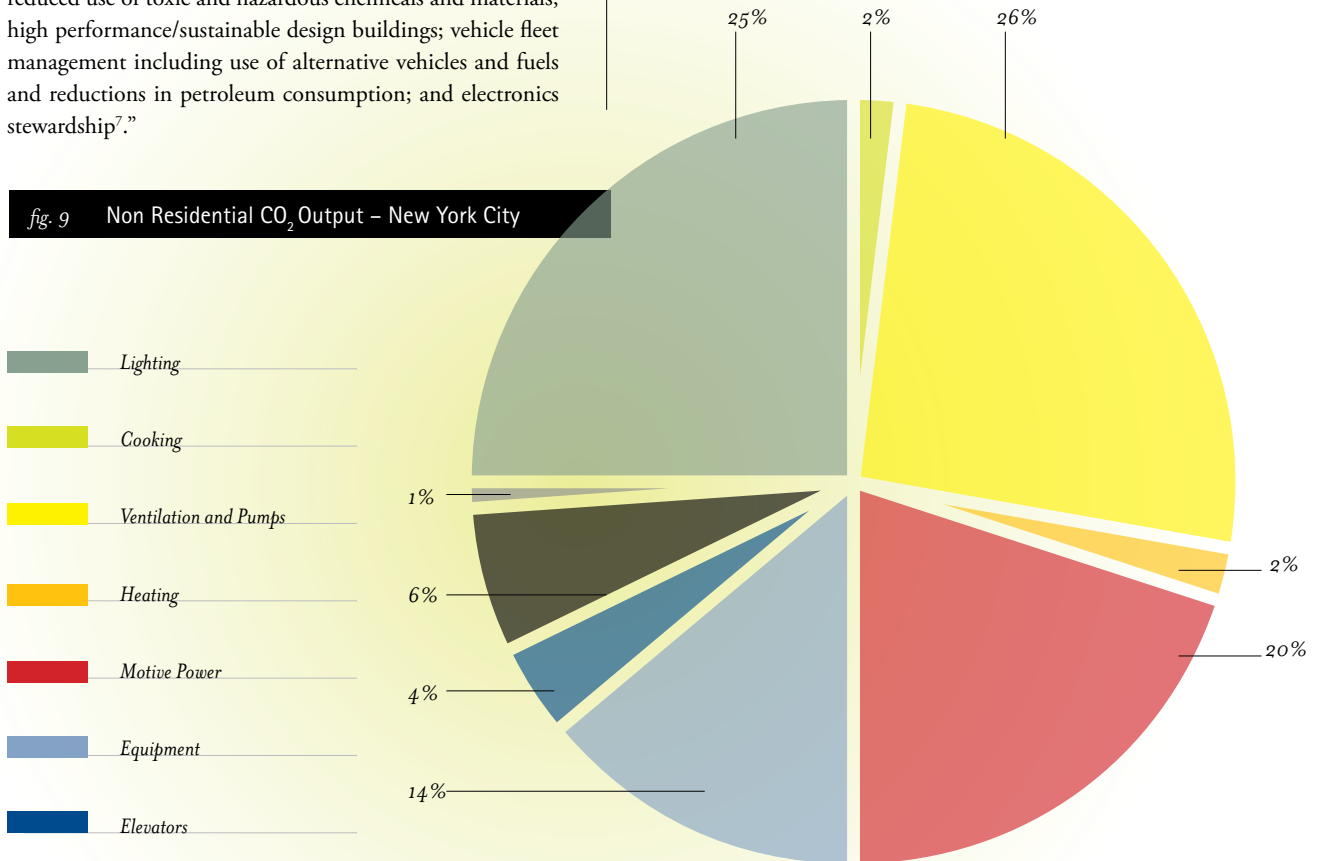
In support of Executive Order (E.O.) 13423 whereby "Federal Agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner,"⁶ the Secretary of the Department of Agriculture issued Memorandum 5500-002. The USDA "will Implement sustainable practices for: energy efficiency and reductions in greenhouse gas emissions; renewable energy, including bio-energy; water conservation; acquisition of green products and services; waste prevention and recycling; reduced use of toxic and hazardous chemicals and materials; high performance/sustainable design buildings; vehicle fleet management including use of alternative vehicles and fuels and reductions in petroleum consumption; and electronics stewardship⁷."

Creating greener facilities will allow USDA to successfully reduce environmental risks and operating costs. Working toward these steps will allow us to achieve the goals to become environmentally conscious.

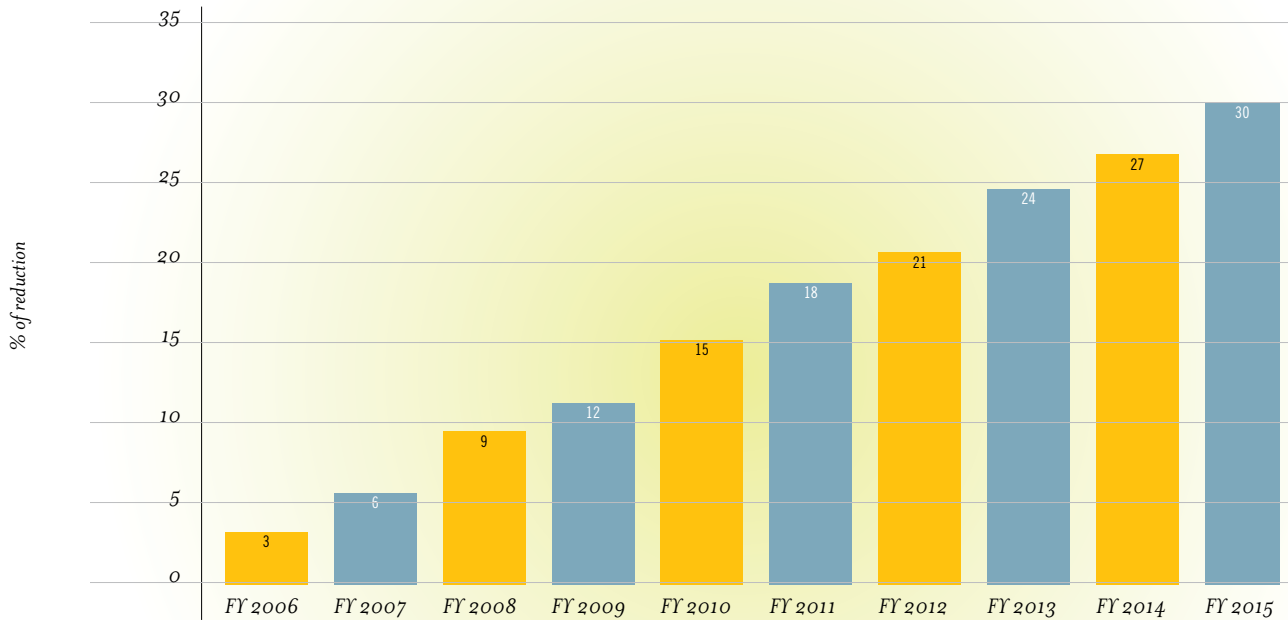
Based on case studies conducted in 2003 and 2007, 67% of New York City's non-residential CO₂ emissions were created by office buildings⁸ (Fig. 9).

These statistics stress the importance of making a more contentious effort towards energy efficiency and conservation.

fig. 9 Non Residential CO₂ Output – New York City



Annual Targeted Reduction in Carbon Emissions Conserving Energy in Facilities



Current measurement

Carbon Reduction Plan

Based on the U.S. Environmental Protection Agency's Green Building initiative, there are seven major focus areas to achieve goals for environmental initiatives for both new construction and existing buildings¹⁰. The areas requiring attention include energy, water, waste, indoor air quality, environmentally preferable building materials toxics reduction, smart growth and sustainable benefits. Each of these efforts involves programs that range from the short term (immediate action available) to long term (future planning in the example of new construction of buildings).

—Energy

Immediate steps taken to decrease energy usage throughout the USDA's Whitten and South Buildings have been to decrease interior lighting by approximately 50%, and shut down 50% of the facilities elevators, but this is just the beginning as technology advances. With the advent of sensor technology, there will one day be an infrastructure

within each building facility that affords the use of energy in only the areas that will be traveled by each individual employee. Sensor technology has already led us down that path, but there is much more untouched, that will lead to greater carbon reduction.

Portions of the IT world that are currently utilized that will reduce the carbon use for the Department include community printers. No longer will there be a need to keep printers on each individual desk, or even in each set of cubicles. USDA is moving towards combination printer, copier, and scan machines that are linked within the USDA network, all of which will meet the E Star energy requirements¹¹. The use of these machines will be for all personnel who reside on the network. For printing, after pressing print, the documents would sit, stored on the server, until the employee logs in with his or her Linc card and password, and from any location in the facility, the document can be retrieved from the router and printed for use. The same process would occur with scanning, just in reverse order.



In the future, USDA will incorporate complete recycling programs for all IT products.

Faxing documentation will be simplified. E-faxing technology currently exists to minimize the use of paper products¹². As technology further develops, the need for paper faxes will diminish. Email and digital documents have become the hub and backbone for the business place; papers get lost in the shuffle as documents are used, saved, and retrieved from electronic platforms.

Computers that every employee uses are also crucial parts of ensuring we maximize our green facilities and minimize our foot print. Turning off screen savers, making backgrounds black and ensuring sleep mode is turned on at a shorter interval than the manufacturers default will ensure lower energy usage for the computer and the monitors. We want to instill in our people the idea of always available not always on¹³. Utilizing flat panel displays will also cut the use of energy. Flat panel displays utilize, on average 33% less energy than traditional monitors¹⁴.

–Water

When the average consumer thinks about water savings, immediately their attention focuses on the ideas of auto shut-off water faucets and conserving consumption by installing newer and more updated toilet facilities that use low flow technology. But that technology has been mastered. It is time to move on and focus on the next task of water conservation. How can we utilize the technology we have today and that of future developments to further our water savings? Many people lose sight of water efficiency when thinking green¹⁵, but it could quite possibly be classified as our most precious resource. While all current technological advances are in place for water efficiency, there is still more to be seen with the advent of future technology and the idea of the self-sustaining building.

Grey water processing will be one of the biggest contributing factors as the world develops into a more green and efficient community. Processing of grey water that makes up sinks, tubs and drainage will eventually be the norm in each building. This water can be collected and processed into a cleaner form that, while unable to be used for human consumption, will definitely decrease water usage while conducting landscaping and gardening of facilities. This plan has with it a two-fold benefit; not only are we able to lower the strain we are putting on our water resources, in turn, the

processing facilities and septic tanks also have less to process. This planning and forethought will lead to construction and design to focus on efficiency while maintaining pleasing aesthetics.

In order to achieve this goal, we must account for the technology necessary to achieve these requirements. The development of sensor technology to gauge water needs and use will become critical to the structure of this plan. Maximizing the water utilized will revolve around sensing rain water, drying soil and need for each plant within its environment. Currently, USDA uses water to cool its large facilities and data centers, which has become an efficient way to regulate temperatures in buildings.

–Waste

Recycling is one of the simplest and well known forms of energy efficiency and reducing waste, but this form goes outside the idea of newspapers and printing paper. In the information technology field, there are forms of recycling that span the gamut of new ideas and resource management, starting simply with one of the quickest and most quickly utilized products of possible recycling, the print cartridge. Recycling these products will inevitably reduce the number of items and toxins in land fills. In the future, USDA will incorporate complete recycling programs for all IT products.

–Indoor Air Quality

Indirect costs can be significant in the area of indoor environmental quality, which focuses on thermal comfort, acoustical quality, visual comfort and indoor air quality (IAQ). Occupant health and comfort is directly associated with operational costs in terms of increased productivity, decreased absenteeism, reduced health care claims and minimized remediation. While these benefits may be more difficult to quantify than water conservation or energy efficiency in terms of cost savings, IAQ does have significant and measurable financial benefits¹⁶.

In order to maximize the priorities of high quality of air while maintaining low energy costs, Agencies must incorporate the technology behind the buildings that



Economic development must be ecologically viable now and in the long run.

have been built for cooling needs. Sensors detect when the outside air is considered to be comfortable to human work and interaction; at that time, air flow shifts from air conditioning to natural, filtered airflow. USDA has this technology utilized throughout its data centers, but we must begin to look at converting older facilities for work use into the same idea.

—Environmentally Preferable Building Materials

Environmentally preferable means “products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose,” according to the Instructions for Implementing E.O. 13423. This comparison applies to raw materials, manufacturing, packaging, distribution, use, reuse, operation, maintenance, and disposal. EPA’s Environmentally Preferable Purchasing (EPP) Program will ensure full compliance with green purchasing requirements. Federal Agencies are directed by Federal laws, regulations and executive orders to make purchasing decisions with the environment in mind. EPA created the Environmentally Preferable Purchasing Program in 1993 to help Federal officials meet these requirements. Most recently, these requirements have E.O. 13423 - Strengthening Federal Environmental, Energy, and Transportation Management which orders Federal Agencies to use sustainable practices when buying products and services¹⁷.

The Environmentally Preferable Purchasing Program provides the following information¹⁸;

- Identify Federal requirements;
- Find and evaluate information about green products and services;
- Calculate the costs and benefits of their purchasing choices;
- Manage their green purchasing processes.

Conducting all purchasing within guidelines of the EPA’s Environmentally Preferable Purchasing program will eventually lead us to achieving goals and construction efforts that will appear similar to the following standards;

- No CFCs are used in any building materials or systems.
- No HCFCs are used in any building materials.
- Recycling center encourages occupant participation.
- Reuse of original building’s structural shell retained in any rehabilitation.
- Construction waste diverted from the landfill.
- Building materials have recycled content, including: drywall, cellulose insulation, linoleum, ceiling tiles, rubber flooring, gravel, fill materials, steel, tile, MDF board, and fireproofing.
- Building materials (excluding mechanical and plumbing systems) were manufactured or assembled within 300 miles of the construction site¹⁹.

