Housekeeping

This Zoom call is being recorded and may be posted on the Energy Department's website or used internally. If you do not wish to have your voice recorded, please do not speak during the call or disconnect now. If you do not wish to have your image recorded, please turn off your camera or participate only by phone. If you speak during the call or use a video connection, you are presumed to consent to recording and to the use of your voice or image.

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

2022 SETO PEER REVIEW

Solar Energy Technologies Office 2022 Peer Review

Alejandro Moreno, Deputy Assistant Secretary for Renewable Power

Office of Energy Efficiency & Renewable Energy

EERE Mission

EERE's mission is to **accelerate the research, development, demonstration, and deployment** of technologies and solutions to **equitably transition America to net-zero greenhouse gas emissions economy-wide by no later than 2050**, and **ensure the clean energy economy benefits all Americans,** creating good paying jobs for the American people—especially **workers and communities impacted by the energy transition and those historically underserved** by the energy system and overburdened by pollution.

EERE Guiding Principles

EERE PROGRAM PRIORITIES

- 100% decarbonized electric grid by 2035
- Decarbonize transportation across all modes
- Enable a net-zero agricultural sector
- Decarbonize energy intensive industries
- Reduce the carbon footprint of buildings

KEYS TO ENSURE THE GREATEST IMPACT

Environmental and Energy Justice

Workforce Development

Diversity in STEM

State and Local Partnerships

How do we accomplish this?

RDD&D efforts in solar, wind, water, and geothermal power to help **reduce the costs** and accelerate the use and **integration of renewables** in a **reliable, secure, and resilient grid.**

Accelerate Deployment

Enable widespread adoption of existing technologies

Sustain Cost Reductions

Drive continued cost reductions

Increase Resource Flexibility & Diversity

Maximize flexibility and reliability of generation & load

(Joint with OE)

