U.S. DEPARTMENT OF ENERGY

Accelerating to Net-Zero: Fueling the Clean Energy Transition

Anna J. Siefken, Deputy Director, U.S. DOE Federal Energy Management Program (FEMP)

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FEMP
Federal Energy Management Program

Quick Introductions

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Key Focus Areas:

- Public-Private Partnerships
- Net-Zero, Energy Efficient Buildings
- Long Duration Energy Storage
- Industrial Decarbonization

FEMP
Federal Energy Management Program

Presentation Overview

- Quick Introductions
- A story about my inspiration
- BIL Highlights – Setting the National Context
- FEMP – Federal Buildings and Fleets
  - Where it all began
  - How FEMP helps
  - Federal progress
- Your Place in the Clean Energy Transition
- 5 Ways to Get Involved

Fireside Chat with Dr. Sanya Carley

Q&A

FEMP
Federal Energy Management Program

Energy & “Climatetech” Innovation as a constant thread.

Product Development & Procurement for Residential, Commercial, & Contractor energy efficiency – B2B & B2C

CORPORATE

Product Assortment & Influencing Market-place Adoption for EE via voluntary program in 60+ product lines

CONSULTING

High Performance & Water Efficiency retrofits in Commercial Buildings at scale in 25 cities via a voluntary cohort model and in spite of outdated building codes. 500+ buildings, 84M sq ft in Pittsburgh

NON-PROFIT

Technology Innovation and RDD&D at all TRLs for energy efficiency and renewables. 175+ researchers. Workforce & economic development. Start-ups raised $313M in follow-on funding.

ACADEMIA

Public-Private Partnerships
Technology Innovation

- Net Zero Energy Buildings
- Long Duration Energy Storage
- Zero-Emission Shipping
- Industrial Decarbonization
- Green Powered Future

GOVERNMENT

Biden Administration and DOE Targets

Building on Past U.S. Leadership, including Efforts by States, Cities, Tribes, and Territories, the New Target Aims at 50-52 Percent Reduction in U.S. Greenhouse Gas Pollution from 2005 Levels in 2030

Accelerate and innovate RDD&D to transition America to a 100% clean energy economy no later than 2050 - and to ensure the benefits to all Americans.

DOE Program Priorities	100% Decarbonized electricity by 2035 Plan to Decarbonize: • Transportation across all modes • Energy intensive and high GHG industries • Buildings industry • To enable a net-zero agricultural sector
	Prioritize DEPLOYMENT for greatest impact

Laws that are Revolutionizing the U.S. Energy Sector

1. **Bipartisan Infrastructure Law** (Nov 2021)
   - Largest long-term investment in our nation's infrastructure in nearly a century
   - $62B for energy and climate

2. **CHIPS and Science Act** (July 2022)
   - Cutting-edge science and innovation to boost American competitiveness, including for semiconductors
   - $280B

3. **Inflation Reduction Act or IRA** (August 2022)
   - Incentivizes deployment of clean technologies and lowering energy costs for American families
   - $391B for clean energy

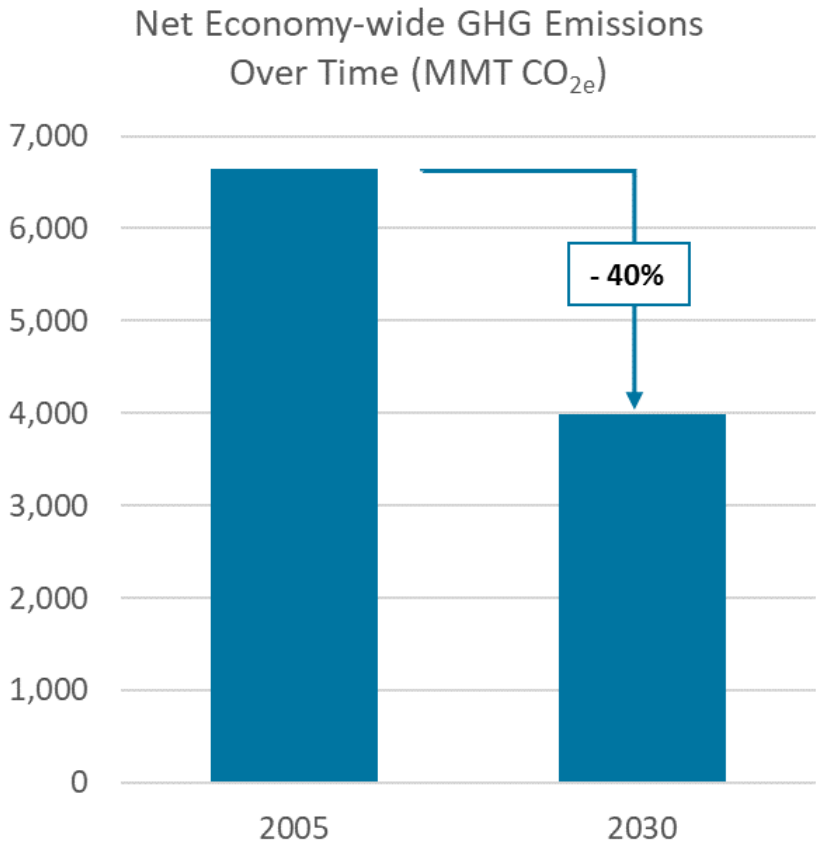
BIL + IRA invest more than $450 billion in U.S. Energy System

