



U.S. DEPARTMENT OF  
**ENERGY**

Office of the  
**UNDER SECRETARY  
FOR SCIENCE AND ENERGY**

# Science and Energy Crosscuts and Energy Earthshots Overview

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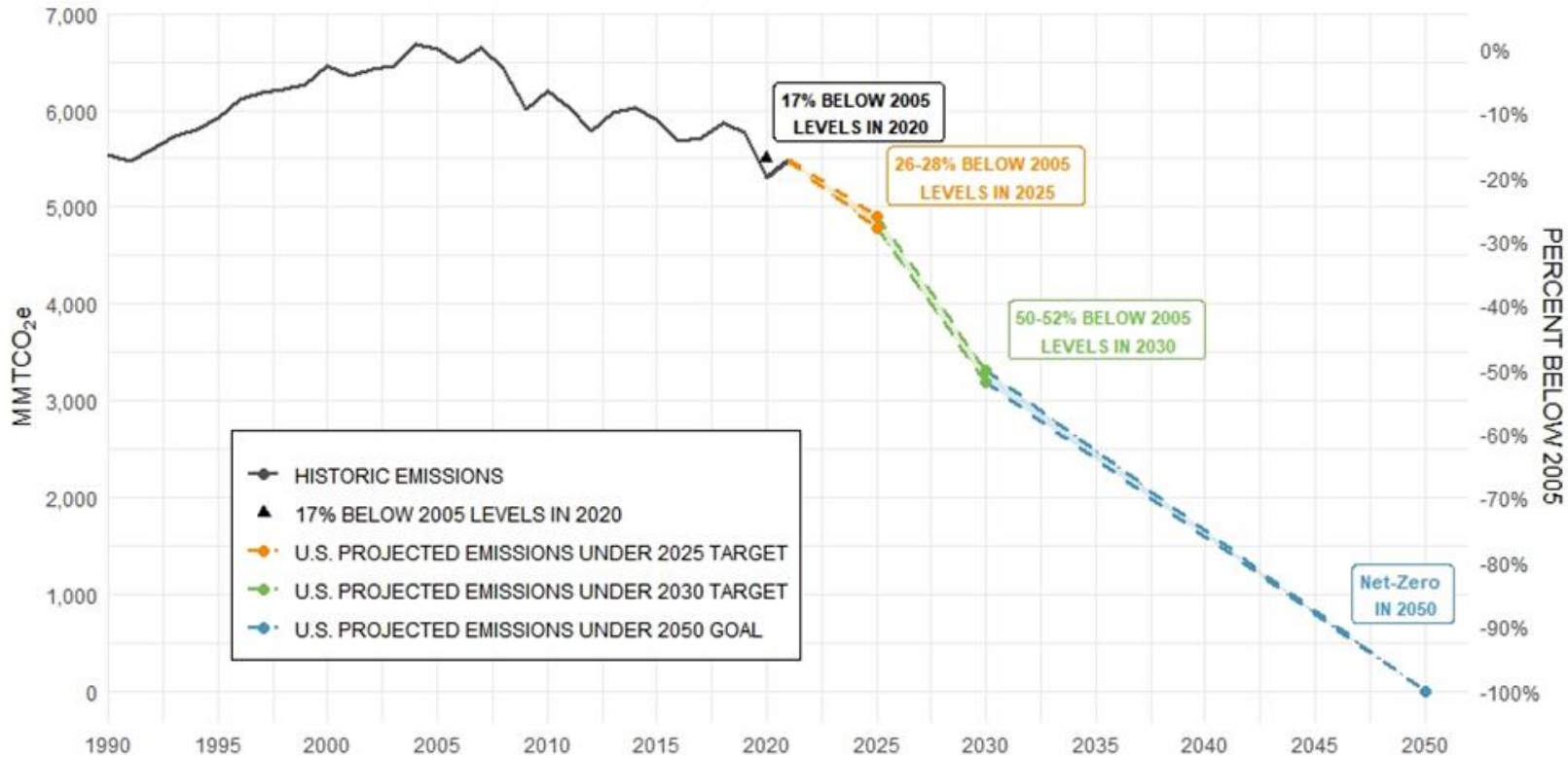
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# Achieving Our Climate and Energy Goals Requires *All-Hands-On-Deck*