—Smart Growth and Sustainable Benefits

The concept of sustainable development combines two important ideas: environmental protection does not preclude economic development; and economic development must be ecologically viable now and in the long run. Sustainable development, which requires an integration of economic, social, and environmental policies, cannot be achieved by any single Federal Agency, because it relies on policy coherence across government Agencies. EPA’s contribution to sustainability is to protect human health and the environment for both this and future generations. Our sustainability research strategy rests on the recognition that sustainable environmental outcomes must be achieved in a systems-based and multimedia context that focuses on the environment without neglecting the roles of economic patterns and human behavior. This recognition creates a fundamental change in research design. In a systems-based approach, the traditional goals of achieving clean air or water or protecting ecosystems and human health can be fully understood only through a multimedia approach. EPA and its partners will develop integrating decision support tools (models, methodologies, and technologies) and supporting data and analysis that will guide decision makers toward environmental sustainability and sustainable development²⁰.

Focusing on six major themes USDA will develop as a growing and sustainable part of the environment and still benefit the needs of work, They include²¹:

- Renewable Resource Systems;
- Non-Renewable Resource Systems;
- Long-Term Chemical and Biological Impacts;
- Human-Built Systems and Land Use;
- Economics and Human Behavior; and
- Information and Decision Making.

Other Benefits

The critical point of these benefits, is when USDA is able to integrate all of the cost and environmental efficient ideas and principles that have been developed through technological advances. The result of this integration will result in Smart buildings. Smart buildings, whose core is integrated building technology systems, are about construction and operational efficiencies and enhanced management and occupant functions²².

Smart buildings will deliver energy control and energy cost savings beyond that of traditional system installation, due to the tighter control system integration. Smart and green buildings deliver the financial and conservation benefits of energy management. One question then is how do smart buildings make a building green? More specifically, how can smart buildings support and effect the LEED certification of a green building? There are three prerequisites that each building must meet prior to any rating²³:

- Fundamental commissioning of the systems
- Minimum energy performance
- The reduction of chlorofluorocarbons (CFCs) in HVAC and refrigerant equipment (related to ozone depletion).

Smart buildings will optimize energy performance. The focus is obviously on HVAC and interior lighting systems (referred to as “regulated” systems), both of which fall under the umbrella of a smart building. Other systems are referred to as “unregulated” systems and include plug loads. Plug loads are everything that plug into the electrical distribution system, such as PC’s, displays, cameras, vending machines, copiers, etc. Plug loads make up 9-20% of a typical building’s electrical load, depending on the building type and density of devices. Buildings can receive “innovation” credits if the energy consumption of the non-regulated systems such as plug loads is also reduced. Enter a smart building where an IP network is able to provide power-over-Ethernet (POE) to a range of “plug load” devices. POE not only supplies low voltage rather than high voltage power to these devices but, more importantly, provides the means to control power to the device. Central control of the POE devices allows for devices to be turned on or off based on a predetermined schedule, a sensor, or an event, such as an occupant’s use of an access card. The result can be reduced consumption of power to devices, reduced power usage and a greener building. In addition POE reduces the use of materials, eliminating the need to provide a power cable to the device²⁴.

A Carbon Dioxide (CO₂) Monitoring system can provide data on the ventilation of spaces which then can be used to adjust the HVAC system. The result is improved indoor air quality and occupant comfort. The monitoring sensors can be designed based on activity levels, zones, or space use and then integrated in the building automation system, therefore becoming part of a smart building²⁵.



High-performance buildings need not be green or smart, but must be both.²⁸

Controllability of systems arises when the building affords individual occupants or specific groups in multi-occupant spaces (conference rooms, classrooms, etc.) the capability to control the lighting, temperature, and ventilation of their spaces. One credit is provided for perimeter and non-perimeter spaces. This level of individual control, while still maintaining overall system management, is part of programmable lighting and HVAC control systems. Many times this type of control is provided to occupants through touch screens or other smart building systems such as VOIP telephones. Temperature and humidity monitoring systems integrated into the HVAC control system to maintain occupant comfort and automatically adjust conditions as needed. The objective is through additional monitoring and sensors the smart building systems collect more data

on system and occupant use which is then turned into actionable information to optimize the system performance and energy usage²⁶.

High-performance buildings need not be green or smart, but must be both. Smart buildings make green buildings greener, and green buildings make smart buildings smarter (Fig. 11).²⁷

Creating truly sustainable structures will ultimately improve our quality of life, and this is reflected in the way we design. Building performance must be people-centric so naturally there will be new innovations in the built environment that make that possible.²⁹

fig. 11

The Commonality of Smart and Green Buildings

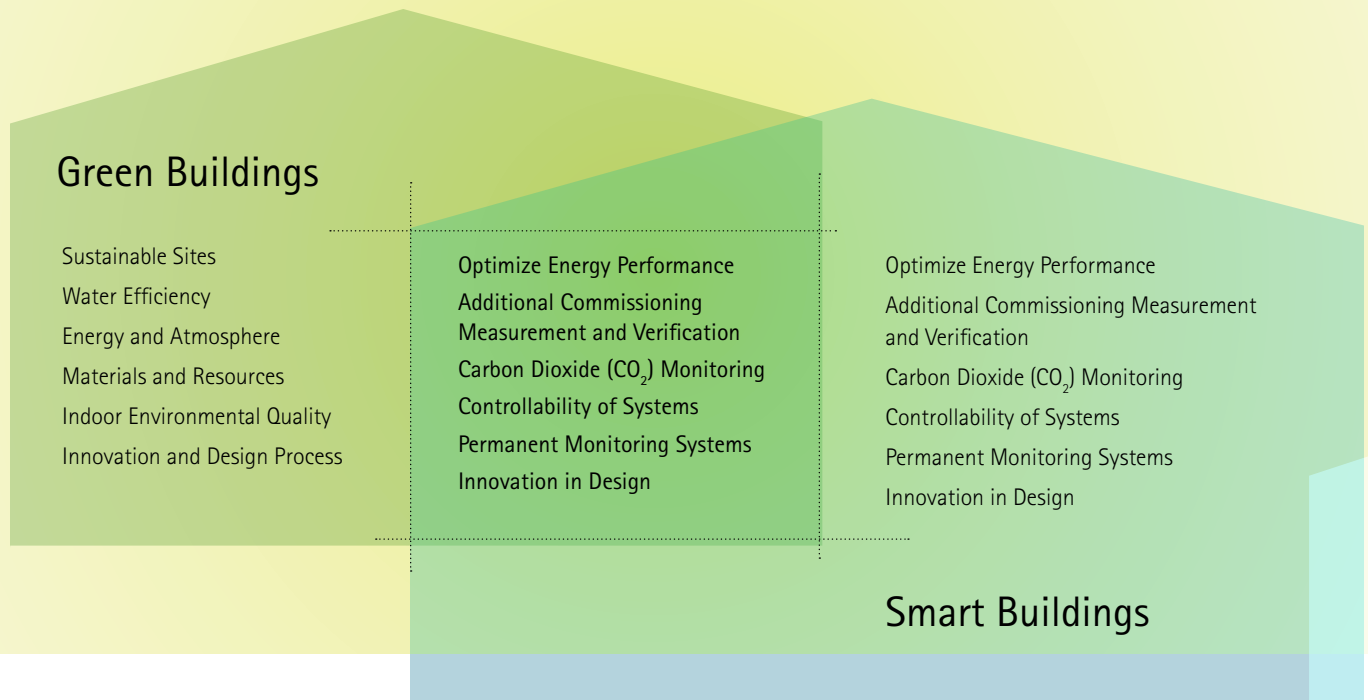


Diagram Source "How Do Smart Buildings Make Green Buildings?" January 2007

The Smart Home

The smart home provides an excellent example of smart building technology. The technology exists in the networked home that offers much more than just comfort and convenient operation. Cost reduction through optimization of energy consumption is the focus of the project. The control system will adjust the electrical energy consumption according to external conditions. The heating system, for example with sensor technology, can be turned down automatically during the night or switched off completely when windows are open during the day. The system also “codes” its occupants. The night-time heating control temperature is not simply reduced on a timer basis like in conventional systems – it is automatically adjusted to personal settings. In conjunction with occupancy sensors, the lighting can be switched off and the heating control temperature reduced automatically. Lighting levels and temperatures will automatically be adjusted to the actual weather conditions. The system can be customized for each occupant. At the same time, energy costs are minimized. Energy consumption is measured continuously and displayed on control panels in the home. The entire house can be strategically controlled to maximize energy savings. The blinds in the home are controlled precisely depending on temperature, daylight and illumination, including adjusting the opening angle. When the home owners leave the building, items such as ovens or irons are switched off automatically³⁰.

Sensor technologies that may be integrated into the home include the following³¹:

- Motion and occupancy sensors;
- Weather station for recording climate data (precipitation, wind, brightness, humidity, external temperature);
- Room temperature; and
- Measuring devices for water and electricity consumption.

Automatic actuators can be utilized for control as well³²:

- Switching and dimming of lights and sockets (also in the garden);
- Heating and ventilation control;
- Control of shutters, blinds, window and door drives;
- Control of garden irrigation, pond pumps;
- Access system with electronic identification of the occupants

8.5 Data Center Consolidation

SCORECARD

5 Year Targeted Carbon Reduction: 90%

5 Year Targeted Carbon Reduction: 187,320 tons

Technology Group: Equipment

Annual Targeted Reduction in Carbon Emissions: Varied

Current Status: 224,464 tons

2009 Target: 192,920 tons

2010 Target: 150,154 tons

2011 Target: 107,387 tons

2012 Target: 64,621 tons

2013 Target: 21,854 tons

Annual Targeted Reduction of Network/Data center Facilities: Varied

Current Status: 150

2009 Target: 130

2010 Target: 75

2011 Target: 30

2012 Target: 5

2013 Target: 5

Annual Target for Data Center Renewable Energy Use:

Current Status: < 1%

2009 Target: 5%

2010 Target: 10%

2011 Target: 15%

Background

Data centers are responsible for running the core business applications that handle the operational data of all of the USDA Agencies and staff offices. In the past, information technology (IT) existed as a means to grow your business and expand your communication capabilities through increased procurement in IT investments. With this growth in IT came the general acceptance of, and reliance on, the Internet as the principal means of communication. As this trend persisted, the only way to meet the needs of USDA Agencies and to continue to fulfill our mission-critical tasks was to increase computing power through the expansion and creation of more data centers.

This growth is now a huge concern for the USDA. Over the years, continuous improvements in price performance and dollars per Gigabyte (GB) made it both easy and affordable to solve server and storage concerns by increasingly procuring hardware as a means to meet expanding needs. This led to organizations moving to a model of deploying distributed servers and storage to support Departmental processes. “While such systems allowed organizations relatively cheap and easy access to powerful applications, IT executives are now discovering that there are limits to that easy growth: floor space, weight loads, rack space, network drops, power connections, cooling infrastructure, and even power itself are finite resources.”³³

Intensifying this issue is the fact that the USDA has scattered data center locations that are not being managed consistently. This not only causes concerns from an IT policy and security standpoint, but also from a power consumption and carbon emission perspective. In most data centers, server and storage space is dedicated to a single application. In the beginning stages of an application implementation, it is often unknown what the server and storage requirements will be, therefore these requirements are generally overestimated. What this means is that our servers and storage spaces are being underutilized across the majority of all USDA applications.

Research suggests that a typical x86 server (more than 80% of all server shipments) uses between 5% and 10% of its available capacity during a 24-hour period³⁴. Data centers are always up and running regardless of the utilization rates of its server and storage hardware, which translates

to high-power consumption even when the data center is not working to process information. It is also of note that for each watt used by the server or storage of a system, A/C, power supplies, and other related equipment together require nearly 1.5 times that amount³⁵. Gartner’s Green IT Goals for USDA states that the need to improve energy efficiency of USDA’s IT operations is through the reduction of energy consumption. USDA data centers are considered to be a high-impact area of opportunity to reduce energy consumption and improve overall energy efficiency because of their power and cooling requirements³⁶.

“Energy consumption is a real and growing problem. Information compiled by the EPA shows that United States data centers consumed about 60 billion kilowatt-hours (KWh) in 2006, roughly 1.5% of total United States electricity consumption, and cost \$4.4 billion to operate. Although 1.5% of anything is not much to some people, it is a major amount when taking into consideration all the things that consume electricity. The EPA also reported that the energy consumption of servers and associated data center infrastructure has doubled in the past five years and is expected to almost double again in the next five years, to more than 100 billion KWh, if steps are not taken to slow growth.”³⁷

“In the past, data center managers have not seen the degree of the problem because they were not held accountable to the exact amount of power consumed. As companies start to measure the power used by data centers and assign charges appropriately, IT budgets will be impacted; therefore, data center management must understand how this will affect things such as chargeback to users. With energy prices not expected to decrease (and probably increase), this will be even more significant to the IT budget if nothing is done to enhance efficiency based on the EPA’s projection of doubling consumption in five years.”³⁸

The Office of Management and Budget (OMB) issued Bulletin No. 96-02, Consolidation of Agency Data Centers on October 4, 1995. This Bulletin calls for Agencies to reduce the total number of Agency data centers into a smaller number of physical locations; collocate small and mid-tier computing platforms in larger data centers; modernize remaining data centers in order to improve the delivery-of-services; and to



Consolidation of all USDA applications and hardware infrastructure to EDCs will directly impact most of the Secretary's Green program areas.

outsource information processing requirements to other Federal or commercial data centers if the aggregate installed base is below minimum target sizes³⁹.