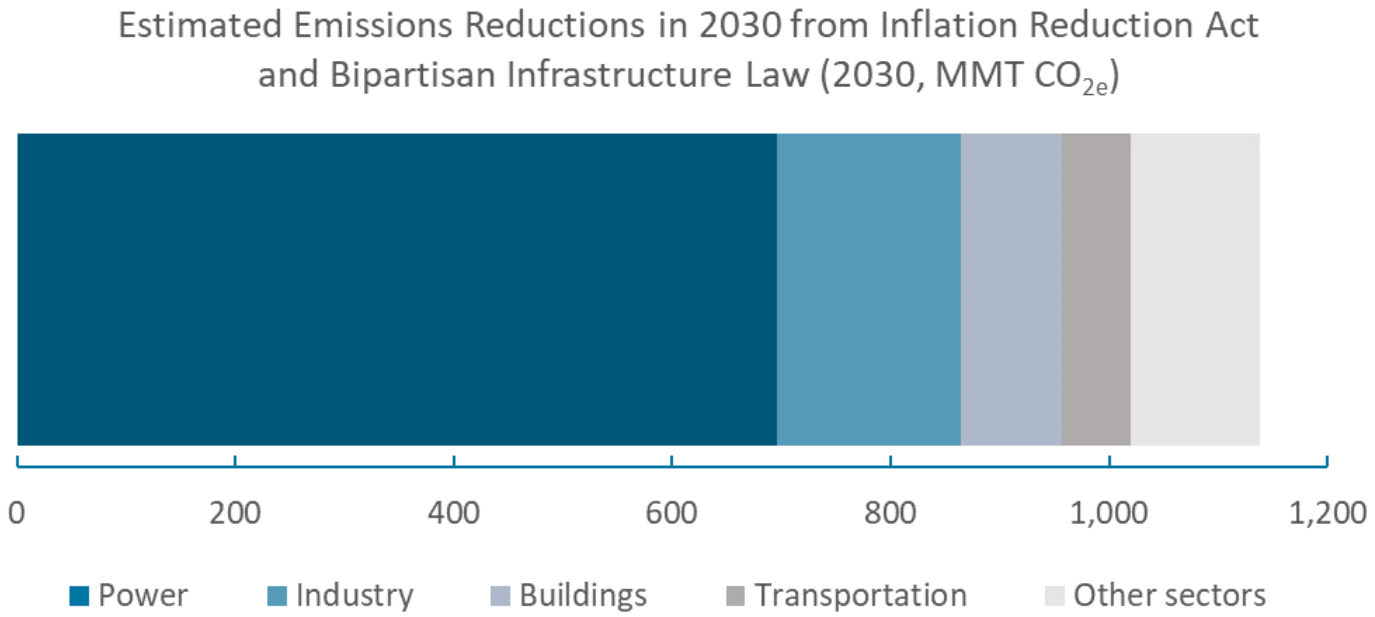
DOE Funding Impacts

Provides DOE ~$35 billion to invest in clean energy

- **$14 billion** for loans (LPO Energy Infrastructure Reinvestment Program, Advanced Technology Vehicle Manufacturing, Domestic Manufacturing Conversion Grants, Section 1703 program from Energy Act 2005)
- **$9 billion** for buildings (High-Efficiency Electric Home Rebates, HOMES, energy code adoptions)
- **$6 billion** for manufacturing (Advanced Industrial Facilities Deployment)
- **$3 billion** for the electric grid
- **$2 billion** for national lab infrastructure (SC, FECM, NE, EERE)
- **Over $1 billion** for other, including DPA, Tribal energy, advanced nuclear fuel (HALEU), etc.
- **$250 million** for Defense Production Act funding for heat pump manufacturing

IRA and BIL: Dramatically Reducing Greenhouse Gases





The Inflation Reduction Act and the Bipartisan Infrastructure Law, in combination with past actions, are projected to drive 2030 economy-wide GHG emissions to 40% below 2005 levels.

Bipartisan Infrastructure Law: Realigning DOE for Impact

The Bipartisan Infrastructure Law provides $62 billion to DOE — the largest investment since the Department's founding. Section 40554 **authorizes FEMP to award $250,000,000** in grants through the Assisting Federal Facilities with Energy Conservation Technologies (AFFECT) program.

To facilitate implementation of the Bipartisan Infrastructure Law, DOE is undergoing an organizational realignment that will position FEMP within a newly created Under Secretary for Infrastructure.

Learn more about the Bipartisan Infrastructure Law

- **Video:** U.S. DOE Bipartisan Infrastructure Deal Briefing - YouTube
- **DOE Fact Sheet:** The Bipartisan Infrastructure Deal Will Deliver For American Workers, Families and Usher in the Clean Energy Future
- **DOE webpage:** Bipartisan Infrastructure Law.

Leading by Example: White House Federal Sustainability Plan

100% Carbon Pollution-Free Electricity by 2030, including 50% on a 24/7 basis

100% Zero-Emission Vehicle Acquisitions by 2035, including 100% light-duty acquisitions by 2027

Net-Zero Emissions Buildings by 2045, including a 50% reduction by 2032

Net-Zero Emissions Procurement by 2050

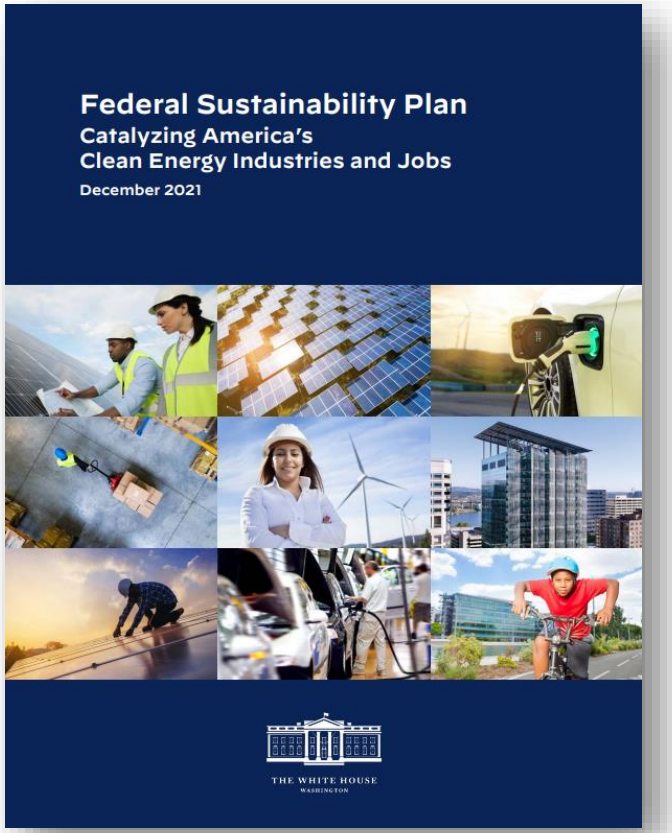
Net-Zero Emissions Operations by 2050, including a 65% reduction by 2030

