



EESI

Environmental and
Energy Study Institute

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CONGRESSIONAL BRIEFING

Energy Efficiency Means Business

Friday, March 05, 2021

About EESI...



NON-PROFIT

Founded in 1984 by a bipartisan Congressional caucus as an independent (i.e., not federally-funded) non-profit organization



NON-PARTISAN

Source of non-partisan information on environmental, energy, and climate policies



DIRECT ASSISTANCE

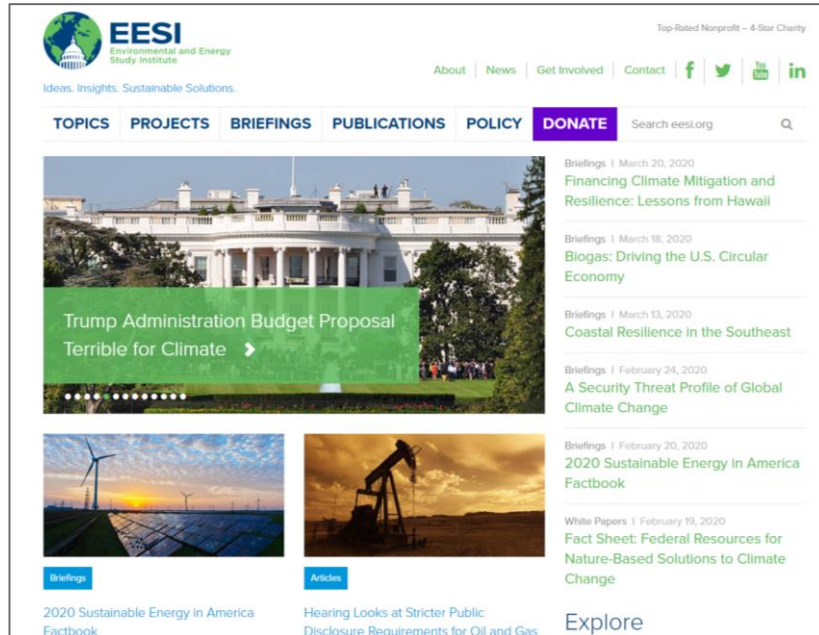
In addition to a full portfolio of federal policy work, EESI provides direct assistance to utilities to develop “on-bill financing” programs



SUSTAINABLE SOCIETIES

Focused on win-win solutions to make our energy, buildings, and transportation sectors sustainable, resilient, and more equitable

...About EESI



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CLIMATE CHANGE SOLUTIONS

Bi-weekly newsletter with all you need to know including a legislation tracker



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FACT SHEETS

Timely, science-based coverage of climate and clean energy topics



Connecticut Department of Energy and Environmental Protection



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

EESI Congressional Briefing: Energy Efficiency Means Business

Vicki Hackett
Deputy Commissioner
Connecticut Department of Energy and Environmental Protection



Connecticut Department of Energy and Environmental Protection

State Energy Program (SEP)

- Each \$1 of SEP federal funds leverages \$10.71 of non-federal funds
- Each \$1 of SEP federal funds produces annual energy savings of 1.03 million source BTUs and cost savings of \$7.22.



C&LM Annual Legislative Report 2020



Every \$1.00 collected results in an additional \$4.84 of clean energy investment

This investment by residential, business and municipal energy customers improves the quality of life in Connecticut.

44,094 Jobs

Clean energy investment supports Connecticut jobs in HVAC, electrical, manufacturing, insulation, weatherization and solar industries. (Includes 36,000 efficiency jobs)¹

\$6.2 Billion increase to the gross state product

Generated by the Conservation and Load Management Plan (Eversource, CNG, SCG and UI) and the Comprehensive Plan (Connecticut Green Bank).²



Energy savings equivalent to a 122 MW power plant

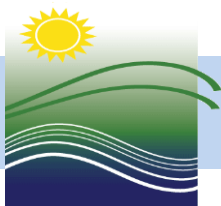
This is enough energy to power approximately 40,923 homes for a year.

186,081 tons of CO₂ emissions avoided, plus \$5.2 Million in public health costs saved

Supporting our state's drive towards carbon neutrality.³

\$72 Million in Connecticut tax revenues

Generated from energy efficiency, renewable and financing measures supported by the Conservation and Load Management Plan (Eversource, CNG, SCG, UI) and the Comprehensive Plan (Connecticut Green Bank).⁴



Annual Program Energy Savings

Table 1-1: 2019-2021 Savings & Benefits*

Year	Budgets (\$000)			Annual Savings						Lifetime Savings	
	Electric	Natural Gas	Total	Electric (GWh)*	Peak (MW)**	Natural Gas (MMcf)	Oil (gallons)	Propane (gallons)	CO ₂ Emissions (tons)	Lifetime Benefit (\$000)	Lifetime Savings (MMBtus)***
2019	\$185,395	\$52,903	\$238,298	305	48	718	982,912	232,819	208,702	\$924,563	25.4
2020	\$211,849	\$58,075	\$269,924	316	86	661	946,494	403,841	211,970	\$994,851	26.0
2021	\$188,016	\$53,466	\$241,482	210	79	574	853,751	371,670	154,530	\$727,924	19.7
TOTAL	\$585,259	\$164,445	\$749,704	831	213	1,953	2,783,157	1,008,330	575,202	\$2,647,338	71.1

*Abbreviation for Gigawatt hours.
 **Savings include demand response programs.
 ***In millions of MMBtu (one million British Thermal Units).



2019-2021 Plan Priorities & Key Themes

1. Advance state energy and environmental policy goals
2. Offer tailored solutions for market segments while ensuring equitable distribution
3. Focus on direct savings to customers
4. Develop and maintain a sustainable workforce for Connecticut
5. Continuous commitment to deliver comprehensive energy efficiency strategies
6. Implement effective demand reduction strategies
7. Continue to explore and implement financing options



State Energy Program (SEP)

Ongoing Connecticut projects:

- EnergyCAP program tracks utility use & cost in state buildings
- EV Infrastructure & planning
- Addressing health and safety barriers to weatherization
- Heat pump adoption initiatives to support building decarbonization
- Supporting energy affordability through Home Energy Score
- Developing the clean energy workforce through investments in programs at local community colleges



EnergyCAP Utility Tracking Software

- Robust, web-based software used to track utility use and cost at state buildings
- DEEP works with each state agency to import utility data and understand use and cost trends dating to 2018
- Currently tracking 3,941 state owned or leased buildings
 - 11,731 individual utility meters
- Helped achieve over \$12 million (8%) in energy savings
 - Decrease of almost 400,000 MMBtus (6%)
- Supported by SEP funds

