



U.S. DEPARTMENT OF
ENERGY

Office of the
**UNDER SECRETARY
FOR SCIENCE & INNOVATION**

Energy Earthshots Initiative

BER Advisory Committee Meeting

Devinn Lambert,

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4/20/2023



Energy Earthshots: 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**



Energy Earthshot Framework

MISSION

Ambitious

Bold and aspirational at the scale of 2030 and 2050 necessity

Technology focused

Establishes cost, performance or other target in a specific DOE tech space

Purposeful

Singularly focused on reducing emissions at scale and foundational to U.S. clean energy agenda

Leading the way

Places DOE and U.S. as central thought leader of global clean energy trajectory

STRATEGIC ALIGNMENT

Resources aligned

Coordinated DOE budget requests

Informed with strategic planning

Science to applied energy near- and long-term RDD&D vision, analysis and periodic reassessments

Stakeholders engaged

Engages stakeholders from universities, national labs, industry throughout each stage

IMPLEMENTATION

Clearly-communicated

Clear, compelling, highly-visible core message tied to DOE innovation story

Measurable progress

Innovation progress evaluated against benchmark targets

Jobs, economic, and energy justice

Impact assessments on opportunity for job creation, equity, and domestic economy

Decisive

Allows DOE to become more risk tolerant, streamlined, and prioritized around achieving targets

Implementation

- **Ideation and Scoping**
 - White House Climate Innovation Working Group
 - 130+ Concept Notes
 - Decision Framework
- **Planning and Execution**
 - Integrated RDD&D planning & gap analysis
 - Budget process input & coordinated funding opportunities
 - Interagency coordination and alignment
- **Stakeholder Engagement**
 - Launch and Annual Summits
 - Requests for Information, workshops and interchanges
- **Track and Report Progress**
 - Establish baseline metrics methodology
 - Measure, track and report progress

*Active Engagement:
From Ideation to
Implementation*

Energy Earthshot Portfolio



Announced June 2021- September 2022



Hydrogen, Long Duration Storage, Carbon Negative

Hydrogen Shot™ seeks to reduce the cost of clean hydrogen by 80% to \$1 per 1 kilogram in 1 decade (“1 1 1”).

Long Duration Storage Shot™ seeks to reduce the cost of grid-scale energy storage by 90% for systems that deliver 10+ hours of duration within the decade.

The **Carbon Negative Shot™** target is durable and scalable CO₂ removal under \$100/net metric ton CO₂e within a decade.

Enhanced Geothermal, Floating Offshore Wind, Industrial Heat

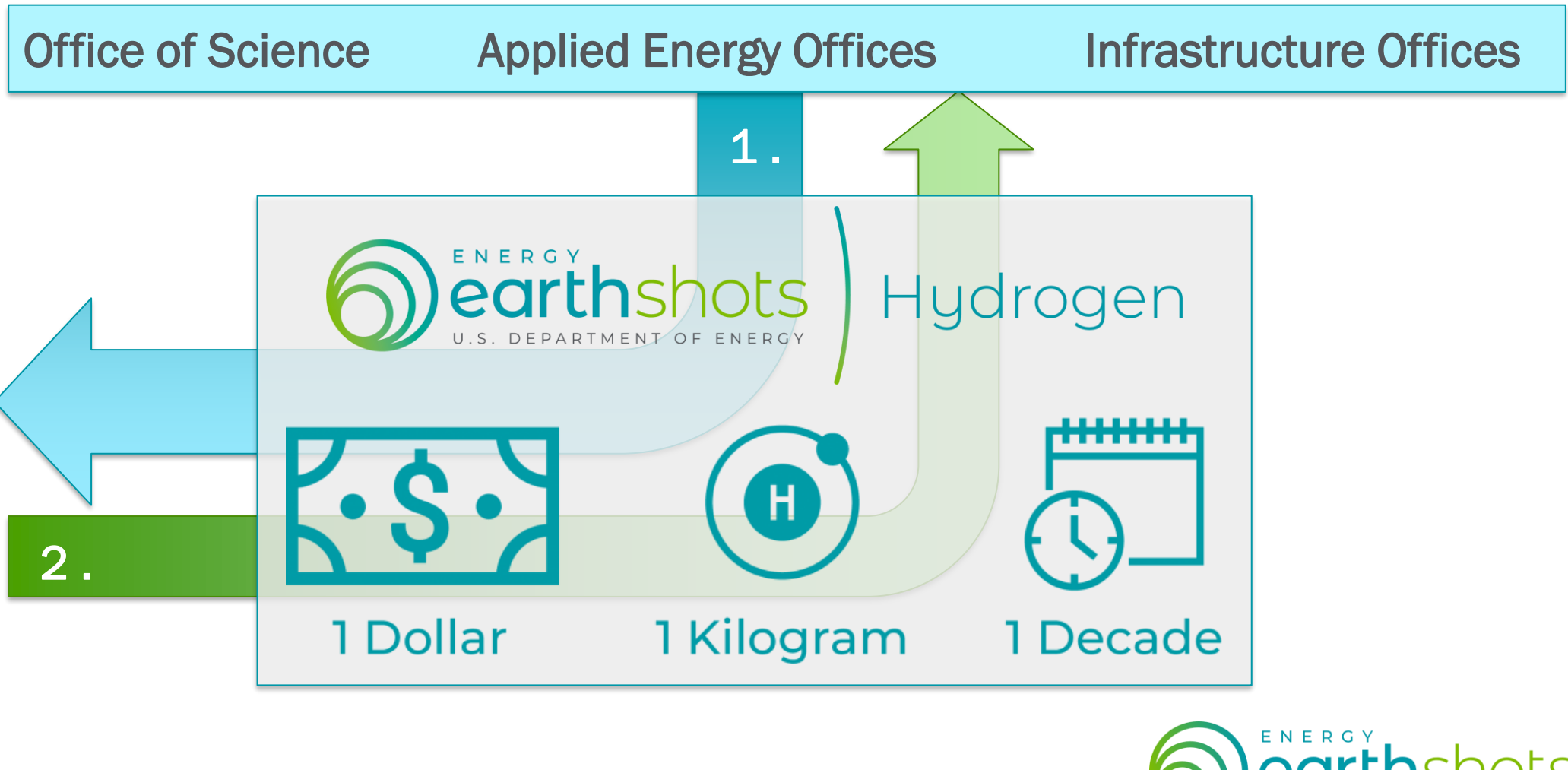
Enhanced Geothermal Shot™ seeks to reduce the cost of EGS by 90%, to \$45 per megawatt-hour (MWh) by 2035.