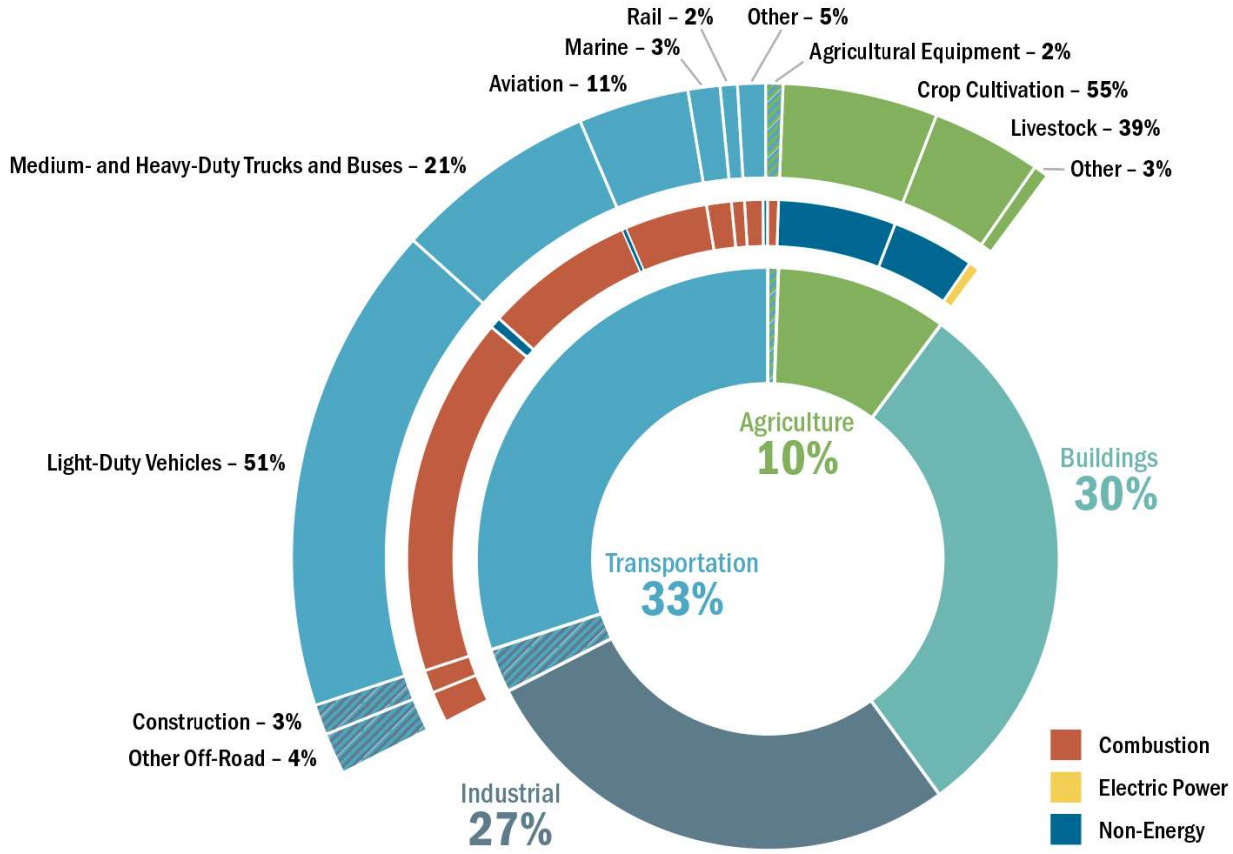
Support a Modernized Grid

Optimize grid infrastructure & mgmt. to an RE-led system,

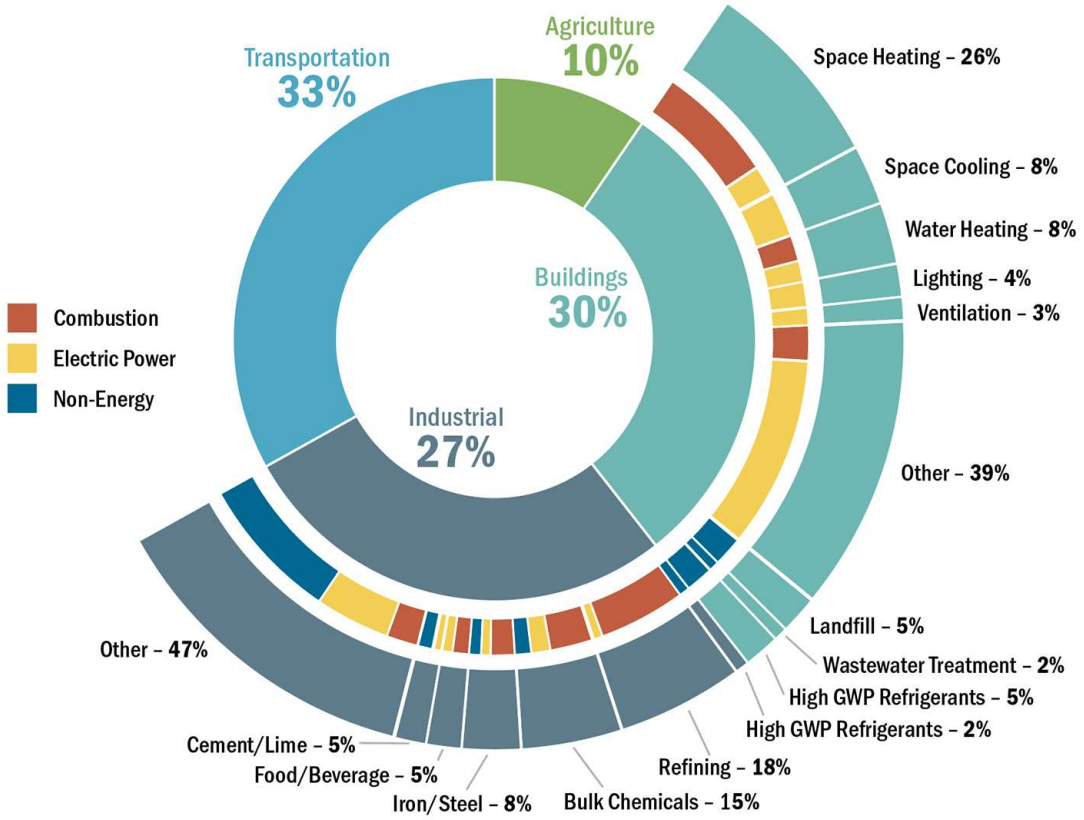
Support U.S. manufacturing and secure supply chains

Ensure renewable resilient supply chains and energy technologies that benefit workers and communities