ENERGYCAP®



Connecticut Department of Energy and Environmental Protection

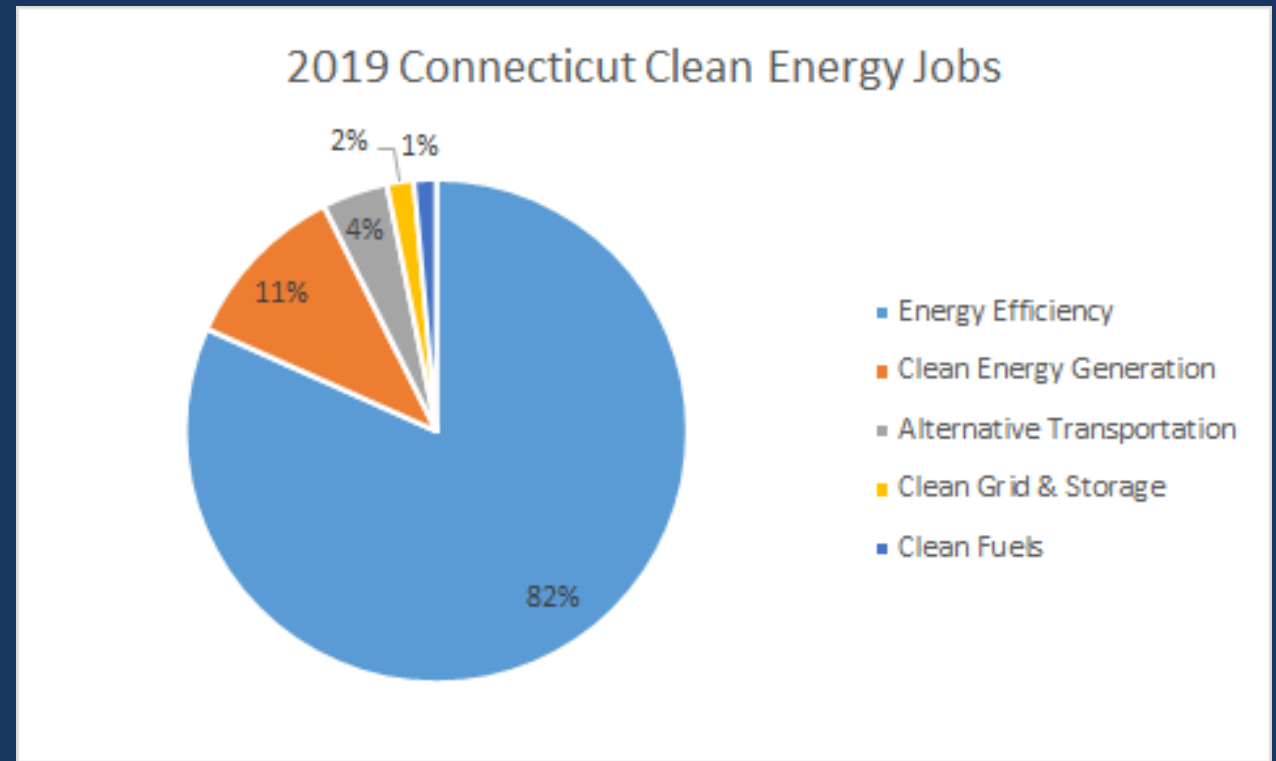
Compost Aeration Heat Recovery project

- Installed at local CT farm in 2017
- The system increases compost decomposition through forced aeration
- Waste heat is recovered and utilized for space and water heating on the farm
- Example of a unique project supported by SEP funds
- Increased compost production revenue by \$21,000 in first year
- Decreased diesel fuel usage by 1,400 gallons
- Decreased labor by 400 hours annually



Connecticut Energy Efficiency Workforce

- Clean energy jobs accounted for 2.6% of total jobs in Connecticut at the end of 2019 and 80% of clean energy jobs are in energy efficiency.
- The energy efficiency sector supports 36,000 jobs statewide across a variety of roles.



Weatherization Barriers

The challenge:

- Health and safety barriers like mold, asbestos, and lead paint result in weatherization deferrals
- 165,000 homes in Connecticut have weatherization barriers
- 23% of income-eligible households are prevented from being weatherized

Solutions:

- Identify and leverage sustainable funding sources
- Coordinate with other agencies and services to generate referrals for weatherization and remediation programs
- Improve community engagement



Microgrids and Resilience

September 2020 Special Session PA 20-5 § 15 — **MICROGRID AND RESILIENCE GRANT AND LOAN PILOT PROGRAM**

The act expands the DEEP-administered microgrid grant and loan program to ***also support resilience projects***, including those related to climate change.

Governor's 2022-2023 biannual budget recommends **\$5 million/year** in new bond funds for microgrid and resilience projects under new program



Microgrids and Resilience

PA20-5 expanded the allowed uses for funding from the program to include:

1. community planning that includes microgrid or resilience project feasibility, including cost-benefit analyses;
2. assistance for the cost of design, engineering services, and interconnection infrastructure for resilience projects;
3. resilience projects connected to storage systems or certain distributed energy systems; and
4. non-federal cost sharing for grant or loan applications for projects or programs that include microgrids or resilience.
 - Requires DEEP to prioritize proposals that benefit vulnerable communities.
 - Allows DEEP to hire a technical consultant to help implement the program.
 - Specifies that the program can accept proposals from nonprofit and academic entities seeking to develop eligible projects.



Weatherization Assistance Program (WAP)

- Federally funded by US Department of Energy
- Provides weatherization services to low-income residents
- Benefits include:
 - Mechanical: Repair/replace heating systems and water heaters; install programmable thermostats; insulate ductwork and water pipes
 - Building Shell: Insulate attic and sidewalls; air sealing; repair/replace windows and doors
 - Health and Safety: Testing of heating systems and combustion appliances; ventilation installation; smoke and CO detector installation; incidental repairs



Weatherization Assistance Program (WAP)

Nationally

- \$4,695 average weatherization cost per unit
- \$283 in average annual savings per unit
- For every \$1.00 invested:
 - \$1.72 in energy benefits
 - \$2.78 in non-energy benefits

Connecticut

- 2021 budget: \$3.4 million
 - 15% Administration
 - 15% Health and Safety
 - 20% Training and Technical Assistance
 - 50% Program Services
- Since 2017, CT WAP has weatherized 299 homes



Prioritizing Equity in DEEP's Energy work

- **Internal Equity Team**
- **2021 Conservation and Load Management Plan Update**
- **Integrated Resources Plan**
- **Weatherization Barrier Remediation**
- **Transportation Climate Initiative Program**
- **Supporting New Legislation to address Home Energy Affordability**



E3 (Equitable Energy Efficiency) Proceeding

- Phase 1 Draft recommendations releasing for public input in March 2021
- Covers several stakeholder recommended topics
- Intended to address and improve equity in our ratepayer-funded energy efficiency programs



NASEO Funding Requests

- **U.S. State Energy Program: \$90 million for the Fiscal year 2022 Annual Appropriation.**
- **Weatherization Assistance Program: \$360 million.**
- **NASEO's SEP funding request under a stimulus or infrastructure package: \$3.8 billion.**





Energy Efficiency Means Business in Your District

Chris Hess – Vice President of Public Affairs
March 5, 2021

Solving industry's toughest power management challenges around the world.