Floating Offshore Wind Shot™ seeks to reduce the cost of floating offshore wind in deep waters by more than 70%, to \$45 per megawatt-hour by 2035.

The **Industrial Heat Shot™** seeks to develop cost competitive industrial heat decarbonization technologies with at least 85% lower greenhouse gas emissions by 2035.

Strategic Alignment: Feedback loop

1. An Energy Earthshot focuses “All-hands” attention on a singular target
2. Scientific and strategic learnings, guides “All-hands”



Strategic Alignment: What “All-Hands” looks like from the street



1 Dollar



1 Kilogram



1 Decade

Snapshot of work
June 21-March 23



Resources
aligned

Energy Earthshot
Research Centers

BIL: Clean Hydrogen Electrolysis,
Manufacturing, and Recycling

BIL: Regional Clean
Hydrogen Hubs

Informed with
strategic
planning



BES Roundtable
Foundational Science
for Carbon-Neutral
Hydrogen Technologies

DOE Clean Hydrogen
Strategy and Roadmap

Pathways to Commercial
Liftoff: Clean Hydrogen

Stakeholders
engaged



PI Meetings

Hydrogen from Next-
generation Electrolyzers
of Water Workshop



H2
Matchmaker



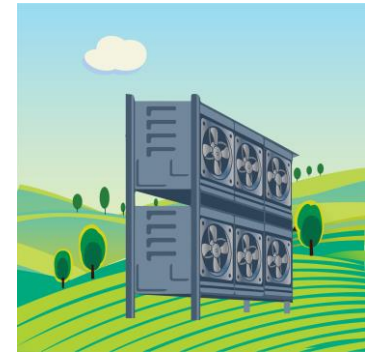
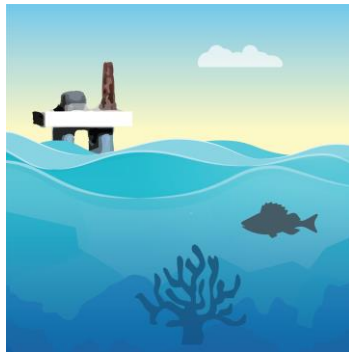
Decisive & Creative: Hydrogen Shot Fellowship



BER's hands in the Energy Earthshots

- Existing projects and fundamental research (e.g. systems biology, climate modeling and scenarios)
- FY23 enacted budget and [FY24 budget request](#)
- In FY23, participating in SC wide Energy Earthshot activities (ASCR, BER, BES):
 - Energy Earthshot Research Center (EERC) Lab Call
 - Science Foundations for Energy Earthshots FOA

Durable and scalable carbon dioxide removal under \$100/net metric ton CO₂e within a decade



Develop cost competitive industrial heat decarbonization technologies with at least 85% lower greenhouse gas emissions by 2035