Sustainable Transportation



Energy Efficiency



Meeting 2035 and 2050 Clean Energy Goals

Our challenge is clear

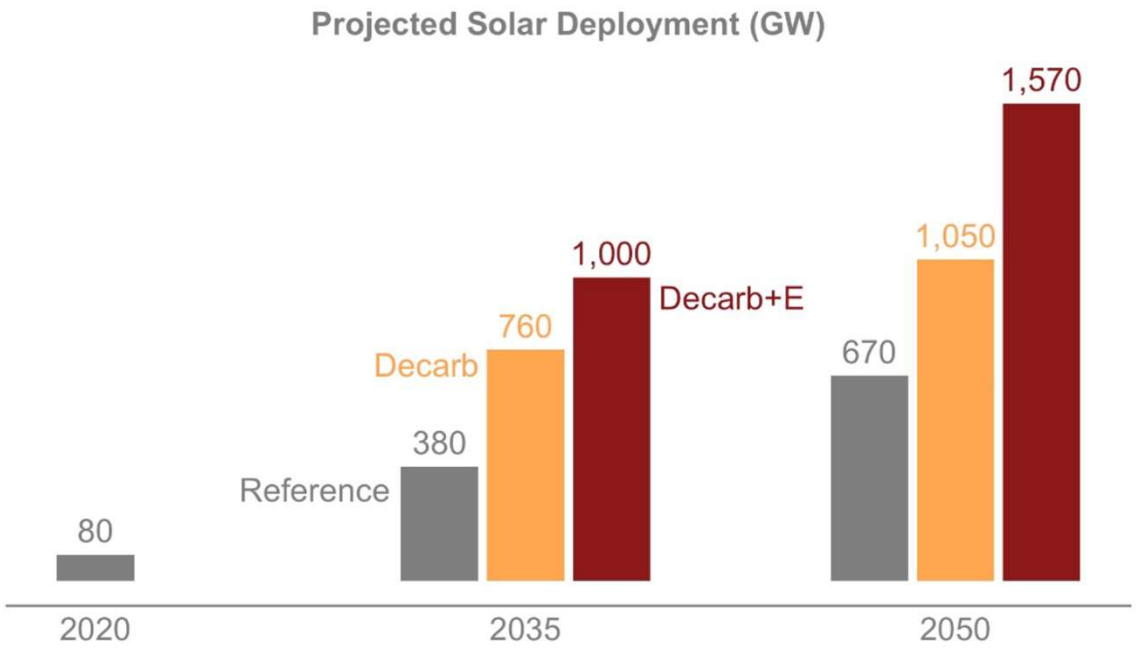


Figure 1 - 3. Projected solar deployment under the Solar Futures scenarios

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

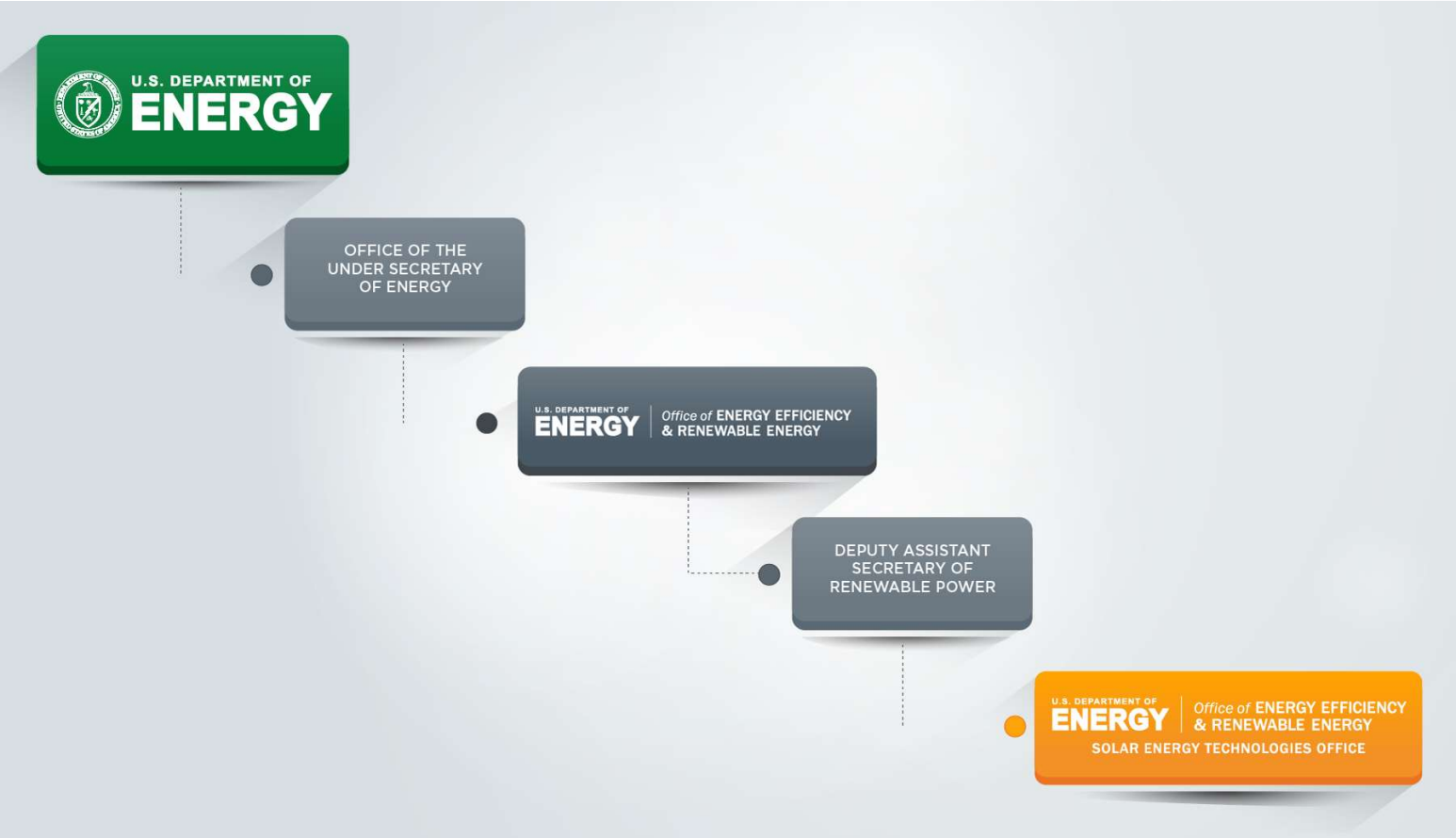
2022 SETO PEER REVIEW

SETO in 2022:
On the Path to U.S. Decarbonization

Garrett Nilsen, Acting Director

Solar Energy Technologies Office

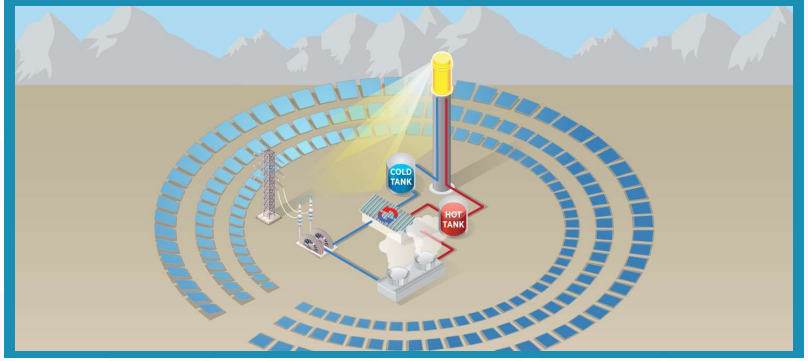
Where Does SETO Fit Within the Energy Department?



SETO Program Areas

PHOTOVOLTAICS

CONCENTRATING SOLAR-THERMAL POWER



BALANCE OF SYSTEMS/ SOFT COST REDUCTION

SYSTEMS INTEGRATION

MANUFACTURING AND COMPETITIVENESS

SETO Teams

- Photovoltaics R&D
- Concentrating Solar Thermal Power R&D
- Systems Integration R&D
- Manufacturing & Competitiveness
- Strategic Analysis and Institutional Support
- Workforce and Equitable Access
- Operations

Balance of System Soft Costs

Solar Energy Technologies Office Leadership Team

Becca Jones-Albertus
Director (on detail to Advanced Manufacturing Office)