Aerospace



Buildings



Data centers



Food and beverage



Government



Healthcare



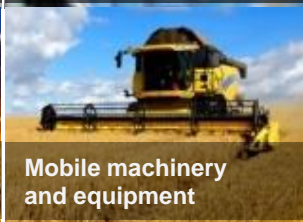
Machine building



Marine



Mining, metals
and minerals



Mobile machinery
and equipment



Oil and gas



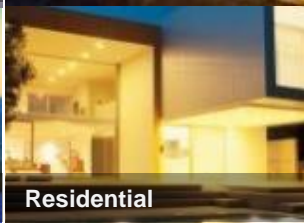
Pharmaceuticals



Rail



Renewables



Residential



Utilities

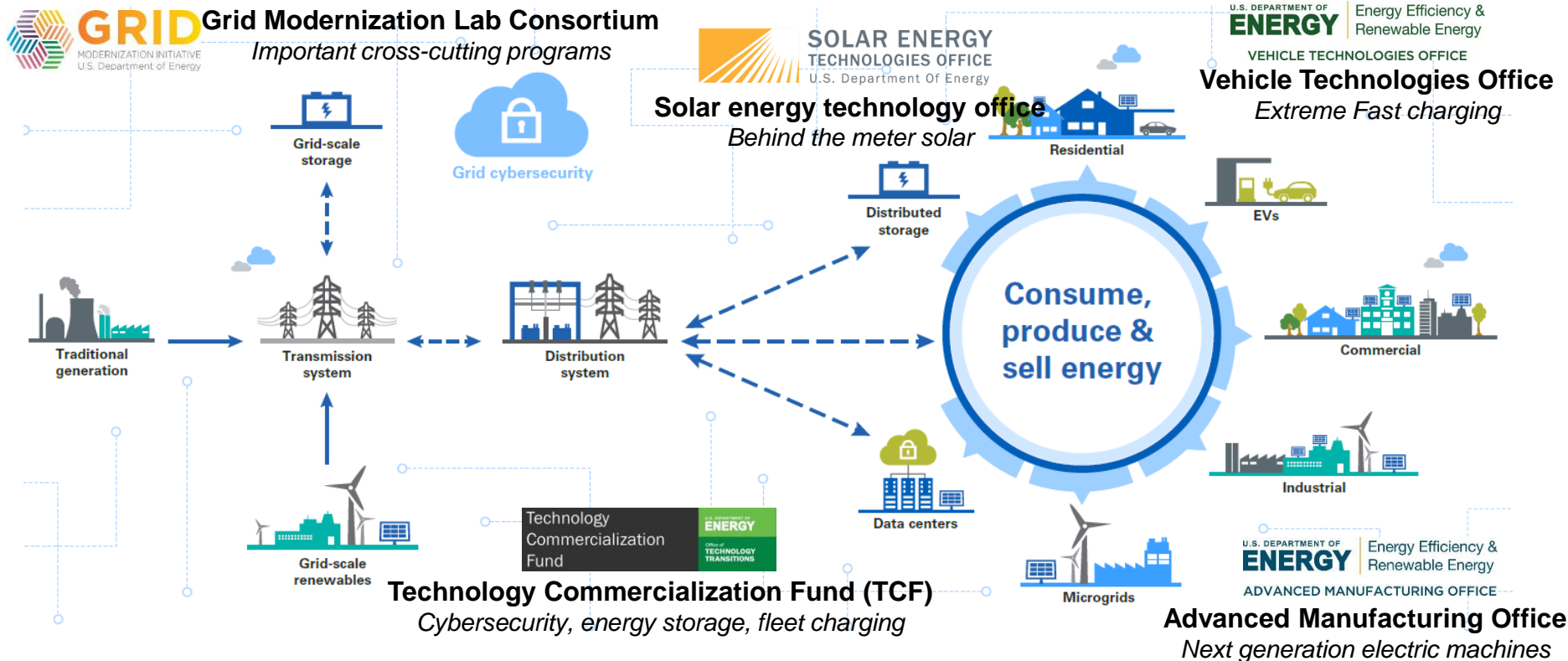


Vehicles



Water/wastewater

EERE is making important investments that broadly invest in energy efficiency, resiliency and jobs

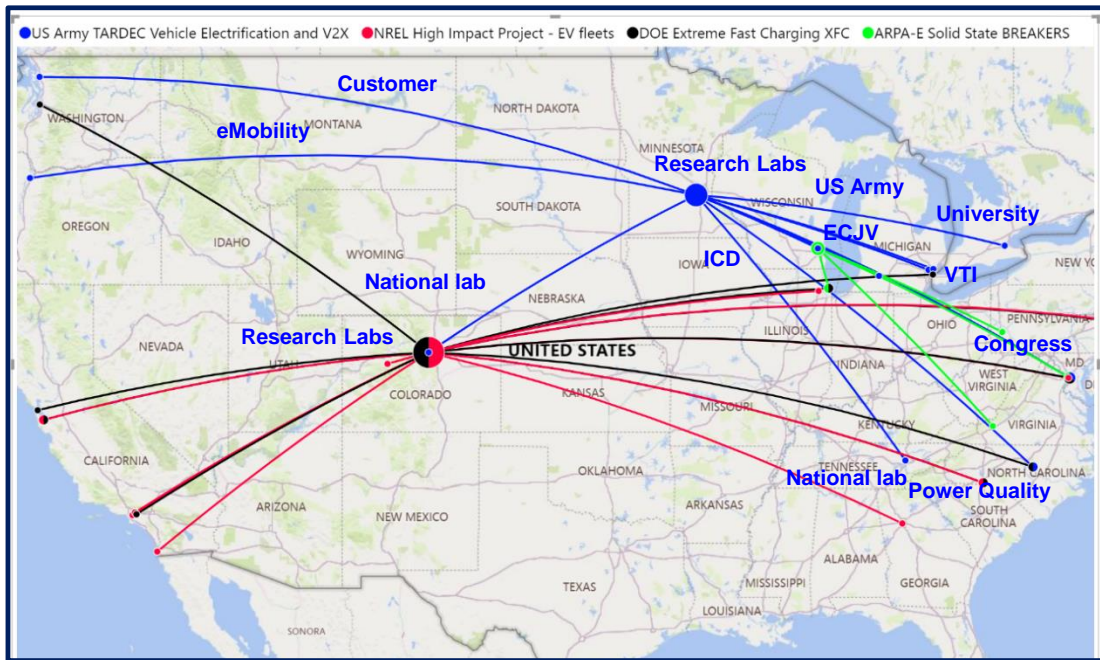


Dept of Energy EERE enables unique partnerships

This collaboration only occurs on government programs

Partnership flow map for four different government programs

Partnering with Dept of Energy, customers, universities and national labs.



Partnering on DOE Solar program

Maximizing use of behind the meter solar energy



Partnering on joint DOD/ DOD program

Solving challenges in vehicle electrification for commercial and military applications



DOE National Lab Partnering Strategy

Lab network providing access to cross cutting technology

Lab Competencies	Advanced Computer Science, Visualization, and Simulation			High Performance Computing, Simulation, and Modeling			Renewable electricity production and use			Sensing and measurement technologies			Solar energy			Strategic energy analysis		
	Advanced Computer Science, Visualization, and Simulation	Advanced Materials and Manufacturing	Batteries	High Performance Computing, Simulation, and Modeling	Integrated energy system engineering and testing	Renewable electricity production and use	Sensing and measurement technologies	Smart grid	Solar energy	Strategic energy analysis								
Next Gen Power Electronics		NETL			NETL	OAK RIDGE National Laboratory											NETL	
Additive Manufacturing	Lawrence Livermore National Laboratory	OAK RIDGE National Laboratory		Lawrence Livermore National Laboratory	OAK RIDGE National Laboratory												Lawrence Livermore National Laboratory	
DERMS	NREL		Pacific Northwest National Laboratory					Lawrence Livermore National Laboratory					NREL		Pacific Northwest National Laboratory		OAK RIDGE National Laboratory	
xPower Genome	OAK RIDGE National Laboratory			Argonne National Laboratory				NREL									Argonne National Laboratory	
EHM	Argonne National Laboratory	SLAC			OAK RIDGE National Laboratory												SLAC	
Grid intelligence	NREL			Lawrence Livermore National Laboratory	NREL			Lawrence Livermore National Laboratory									INEL	
Lightweighting and sustainability	Lawrence Livermore National Laboratory			NREL				Argonne National Laboratory									Pacific Northwest National Laboratory	
Advanced Energy Storage			Argonne National Laboratory														AMES LABORATORY	
Novel machinery																		
Digital manufacturing																		

DOD focus area

DOD focus areas

Strengthen with cybersecurity and smart grid analytics

Eaton and NREL Partnership

Corporate research team first ever to be located at NREL ESIF in April 2018

Unique NREL – Eaton partnership

- Eaton moved 15 PhD researchers on-site to the Energy Systems Integration Facility at NREL.
- The Energy Systems Integration Facility (ESIF) is a unique \$140M+ grid integration testing facility.
- Unprecedented partnership between a multi-national company and a DOE national lab.
- Plan to grow to 18 team members at NREL ESIF in 2020 and 45 employees by 2025.
- Locating Eaton researchers at this User Facility provides access to world-class facilities and NREL personnel, faster value prop testing, increased customer co-development and reduced capital investment.



High Power Fast Charging for EV Fleets

DOE program bringing in significant partners for new business models

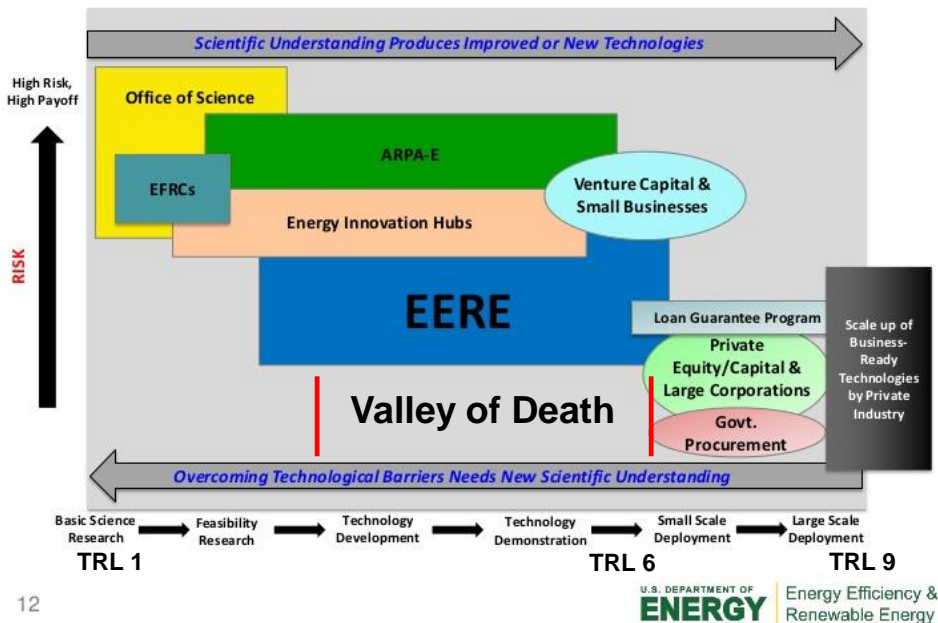
- Cost effective charging for large EV fleets
- New business model for utilities – DC
- Partnership enabled by DOE FOA VTO



Commercialization

Fill knowledge and funding gaps through TRL6 demonstration

EERE Guiding Principles: Leveraging Technology Investments



- Asset-heavy energy technology companies focus RDT&E investment on commercialization TRL 7-9.
- EERE and OE currently address the “valley of death” in TRL 4-6 and “pull” technology into mature industries.
- Customers in energy technologies (grid, vehicles) require real-world demonstration before making investments & commitments.
- Commercial firms create partnerships through DOE that would otherwise not occur to explore high risk areas and demo new technologies.
- EERE/OE and ARPA-E are fundamental to research and commercialization of technology.