Many of the USDA locations that house application, server, storage, and related network infrastructure were not built to handle the requirements of such highly sophisticated IT equipment. Not only are these locations highly inefficient in electricity consumption for powering and cooling IT equipment, but they are also not properly equipped to handle the ongoing increase in needed wattage to power the IT equipment. As the amount of data being communicated across computing devices grows, USDA has been filling data center racks with increasingly powerful servers to keep pace. In Washington DC, the data centers and network closets that house such equipment are in buildings that were constructed circa 1930. It would take major structural, electrical, and network renovations to even approach current data center efficiency standards. Continuing to keep information technology and communication equipment scattered in these historic buildings not only keeps USDA's power consumption needlessly high, but also inflates USDA's business risk as energy shortages and power outages increase. The network communications of the United States supports putting information technology in the most efficient data center locations and transporting information to teleworkers or other employee business locations.

To illustrate, Gartner research suggests that legacy data centers typically were built to a design specification of about 35 to 70 watts per square foot. "Current design needs can vary from between 150 to 200 watts per square foot, and by 2011, this could rise to more than 300 watts per square foot. These figures for energy per square foot represent just the energy needed to power the IT equipment; they do not include the energy needed by air-conditioning systems to remove the heat generated by this equipment. Depending on the tier level and future equipment density plans in the data center, these cooling needs can increase the overall power requirements by an additional 80% to 120%."⁴⁰

The USDA has Enterprise Data Centers (EDC) that were specifically designed and constructed to take into consideration modern energy and cooling needs, operational processes, and efficiency standards. In order to take full advantage of USDA EDCs, all scattered server, storage, and related IT equipment should be taken out of highly inefficient

data centers and net closets and physically consolidated to EDCs. Consolidation of all of USDA's applications and hardware infrastructure to EDCs will directly impact most of the Secretary's Green Program Areas, as well as drive USDA toward meeting the environmental goals set by E.O. 13423 for Strengthening Federal Environmental, Energy, and Transportation Management⁴¹. Moving from highly fragmented, and often unnecessarily expensive, IT operations to a more-consolidated organization at the enterprise level has the potential to save a great deal of money, improve the capability of IT, and help minimize security and business continuity risks⁴².

Current measurement:

—Hardware and Infrastructure

Currently the USDA has 30 data centers and 120 major network closets, consisting of an estimated 16,000 servers (figure includes Mainframe, Wintel, Unix, and other midrange servers). Most of these data centers and net closets do not meet EPA standards for energy efficiency, and will not be able to meet the goal of reducing energy intensity by 3% annually through the end of FY2015 as set by E.O. 13423.

—Energy Consumption

Most large enterprise IT organizations spend approximately 5% of their total IT budgets on energy alone. Some estimates go as high as 10% to 15%. Data centers account for a large portion of this energy consumption. This is especially true when an organization is using legacy data centers that do not meet modern standards for data center efficiency. If a data center is not efficient in consuming power, the energy costs can increase at a steep rate. The Green Grid Data Center Power Efficiency Metrics gauge a data center's power consumption efficiency via Power Usage Effectiveness (PUE) ratio. Preliminary work indicates that many data centers have a PUE of 3.0 or greater⁴³. If a data center has a PUE of 3.0, it indicates that the IT equipment consumes 33% of the power in the data center. The closer a data center gets to 1.0, the closer the data center comes to 100% efficiency.

The Midwest data center, National Information Technology Center (NITC), has an average PUE ratio of 1.69. The EPA has recommended to Congress that all Federal data centers achieve a PUE ratio of 1.7 by 2011. Judging by the estimates that many data centers have a PUE above 3.0, we can assume that the rest of the USDA has a PUE ratio of around 5.0. Through these PUE ratios, it can be determined that USDA data centers will have consumed 340,096,830 KWh in 2008 for all IT equipment power and cooling needs.

This energy consumption translates to about 224,464 tons of carbon emissions for 2008 and could increase to be approximately 293,357 tons of carbon emissions for 2009. EPA calculations show that energy consumption of servers and associated data center infrastructure has doubled in the past five years and is expected to almost double again in the next five years. If nothing is done to slow this growth, then the USDA could be held accountable for 488,928 tons of carbon emissions from data center operations alone (Fig. 12).

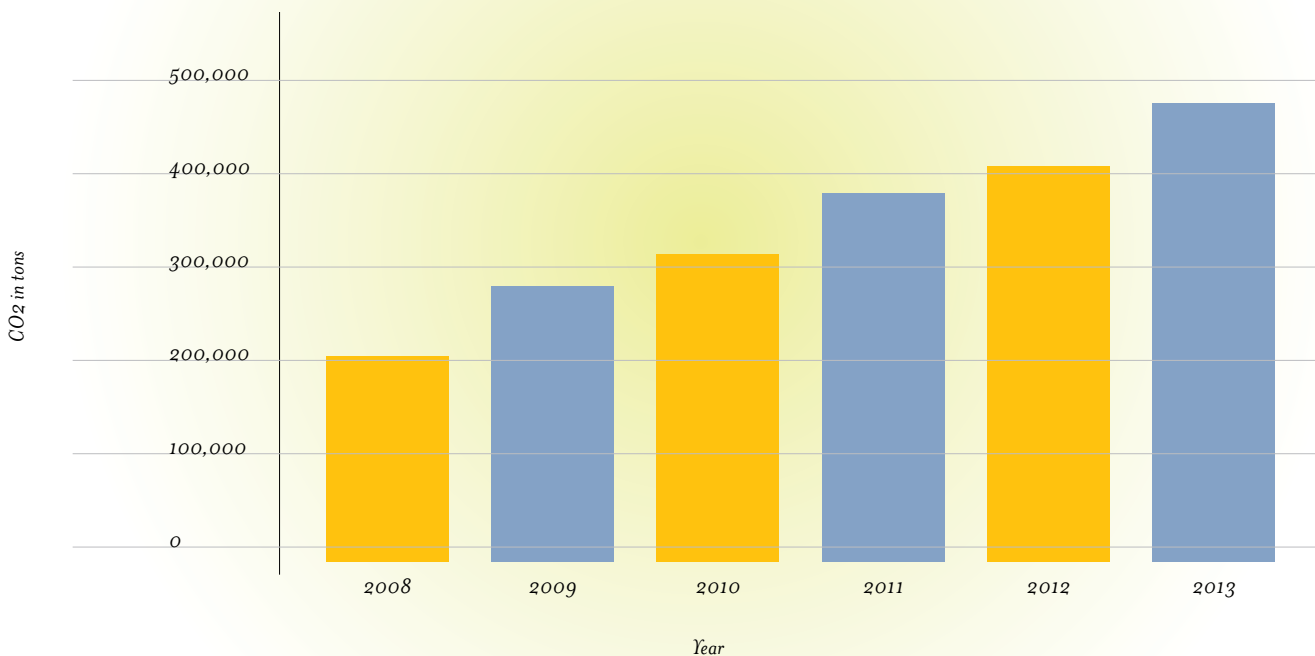
A problematic area, but also an opportunity in waiting is that USDA servers are computing at an estimated average of 15% of their capacity during a 24-hour period. This is due to the need for excess space for peak processing times, the variation in processing times across applications, and overestimates for workload and space. These issues cause servers to be idle for much of their IT lifespan. When a server is not processing information, it is still using electricity for power and cooling. If server utilization rates were improved and power management technology and techniques were employed to scale down power when servers are not in use, USDA would make significant improvements for decreasing power consumption and CO₂ emissions.

Carbon Reduction Plan

Advances in IT allow an organization to reduce equipment through consolidation. There are three phases of consolidation that the USDA must complete in order to reduce equipment, increase energy efficiency, and reduce

fig. 12

Projected Growth in Data Center CO₂ Emissions Before Consolidation Plan





Power consumption decrease from a comprehensive physical consolidation amounts to a decrease in carbon emission of 124,880 tons based on year 2008 numbers.

the carbon footprint caused by USDA data centers. These phases are logical, facilities, and equipment/infrastructure consolidation.

—Logical Consolidation

The first step in server consolidation is usually logical consolidation, which involves placing all servers and network infrastructure under the control of a single centralized group. “This reduces the political issues that impede consolidation and gives a single group the ability to set standards that are uniform across all data.”⁴⁴

—Facilities Consolidation

The next server consolidation phase is usually a physical consolidation of facilities. “Physical consolidation involves reducing the number of physical sites where servers are installed.”⁴⁵ The USDA should move all servers, storage, and infrastructure to EDCs. When floor space runs out, build out additional floor space to handle more equipment. For instance, NITC has 7,000 sq. ft. of space available in its Midwest EDC. Beyond this available space, NITC has an additional 30,000 sq. ft. of conditioned and powered raised floor space that can be built out within 6 to 12 months. By consolidating facilities into EDCs, the USDA can achieve management consistencies and economies of scale more easily as compared to when assets are disbursed. This collocation can lead to greater efficiency by eliminating the replication of skill sets across different locations. When systems are in a central location, networking becomes much easier and more efficient, power and real estate costs are reduced, backup can be performed more efficiently, and security can be increased.

Through facility consolidation, USDA can immediately benefit from lower utility costs due to the move from highly inefficient space into data centers that are specifically designed to power and cool IT equipment. If all server, storage, and related IT equipment is physically consolidated to EDCs, the estimated electricity savings in one full year is \$18M. This estimate takes into consideration the electricity cost per KWh decrease, as well as assumes that all EDCs can

maintain a PUE of 2.0 with all of the additional equipment. This power consumption decrease from a comprehensive physical consolidation amounts to a decrease in carbon emission of 124,880 tons based on year 2008 numbers.

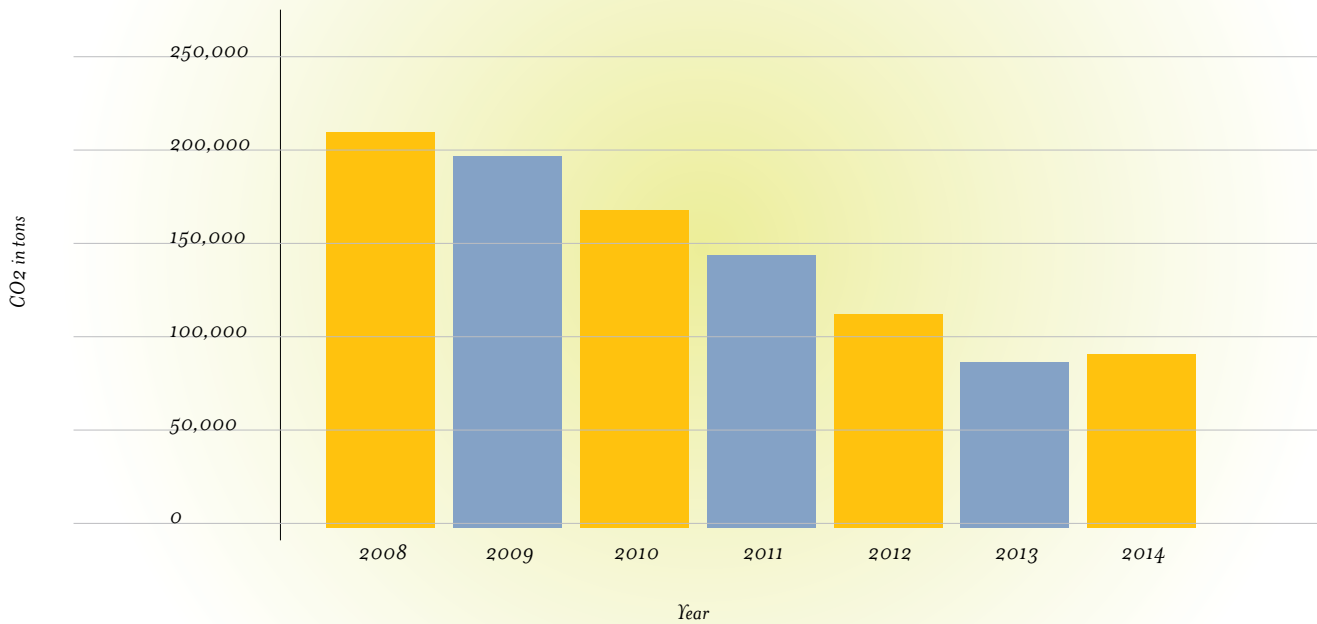
In addition to the benefits from all IT infrastructure being consolidated to efficient EDCs, it is worth mentioning that USDA’s EDCs are mostly located in areas where utility costs are lower than the National average. The two NITC Midwest EDCs have a \$.05 cost per KWh of electricity according to the Energy Information Administration⁴⁶. This \$.05 rate is a full \$.07 per KWh less than the Washington, D.C., cost of \$.13 per KWh. Data center efficiency aside, moving all data center and net closet equipment out of Washington, D.C., would reduce electricity cost for that equipment by more than half.

Figure 13 shows carbon reduction based solely on the physical consolidation to EDCs. The reduction in power consumption and carbon emission is drastic due to the efficiency of EDCs. This chart assumes that the physical consolidation to EDCs would be completed by 2013. The carbon emission numbers then show an increase in 2014 due to inflation (5% per year energy increase is built into entire model due to increasing workloads and electricity inflation, but is only seen as an uptick after consolidation is complete).