Climate Resilient Infrastructure and Operations

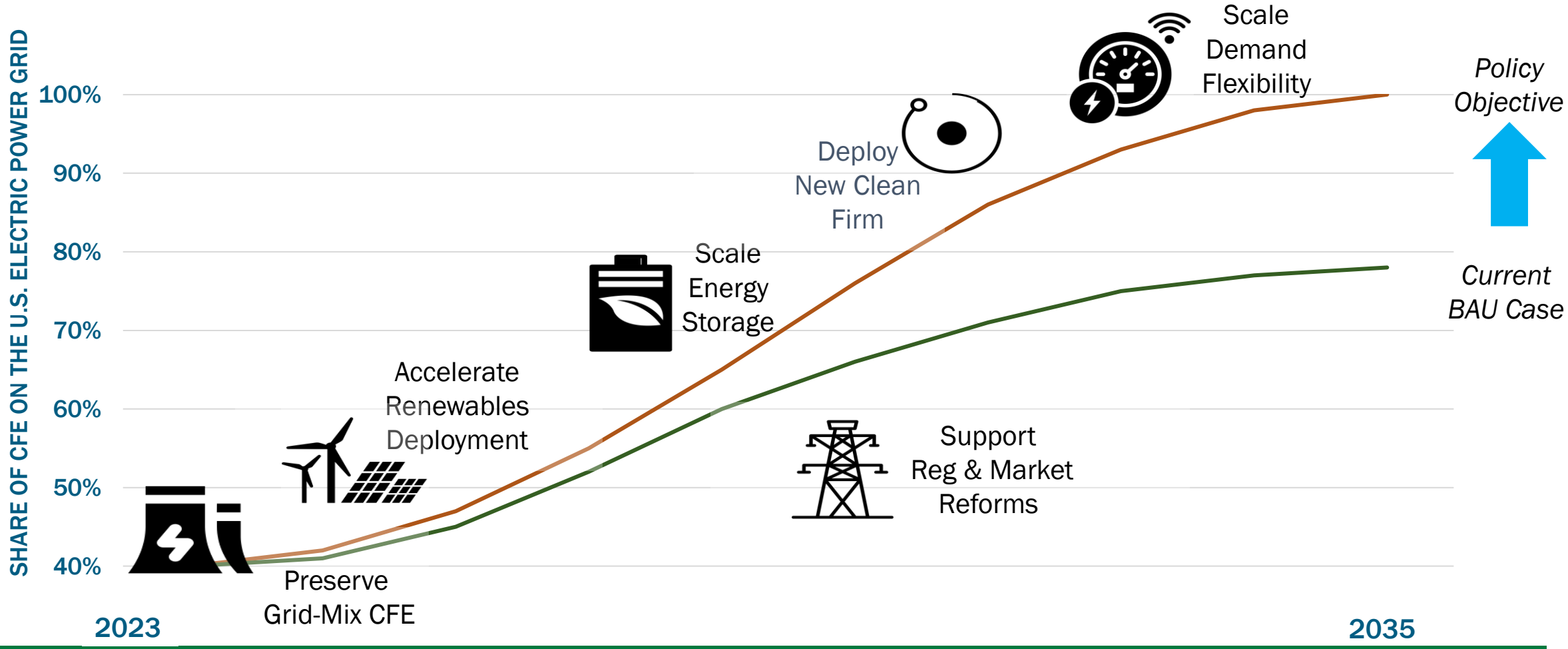
Develop a Climate- and Sustainability-Focused Workforce

Advance Environmental Justice and Equity-focused Operations

Accelerate Progress through Domestic and International Partnerships



Using the power of the federal footprint, we will help close the gap between current trends and President Biden's 2035 clean grid goal.



Conceptual Timing of CFE Technologies Deployments to reach Administration Policy Objective of 100% by 2035

Slide courtesy of the Council on Environmental Quality

Research, Development, Demonstration, and Deployment

- **Historically, ~80% of DOE funding was allocated to early-stage research and development (R&D)**
- **In 2022, DOE established a new demonstration and deployment arm:**
  - Infusion of Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) funds, nearly all of which are for large-scale demonstration and deployment
  - Strategic competition and evolution of clean energy technologies
- **Expanded DOE's scope to include RDD&D**
  - In sectors where the technology is already cheap and available.
  - In sectors in which we have the technology but need private-sector buy-in – finding ways to demonstrate/commercialize
- **Basic research continues to provide new scientific understanding underpinning emerging technologies.**

DOE's Two-Year, BIL & IRA Progress Snapshot

By the Numbers

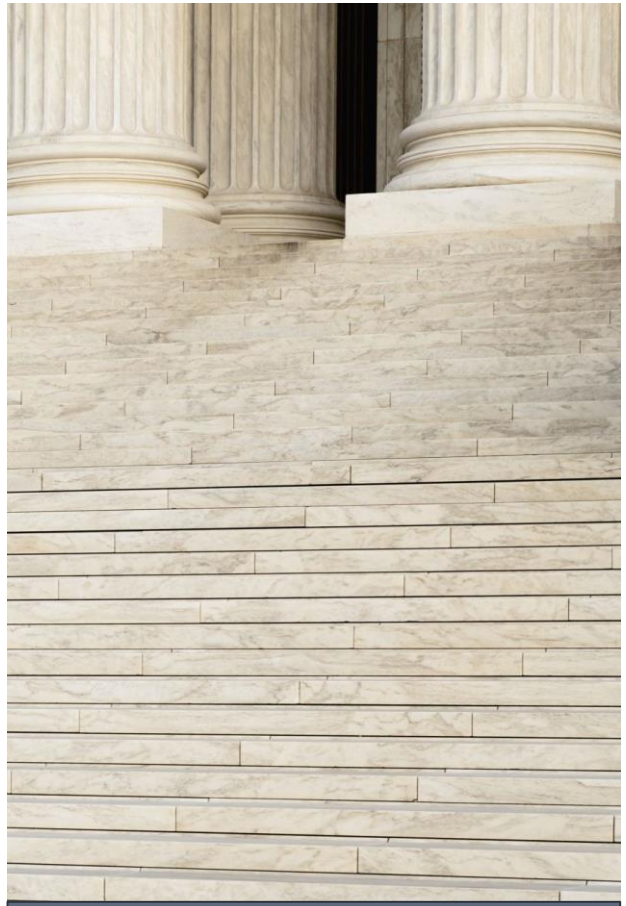
- **$80B+** federal funding opportunities announced for clean energy
- **$40B+** in BIL and IRA funding for 700+ competitively selected projects and 4000+ formula funding awardees
- **100%** of programs launched
- **$60B+** of private capital in matched federal dollars for selected projects.

On Track to Supercharge the Clean Energy Economy

- Build out a more resilient grid
- Reduce Energy Costs through Building Upgrades
- Secure Key U.S. Clean Energy Supply Chains
- Supercharge Clean Industrial Innovation
- Create High-quality, Accessible Careers
- Invest in Underserved Communities
- Bolster Clean Energy Generation and Storage