From DOE 2013 EERE Congressional Budget Request, Henry Kelly, Feb 14, 2012

Thoughts to Accelerate Energy Transition

Cross-cutting technologies (major role for national labs):

- Artificial intelligence, modelling and simulation - special testing facilities at national labs
- New materials research – address foundational technology (power electronics, motors and solar) and critical minerals shortages
- New business models – create specific FOAs to address this broad gap based on economic analyses
 - Ex. Value of batteries on fleets of vehicles to the grid
- Consider DOE programs on broader scope subjects
 - 30 partners or more including numerous competitors looking at different work packages but with very specific requirements for communication of results and commercialization

Vehicles

- Next generation design philosophies that include artificial intelligence and machine learning
- Large scale fleet electrification programs – includes both vehicles and charging infrastructure; batteries and fuel cells
- Off-road vocational, construction and agriculture vehicles: hybrids and highly electrified

Aerospace

- Electrification – ARPA-E has first program here, near term potential but need to work with DOD

Electrical: Grid intelligence

- Charging infrastructure
- Grid business models: non wires alternative (Behind The Meter assets – DE. Solar, controls)
- Microgrids for grid stability with utilities / fire mitigation / resilience / Regional/Communities demo
- Intelligent buildings



Building the Clean Energy Economy Through the Federal Budget



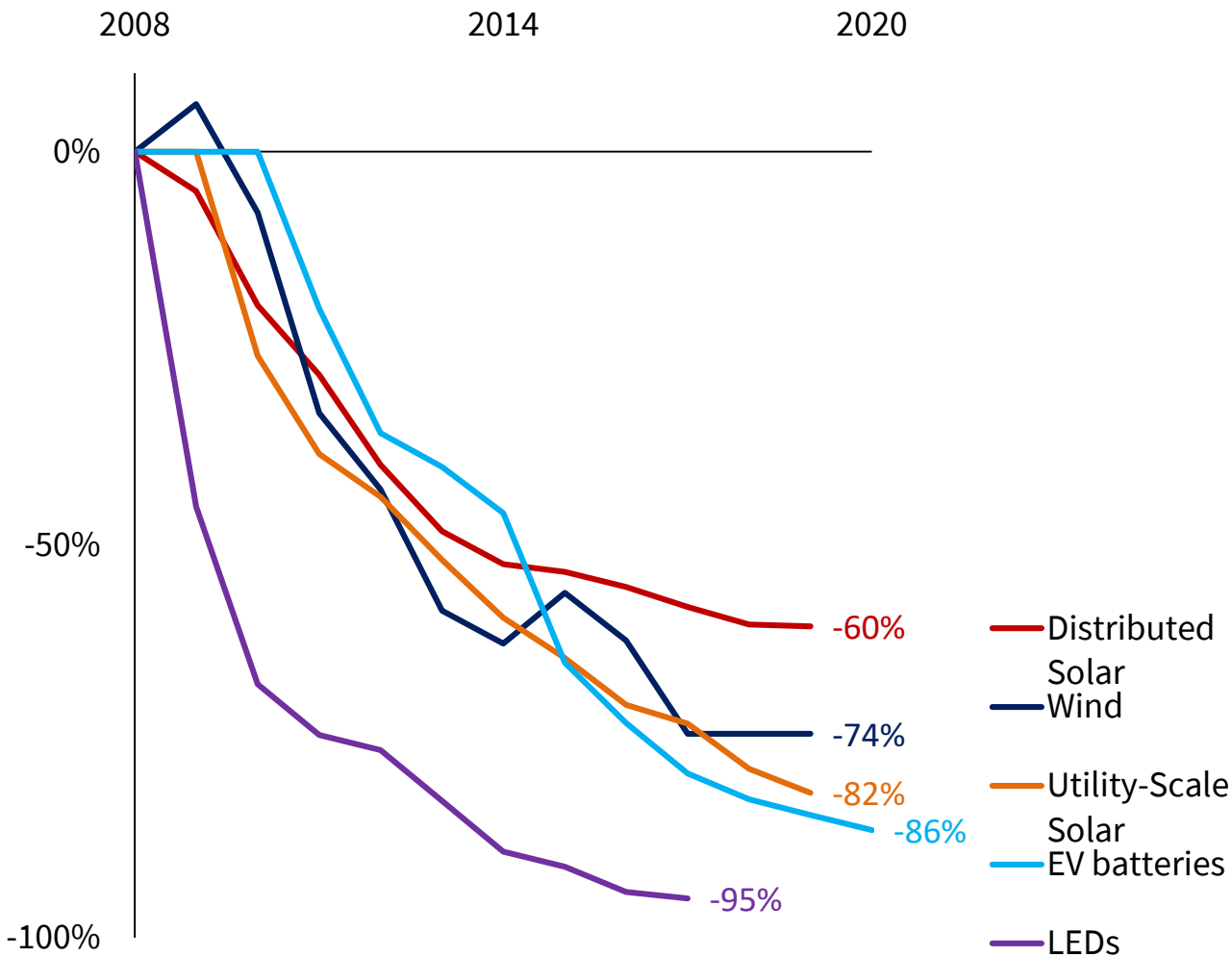
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EESI March 5, 2021

Making the Case for Bold Increases in DOE's Clean Energy Budget

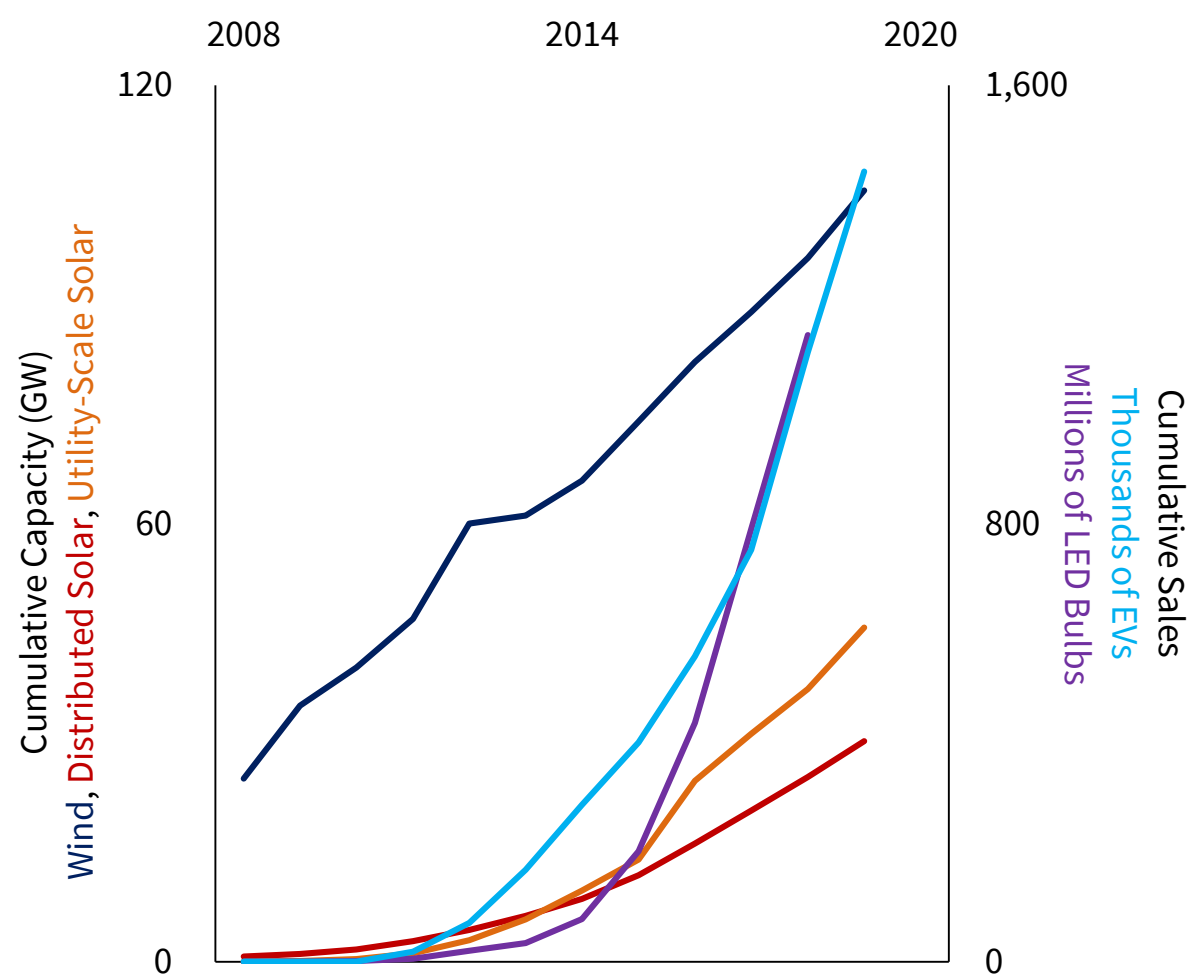
- 1) Federal Investments Have Helped Drive Clean Energy Growth
- 2) DOE Programs are Underfunded Relative to the Need
- 3) The Time is Ripe for Significant Expansion of the DOE Budget