Garrett Nilsen
Acting Director

Paul Basore
Chief Scientist

Markus Beck
Manufacturing and Competitiveness Program Manager

Michele Boyd
Strategic Analysis and Institutional Support Program Manager

Sheila Moynihan
Operations Supervisor

Avi Shultz
Concentrating Solar-Thermal Power Program Manager

Nicole Steele
Workforce and Equitable Access Program Manager

Lenny Tinker
Photovoltaics Program Manager

Guohui Yuan
Systems Integration Program Manager

Solar Energy Technologies Office Team

DOE Solar Office Funds 400+ Active Projects

Projects and partners in 42 states plus the District of Columbia

33% of projects led by **national labs**

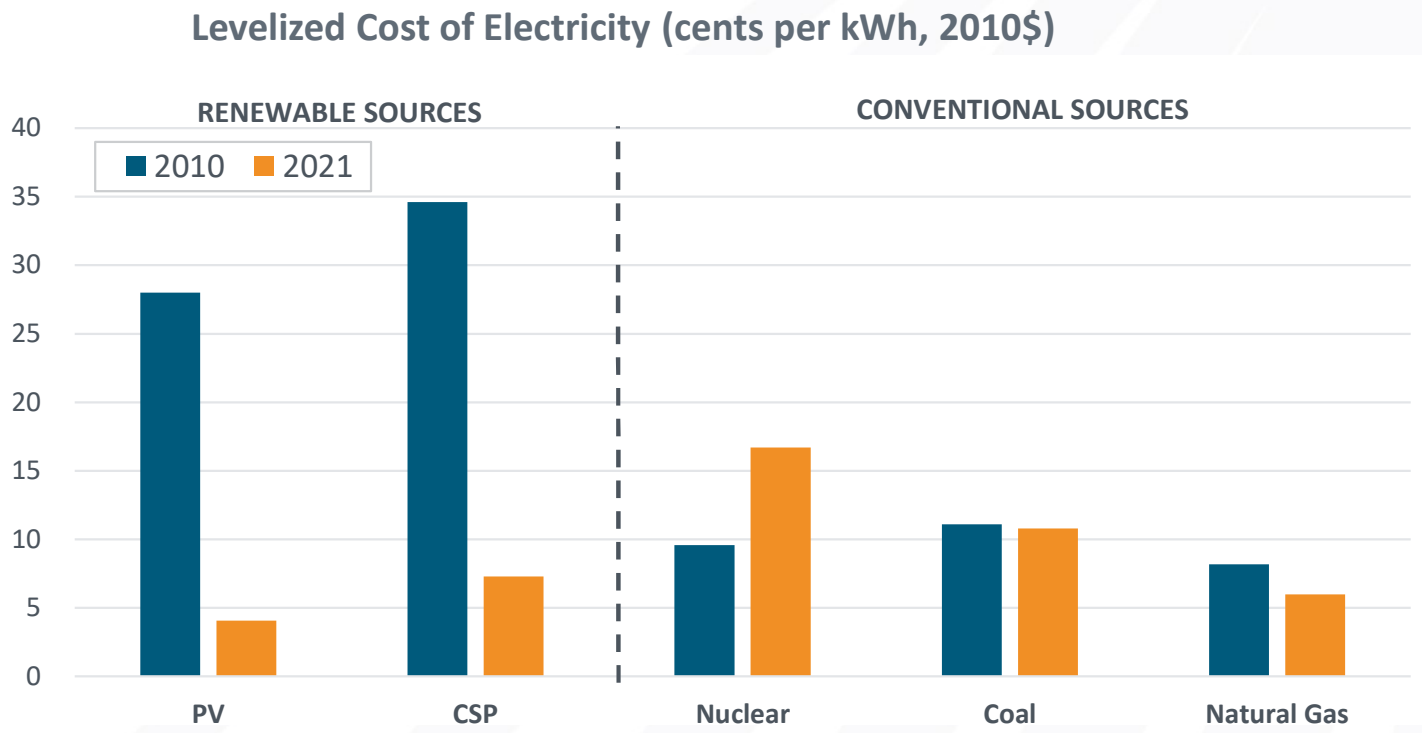
32% of projects led by **universities**

35% of projects led by **businesses, non-profits, and state and local government**

A View of the Solar Industry to start 2022

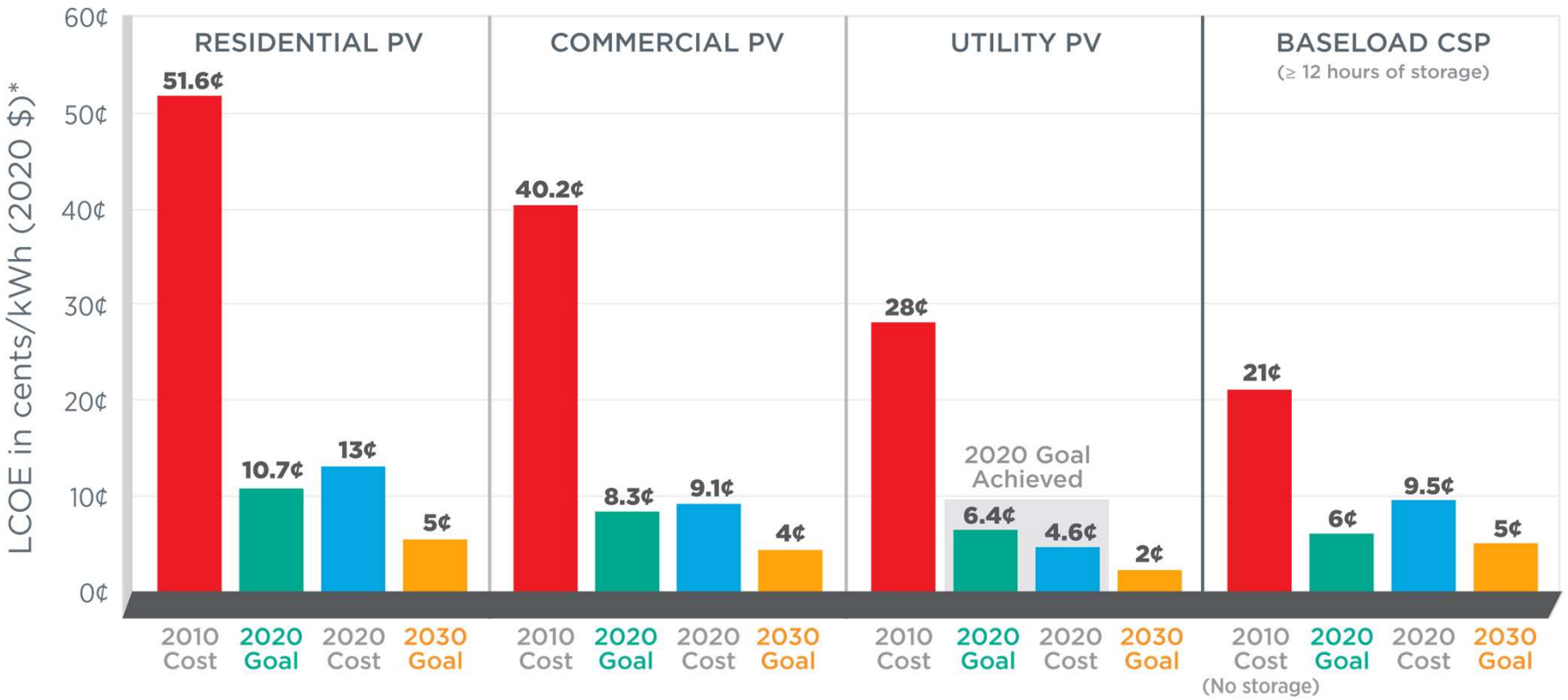
Just 11 Years Ago

Growing from 1 gigawatt solar capacity in the United States in 2010 to over 90 GW in 2021