## The Challenge



## The Strategies:

1. Transform the Energy System
2. Reduce Non-CO<sub>2</sub> Emissions
3. Remove Carbon

The Long-Term Strategy of the United States, Pathways to Net-Zero Greenhouse Gas Emissions by 2050



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# S4 Science and Energy Crosscut Team: Mission & Approaches

**Mission:** Spur innovation and accelerate progress towards 2030, 2035 and 2050 climate and energy goals through **fully integrated** science and applied energy research, development, demonstration, and deployment (RDD&D) **within and across key technology domains in DOE.**

## Coordinate

- Be a Focal Point
- Work Across S4 and DOE Technology Program Offices

## Catalyze

- Enable DOE-Wide Science and Energy Crosscuts in key areas
- Lead the Energy Earthshots Initiative

## Connect

- Partner with internal and external experts:
- Identify and participate in inter-agency RD&D activities



# S4 Science and Energy Crosscut Team: Portfolio

## 1. Science and Energy Crosscuts

Coordinate, catalyze and connect across DOE to develop and execute goal driven RD&D plans to achieve National targets

Next 2-3 Years

Next 5-7 Years

Next 5-10 Years

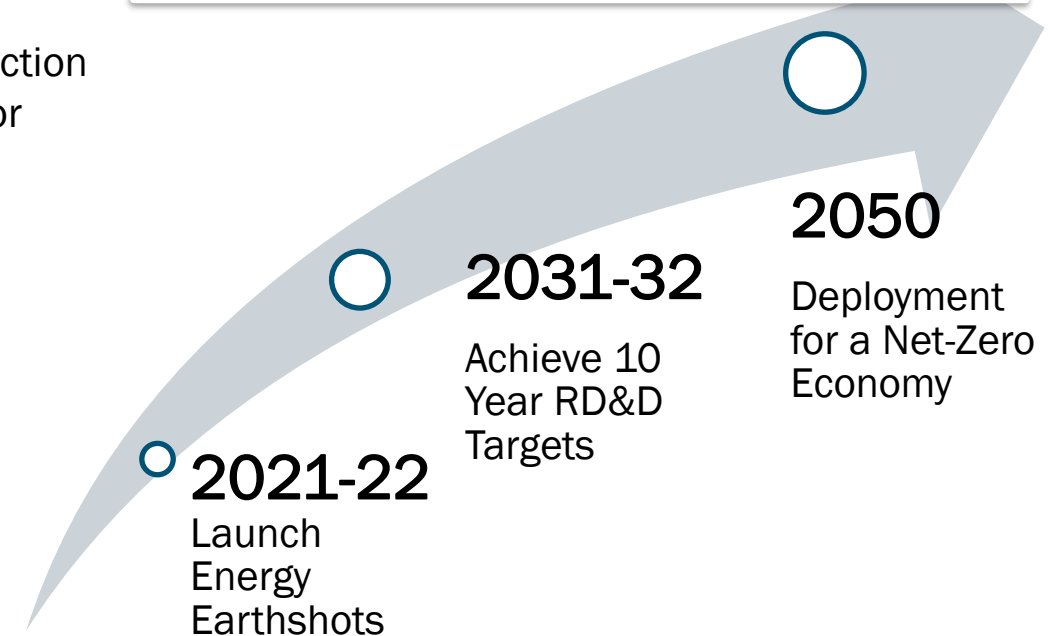
- 2030 50% Emissions Reduction
- 2035 Net-Zero Power Sector
- 2050 Net-Zero Emissions Economy-Wide

### FY21-22 Priority Technology Domains:

- Hydrogen
- Carbon Dioxide Removal
- Grid Modernization
- Energy Storage
- Critical Minerals & Materials
- Clean Energy Tech Manufacturing
- Energy-Water Nexus
- Industrial Decarbonization
- Alternative Fuels and Feedstocks
- Net Zero Buildings
- Subsurface Clean Energy Applications

## 2. Energy Earthshots Initiative

For a targeted *subset of the hardest remaining RD&D challenges to solve in 10 years* to reach our 2050 net-zero goal.