—Equipment/Infrastructure Consolidation

The first step involved in an equipment consolidation should be storage consolidation. This step involves moving all applications off of server internal storage or directly attached storage to consolidated Storage Area Networks (SAN). SAN allows multiple applications to share in a pool of storage space. Those applications that are already pooled to a SAN could further consolidate by merging multiple SANs into one. In addition to SAN consolidation is the idea of tiered storage. “Tiered storage matches the value of data with the performance (and expense) of storage. For example, valuable or frequently accessed data is kept on high-performance Fibre Channel (FC) disk, less valuable data is moved to less expensive nearline storage, such as Serial Attached SCSI (SAS) or SATA disk, and infrequently accessed data can be migrated to high-volume SATA disk or tape. Ideally, tiered storage can save money, while easing the access demands to any single storage tier.”⁴⁷

fig. 13

Reduction in CO₂ Emissions from Data Center Facilities Consolidation

Procuring storage products according to a tiered storage framework saves money because each tier after the first costs around 20% less than the storage tier above it. This can further assist in consolidation efforts because more information will be pulled out of high-cost storage equipment and placed in appropriate lower level storage, which will in turn lead to the retiring of aging storage hardware that is no longer needed.

Techniques and technology for thin provisioning and storage virtualization should also be used. These approaches assist in eliminating unused storage due to over-allocation. Thin provisioning solves the issue of over allocating storage to new applications that then lead to unused disk space. Through thin provisioning, “administrators can create ‘flexible’ volumes that appear to the application to be a certain size,

but are in reality much smaller physically. Data volumes can be resized quickly and dynamically as application requirements change.”⁴⁸ Deploying storage virtualization technology in enterprise data centers will enable USDA to pool storage resources and easily scale storage up as needed. The virtualization software acts as the management platform and performs all storage functions as the third party oversight. The ability to allocate storage resources on-demand, integrate storage products from various vendors, configure for high availability, and reduce the total cost of ownership are among the benefits that storage virtualization provides. USDA’s use of these storage technologies will create savings in data center power and cooling requirements, thus increasing energy efficiency.

The next step in equipment consolidation is infrastructure application consolidation. This is the “first step in server rationalization, that is, consolidating applications with common code stacks, such as infrastructure applications (for example, file/print, e-mail, Web serving) and common database instances. This does not require a virtualization product, but just involves combining common code stacks on larger servers.”⁴⁹ This step would begin to decrease the number of servers needed per application since USDA would break further away from the dedicated application server mentality.

The rationalization of diverse applications (test/development and production) becomes the next objective for most server consolidation efforts. Rationalization consolidation is the process of reducing the number of physical servers, the number of operating system instances, and the number of applications. Shared operating system virtualization and partitioning virtualization offer capabilities to achieve rationalization consolidation⁵⁰.

Virtualization can be defined as software which creates a virtual server that decouples applications and operating systems from their underlying hardware, allowing multiple operating systems and multiple applications to run on a single server. This drastically improves utilization rates in servers because the server is no longer functioning in a single application, single server ‘silo’ model. Instead, the server is having work allocated to it by the virtual machine that is communicating with multiple platforms. This technology will also scale across many physical servers, creating a pool of

resources through which USDA’s applications can function. As a result of server virtualization, USDA will achieve higher server utilization rates, allow for the decommissioning of unneeded servers, attain higher application availability, and improve organizational flexibility and scalability.

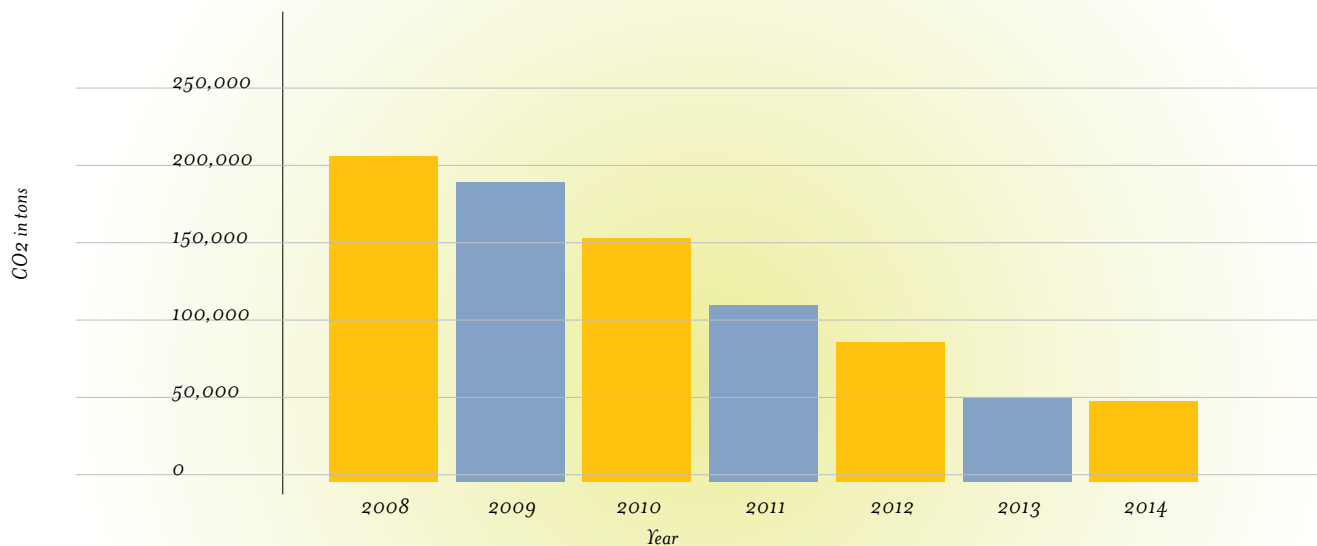
Gartner estimates that a typical server runs at 10% to 20% utilization. Virtualization might improve this to 50% to 60%, thus requiring fewer servers to execute the same workload and saving significant amounts of power. USDA estimates that servers could be reduced at a rate of 4 to 1. This shift in workload to underutilized servers reduces both energy consumption and floor space needed for data center IT equipment.

In order to begin implementation of virtualization consolidation, a comprehensive inventory of operating systems, applications, and servers should be merged and analyzed. “This is required to understand standardization potential and gather factors that are used to determine suitability for consolidation and consolidation mix. Depending on the number of servers, this may be done manually or with automated tools.”⁵¹ Application efficiency is achieved through reducing the equipment needed to run these applications.

“Virtualization gives a facility more room to grow by reducing the number of servers in an existing data center. Using virtualization allowed the Postal Service to slash the number of servers it needed from 895 to 104, according to EPA.”⁵² If the USDA can achieve an estimated server

fig. 14

Reduction in CO₂ Emissions from Equipment Consolidation



consolidation ratio of 4 to 1, this act alone would reduce data center carbon emission by 156,100 tons in 5 years. This carbon reduction figure would be an annualized reduction based on estimates for 2008 and would far exceed the 10% annualized targeted reduction goal.

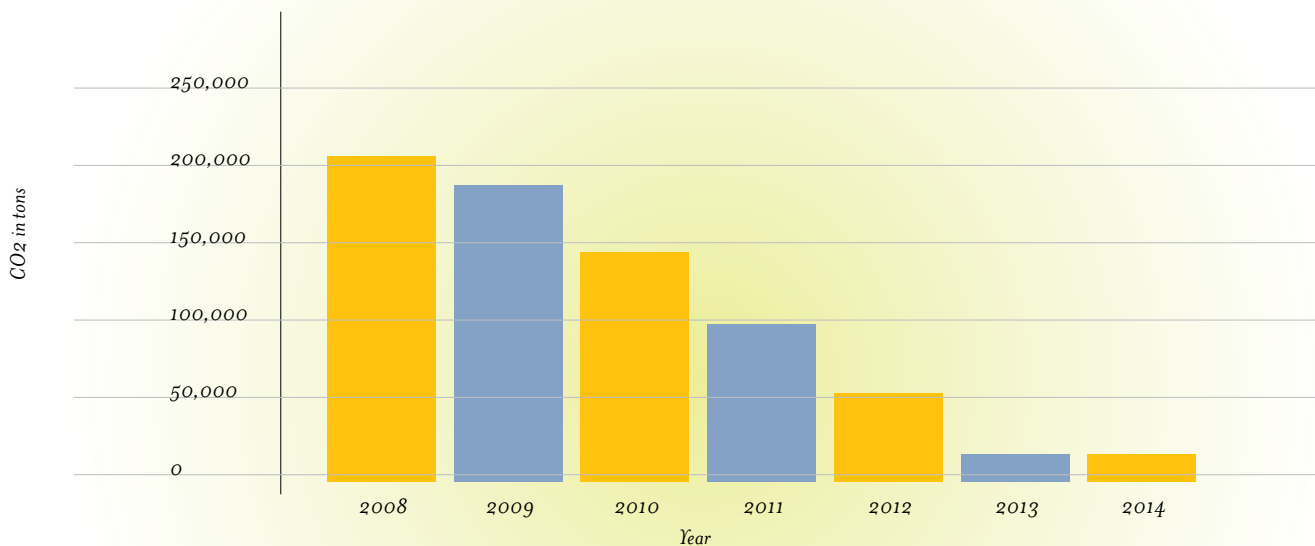
Figure 14 shows carbon reduction based solely on equipment consolidation through virtualization. The reduction in power consumption and carbon emission is drastic due to the amount of equipment that can be reduced through better use of IT for data management and virtualization. This chart assumes that the equipment consolidation would be completed by 2013. The carbon emission numbers then increase in 2014 due to inflation (5% per year energy increase is built into entire model due to increasing workloads and electricity inflation, but is only seen as an uptick after consolidation is complete).

“Strategic planning assumption: During the next 5 years, most United States enterprise data centers will spend as much on energy (power and cooling) as they will on hardware infrastructure. To achieve these levels of use, choose appropriate software tools. These include virtualization software and better workload tools. However, these tools won’t be of much use unless organizations change their operational processes to benefit from the software. For example, having multiple, virtual machines on a single server should ensure that production partitions can be run next to test partitions in the same box. This requires a change in the application production/acceptance and testing processes.”⁵³

The goal is to improve the material and energy efficiency by squeezing out the maximum amount of productive work from the minimum amount of material and energy without compromising performance, resilience and security. This requires an end-to-end integrated view of the data center, including the building, energy efficiency, waste management, asset management, capacity management, technology architecture, support services, energy sources and operations⁵⁴.

Figure 15 shows carbon reduction based on both physical consolidation to the EDCs and equipment consolidation through virtualization. By performing both an equipment and physical consolidation, one can see that there is an immense reduction in carbon emission due to the amount of equipment that can be reduced through better use of IT for data management and virtualization, as well as from moving all equipment to more efficient and energy-conscious EDCs. This chart assumes that both the physical consolidation to EDCs and the equipment consolidation would be completed by 2013. The carbon emission numbers then show a slight increase in 2014 due to inflation (5% per year energy increase is built into entire model due to increasing workloads and electricity inflation, but is only seen as an uptick after consolidation is complete).

fig. 15

Reduction in CO₂ Emissions from both Data Center Facilities and Equipment Consolidation



The Midwest EDC received a Tier 3 Telecommunications Industry Association Standards for Data Centers rating, which translates to a 99.741% availability rate.

Other Benefits

The 4 EDCs chosen are designed to provide the correct operating environment for Federal Government systems. EDCs responsibility includes physical system security, operations management, cyber security, scan and patch of operating systems, and continuity of operations. In addition, USDA will be moving the planning and development of hardware architecture for systems to the OCIO, under the executive responsible for the Enterprise Data Centers. In a study conducted by OCIO, the hardware architecture for approximately 250 network application servers was reviewed. For these servers, better hardware architecture would improve system performance and result in a savings of approximately \$10 million (payroll, hardware, application, and energy expense).

–Increased Security

Data center security is an immense threat due to the USDA data centers having various security policies and requirements. Without a central body working toward consolidation, there is no oversight which guarantees that all data centers are fully secure from all threats. Data centers house privacy, sensitive, and personal identifiable information. The USDA can ill-afford to have security falter on any front. Consolidation will increase security due to all EDCs operating under a unified security policy. These efforts ensure that all mission-critical systems will be protected on an ongoing basis.

–Limit the Impact of Rising Energy Prices

Consolidation will limit the impact of rising energy prices on operational budgets. Most large enterprise IT organizations spend approximately 5% of their total IT budgets on energy. Gartner research suggests that this number will rise by two to three times within 5 years. Not only because of the increasing energy consumption of data centers, but also because of the steady rise of KWh charges. With less hardware, there will

be less energy needed to power equipment and less energy consumed for cooling the data center. This not only helps to curb the USDA appetite for power, but also protects the organization from rising commodity prices. Moving data center and net closet equipment to areas that charge less for electricity also protects USDA from the rise in energy prices. The incremental increases in utility costs are even more protected from approaching the National average.

–Ease of Maintenance

Once data centers have the virtualization technology in place, the ease of maintenance for replacing servers becomes evident. If a server in the server pool goes down, all that is needed is for a technician to pull the bad server out and replace it with a new one. Since the new server is hooked in to a pool, it will then receive its tasks from the data manager for processing jobs and begin working. There is no longer a need for configuration and coding.

–Less Application Downtime

Data center consolidation to EDCs will provide for less application downtime in two ways: 1.) The EDC locations have a higher availability rate than the decentralized Agency data centers, as determined by the Telecommunications Industry Association (TIA) Standards for Data Centers (TIA-942), and 2.) Virtualization enables less application downtime by directing workload to other servers.

The Midwest EDC received a Tier 3 TIA-942 rating which translates to a 99.741% availability rate. EDCs are designed and constructed to meet these types of stringent requirements that other data centers are unable to meet. By simply moving all applications into EDCs, application availability USDA-wide makes an immediate jump up.

Virtualization software further decreases application downtime by directing workload to a pool of available servers. If a server goes down, the software will send all processing instructions to the other servers in the pool, thus reducing any down-time for mission-critical applications.

–More Organizational Flexibility

The greatest strategic value that organizations gain from consolidation is an improved ability to efficiently adapt the infrastructure to incorporate new technologies and respond to new business requirements.