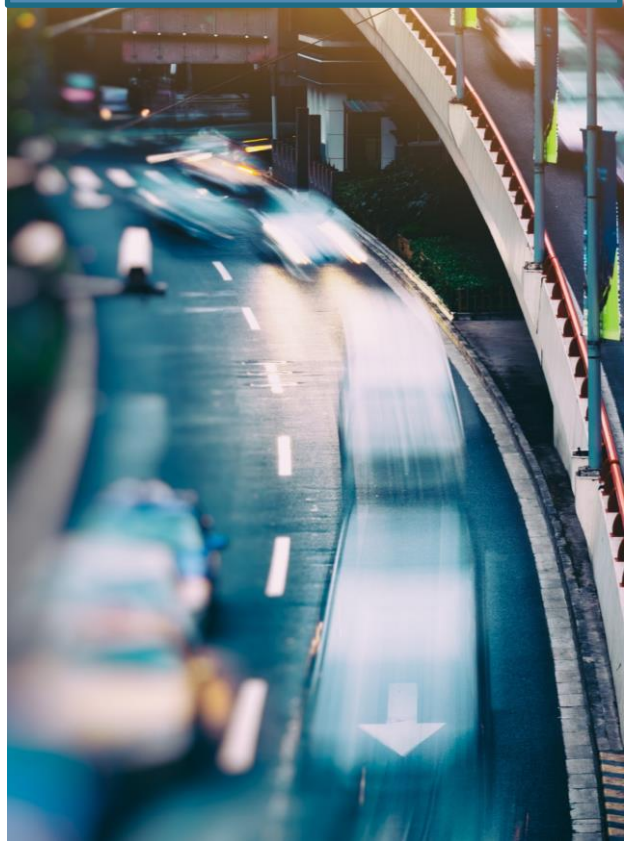

FEMP
Federal Energy Management Program

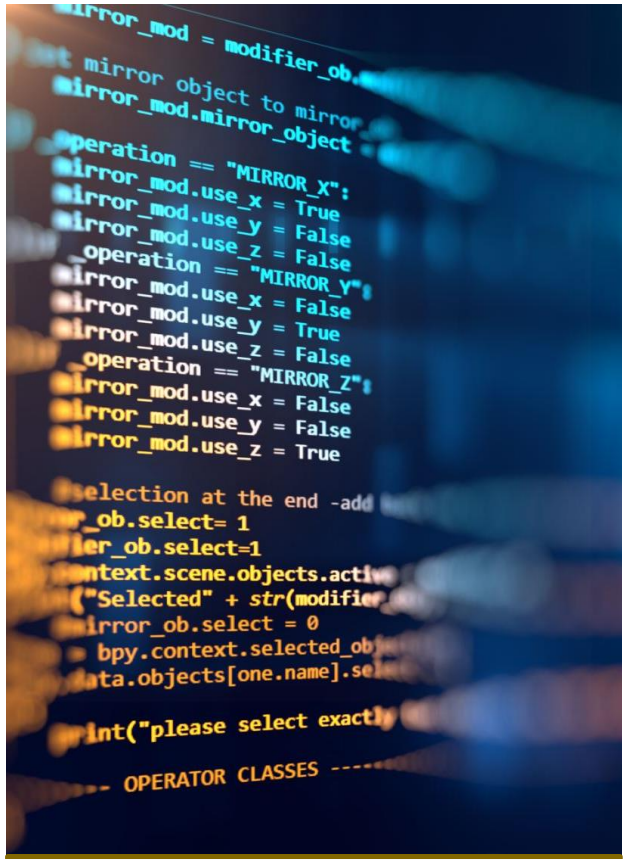
Federal Energy Management Program



Meet Legislative and Administration Objectives

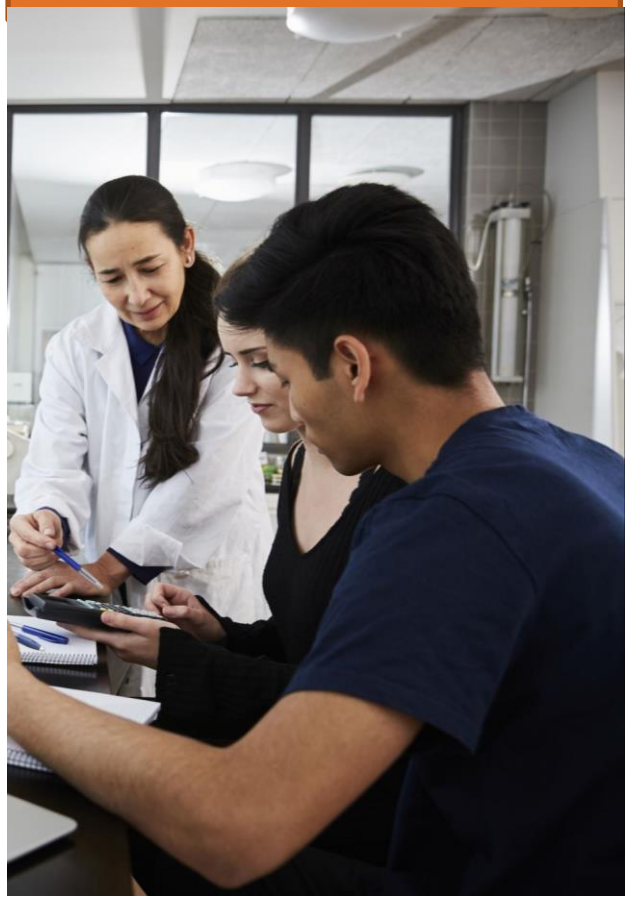
Facilitate Technology Integration in Facilities and Fleets





Provide Technical Assistance and Tools

Train the Federal Energy Management Workforce



FEMP Supports Agencies in All Stages of Energy Management

FEMP works with key stakeholders to support all stages of energy management in federal agencies' critical areas.

Key Stakeholders

- White House
- Industry
- Agencies
- National Labs
- Congress
- MUSH Markets

Technical Areas

- Facilities
- Fleets
- Grid

FEMP's Key Stakeholder Communities

White House

Congress

Federal Agencies

MUSH Market

Utilities

Industry

National Labs

Federal Buildings, Vehicles, and Energy Use

Number of Buildings: 350,000
- 37,000 have advanced meters
- 3 billion gross square feet

Number of Vehicles: 600,000

Energy Spend: $15 billion in FY 2021

Energy Use: 852 Trillion BTU
- 507 trillion BTU Vehicles & Equipment

*Source: U.S. Treasury's Bureau of Fiscal Service. Summary Report (pg 195): https://www.fiscal.treasury.gov/files/reports-statements/financial-report/02142018-FR(Final).pdf

FEMP: Key Focus Areas and Activities

FEMP facilitates federal cost-effective energy and water management and investment

Key Focus Areas

- Implement Legislative Requirements and Administration Objectives
- Facilitate Clean Energy Technology Deployment for Decarbonization
- Provide Tools and Technical Assistance to Support Infrastructure Investments
- Train Federal Energy and Water Management Workforce