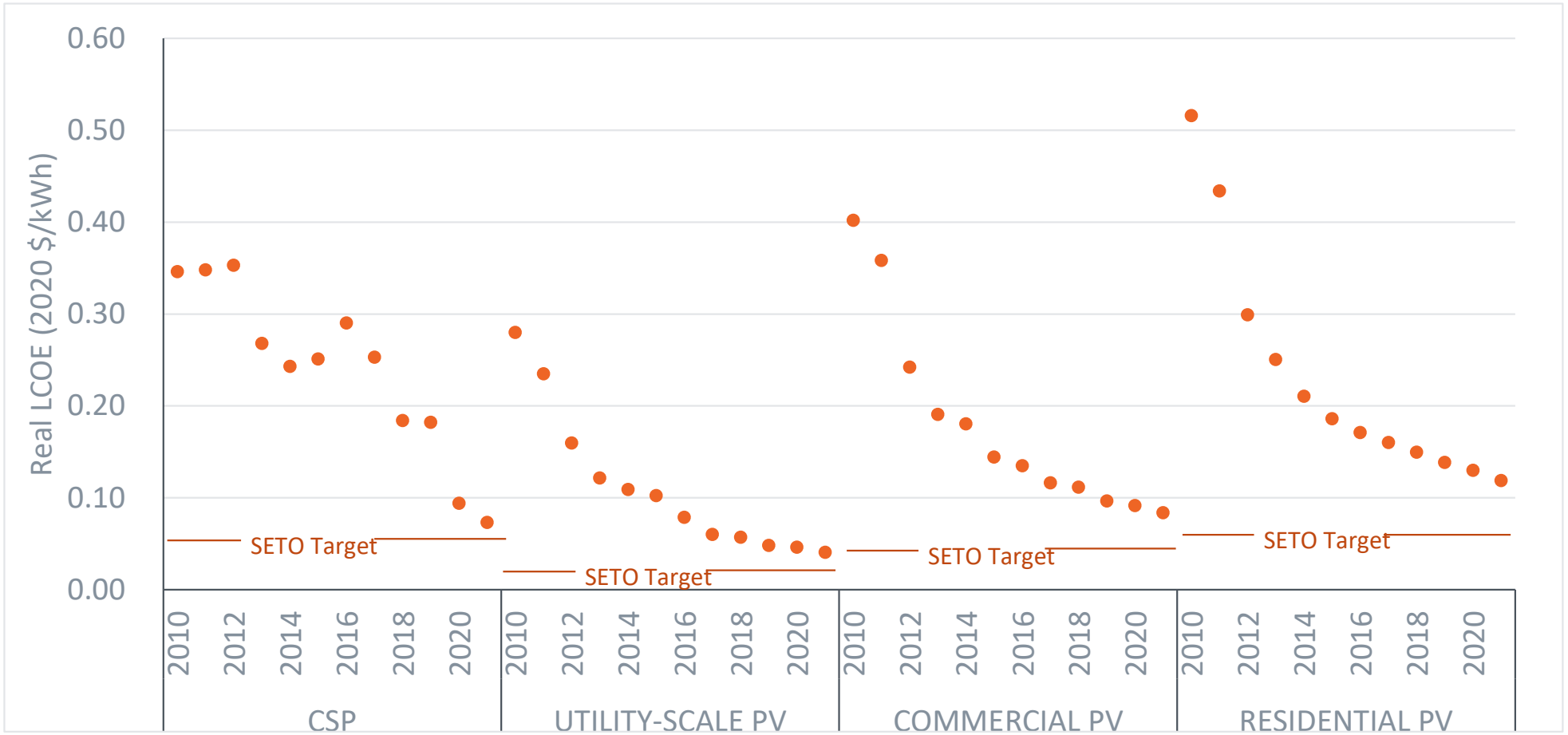
Sources: NREL's "Annual Technology Baseline"; Lazard's Levelized Cost Of Energy Analysis—version 15.0