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# Science and Energy Crosscuts: Technology Domains

## FY21-22 Prioritized Science and Energy Crosscuts

- Hydrogen
  - Hydrogen Shot
- Energy Storage
  - Long Duration Storage Shot
- Carbon Management
  - Carbon Negative Shot
- Grid Modernization
- Critical Minerals and Materials
- Industrial Decarbonization
- STEM
- Subsurface Clean Energy Applications
- Clean Energy Technology Manufacturing
- Net Zero Buildings
- Sustainable Fuels
- Energy-Water Nexus

## Additional Crosscutting Topic Areas

- Biotechnology
- Plastics
- Decarbonizing Agriculture
- Advanced Transportation
- Renewable Power
- Nuclear Energy



# Energy Earthshots Initiative: Call to Action



**“...I’ve asked the Secretary of Energy...to speed the development of critical technologies to tackle the climate crisis. No single technology is the answer on its own because every sector requires innovation to meet this moment.”**

President Joseph R. Biden  
April 23, 2021



**"Over the coming weeks...DOE will be announcing new goals for bold, achievable leaps in next-generation technologies—**

**This is our generation’s Moonshot.”**

Secretary Jennifer M. Granholm  
April 23, 2021



# Energy Earthshots: Necessary and Urgent

Energy Earthshots target the remaining, major RD&D breakthroughs we know we must achieve in the next decade to solve the climate crisis and reach our 2050 net-zero carbon goals.

- Make a major impact to **reduce emissions**
- Address the **hardest technology barriers**
- Set highly **ambitious decadal targets**
- Are **compelling, bold, and inspirational**
- **Significantly engage stakeholders**



# Current Portfolio



1 Dollar



1 Kilogram



1 Decade

*Exclusive: DOE launches push to meet hydrogen “Earthshot” goal*

*- [Axios, June 7, 2021](#)*



Reduce storage costs by **90%** from a 2020 Li-ion baseline...



...in storage systems that deliver **10+** hours of duration



...in **1** decade

*Energy Department Targets Vastly Cheaper Batteries to Clean Up the Grid*

*- [New York Times, July 14, 2021](#)*



<100 Dollars



1 Ton



1 Decade

*Energy Department Aims to Slash Cost of Removing Carbon From the Air*

*- [New York Times, Nov 5, 2021](#)*





# Energy Earthshots: Support Structure

Energy Earthshots  
Working Group  
DOE Senior Leaders  
(Advisory Role)

- Energy Efficiency and Renewable Energy
- Fossil Energy and Carbon Management
- Office of Nuclear Energy
- Office of Science
- Office of Electricity
- Office of Technology Transitions
- Office of the Secretary of Energy
- Office of Policy
- ARPA-E
- Office of Economic Impact and Diversity
- SunShot Initiative Representative

Hydrogen  
SETT  
S4 SEPM  
Co-Leads: EERE; BES; FECM

Energy Storage  
Grand Challenge/SETT  
S4 SEPM  
Co-Leads: OE & EERE

Carbon Management  
SETT  
S4 SEPM  
Co-Leads: FECM; SC; EERE;  
ARPA-E

Core Team Members come from: ARPA-E, EERE, FECM, NE, OE, SC  
Support from: PA, CI, IA, and National Laboratories