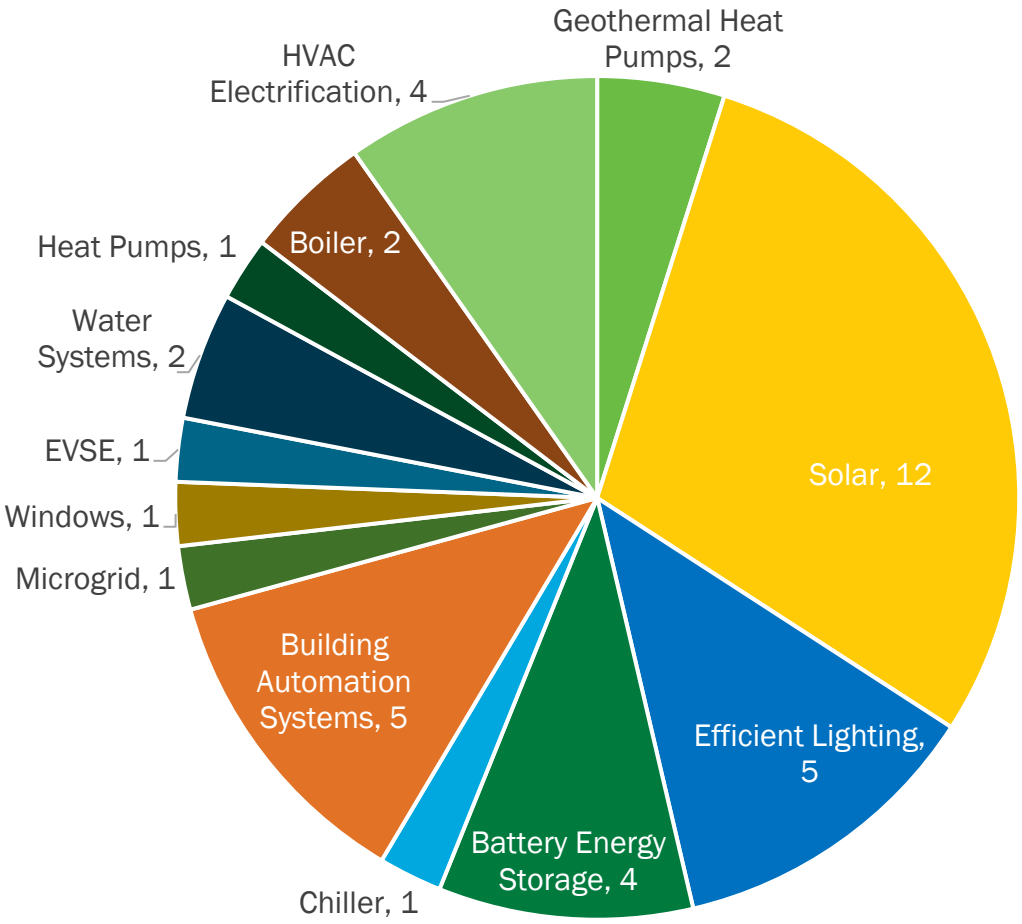
KEY ACTIVITIES

- Support implementation of **Executive Order 14057** and Energy Act of 2020
- Leverage **AFFECT** to build, expand, and accelerate agency infrastructure investments
- Support large-scale federal **fleet electrification**
- Accelerate the deployment of renewable resources and energy storage at federal facilities
- Establish a **federal smart building** accelerator and demonstrate viability at federal sites
- Support agency **climate adaptation and sustainability planning** and implementation
- Conduct **Energy Exchange 2024** and develop training that incorporates climate, sustainability, and equity

FEMP & Grant-Funded Efficient Technologies & Innovation

- **AFFECT funding helps federal agencies tackle many types of projects including:**
  - Battery storage
  - Boiler, chiller retrofits
  - Electric vehicle supply equipment
  - Geothermal heat pumps
  - HVAC retrofits and replacements
  - Lighting & lighting control improvements
  - Microgrids
  - Solar panels
  - Water systems
  - Window replacements

AFFECT BIL Phase 1: 19 New & Existing Building Energy Conservation Measures



FEMP Assistance with Facility Decarbonization

		FEMP Technical Assistance	Key Takeaways
	Planning, Evaluating, Prioritizing	Acquisition Planning Emerging Technologies Building Performance Standards	Identifying 'suitable' facilities, optimal use of available funding opportunities, support agency mission needs
	Development, Deployment, Procurement	ESPC, UESC Technical Assistance Carbon-free electricity Distributed generation Technology validation Grid-interactive Efficient Buildings (GEB) Environmental Justice	Develop opportunities, technologies and impacts through qualified projects; combining best measures for greatest impact within economic limits
	Monitoring, Sustaining, Optimizing	Measurement & verification Life of contract support O&M support	Ensuring persistence of savings and performance of facilities and implemented measures over the life of the project
	Tracking, Reporting, Recognizing	Annual reporting Leveraging EISA 432 evaluations FEMP Energy and Water Management Awards	Accountability in public disclosure of building portfolio; recognizing agency individuals, projects and programs contributions to energy and water efficiency

Workforce Development and Training through Whole Building Design Guide

Private Sector Investment in Federal Facilities

Project Investment: $8 Billion

FY1998–FY2023

Policy Priorities Guiding FEMP Action

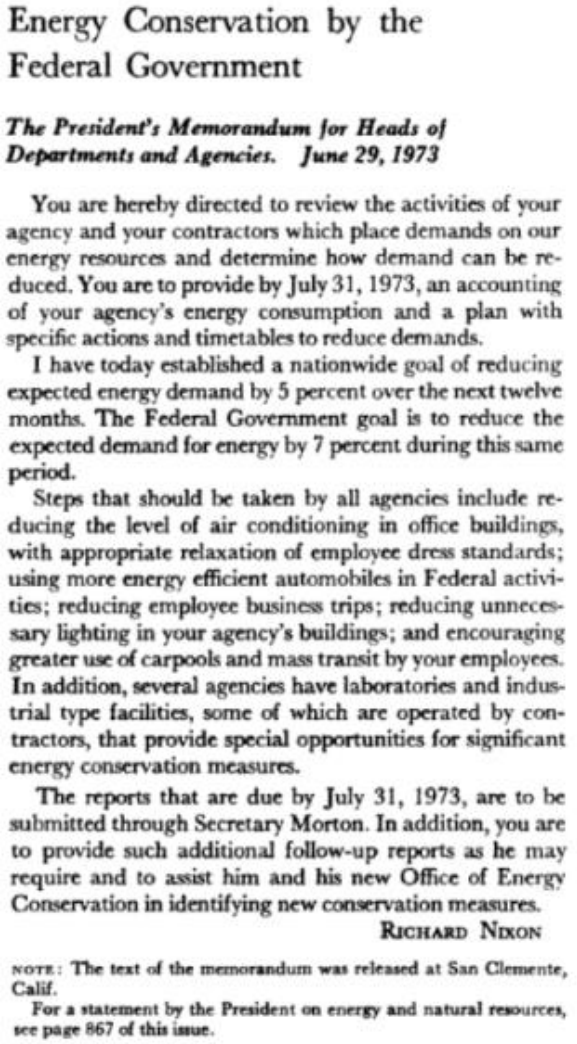
FEMP is expanding existing programs to support federal agencies in meeting priorities outlined in recent policies, with an emphasis on modernizing energy and water infrastructure through technology deployment to meet decarbonization goals and mission objectives.