All types of organizations are driven by the need for high levels of services and information availability. With a consistent framework for managing data, IT spends less time moving data and transforming it into a usable form and, therefore, can respond more quickly to demands for data availability. The infrastructure is then better able to adapt as the organization moves forward. Once the IT center has completed the consolidation process and achieved the desired environment, users can expect more rapid deployment of new applications and features, leading to greater flexibility to respond to changing demands.

Additionally, this transformation from the legacy ‘silo’ model to an organizational ‘virtual’ model will enable USDA’s infrastructure to become more scalable.

–Less Manpower Needed

As a direct result of the ease of maintenance and consolidation efforts, there will be less manpower needed to maintain the data centers. Support staff is often recruited on the basis of how many servers an organization has. Most consolidation projects aim to reduce costs by freeing staff from mundane server maintenance tasks. Gartner suggests that more than 70% of the potential savings from a typical project will come from reduced staffing requirements, but they caution that this is usually the hardest area in which to pre-quantify savings, especially since displaced support staff often moves to new posts elsewhere in the same information services organization.

Research firm IDC notes that as much as 55% of IT costs are associated with personnel, and, in a consolidated environment, the productivity of administrative personnel increases greatly. IDC studies have shown a 7:1 cost savings

in people management resources when processes and resources are consolidated. This enables the organization to focus highly skilled resources on higher value tasks.

IT support including Help Desk consolidation reduces duplication of responsibilities, enabling cost savings and gain in efficiency.

Additionally, the individual Agencies/Departments are relieved of IT burden, making them focus on their core mission areas.

Thus, the Total Cost for Ownership (TCO) for IT drops dramatically in a consolidated environment, increasing the Return On Investment (ROI) for the operations.

–Lower Hardware and Software Costs

Hardware and Software costs will be lowered due to the lowering of the number of servers and storage used in the EDCs. Servers and storage are being utilized at a much higher rate, so when any hardware needs to be replaced, it will only need to be replaced in the pool of servers. The rate of servers per application has decreased the need to procure sustaining IT dramatically.

–Less Floor Space Used

Less floor space translates to less rent and utilities, or the ability to use the additional space for other office needs.

–Decrease in E-Waste

Due to data management technology and virtualization, there is a drastic reduction in IT equipment needed at USDA. As a direct result, future e-waste produced from our data centers also decreases in the technology refresh cycle.

8.6 FSA Modernization / MIDAS

SCORECARD

5 Year Targeted Carbon Reduction: 18,191 tons

Technology Group: Application Consolidation and Modernization

Hosting

Annual Targeted Reduction in Carbon Emissions: 3%

Current Status: 6,680 tons

2009 Target: 6,479 tons

2010 Target: 6,280 tons

2011 Target: 6,078 tons

2012 Target: 5,878 tons

2013 Target: 5,678 tons

Travel

Current Status: 113,025 tons

2009 Target: 109,634 tons

2010 Target: 106,244 tons

2011 Target: 102,852 tons

2012 Target: 99,462 tons

2013 Target: 96,071 tons

Paperwork

Current Status: 1,570 tons

2009 Target: 1,523 tons

2010 Target: 1,476 tons

2011 Target: 1,429 tons

2012 Target: 1,382 tons

2013 Target: 1,334 tons

Note: Annual USDA-FSA Expense is based on costs associated with paper, ONLY. The numbers do NOT include costs savings associated with new hardware and software (maintenance or server costs, etc.)

Technology Investment: \$ 304 million

2009 Return on Investment: 0 %

Accumulative 5 Year Return on Investment: 56%ⁱⁱⁱ

ⁱⁱⁱ The return on investment (ROI) is based on the \$170 million savings in the Customer/Producer Burden Costs and \$500,000 Savings in FSA costs for paper. The total cost savings is \$170.5 million. 170.5/304 million equal 56%. It should be noted that hardware costs savings was NOT factored in the 5-year ROI.

Background

USDA-Farm Service Agency (FSA) provides several services and benefits to achieve the mission and goals of the Department. FSA delivers commodity, credit, conservation, disaster and emergency assistance programs that help improve the stability and strength of the agricultural economy. FSA also hosts and supports the delivery of the programs to assure the Nation of a stable food supply. The delivery of these services and benefits to customers (farmers, ranchers and cooperatives, etc.) is conducted through a National network of local offices throughout rural America. Typically, customers make an average of 4 trips annually to the local County Offices to conduct business with the Farm Service Agency. The purpose of these trips includes program application/signup; acreage reporting or certification; reconciliation of annual data or contract modifications; and inquiries about additional services and program benefits not accessible electronically.

When the automated system for program delivery was developed, cellular telephone, voice over Internet protocol telephony, and the public Internet were non-existent. The basic operation of the automated system was designed with over 17 million lines of COBAL code on the mini computer. These mini-computers reside and routinely transmit information to a central mainframe to complete payment processing in every local county office to ensure the delivery of farm programs. The current system for delivery of farm program benefits and services is outdated, unstable, and lacks necessary support to continue the efficient and cost-effective delivery of farm programs. The system limitations on the delivery of farm program benefits and services directly impacts the human activities performed by FSA customers which result in the environmental impacts related to the Agency's carbon footprint measurement.

Significant and numerous program requirements and the limited accessibility of the current legacy system for electronic submissions require frequent travel of our customers, and the utilization of enormous amounts of paper. FSA's current systems hardware, mini-computers, and mainframe computers consume a large amount of electricity.

FSA is currently pursuing significant modernization of the aging legacy system in order to address the challenges and opportunities in the rapidly changing legislative and technology environment. This project is known as Modernize and Innovate the Delivery of Agriculture Systems (MIDAS). The MIDAS project includes the acquisition of a Commercial-Off-The-Shelf (COTS) software product that

will be configurable to meet the legislated mandates and to deliver farm program benefits and services to our customers. The COTS solution and proposed hardware architecture will be housed in an energy efficient data center.

The USDA-FSA MIDAS IT investment project will reduce the carbon dioxide emissions related to the delivery of farm program benefits associated with:

- Hardware/software
- Paper consumption
- Travel to and from the local offices

Current measurement:

—Hardware and Infrastructure

FSA's legacy system currently operates using over 17 million lines of COBAL code on 2,555 mini computers located in approximately 2,277 FSA County Offices.

Farm Service Agency (FSA) spends \$3 million for maintenance^{iv} costs related to the legacy systems. The estimated carbon emissions use to host and support the delivery of farm programs based on the current program activity is 6,680 tons annually. The topography of the original hardware was to locate a mini-computer in each county office when communications in the United States was mostly low speed over twisted pair. These physical county office locations were not designed with modern data center power and cooling efficiencies.

Compared to the low-power, virtualized, equipment today; the FSA infrastructure is no longer an efficient host of applications. In addition, the system is no longer manufactured or supported in the United States. A new application hosted in a data center system will better support the producers in the United States and reduce the carbon footprint generated by the legacy systems and the equipment operating and maintained in the county offices.

^{iv} Data provided by OCIO

NOTE:

The Agency uses four general ledger and five payment modules to support the farm payments system. The carbon reduction found in these modules is documented on the Data Center Consolidation, Application Consolidation, and ERP section of this plan.

–Paperwork

Current systems and processes require manual paper applications, contracts and reporting for the majority of the programs. It is estimated that the average number of paper pages created by FSA for producers to apply, qualify, contract, and report for the programs is 60 pages per year per producer. An average of 1.5 million producers received payments or benefits from FSA during FY2004 and FY2007. Therefore, 110 million pieces of paper or 221,000 reams of paper were consumed annually during FY 2004 through 2007⁵.

FSA annual costs associated with purchasing 221,000 reams of paper are estimated to be \$552,500^{vi}. In terms of the carbon dioxide attributable to the consumption of paper due to the large number of manually processes required by the farm programs and the legacy system's inability to provide Internet capabilities, such as online application and eligibility processes, etc., FSA estimates 1,570 tons in carbon emissions annually.

The paper cost does not include the required storage of the paper to meet the Federal document retention regulations or the transportation of documents to a storage facility. By allowing producers to submit program application forms

and/or other required documents electronically, accepting electronic or digital signatures, and storing files electronically, FSA will reduce the carbon footprint, conserve energy and provide greater benefits to customers and society as whole.

–Producer's Travel

On average most customers make 4 trips to the local county office to conduct business with FSA^{vii}. During these visits producers normally submit and sign annual program requirement documents, such as acreage reports, and/or complete various farm program applications for benefit or services throughout the applicable crop year.

FSA estimates that a producer's average miles traveled per visit is 36 miles round trip to the local County Office. Based on 18 miles per gallon for the producer's transportation^{viii} at \$3.60 per gallon of fuel (based on October 2008 prices), the total estimated cost of all the annual trips by the 1.5 million producers is \$47 million; generating an estimated 113,025 tons of carbon dioxide. As a rough estimate, using an hourly wage for a producer at \$16.04 per hour at two hours per visit in travel and time; with 1.5 million producers the value of the producer's cost for 4 visits is an estimated \$192.4 million per year.

fig. 16

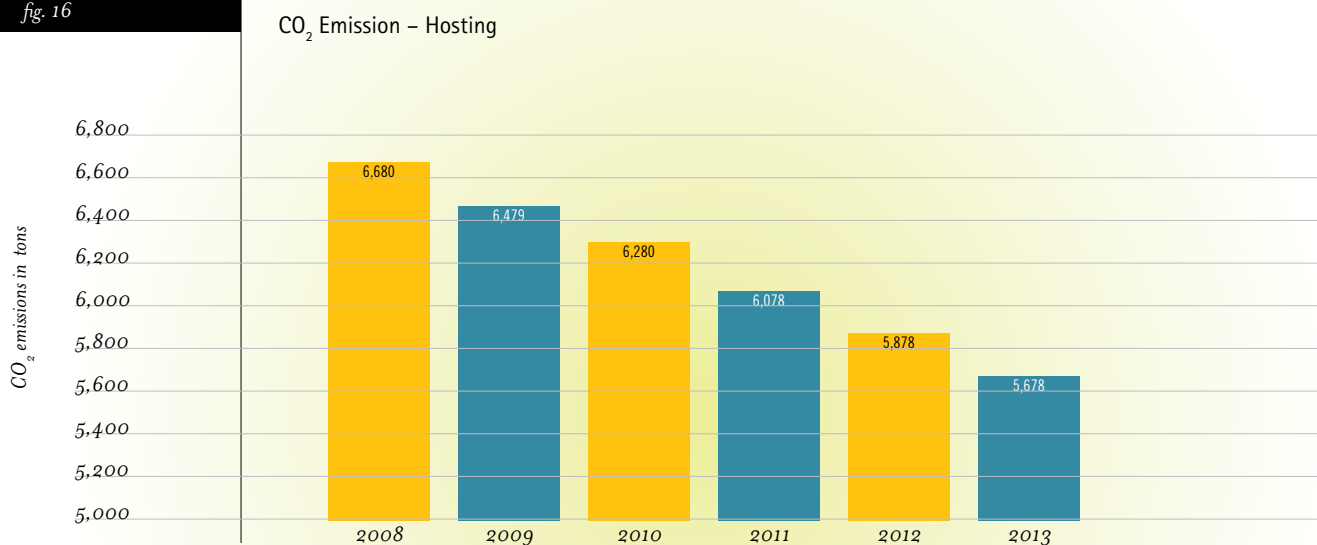
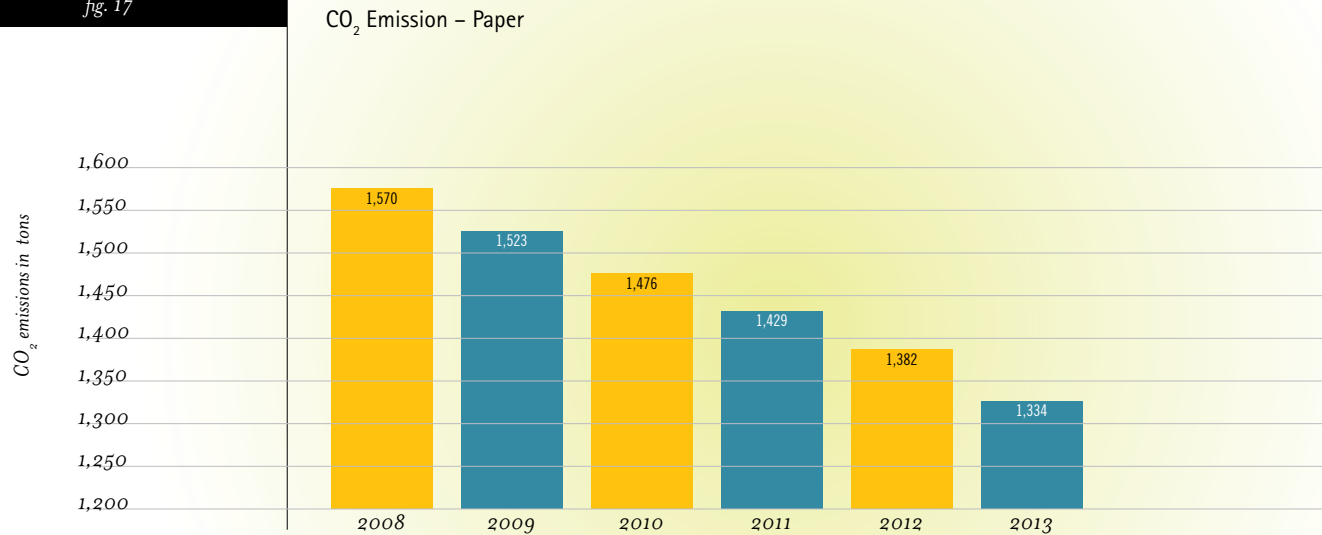


fig. 17



Carbon Reduction Plan

Implementation of the MIDAS project will reduce the carbon emissions and provide a more energy efficient delivery system that will be more environmentally sensitive and responsible.