Status of SunShot Goals

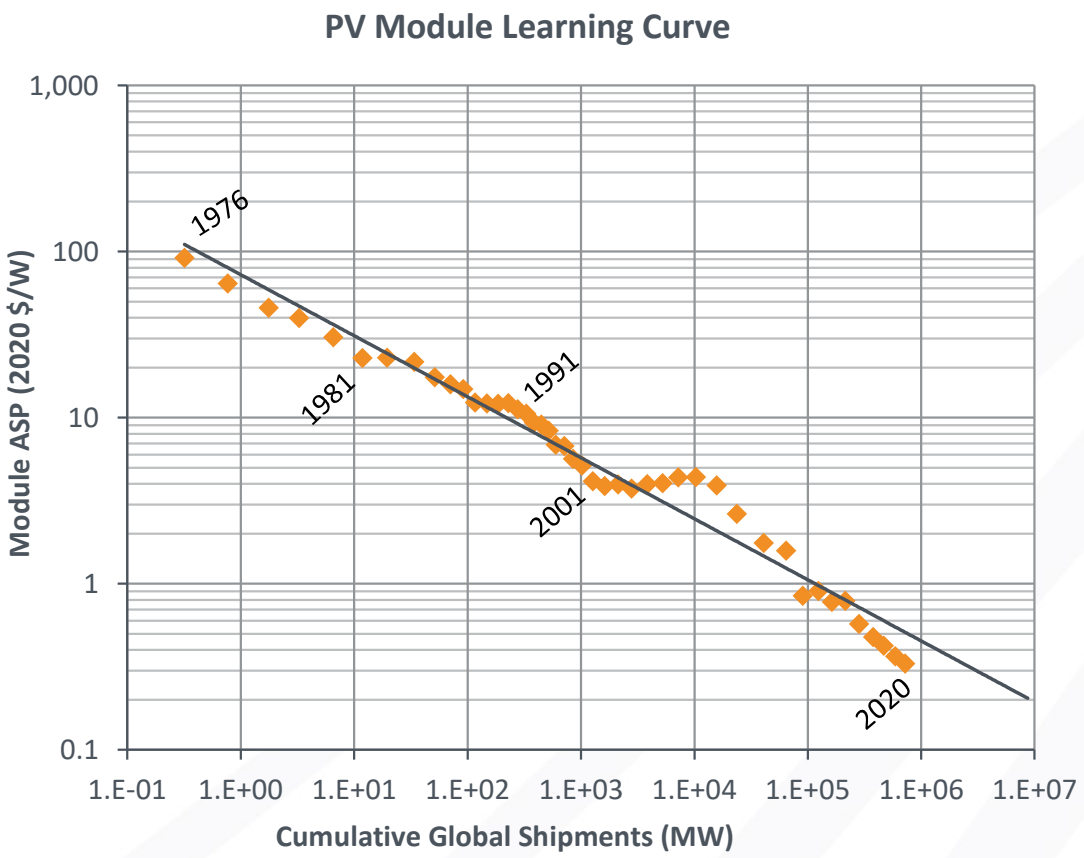


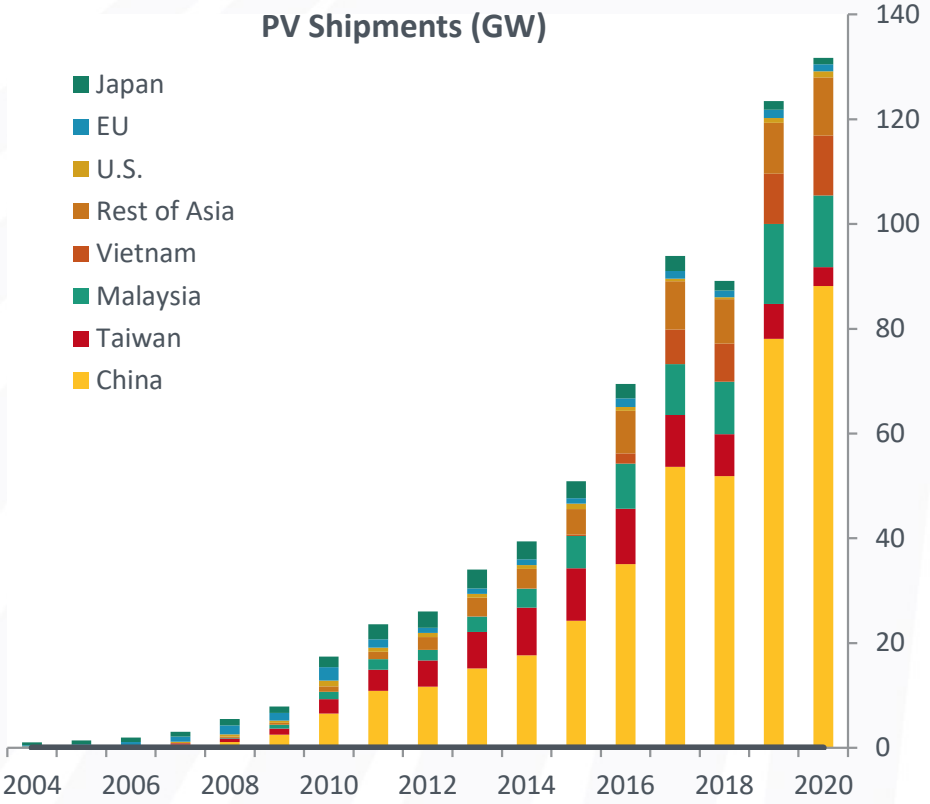
*Levelized cost of energy (LCOE) PV progress and targets are calculated based on average U.S. climate and without the Investment Tax Credit or state/local incentives.

Cost Declines of 75% - 90%



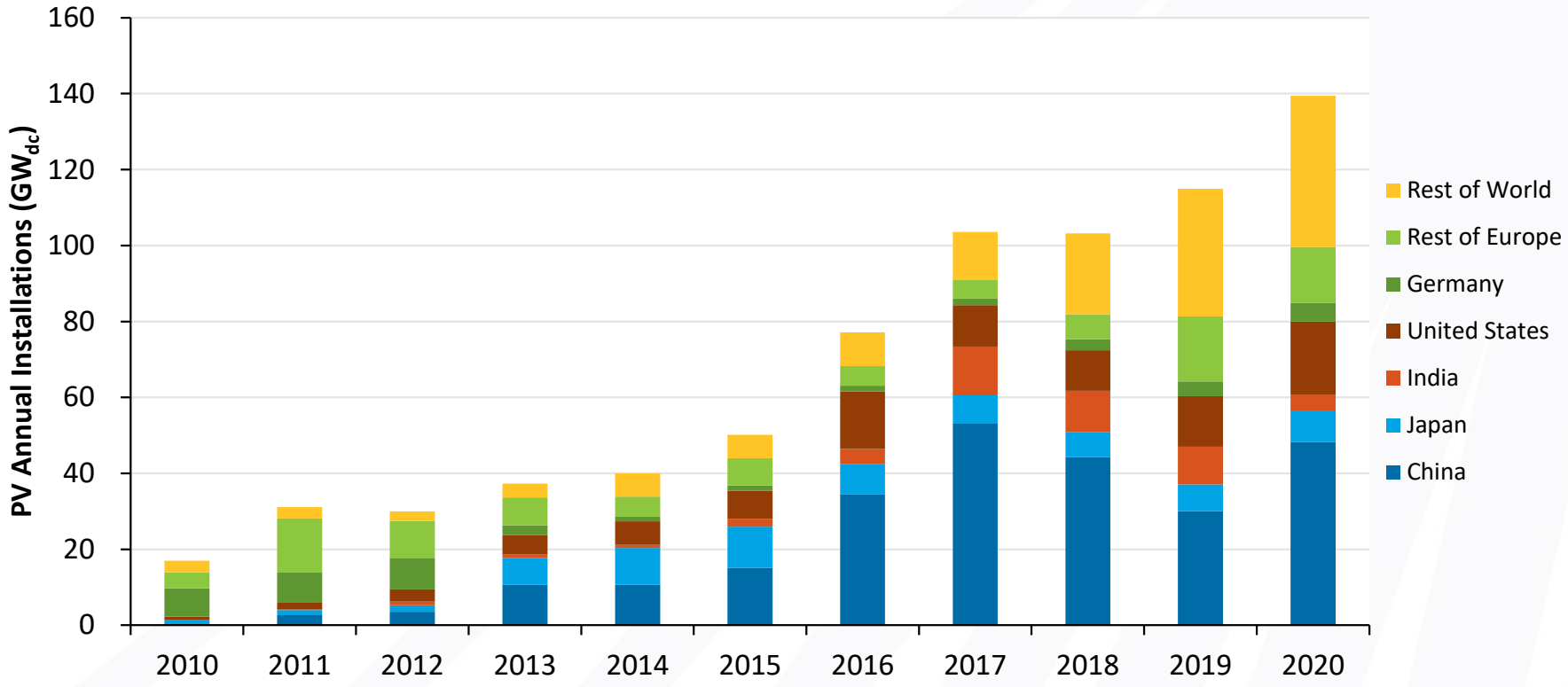
Advancing the Learning Curve with Economies of Scale