Bipartisan Infrastructure Law	Executive Order 14057	Energy Act of 2020
• Key piece in President Biden's Build Back Better agenda • Includes more than $62 billion for DOE to deliver a more equitable clean energy future • Expanding access to energy efficiency and building on technologies of tomorrow	• Government-wide targets for long-term and mid-term GHG reductions • 100% net zero buildings, zero-emission fleets, 24/7 carbon pollution-free electricity • Net zero federal government operations by 2050 or sooner	• Agencies to use performance contracting to address at least 50% of ECMs identified • Agencies to implement all cost-effective ECMs identified within 2 years • FEMP to establish a Federal Smart Building Program

Note: Descriptions are illustrative and not comprehensive

Birth of the Federal Energy Management Program

- **1973**: Nixon established the Federal Energy Office focused on energy conservation.
- **1974**: Ford set federal energy use reduction goals.
- **1977**: Carter set reduction goals for petroleum-based fuels in federal buildings setting the course for today's Federal Energy Management Program.



Energy Conservation by the Federal Government

The President's Memorandum for Heads of Departments and Agencies. June 29, 1973

You are hereby directed to review the activities of your agency and your contractors which place demands on our energy resources and determine how demand can be reduced. You are to provide by July 31, 1973, an accounting of your agency's energy consumption and a plan with specific actions and timetables to reduce demands.

I have today established a nationwide goal of reducing expected energy demand by 5 percent over the next twelve months. The Federal Government goal is to reduce the expected demand for energy by 7 percent during this same period.

Steps that should be taken by all agencies include reducing the level of air conditioning in office buildings, with appropriate relaxation of employee dress standards; using more energy efficient automobiles in Federal activities; reducing employee business trips; reducing unnecessary lighting in your agency's buildings; and encouraging greater use of carpools and mass transit by your employees. In addition, several agencies have laboratories and industrial type facilities, some of which are operated by contractors, that provide special opportunities for significant energy conservation measures.

The reports that are due by July 31, 1973, are to be submitted through Secretary Morton. In addition, you are to provide such additional follow-up reports as he may require and to assist him and his new Office of Energy Conservation in identifying new conservation measures.

RICHARD NIXON

NOTE: The text of the memorandum was released at San Clemente, Calif.

For a statement by the President on energy and natural resources, see page 867 of this issue.

FEMP 50

50 Years of Federal Energy Management

FEMP celebrated 50 years of federal energy management in September 2023.

Carter Era Goals Continue into the Reagan Administration

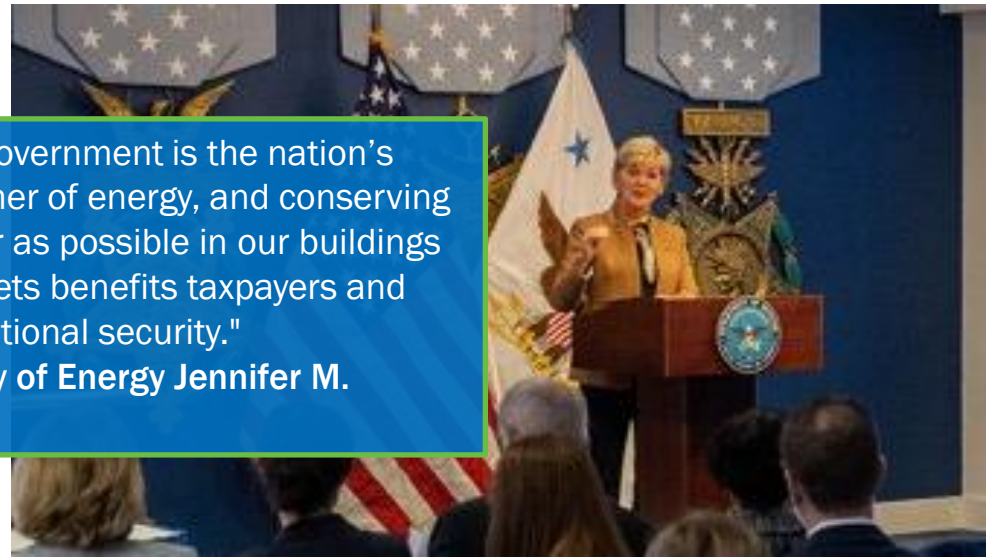
- **President Carter's Executive Order 12003—Energy Policy and Conservation, July 20, 1977, amends Executive Order 11912**
  - For the total of all federally-owned, existing buildings the goal shall be a reduction of 20 percent in the average annual energy use per gross square foot of floor area.
  - Goal exceeded with a 43% reduction in FY 1985
  - Petroleum-based fuel use in buildings in FY 2022 has declined 91% since 1975.

The Carter Administration introduced the use of solar power at the White House on June 20, 1979. 32 solar water heating panels were placed on the roof of the West Wing. The solar panels were removed in 1986.

2024 - Solar on The Pentagon!

The Pentagon, U.S. Department of Defense
This $10M project will advance the net-zero energy goal at the Pentagon Campus by implementing the following key measures on two of the five wedges:

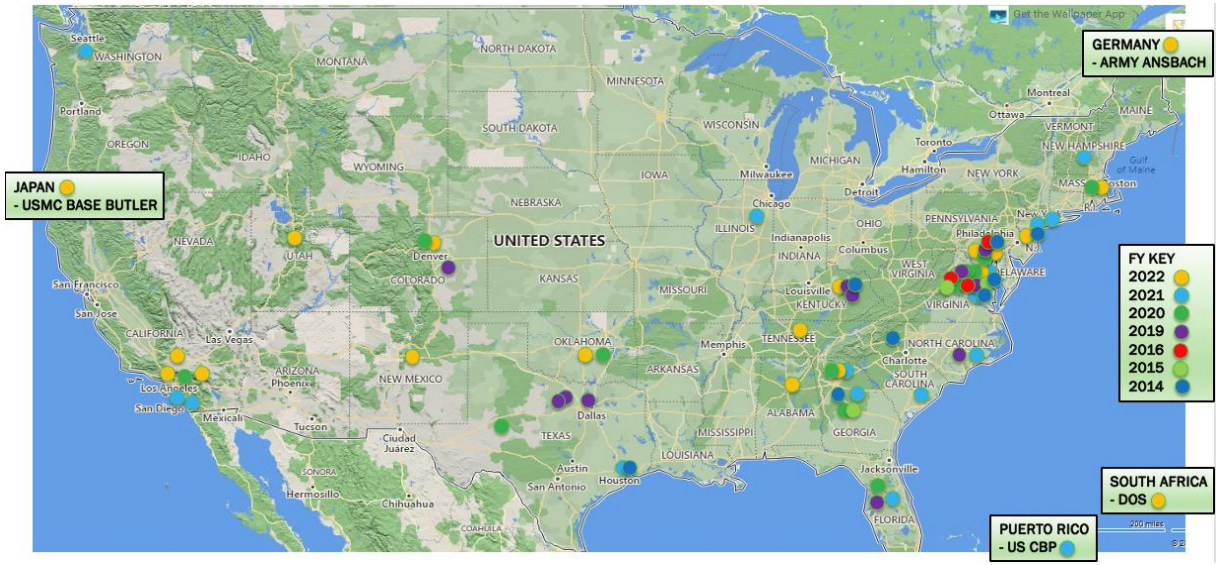
- Rooftop solar panels + battery storage
- Heat-recovery heat pump system
- Solar water thermal panels.



"The Federal Government is the nation's largest consumer of energy, and conserving as much power as possible in our buildings and vehicle fleets benefits taxpayers and bolsters our national security."
- U.S. Secretary of Energy Jennifer M. Granholm.

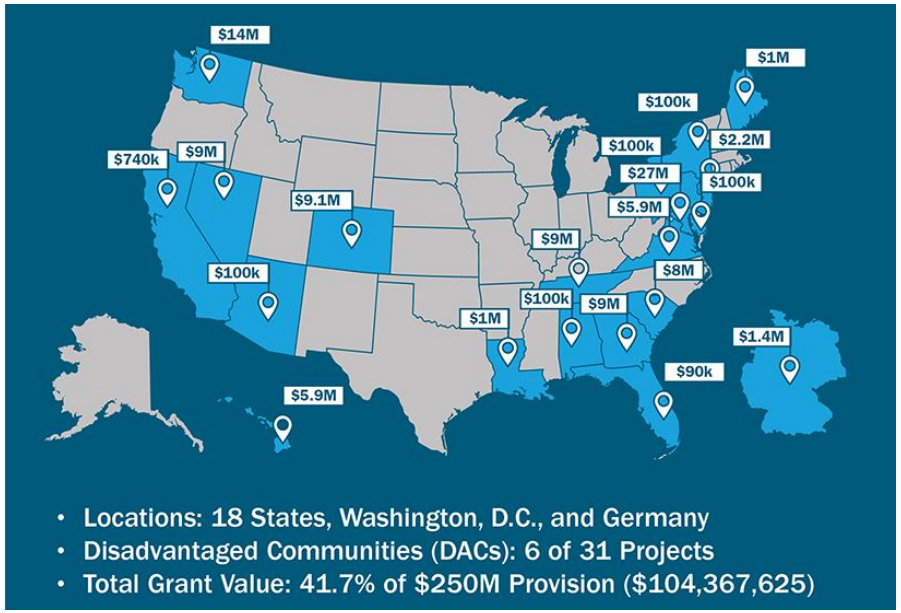
Grant Funding for Federal Projects

AFFECT Appropriations-Funded



Total Funding: ~$62M
Funding Cycles Completed: 7 since 2014
Total Projects: 72
Total Projected Energy Savings: 3.3T BTUs
Total Projected Cost Savings: ~$298M
Total Project GHG Savings: 314,612 MT CO2e
Cost Leverage: ~$2.12B in private funding

AFFECT Bipartisan Infrastructure Law



- **Amount:** $250M over 5 years
- **Funding Cycles Completed:** 1 of 3, Phase 1 in January 2024
- **Phase 1 Projects:** 18 (~$94.2M)+ 12 ($1.2M) assistance for project start
- **Anticipated Annual Energy Savings:** ~1.2T BTUs
- **Anticipated Annual Cost Savings:** ~ $27.9M
- **Anticipated GHG Savings:** ~99,412 MT CO2e
- **Cost Leverage:** ~$400M in private funding + ~$134M appropriation