Clean Energy Success Stories

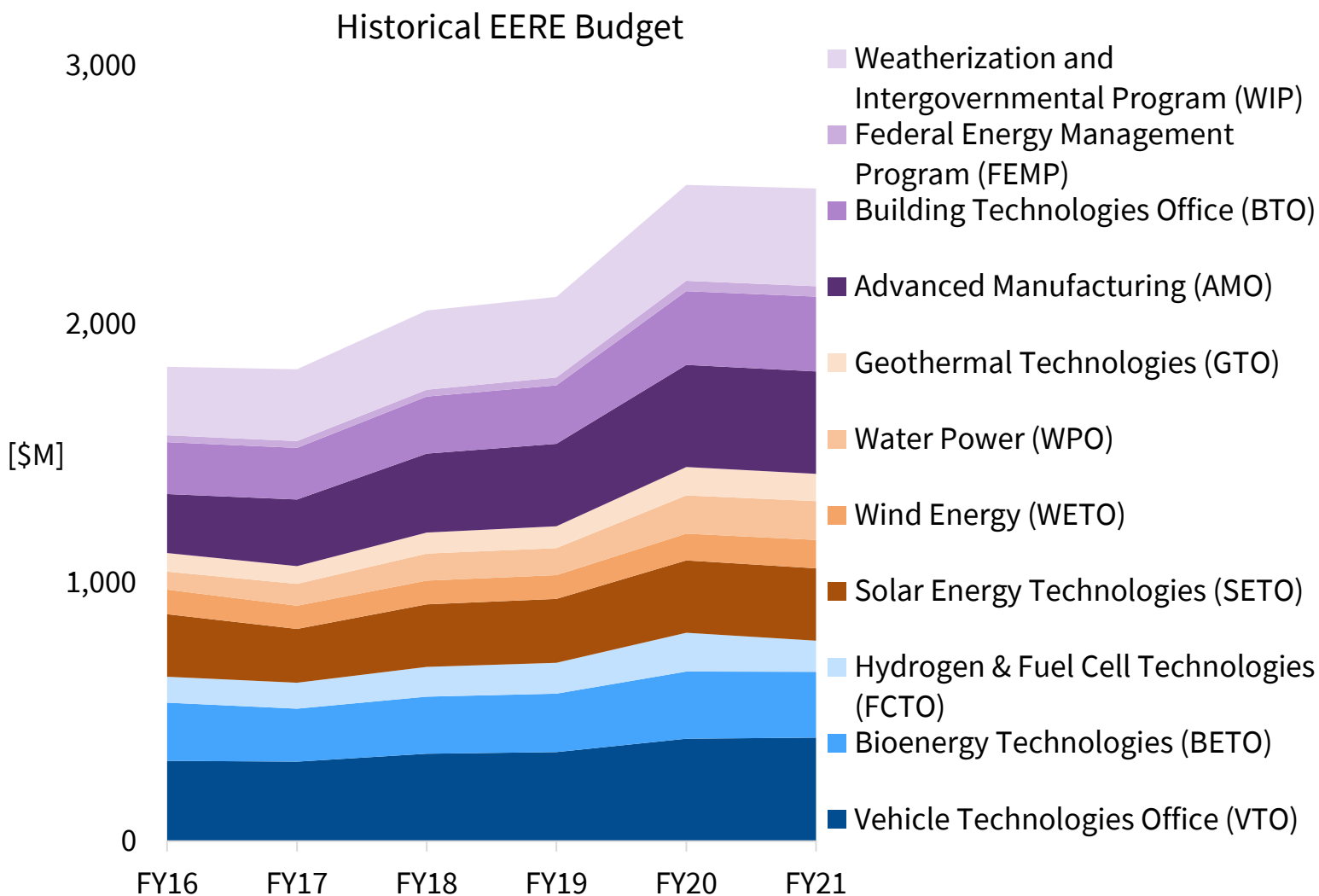
Cost Reductions



Growth

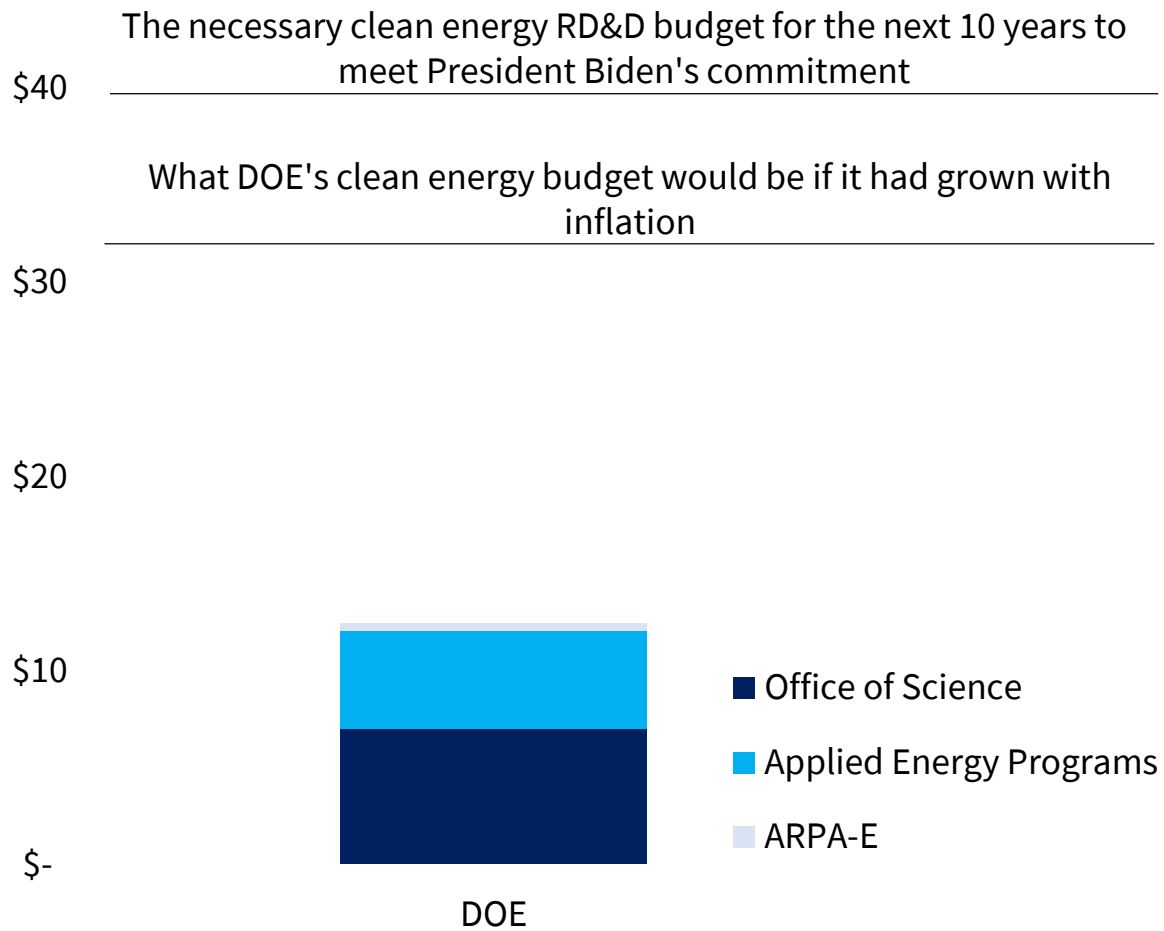


Looking Back at DOE's Budget



- 1) Each \$1 invested through EERE programs resulted in **\$33 dollars in benefit** to the United States, according to independent, peer-reviewed evaluations.
- 2) DOE HVAC, water heating, and appliance R&D investments resulted in **\$20-\$66 of benefits per dollar invested**.
- 3) R&D investments help increase the impact of the standards and deployment programs.
- 4) WAP supports 8,500 jobs in a typical year and saves the average household almost \$300 per year.

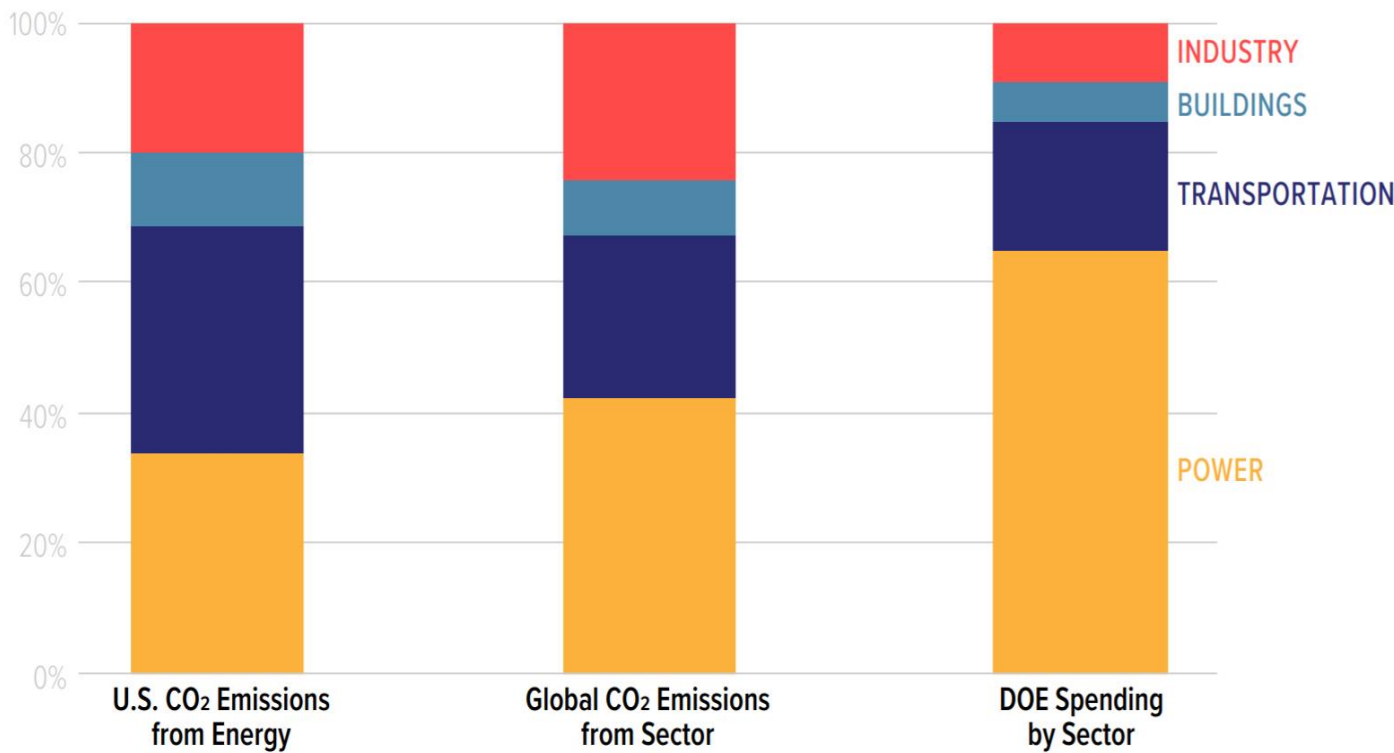
DOE Programs Are Underfunded