Source: Paula Mints, SPV Market Research

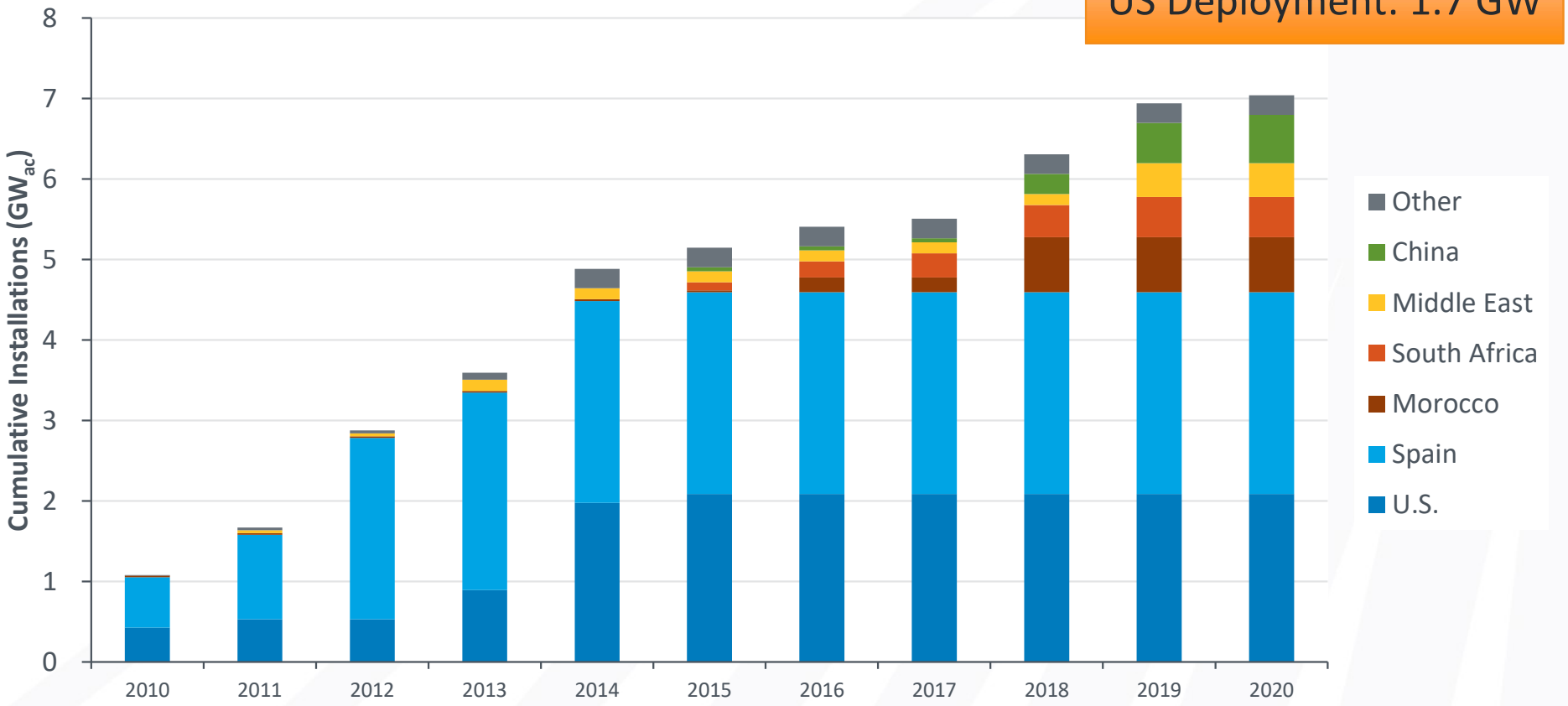
Global PV Capacity Growth



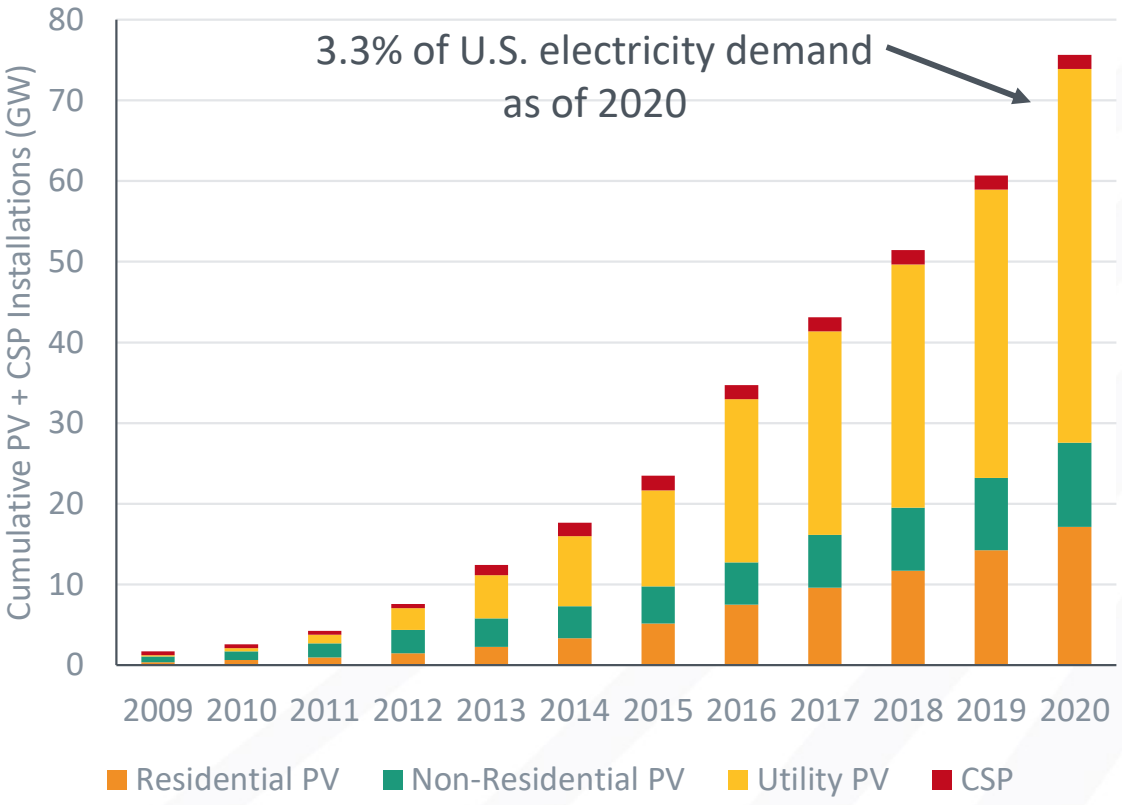
Sources: IEA, Snapshot of Global PV Markets: 2021; PVPS Snapshot 2020.