Modeling impacts



Floating Offshore Wind™



>70% Reduction



2035



Hydrogen



1 Dollar



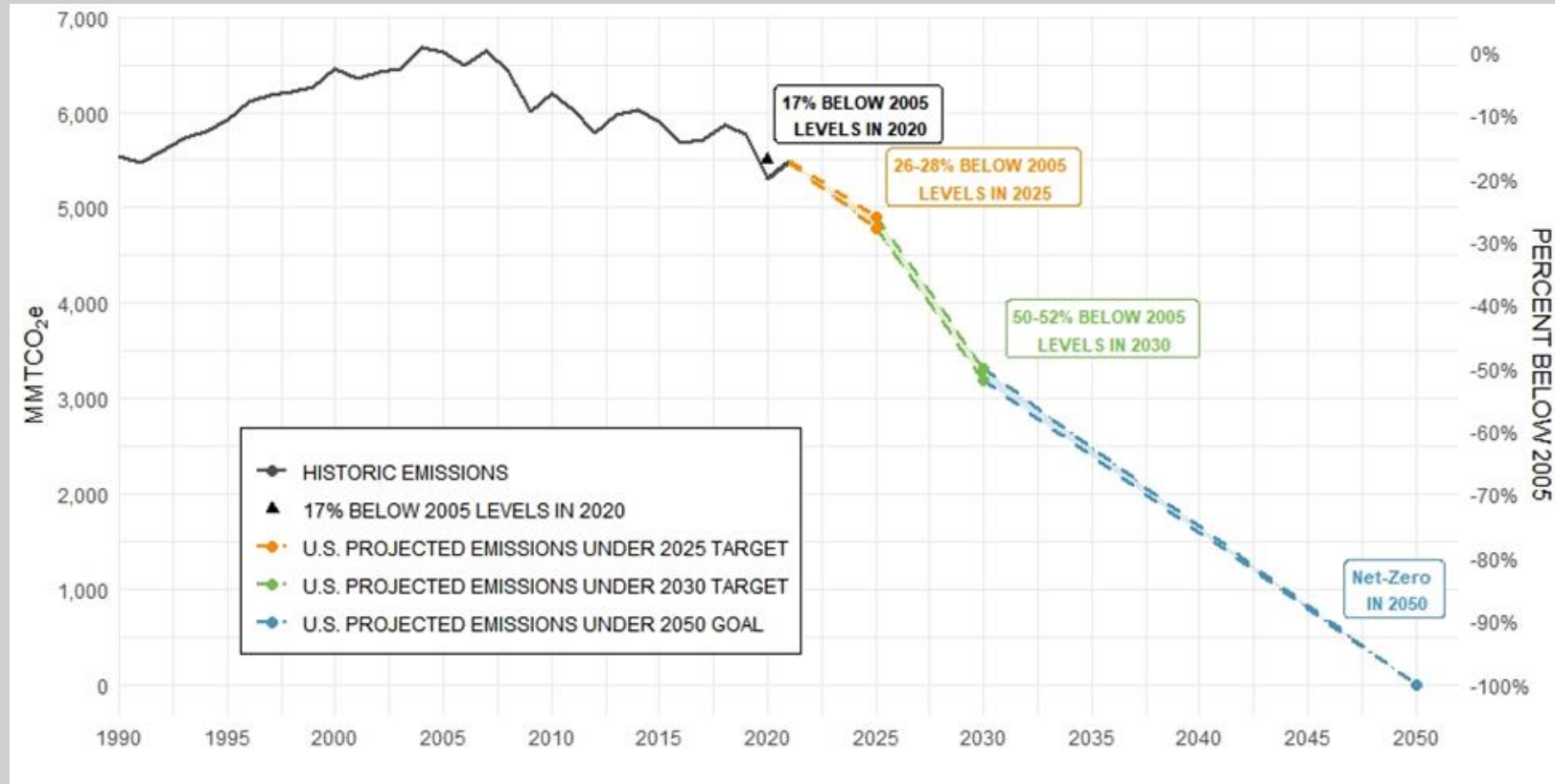
1 Kilogram



1 Decade



The challenge is great, *and achievable*



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

The challenge requires *All-Hands-On-Deck* from *fearless innovators*

“We need *fearless innovation* to bring down the costs of batteries, to commercialize carbon capture, to make blue and green hydrogen market ready, and perhaps most of all, we need a mindset that overcomes resistance to change. Many are stuck on the status quo,”

Secretary Jennifer M. Granholm

[President Biden’s Leader Summit on Climate, “Unleashing Climate Innovation”
Session,](#)

April 23, 2021

**What are the opportunity spaces for BER
in the Energy Earthshots?**



Thank you.