- 1) If DOE's clean energy budget had increased with inflation, **it would be \$32 billion**, instead of \$9 billion today.
- 2) Existing programs could support far more qualified applicants. For example, **a recent funding opportunity could only support 4 percent of applicants** ([link](#)).
- 3) Deployment and equity programs are especially underfunded. At current funding, **WAP will only retrofit 150,000 homes over four years (out of 40 million eligible)**.
- 4) States and cities are critical to addressing the climate crisis but are often limited by funding to do this work. DOE can help expand local and state efforts with a greater budget.

Buildings, Industry, and Transportation Are Particularly Underfunded

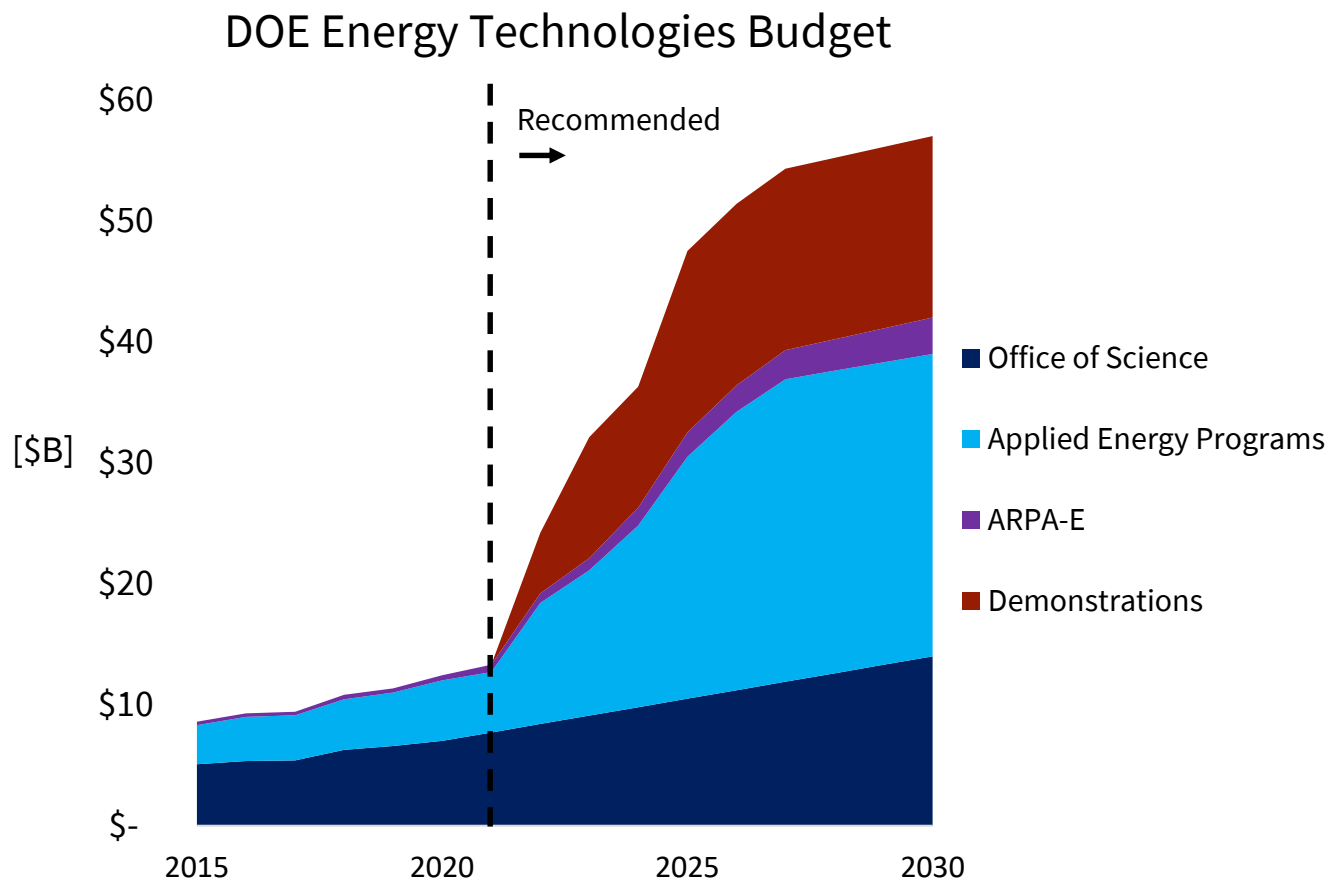
FIGURE 2.2 Comparison between GHG emissions and DOE spending by sector.