Geraldine Richmond  
U/S for Science & Energy



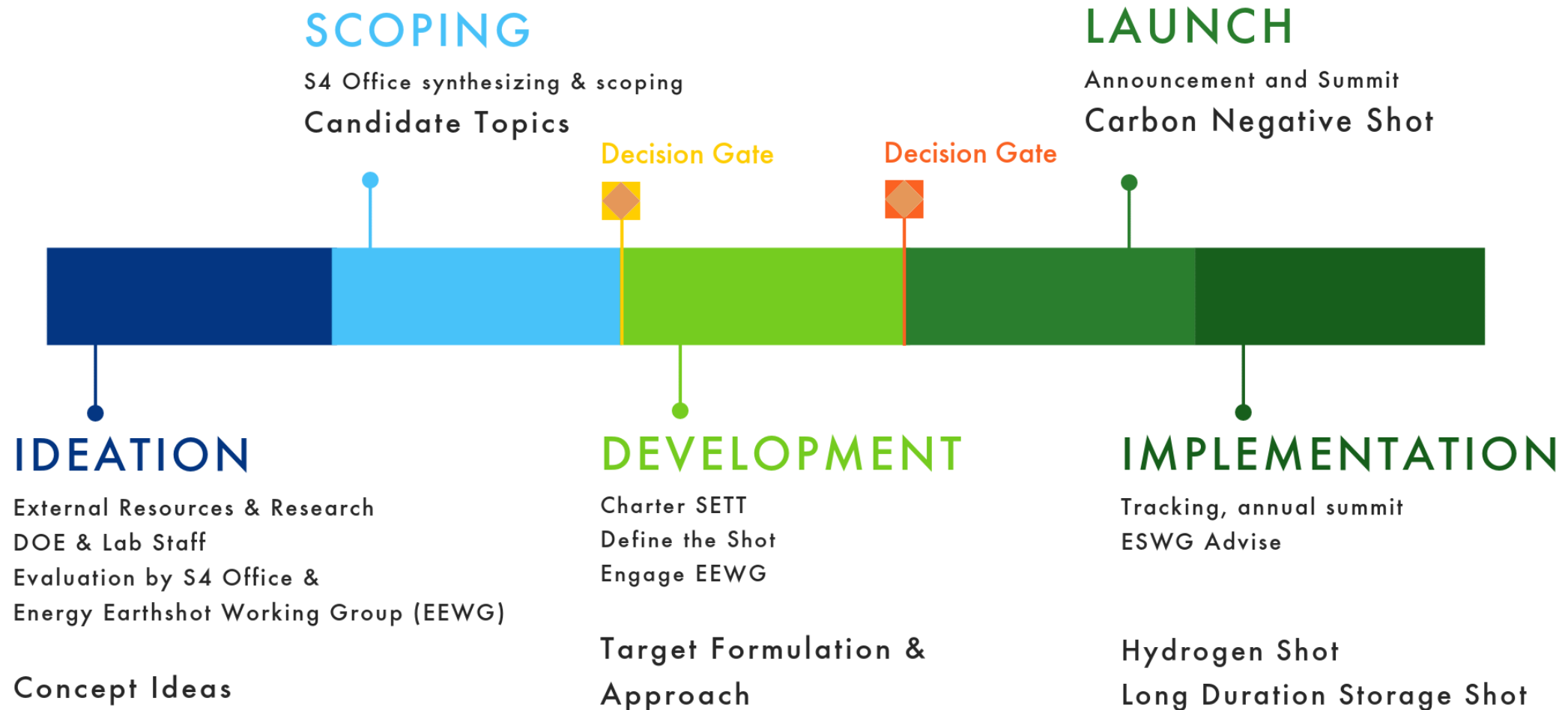
Ali Douraghy  
Chief of Staff



Kelly Visconti  
Crosscut Team Lead

SETT = Science & Energy Technology Team

# Energy Earthshots: Process



# Energy Earthshots: Implementation

- **Stakeholder Engagement**
  - Launch and Annual Summits
  - Requests for Information
  - Technical workshops and interchanges
- **Planning and Execution**
  - Integrated RDD&D planning
  - Identify RDD&D gaps
  - Budget process input
  - Coordinate funding opportunities
  - Interagency coordination and alignment
- **Track and Report Progress**
  - Establish baseline metrics methodology
  - Measure, track and report progress

*Active Engagement:  
From Ideation to  
Implementation*

**Thank you!**