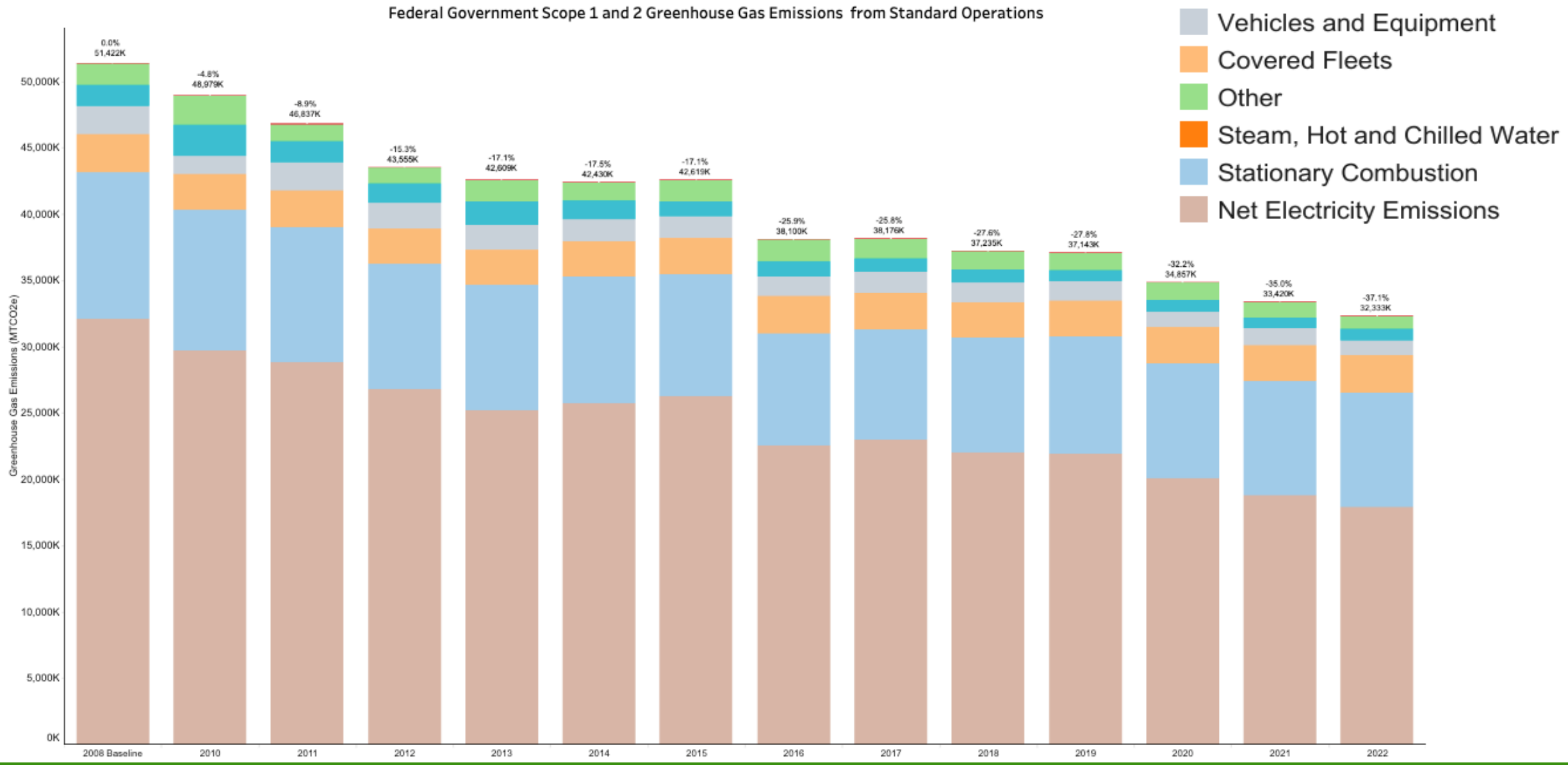
Increasing Agency Investments

In FY 2020, federal agencies invested approximately $2.1 billion in energy efficiency, water conservation, and renewable energy projects in buildings and facilities. This is a 76% increase from 2019 levels. Funding came from three primary sources:

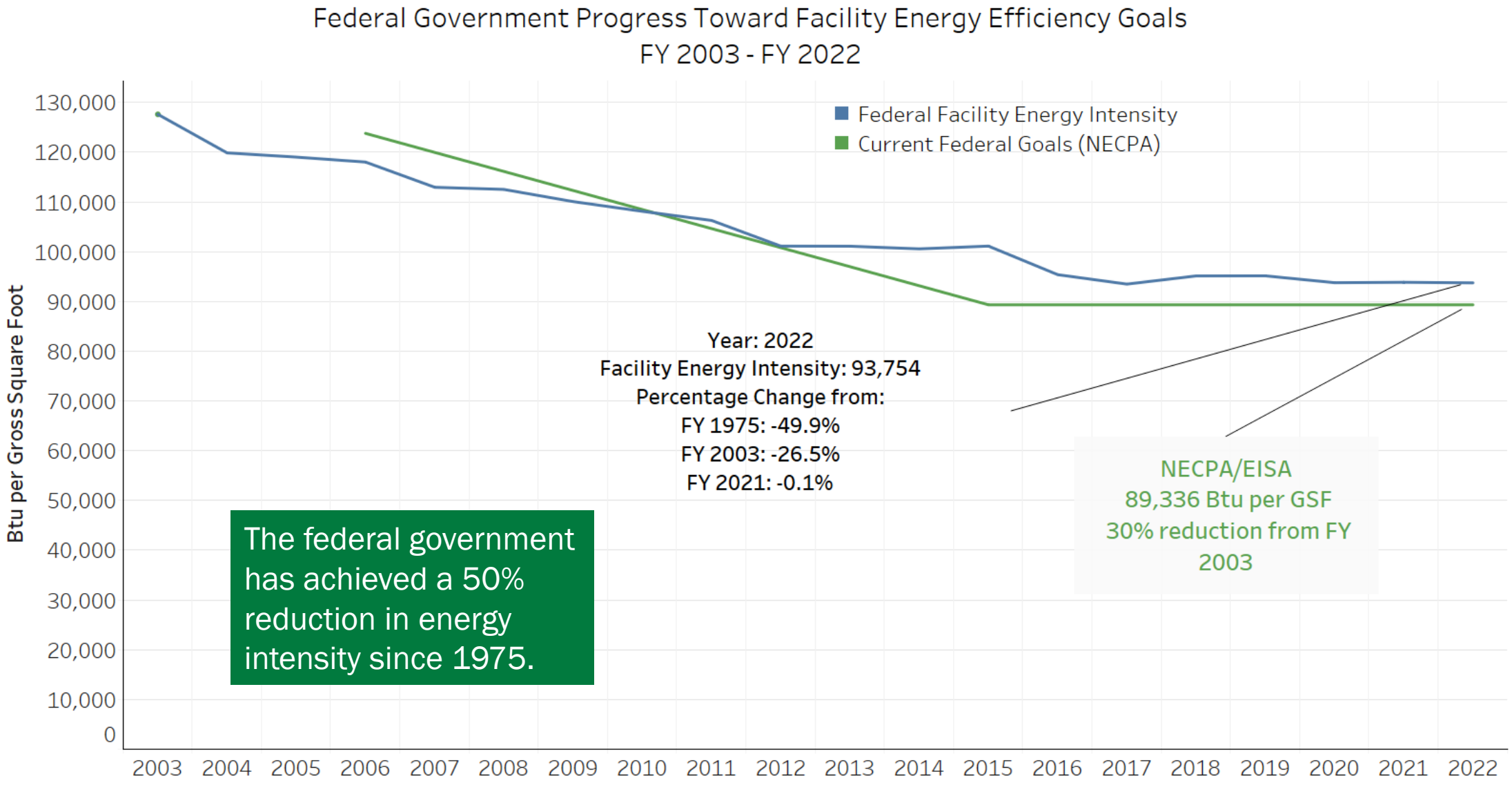
- One billion dollars of direct obligations
- $949 million from energy savings performance contracts (ESPCs) and
- $199 million from utility energy service contracts (UESCs)

Agencies reduced Scope 1 & 2 greenhouse gas emissions in FY22 from standard operations by 37.1% vs. 2008.

U.S. Federal Agency Performance Data



Federal Facility Energy Use Intensity (Btu/GSF)



GLOBAL CLIMATE TECH LANDSCAPE 1.0

www.globalclimatelandscape.org

Find Your Place in the Clean Energy Transition

1. Consider your next role with clean energy in mind. Every purchase matters.
2. Apply for a FEMP DOE Scholars Internship or the Early Career Professionals Program.
3. Join the Clean Energy Corps.
4. Consider a stint in public service during your career.
5. Take roles where your decisions can have cascading impacts, and make better choices.

Quality Careers, Maximum Impact

We are at the forefront of a clean energy revolution with exciting advancements and innovative technologies announced daily.

It has never been more critical to have our nation's best and brightest minds leading the charge to save our planet.

Significant investments in clean energy have accelerated high-quality, public and private sector career opportunities nationwide.

Thank you!

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