Greater funding for energy efficiency and efficient electrification is needed to balance the portfolio.

Sources: 2018 U.S. CO₂ Emissions, 2017 Global CO₂ Emissions, FY19 DOE Appropriations
A Progressive Climate Innovation Agenda, Data For Progress

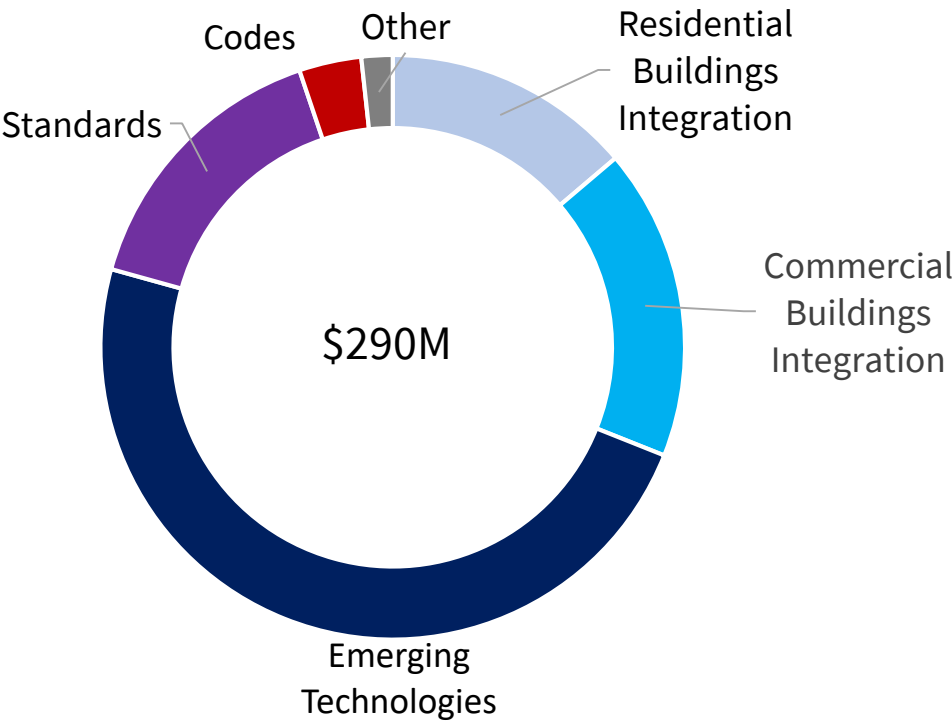
The Time is Ripe for Bold Investments



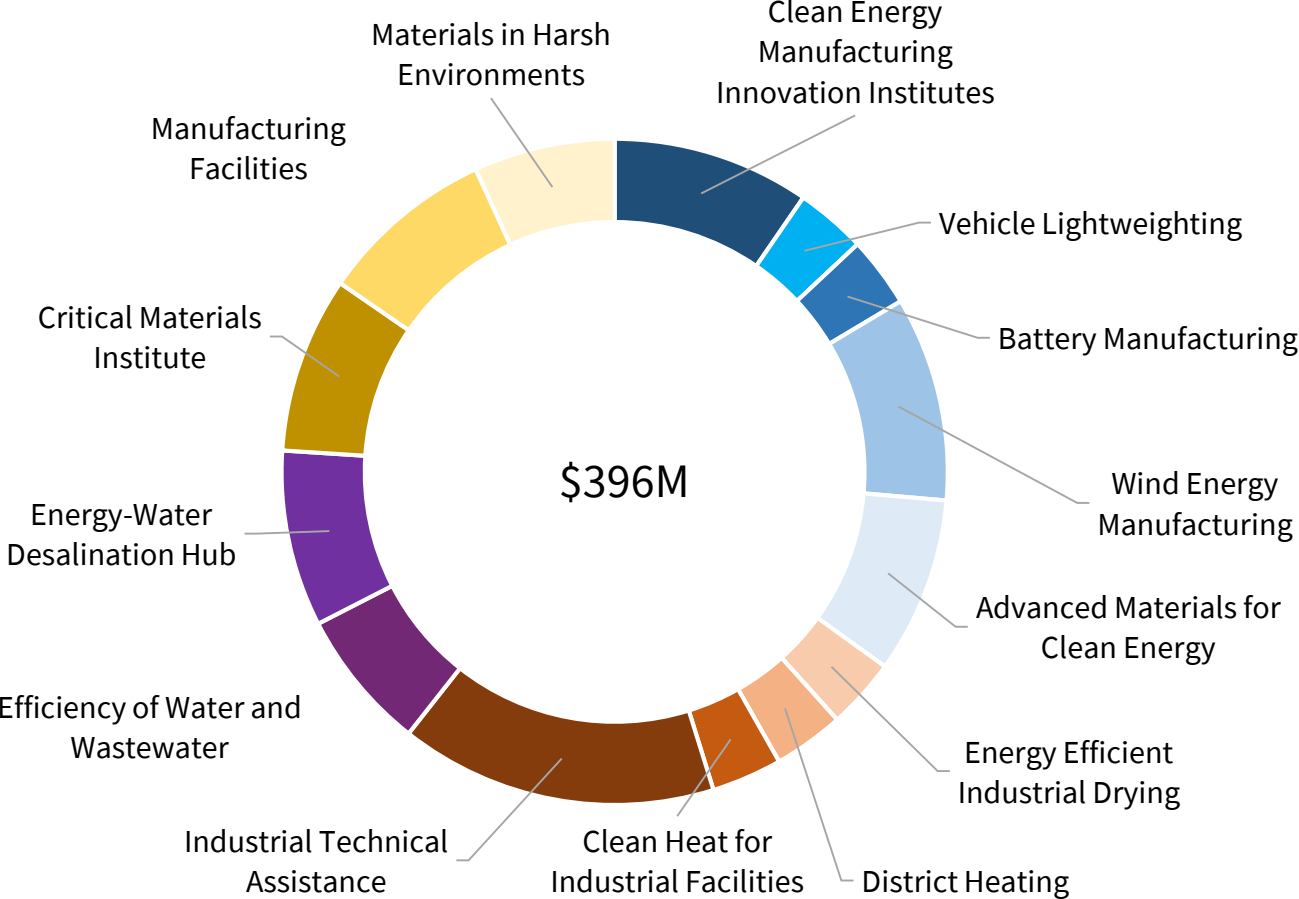
- 1) The recommendation shows the kind of increases we need to achieve a \$400B investment over 10 years.
- 2) There is a major opportunity for BOTH stimulus funding AND expansion of DOE's budget to provide long-term, consistent support to bring the benefits of energy efficiency and clean energy to more people.
- 3) EERE—and in particular the buildings, industry, and transportation offices—needs a much larger annual budget to take advantage of the opportunities.

Opportunities: BTO and AMO

Building Technologies Office



Advanced Manufacturing Office



Opportunities: Assistance to State, Tribal, and Local Governments

1) Weatherization Assistance Program (\$315M in FY21):

- Consistent, long-term budgets will help grow and maintain the workforce and bring the benefits of healthy, efficient homes to more people.
- WAP needs an increase to consistent funding of \$1-\$2 billion per year.

2) State Energy Program (\$62.5M in FY21):

- SEP is a highly effective program that supports state clean energy efforts, leverages private finance to expand the impact of federal spending, and results in \$7 of savings for every dollar invested.
- The program's budget is too small to support the great work that states want to do and should increase to \$1-\$2 billion per year in the next few years.