–Hardware/Software Carbon Reduction Plan

MIDAS will reduce the carbon emissions related to energy expended to maintain, and support the IT system for the delivery of farm program benefits and the carbon footprint for services by removing the mini computers, approximately 2,400 distributed servers to 50 servers Nationwide. Additionally the architecture will eliminate the need to redundantly store information on a mainframe, thus further reducing energy usage. The reduced number of servers and the implementation of cost-efficient energy data storage is projected to reduce the CO₂ emissions to 5,878 tons in 2012[2] and to 5,678 tons in 2013 (Fig. 16).

–Paperwork Carbon/Cost Savings Reduction Plan

MIDAS will allow for full electronic submission and reporting through a secured Internet Website. This will reduce the Agency's paper cost, reduce the producers' travel time, reduce potential errors and duplication associated with data entry, and reduce the carbon emissions associated with the system generation of excess pieces of paper.

FSA estimates with the implementation of MIDAS and Lean Six Sigma process improvements, reduction in paper costs and carbon emissions will be achieved beginning in FY2009. The reductions in FY2009 will be as result of the Lean Six Sigma business process improvements that will help to reduce the number of manual processes by eliminating inefficient or defective business processes or requirements (Fig. 17).

FSA estimates a 90% reduction in paper cost by FY 2013 for a paper cost savings of \$497,250.00 and a carbon emissions reduction of 236 tons. FSA projects short-term savings, as a result of Lean Six Sigma business process improvements, will be realized in FY 2009. CO₂ emission will be reduced by 47 tons^x.

^x Multiplied by an estimated 1 million producers, that the program requires 110 million pieces of paper or 221,000 reams of paper per year.

ⁱⁱ The costs are based on the GSA schedule price for a ream of paper which is \$2.50 per ream

ⁱⁱⁱ 4 Trip Average is based on the DCP Customer Satisfaction Survey.

^{iv} Assuming the producer vehicle of choice is a SUV

^v Assumption is based on 50% of the AS400 being removed (Transitioning process) as a part of the MIDAS project

^x Assumption is based on implementation of 1 of the MIDAS-Lean Six Sigma Quick Hit projects — that will minimally reduce the use paper.

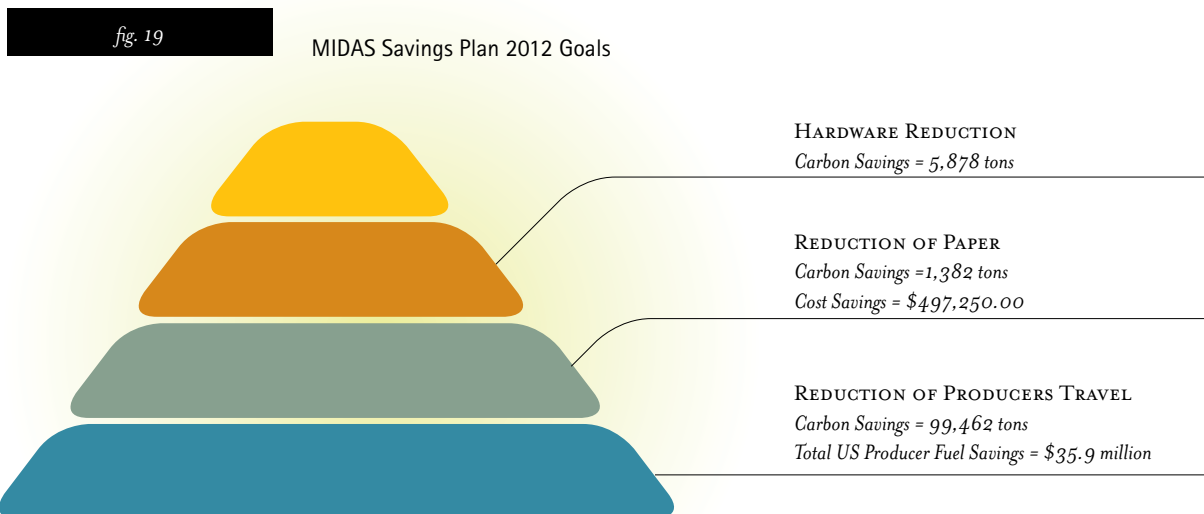
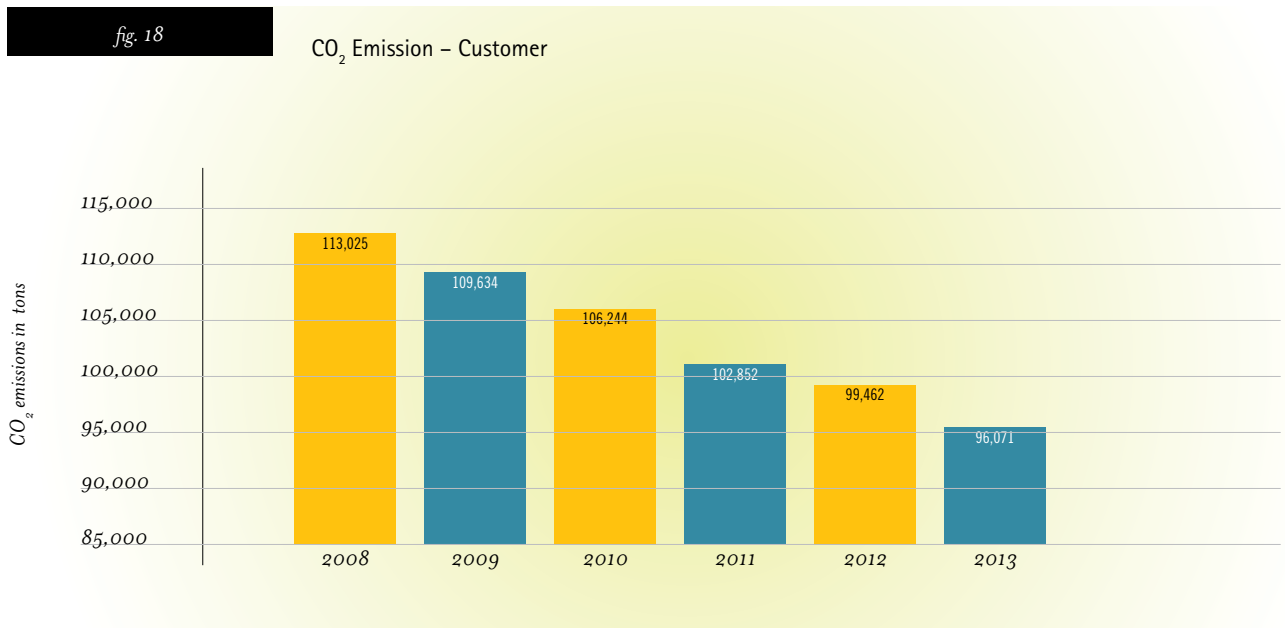


–Producer’s Travel

MIDAS will provide expanded functionality for all types of users of the systems. The redesigned system would provide information that is centralized and accessible to internal and external customers through the Internet and Web services. FSA envisions that the level of effort for currently existing, highly manual processes will be reduced significantly through the increased automation capabilities. Customers’ travel

time and travel costs will be reduced, therefore, reducing the CO₂ emissions and positively impacting the environment. Reducing the average 4 visits to the local County Offices to 1 annual visit will reduce the CO₂ emissions to 96,071 tons by year 2013 for a savings of 16,954 tons (Fig. 18). The estimated fuel costs savings as a result of the reduced CO₂ emission in year 2013 is \$47 million^{vi}.

^{vi} \$3.60 per gallon / four trips per year / 36 miles round trip / 18 miles per gallon assumed



8.7 Other Targeted Areas



SCORECARD

Technology Group: Various

Employees on VoIP Desktop Phones

Current Status:	11,000 phones
2009 Target:	26,000 phones
2010 Target:	52,000 phones
2011 Target:	58,000 phones
2012 Target:	89,000 phones
2013 Target:	89,000 phones

Thin Client Deployment

Current Status:	75 thin clients
2009 Target:	1,000 thin clients
2010 Target:	2,000 thin clients
2011 Target:	4,000 thin clients
2012 Target:	8,000 thin clients
2013 Target:	15,000 thin clients

Laptop Procurement in EPEAT Gold and Silver Standard

Current Status:	0% EPEAT
2009 Target:	14% EPEAT
2010 Target:	28% EPEAT
2011 Target:	42% EPEAT
2012 Target:	56% EPEAT
2013 Target:	70% EPEAT

Computer Power Management

Current Status:	100% computers
2009 Target:	100% computers
2010 Target:	100% computers
2011 Target:	100% computers
2012 Target:	100% computers
2013 Target:	100% computers

"Whether it's achieving energy independence, whether it's improving the environment, or creating a new framework of rules for international trade – agriculture holds the solutions that can create a more secure and a more prosperous future for not only Americans but for a world."

–Former Secretary of Agriculture, Mike Johanns, to USDA's Annual Agricultural Outlook Forum

SCORECARD

Server Virtualization

Current Status:	Pending ^{xii}
2009 Target:	15% servers
2010 Target:	30% servers
2011 Target:	45% servers
2012 Target:	60% servers
2013 Target:	70% servers

EmpowHR

Current Status:	25 HR solutions
2009 Target:	25 HR solutions
2010 Target:	1 HR solution

Web TA

Current Status:	5 T&A solutions
2009 Target:	1 T&A solution

General Ledgers

Current Status:	9 general ledgers
2009 Target:	9 general ledgers
2010 Target:	5 general ledgers
2011 Target:	1 general ledger

Grant Systems

Current Status:	13 grant solutions
2009 Target:	13 grant solutions
2010 Target:	1 grant solution

^{xii} Currently undergoing EDC consolidation plan, which will significantly affect the status of server virtualization. Current status is pending at this time.

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To build a future of energy security, we must trust in the creative genius of American researchers and entrepreneurs and empower them to pioneer a new generation of clean energy technology.

Together we should take the next steps: Let us fund new technologies that can generate coal power while capturing carbon emissions. Let us increase the use of renewable power and emissions-free nuclear power. Let us continue investing in advanced battery technology & renewable fuels to power the cars and trucks of the future. Let us create a new international clean technology fund, which will help developing nations like India and China make greater use of clean energy sources.

And let us complete an international agreement that has the potential to slow, stop, and eventually reverse the growth of greenhouse gases. This agreement will be effective only if it includes commitments by every major economy and gives none a free ride"

-President George W. Bush, 2008 State of the Union Address.

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"Farmers and ranchers have a deep respect for the land; they depend on it, it sustains them. And in return they're one of the best guardians of our properties. At USDA we recognize this commitment and the commitment to conservation. And we appreciate it. We've developed a wide range of programs and partnerships to help our farmers and ranchers protect America the beautiful."

—Secretary of Agriculture Ed Schafer on Earth Day 2008



Federal Register

**Friday,
January 26, 2007**

Part II

The President

**Executive Order 13423—Strengthening
Federal Environmental, Energy, and
Transportation Management**

Federal Register

Vol. 72, No. 17

Friday, January 26, 2007

Presidential Documents

Title 3—

Executive Order 13423 of January 24, 2007

The President

Strengthening Federal Environmental, Energy, and Transportation Management

By the authority vested in me as President by the Constitution and the laws of the United States of America, and to strengthen the environmental, energy, and transportation management of Federal agencies, it is hereby ordered as follows:

Section 1. Policy. It is the policy of the United States that Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

Sec. 2. Goals for Agencies. In implementing the policy set forth in section 1 of this order, the head of each agency shall:

(a) improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003;

(b) ensure that (i) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (ii) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use;

(c) beginning in FY 2008, reduce water consumption intensity, relative to the baseline of the agency's water consumption in fiscal year 2007, through life-cycle cost-effective measures by 2 percent annually through the end of fiscal year 2015 or 16 percent by the end of fiscal year 2015;

(d) require in agency acquisitions of goods and services (i) use of sustainable environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products, and (ii) use of paper of at least 30 percent post-consumer fiber content;

(e) ensure that the agency (i) reduces the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency, (ii) increases diversion of solid waste as appropriate, and (iii) maintains cost-effective waste prevention and recycling programs in its facilities;

(f) ensure that (i) new construction and major renovation of agency buildings comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006)*, and (ii) 15 percent of the existing Federal capital asset building inventory of the agency as of the end of fiscal year 2015 incorporates the sustainable practices in the Guiding Principles;

(g) ensure that, if the agency operates a fleet of at least 20 motor vehicles, the agency, relative to agency baselines for fiscal year 2005, (i) reduces the fleet's total consumption of petroleum products by 2 percent annually through the end of fiscal year 2015, (ii) increases the total fuel consumption that is non-petroleum-based by 10 percent annually, and (iii) uses plug-in hybrid (PIH) vehicles when PIH vehicles are commercially available at



a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles; and

(h) ensure that the agency (i) when acquiring an electronic product to meet its requirements, meets at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product, (ii) enables the Energy Star feature on agency computers and monitors, (iii) establishes and implements policies to extend the useful life of agency electronic equipment, and (iv) uses environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.