3) Convening, Funding, and Technical Assistance for Local and Tribal Governments and Partners:

- There's an enormous opportunity for EERE to support local governments in advancing energy efficiency, clean & efficient transportation systems, distributed clean energy, workforce development, and more.

Opportunities: Funding for Equity, Justice, and Workforce Development



EQUITY.

Does it combat the historically unequal impacts of pollution, while increasing equitable access to new economic opportunity, improved public health, and resilience?

A Progressive Climate Innovation Agenda, Data For Progress

- 1) **Funding for analysis, tool development, and community engagement** to incorporate equity, environmental and energy justice, and strong workforce standards into all investments.
- 2) Provide funding to specifically **combat energy burden & energy poverty through DOE investments**, including through funding for BTO to reduce barriers to adoption of energy efficiency measures.
- 3) **Funding for workforce development** in BTO, AMO, and across DOE.

Building the Clean Energy Economy

- 1) Almost 3.4 million people in the United States worked in clean energy industries, 2.4 million in energy efficiency, before the pandemic. Almost 430,000, or 12 percent, are still out of work (E2) because of the pandemic.
- 2) Federal clean energy investments will help clean energy workers get back on their feet and continue to expand the clean energy economy.
 - Increasing R&D spending to 1% of GDP would support **3.4 million jobs** and spur enormous other economic, environmental, and health benefits (Breakthrough Energy).
 - ~\$100B in clean energy investments would create almost **300,000 – 900,000 jobs** for the next five years (Rhodium and E2).
 - ~\$600B in climate investments *per year* is projected to create **\$9 million new jobs** for the next 10 years (Political Economy Research Institute).



Source: DOE

Thank You!



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EESI March 5, 2021



FY2022 Appropriations

March 5, 2021

Jennifer Schafer

Executive Director

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2021 FPCC Members



Looking Ahead- Bigger and Better ESPCs



The art of the possible



Cybersecurity



Making energy
efficiency a top priority

Energy Policy Act 2020 Drives some Appropriations Needs

- Section 1012 authorizes the Federal Energy Management Program at \$36 M per year for the base program
- Section 1002 expands the definition of eligible energy conservation measures for energy savings performance contracts (ESPC)
- Section 1002 mandates that previously (EISA 432) required audits of our Federal buildings for energy savings lead to projects if the measures found are cost effective.
- Section 1002 further mandates that 50% of these cost effective measure are accomplished through performance contracting

DOE FY22 Request: Federal Energy Management Program (FEMP)

- Fund base FEMP program at \$36 M as authorized
 - FY21 and FY20 funding for FEMP \$27 M
- Provide an additional \$20 M for the AFFECT Grant Program (Assisting Federal Facilities with Energy Conservation Technologies)
 - Funding in FY21 and FY20 was \$11 M

Other Agency Requests

- Ensure appropriate implementation funding available at
 - Army
 - Navy
 - Air Force
 - General Services Administration
 - Veteran's Administration
- Support funding at GSA to leverage performance contracting
- Advocate for \$20 M to DOD for a Pilot program similar to AFFECT

Stimulus Request

\$500 M per year to AFFECT for five years

- This will leverage between \$2.5 -\$5.0 BILLION of investment annually from the performance contracting industry
- Open Back Better legislation (included in CLEAN Futures Act) includes this concept
- Combination of funding at DOE AFFECT, DOD Resiliency Fund and GSA Public Buildings leverage

Why Incremental Funding?

- Incremental, missions critical ECMs
- Address Backlog Maintenance at Agencies
- Increased government benefits accrue
- Jobs impact is magnified
- Emissions reduction maximized

Jobs and Climate Benefits

- Building Infrastructure improvements create 9.5 jobs per million dollars of investment
 - Direct funding of \$5 B Federal investment creates 47,500 jobs
 - Funding with Performance Contracting instead creates 237,000-500,000 jobs
- Historic CO2 savings:
 - \$7,500,000,000 of private sector investment over the past 20 years (much smaller than recently)
 - Is reducing CO2 equivalent by over 7 Billion lbs. **annually**
 - This is the equivalent of eliminating three coal fired power plants.



BASF

Supporting DOE Programs & Technologies



We create chemistry



Curtis J. Zimmermann
March 5, 2021

Who we are

BASF in North America – 2020 performance



DOE Critical Energy Programs

ARPA-E

- Transformational energy technologies. Unicorn territory.
- OPEN 2021 FOA right now!

ENERGY STORAGE

- Imperative for renewable energy, AV's/EV's and...
- DOE has a road map!

PLASTICS INNOVATION CHALLENGE

- Plastics and energy efficiency?
- Valorization → Circularity
- Plastic waste as a “Critical Material” to reduced energy utilization
- ChemCycling™

HYDROGEN (H₂)

- H₂ economy is here!
- Production/infrastructure for **grey**, **blue** & **green** hydrogen.
- Methane pyrolysis

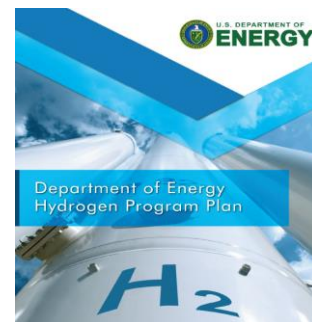
All areas contribute to energy efficiency



Advanced Research Projects Agency • ENERGY

Plastics Innovation Challenge Draft Roadmap

U.S. Department of Energy



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We create chemistry

DOE Critical Energy Programs

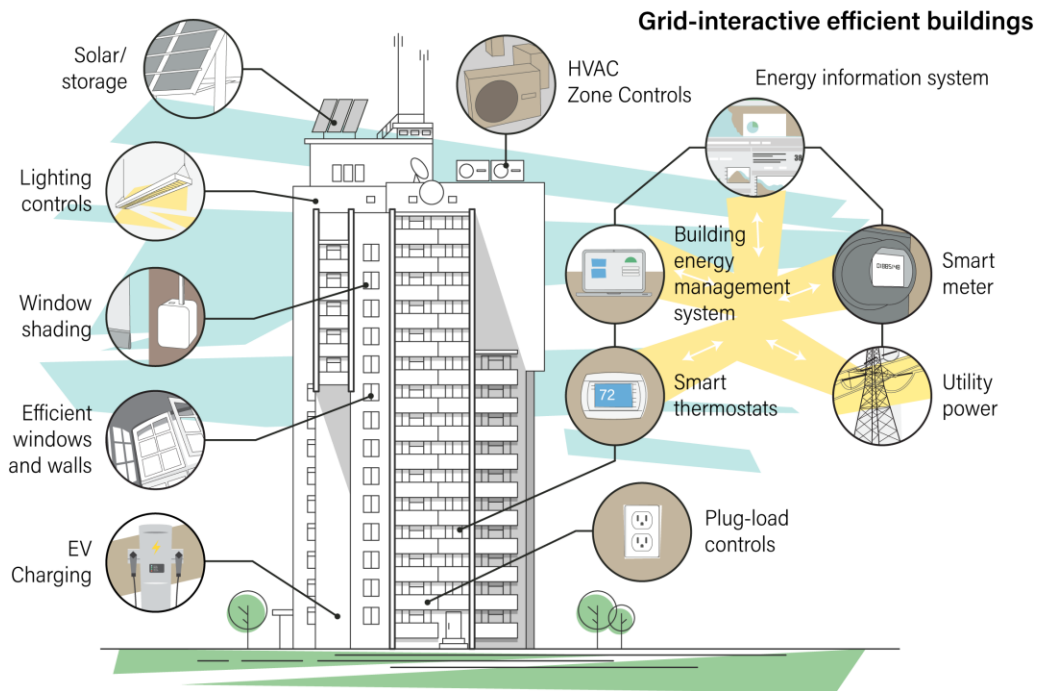
Programs Impacting the Built Environment

❑ Building Energy Codes Program (Efficiency) - BTO

- Technical and financial assistance to states, local governments to adopt and **implement** energy codes
- Additional funding to update codes
- BTO strives to reduce by 2025, the energy use for space conditioning and water heating in single-family homes by 40% from 2010 levels
- REScheck & COMcheck supporting tools

❑ Building America Program (Efficiency)

- Leverage building science expertise, innovation, and applied research for high performance homes with emphasis on efficiency to benefit the residential building industry





We create chemistry



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Friday, March 05, 2021