Sec. 3. Duties of Heads of Agencies. In implementing the policy set forth in section 1 of this order, the head of each agency shall:

(a) implement within the agency sustainable practices for (i) energy efficiency, greenhouse gas emissions avoidance or reduction, and petroleum products use reduction, (ii) renewable energy, including bioenergy, (iii) water conservation, (iv) acquisition, (v) pollution and waste prevention and recycling, (vi) reduction or elimination of acquisition and use of toxic or hazardous chemicals, (vii) high performance construction, lease, operation, and maintenance of buildings, (viii) vehicle fleet management, and (ix) electronic equipment management;

(b) implement within the agency environmental management systems (EMS) at all appropriate organizational levels to ensure (i) use of EMS as the primary management approach for addressing environmental aspects of internal agency operations and activities, including environmental aspects of energy and transportation functions, (ii) establishment of agency objectives and targets to ensure implementation of this order, and (iii) collection, analysis, and reporting of information to measure performance in the implementation of this order;

(c) establish within the agency programs for (i) environmental management training, (ii) environmental compliance review and audit, and (iii) leadership awards to recognize outstanding environmental, energy, or transportation management performance in the agency;

(d) within 30 days after the date of this order (i) designate a senior civilian officer of the United States, compensated annually in an amount at or above the amount payable at level IV of the Executive Schedule, to be responsible for implementation of this order within the agency, (ii) report such designation to the Director of the Office of Management and Budget and the Chairman of the Council on Environmental Quality, and (iii) assign the designated official the authority and duty to (A) monitor and report to the head of the agency on agency activities to carry out subsections (a) and (b) of this section, and (B) perform such other duties relating to the implementation of this order within the agency as the head of the agency deems appropriate;

(e) ensure that contracts entered into after the date of this order for contractor operation of government-owned facilities or vehicles require the contractor to comply with the provisions of this order with respect to such facilities or vehicles to the same extent as the agency would be required to comply if the agency operated the facilities or vehicles;

(f) ensure that agreements, permits, leases, licenses, or other legally-binding obligations between the agency and a tenant or concessionaire entered into after the date of this order require, to the extent the head of the agency determines appropriate, that the tenant or concessionaire take actions relating to matters within the scope of the contract that facilitate the agency's compliance with this order;

(g) provide reports on agency implementation of this order to the Chairman of the Council on such schedule and in such format as the Chairman of the Council may require; and

"It is a nation's responsibility to treat its natural resources as assets it must turn over to the next generation increased, not impaired, in value."

— President Theodore Roosevelt

(h) provide information and assistance to the Director of the Office of Management and Budget, the Chairman of the Council, and the Federal Environmental Executive.

Sec. 4. *Additional Duties of the Chairman of the Council on Environmental Quality.* In implementing the policy set forth in section 1 of this order, the Chairman of the Council on Environmental Quality:

(a) (i) shall establish a Steering Committee on Strengthening Federal Environmental, Energy, and Transportation Management to advise the Director of the Office of Management and Budget and the Chairman of the Council on the performance of their functions under this order that shall consist exclusively of (A) the Federal Environmental Executive, who shall chair, convene and preside at meetings of, determine the agenda of, and direct the work of, the Steering Committee, and (B) the senior officials designated under section 3(d)(i) of this order, and (ii) may establish subcommittees of the Steering Committee, to assist the Steering Committee in developing the advice of the Steering Committee on particular subjects;

(b) may, after consultation with the Director of the Office of Management and Budget and the Steering Committee, issue instructions to implement this order, other than instructions within the authority of the Director to issue under section 5 of this order; and

(c) shall administer a presidential leadership award program to recognize exceptional and outstanding environmental, energy, or transportation management performance and excellence in agency efforts to implement this order.

Sec. 5. *Duties of the Director of the Office of Management and Budget.* In implementing the policy set forth in section 1 of this order, the Director of the Office of Management and Budget shall, after consultation with the Chairman of the Council and the Steering Committee, issue instructions to the heads of agencies concerning:

(a) periodic evaluation of agency implementation of this order;

(b) budget and appropriations matters relating to implementation of this order;

(c) implementation of section 2(d) of this order; and

(d) amendments of the Federal Acquisition Regulation as necessary to implement this order.

Sec. 6. *Duties of the Federal Environmental Executive.* A Federal Environmental Executive designated by the President shall head the Office of the Federal Environmental Executive, which shall be maintained in the Environmental Protection Agency for funding and administrative purposes. In implementing the policy set forth in section 1 of this order, the Federal Environmental Executive shall:

(a) monitor, and advise the Chairman of the Council on, performance by agencies of functions assigned by sections 2 and 3 of this order;

(b) submit a report to the President, through the Chairman of the Council, not less often than once every 2 years, on the activities of agencies to implement this order; and

(c) advise the Chairman of the Council on the Chairman's exercise of authority granted by subsection 4(c) of this order.

Sec. 7. *Limitations.* (a) This order shall apply to an agency with respect to the activities, personnel, resources, and facilities of the agency that are located within the United States. The head of an agency may provide that this order shall apply in whole or in part with respect to the activities, personnel, resources, and facilities of the agency that are not located within the United States, if the head of the agency determines that such application is in the interest of the United States.



(b) The head of an agency shall manage activities, personnel, resources, and facilities of the agency that are not located within the United States, and with respect to which the head of the agency has not made a determination under subsection (a) of this section, in a manner consistent with the policy set forth in section 1 of this order to the extent the head of the agency determines practicable.

Sec. 8. Exemption Authority. (a) The Director of National Intelligence may exempt an intelligence activity of the United States, and related personnel, resources, and facilities, from the provisions of this order, other than this subsection and section 10, to the extent the Director determines necessary to protect intelligence sources and methods from unauthorized disclosure.

(b) The head of an agency may exempt law enforcement activities of that agency, and related personnel, resources, and facilities, from the provisions of this order, other than this subsection and section 10, to the extent the head of an agency determines necessary to protect undercover operations from unauthorized disclosure.

(c) (i) The head of an agency may exempt law enforcement, protective, emergency response, or military tactical vehicle fleets of that agency from the provisions of this order, other than this subsection and section 10.

(ii) Heads of agencies shall manage fleets to which paragraph (i) of this subsection refers in a manner consistent with the policy set forth in section 1 of this order to the extent they determine practicable.

(d) The head of an agency may submit to the President, through the Chairman of the Council, a request for an exemption of an agency activity, and related personnel, resources, and facilities, from this order.

Sec. 9. Definitions. As used in this order:

(a) "agency" means an executive agency as defined in section 105 of title 5, United States Code, excluding the Government Accountability Office;

(b) "Chairman of the Council" means the Chairman of the Council on Environmental Quality, including in the Chairman's capacity as Director of the Office of Environmental Quality;

(c) "Council" means the Council on Environmental Quality;

(d) "environmental" means environmental aspects of internal agency operations and activities, including those environmental aspects related to energy and transportation functions;

(e) "greenhouse gases" means carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride;

(f) "life-cycle cost-effective" means the life-cycle costs of a product, project, or measure are estimated to be equal to or less than the base case (i.e., current or standard practice or product);

(g) "new renewable sources" means sources of renewable energy placed into service after January 1, 1999;

(h) "renewable energy" means energy produced by solar, wind, biomass, landfill gas, ocean (including tidal, wave, current and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project;

(i) "energy intensity" means energy consumption per square foot of building space, including industrial or laboratory facilities;

(j) "Steering Committee" means the Steering Committee on Strengthening Federal Environmental, Energy, and Transportation Management established under subsection 4(b) of this order;

(k) "sustainable" means to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling

the social, economic, and other requirements of present and future generations of Americans; and

(l) "United States" when used in a geographical sense, means the fifty states, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, and the Northern Mariana Islands, and associated territorial waters and airspace.

Sec. 10. General Provisions. (a) This order shall be implemented in a manner consistent with applicable law and subject to the availability of appropriations.

(b) Nothing in this order shall be construed to impair or otherwise affect the functions of the Director of the Office of Management and Budget relating to budget, administrative, or legislative proposals.

(c) This order is intended only to improve the internal management of the Federal Government and is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by a party against the United States, its departments, agencies, instrumentalities, entities, officers, employees or agents, or any other person.

Sec. 11. Revocations; Conforming Provisions. (a) The following are revoked:

(i) Executive Order 13101 of September 14, 1998;

(ii) Executive Order 13123 of June 3, 1999;

(iii) Executive Order 13134 of August 12, 1999, as amended;

(iv) Executive Order 13148 of April 21, 2000; and

(v) Executive Order 13149 of April 21, 2000.

(b) In light of subsection 317(e) of the National Defense Authorization Act for Fiscal Year 2002 (Public Law 107-107), not later than January 1 of each year through and including 2010, the Secretary of Defense shall submit to the Senate and the House of Representatives a report regarding progress made toward achieving the energy efficiency goals of the Department of Defense.

(c) Section 3(b)(vi) of Executive Order 13327 of February 4, 2004, is amended by striking "Executive Order 13148 of April 21, 2000" and inserting in lieu thereof "other executive orders".



THE WHITE HOUSE,
January 24, 2007.

[FR Doc. 07-374
Filed 1-25-07; 8:50 am]
Billing code 3195-01-P

UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

September 17, 2007

SECRETARY'S MEMORANDUM 5500-002

IMPLEMENTING EXECUTIVE ORDER 13423

STRENGTHENING FEDERAL ENVIRONMENTAL, ENERGY, AND TRANSPORTATION MANAGEMENT

1. PURPOSE

Executive Order (E.O.) 13423 requires the Department of Agriculture (USDA) to adhere to the policy set forth in the E.O. "that Federal Agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner." The E.O. requires USDA to develop and implement environmental management systems (EMS) and sustainable practices that adhere to the requirements specified in the E.O. The purpose of this memorandum is to emphasize the importance of internal USDA actions to meet these requirements.

2. BACKGROUND

The E.O. requires that the head of each executive branch department and Agency implement the policy cited above by taking the following actions:

- a. Designate a senior civilian officer to be responsible for implementation of the E.O. within the Agency and assign the designated official the authority and duty to monitor and report to the head of the Agency on Agency implementation activities;
- b. Implement sustainable practices for: energy efficiency and reductions in greenhouse gas emissions; renewable energy, including bioenergy; water conservation;

acquisition of green products and services; waste prevention and recycling; reduced use of toxic and hazardous chemicals and materials; high performance/sustainable design buildings; vehicle fleet management including use of alternative vehicles and fuels and reductions in petroleum consumption; and electronics stewardship;

- c. Implement EMS at all appropriate organizational levels within the department;
- d. Use EMS as the primary management approach for addressing environmental aspects of internal Agency operations and activities, including environmental aspects of energy and transportation functions; and
- e. Establish within the Agency programs for: environmental management training; environmental compliance review and audit; and leadership awards.

The E.O. directs the Chairman of the Council on Environmental Quality (CEQ) and the Director of the Office of Management and Budget, in consultation with the Steering Committee on Strengthening Federal Environmental, Energy, and Transportation Management, to issue implementing instructions to the heads of Agencies.

Federal Environmental, Energy, and Transportation Management is a component of the President's Management Council (PMC) and progress is measured by three Office of Management and Budget (OMB) scorecards: Environmental Stewardship, Energy Management, and Transportation Management. Pursuant to E.O. 13423 and these scorecards, USDA must use environmental management systems as the primary management approach to address environmental aspects of internal Agency operations, including the collection, analysis, and reporting of information to measure performance in the implementation of the E.O.

USDA's Office of Procurement and Property Management, in consultation with the USDA Sustainable Operations Council (SOC), will develop internal guidance to comply with E.O. 13423. As

ordered by the E.O., USDA has designated a Senior Official, Assistant Secretary for Administration (ASA), Boyd Rutherford, accountable for the effective implementation of E.O. 13423 within the Department. The ASA is the designated official for all information and communications regarding E.O. 13423 and USDA's responsibilities under the E.O. The ASA, through the SOC, will develop and implement policies, procedures, processes, reporting mechanisms, and required actions that meet the goals and requirements established by E.O. 13423 and the implementing instructions issued by the CEQ and OMB.

3. EFFECTIVE DATE

The provisions of this memorandum are effective immediately.

4. POLICY

It shall be USDA's policy to comply with the goals and requirements established by E.O. 13423 and the implementing instructions issued by the CEQ and OMB consistent with the actions ordered below.

5. ACTIONS ORDERED

The following actions are hereby ordered:

- a. The ASA shall establish and chair a USDA SOC to advise the ASA and provide ongoing senior management involvement and coordination to Agencies' EMS and sustainable operations programs.
- b. USDA shall establish and implement environmental, energy, and transportation management performance measures and begin data collection to meet E.O. and OMB scorecard reporting requirements, utilizing EMS as the primary management approach.
- c. USDA shall develop a timeline for, and implement environmental management systems at all appropriate organizational levels.

- d. Each landholding Agency shall, in the three-year rolling timeline established under E.O. 13327, include in their plans how the E.O. 13423 goals and performance measures applicable to design, construction, and operation of real property facilities will be met.
- e. USDA Agencies shall manage Departmental real and personal property assets consistent with the goals and objectives of E.O. 13423 and the Department's implementing instructions.

6. TERMINATION

This memorandum shall remain in effect for 12 months.

Mike Johanns
Secretary

Distribution:
Assistant Secretary for Administration
Director, Office of Budget and Program Analysis
Chief Information Officer
Director, Office of the Executive Secretariat
General Counsel

National Information Technology Center

Report On Kansas City Data Center Energy Efficiency

Background

Since 1996, the National Information Technology Center (NITC) has been actively involved in evaluating new technologies and implementing more energy efficient solutions for its infrastructure systems and computing environments. Upon the enactment of the EPCRA 2005 (dated August 2005), which accelerated energy consumption reductions to 2% annually, the NITC reprioritized many infrastructure upgrades to ensure that these goals were met. These efforts have served to reduce NITC's average Power Usage Effectiveness (PUE)³ ratio to 1.69 and its worst case² PUE ratio is 1.88.

Actions Taken

Over the past 11 years NITC has identified and implemented many energy savings initiatives the most significant are as follows:

- Replacement of Data Center lighting with high efficiency electronic ballasts utilizing low wattage lamps.
- Installation of a Virtual Tape System allowing for the decommissioning and removal of many outdated and inefficient tape drives.
- Replacement of outdated and inefficient Computer Room Air Conditioning (CRAC) Units with newer technology CRAC Units that are rated at >90% efficient.
- Replacement of Uninterruptible Power Supply (UPS) units, with high efficiency modular units that allow for the right sizing of supply power to load while operating at >93% efficiency.
- Replacement of main electrical distribution system transformers with newer technology transformers that operate at >95% efficiency.
- Replacement of rooftop mounted air conditioning dry-coolers with new units rated to operate at >90% efficiency.
- Replacement of air conditioning system in the main power distribution center with units rated to operate at >90% efficiency. Additionally, due to the equipment housed in this space being able to withstand higher relative humidity (rH) levels than the computing equipment NITC was able to install an air economizer feature allowing this space to utilize "free-cooling" when outside air temperatures drop below 40F.
- NITC implemented virtualization across many of its shared computing environments allowing the physical number of machines to be reduced, as compared to the old paradigm of one server per application.
- NITC identified a number of under floor blockages within the data center that could potentially impact air flow to computing equipment and took action to have these blockages removed.
- NITC made a concerted effort to optimize the raised floor layout by relocating equipment and aligning the entire space to the hot row-cold row concept of operations. This process is ongoing as customer outages have to be coordinated to physically relocate equipment.
- NITC analyzed the layout and location of vented floor tiles, and realigned as necessary to ensure that the static pressure of the raised floor plenum was maintained and that conditioned air was directed to the heat loads rather than inefficiently expended to areas where no load was present.

- NITC installed blanking panels in racks and air dams in floor penetrations to ensure that conditioned air was directed to the heat loads rather than inefficiently expended.
- NITC continuously monitors and adjusts CRAC units to ensure that they are properly coordinated, and that inefficient operations such as, one unit being in a heat mode competing with others in a maximum cooling mode, do not occur.

Future State

The NITC has evaluated several technologies where additional energy efficiencies can be gained and intends to implement the following during the next two to three years:

- In-row cooling, by adopting close coupled cooling technology the cooling source can be moved directly adjacent to the heat source. This proximity allows the use of less powerful fans as compared to cooling a large open space.
- As Energy Star and/or other energy efficient certifications become available and cost effect the NITC intends to institute a policy where all new and replacement servers shall be required to have an energy efficient certification.
- The NITC will consolidate to a single shared storage solution for mainframe DASD and its midrange Enterprise Storage Area Network. Elimination of an entire storage platform will dramatically reduce energy consumption directly attributable to enterprise

storage.

- As customer computing uptime requirements allow, NITC will continue to optimize its floor layout optimization.
- NITC will continue to maximize virtualization of its shared computing environments and when applicable, recommend this solution to customers on dedicated platforms.

Conclusion

The NITC average PUE ratio of 1.69 meets the EPA recommendation³ of data center PUE ratios of 1.7 by 2011. The NITC estimates that by implementing the additional technologies, cited above, that it can achieve a PUE ratio of 1.6 or less by 2011.

¹ Whitepaper—Green Grid Metrics: Describing Data Center Power Efficiency, February 20, 2007

² Worst Case Conditions based on electrical consumption during peak-period computing hours with a 102F outside air temperature.

³ Table 3–5, Page 53, EPA Report to Congress on Server and Data Center Energy Efficiency Public Law 109-431, dated August 2, 2007



United States Department of Agriculture

Office of the Secretary
Washington, D.C. 20250

JUL 28 2008

TO: Agency Chief Information Officers

FROM: Charles R. Christopherson, Jr.
Chief Financial and Information Officer

Boyd K. Rutherford
Assistant Secretary for Administration

SUBJECT: Required Workstation Energy Conservation Settings

The Department of Agriculture (USDA) strongly supports the President's initiative to conserve energy in the Federal government. For all employee workstations, USDA will be requiring a standard configuration policy on the computer to conserve energy.

1. **Monitor Background and Screensaver**– Agencies are to remove graphical backgrounds and provide, by system policy, a black background; agencies are also to remove the graphical screensavers and, by system policy, require a black screensaver.

Electric Savings = Approximately 4 watts per computer per hour for approximately 118,000 computers. This totals 113,280 KWh per year. The savings equals operating 12,414 halogen light bulbs for 24 hours per day for a full year.

Total USDA Carbon Savings = 86.94 tons per year (1.535/KWh)

Total USDA Dollar Savings = \$11,328 (.09 per KWh)

2. **Monitor Sleep Mode** – USDA requires agencies, by system policy, to ensure that the power management system be set to shut the monitor off after 15 minutes of inactivity.

Electric Savings = Approximately 90 watts per computer per hour for approximately 118,000 computers during non-working hours. This totals 62,020,800 KWh per year.

Total USDA Carbon Savings = 47,601 tons per year (1.535/KWh)

Total USDA Dollar Savings = \$5,581,872 (.09 per KWh)

An Equal Opportunity Employer

3. **Hibernate Mode** – USDA requires agencies by system policy to require that the power management system be set to hibernate the system after 30 minutes of inactivity.

Electric Savings = Approximately 84 watts per computer per hour for approximately 118,000 computers during non-working hours. This totals 57,886,080 KWh per year.

Total USDA Carbon Savings = 44,427 tons per year (1.535/KWh)

Total USDA Dollar Savings = \$5,209,747 (.09 per KWh)

While the savings noted above are only rough estimates, the savings in carbon, electric usage, and dollars is large. With the implementation of these policies, USDA can reduce carbon usage by 92,114 tons each year. This is equivalent to the amount of carbon produced by 108,305 cars per year.

We appreciate all employees helping to reduce power consumption by adhering to the USDA system configuration for power management settings.

Attachment E

Fortune 100 Corporation Green Plans (2008)

Rank	Company	Green Plan Link
1	Wal-Mart Stores	http://walmartstores.com/Sustainability/
2	Exxon Mobil	http://www.exxonmobil.com/Corporate/energy_climate_actions.aspx
3	Chevron	http://www.chevron.com/globalissues/climatechange/actionplan/
4	General Motors	http://www.gm.com/corporate/responsibility/environment/
5	ConocoPhillips	http://www.conocophillips.com/social/environment/index.htm
6	General Electric	http://ge.ecomagination.com/site/index.html#vision/commitments
7	Ford Motor	http://www.ford.com/our-values/environment
8	Citigroup	http://www.citigroup.com/citigroup/environment/index.htm
9	Bank of America Corp.	http://www.bankofamerica.com/environment/index.cfm?template=env_redimpact
10	AT&T	http://www.corp.att.com/emea/docs/sustainability_2008_eng.pdf
11	Berkshire Hathaway	Green Plan can be found within individual holding portfolios
12	J.P. Morgan Chase & Co.	http://www.jpmorganchase.com/cm/cs?pagename=Chase/Href&urlName=jpmc/community/env/policy
13	American Intl. Group	http://phx.corporate-ir.net/phoenix.zhtml?c=76115&p=irol-govresponscorppolicy
14	Hewlett-Packard	http://www.hp.com/hpinfo/globalcitizenship/environment/index.html
15	Intl. Business Machines	http://www.ibm.com/ibm/green/index3.shtml?ca=agus_itgrngrhp-20080812&me=ibm&met=ibmhp&re=ibmhp&s_tact=106aw01w&cm_mmc=106aw01w_-_s_-_ibmhp-ibmhp_-_agus_itgrngrhp-20080812&sa_campaign=message/ideas/leadspace/all/eadflash
16	Valero Energy	http://www.valero.com/Environment/EnvironmentalStewardship.htm
17	Verizon Communications	http://responsibility.verizon.com/our-principles/environment.htm
18	McKesson	Not available
19	Cardinal Health	Not available
20	Goldman Sachs Group	http://www2.goldmansachs.com/citizenship/environment/policy-framework.pdf
21	Morgan Stanley	http://www.morganstanley.com/global/environment.html
22	Home Depot	http://corporate.homedepot.com/wps/portal/Environmental_Principles
23	Procter & Gamble	http://www.pg.com/company/our_commitment/environment.jhtml
24	CVS/Caremark	http://www.cvsremark.com/our-company/corporate-responsibility
25	UnitedHealth Group	http://www.unitedhealthgroup.com/about/com.htm
26	Kroger	http://www.kroger.com/healthy_living/Pages/green_living.aspx
27	Boeing	http://www.boeing.com/aboutus/environment/
28	AmerisourceBergen	Not available
29	Costco Wholesale	Not available
30	Merrill Lynch	http://www.ml.com/index.asp?id=7695_8134_13653_71406
31	Target	http://sites.target.com/images/corporate/about/responsibility_report/responsibility_report_environmental.pdf
32	State Farm Insurance Cos	http://www.statefarm.com/about/media/current/envirofriend.asp
33	WellPoint	Not available
34	Dell	http://www.dell.com/content/topics/global.aspx/about_dell/values/sustainability/environment/env_resp?c=us&l=en&s=corp
35	Johnson & Johnson	http://www.jnj.com/connect/caring/environment-protection/?flash=true
36	Marathon Oil	http://www.marathon.com/Social_Responsibility/Our_Global_Community/
37	Lehman Brothers Holdings	Green Plan can be found within individual holding portfolios
38	Wachovia Corp.	http://www.wachovia.com/inside/page/0,,132_10475,00.html
39	United Technologies	http://utc.com/responsibility/environment.htm
40	Walgreen	http://www.walgreens.com/images/pdfs/about/community/social_report_2008.pdf
41	Wells Fargo	https://www.wellsfargo.com/about/csr/ea/
42	Dow Chemical	http://www.dow.com/commitments/commit.htm
43	MetLife	Not available
44	Microsoft	http://www.microsoft.com/environment/
45	Sears Holdings	http://www.searsholdings.com/about/sustainability/index.htm
46	United Parcel Service	http://www.sustainability.ups.com/
47	Pfizer	http://www.pfizer.com/responsibility/
48	Lowe's	http://www.lowes.com/lowes/lkn?action=pg&p=AboutLoves/responsibility.html

49	Time Warner	http://www.timewarner.com/corp/citizenship/environment/index.html
50	Caterpillar	http://www.cat.com/cda/layout?m=199421&x=7
51	Medco Health Solutions	Not available
52	Archer Daniels Midland	http://www.admworld.com/naen/about/responsibility.asp
53	Fannie Mae	Not available
54	Freddie Mac	Not available
55	Safeway	http://shop.safeway.com/superstore/sixframeset.asp?page=investors
56	Sunoco	http://www.sunocoinc.com/Site/HES
57	Lockheed Martin	http://www.lockheedmartin.com/aboutus/energy_environment/index.html
58	Sprint Nextel	http://www.sprint.com/citizenship/
59	PepsiCo	http://www.pepsico.com/PEP_Citizenship/EnvironmentalNews/index.cfm
60	Intel	http://www.intel.com/intel/environment/index.htm?iid=about_intel+cr_environ
61	Altria Group	http://www.altria.com/responsibility/4_6_environmentagriculture.asp
62	Supervalu	http://www.supervalu.com/about/envstewardship.jsp
63	Kraft Foods	http://www.kraft.com/About/sustainability/
64	Allstate	http://www.allstate.com/environment/main.aspx
65	Motorola	http://www.motorola.com/content.jsp?globalObjectId=8505-11278
66	Best Buy	http://www.bestbuyinc.com/corporate_responsibility/
67	Walt Disney	http://corporate.disney.go.com/environmentality/index.html
68	FedEx	http://about.fedex.designcdt.com/corporate_responsibility/the_environment
69	Ingram Micro	Not available
70	Sysco	http://www.sysco.com/services/features/sysco_green/sysco_green.html
71	Cisco Systems	http://www.cisco.com/web/about/citizenship/environment/index.html
72	Johnson Controls	http://www.johnsoncontrols.com/publish/us/en/sustainability.html
73	Honeywell Intl.	http://www51.honeywell.com/hser/
74	Prudential Financial	http://www.prudential.com/view/page/public/14121
75	American Express	http://home3.americanexpress.com/corp/csr.asp
76	Northrop Grumman	Not available
77	Hess	http://www.hess.com/ehs/env_health_safety.htm
78	GMAC	Not available
79	Comcast	Not available
80	Alcoa	http://www.alcoa.com/global/en/eco_alcoa/eco_overview.asp
81	DuPont	http://www2.dupont.com/DuPont_Home/en_US/
82	New York Life Insurance	Not available
83	Coca-Cola	http://www.thecoca-colacompany.com/citizenship/environment.html
84	News Corp.	http://www.newscorp.com/energy/index.html
85	Aetna	http://www.aetna.com/about/aetna/cr/
86	TIAA-CREF	Not available
87	General Dynamics	http://www.generaldynamics.com/
88	Tyson Foods	http://www.tyson.com/Corporate/AboutTyson/TysonCares/Environment.aspx
89	HCA	Not available
90	Enterprise GP Holdings	Not available
91	Macy's	http://www.macysinc.com/AboutUs/SocialResponsibility/sustain.aspx
92	Delphi	http://delphi.com/about/social/environment/
93	Travelers Cos.	http://www.travelers.com/corporate-info/about/climateEnvironment.aspx
94	Liberty Mutual Ins. Group	Not available
95	Hartford Financial Services	Not available
96	Abbott Laboratories	http://www.abbott.com/global/url/content/en_US/40.60:60/general_content/General_Content_00061.htm
97	Washington Mutual	Not available
98	Humana	http://www.humana.com/about/company_information/environmental_responsibility.asp
99	Massachusetts Mutual Life Insurance	http://www.massmutual.com/mmfg/pdf/cr_report.pdf
100	3M	http://solutions.3m.com/wps/portal/3M/en_US/global/sustainability/



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