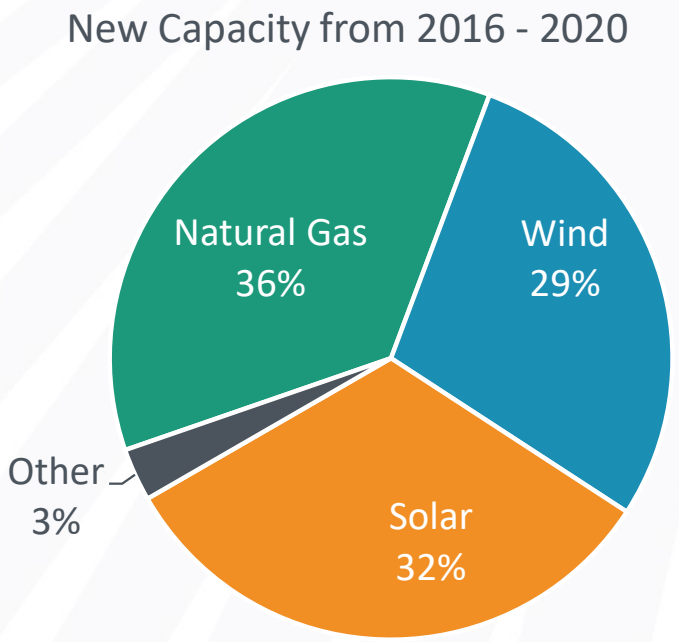
CSP Deployment: 7 GW Worldwide

US Deployment: 1.7 GW



The Result: U.S. Solar Capacity Grows 50x in 10 Years

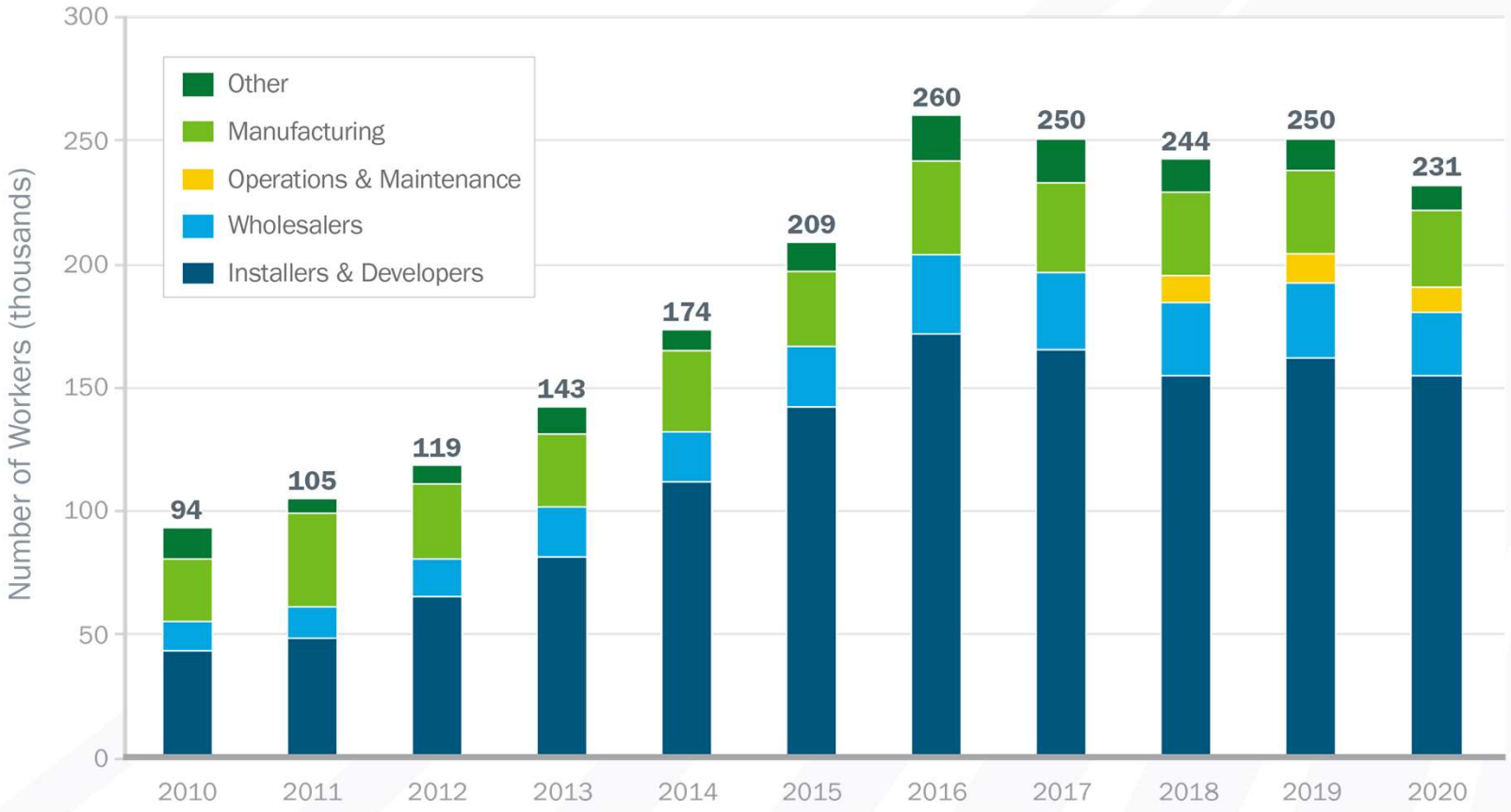




Solar energy represented more than **30%** of new capacity additions **over the past 5 years** and **now supplies nearly 4%** of the nation's annual U.S. electricity.

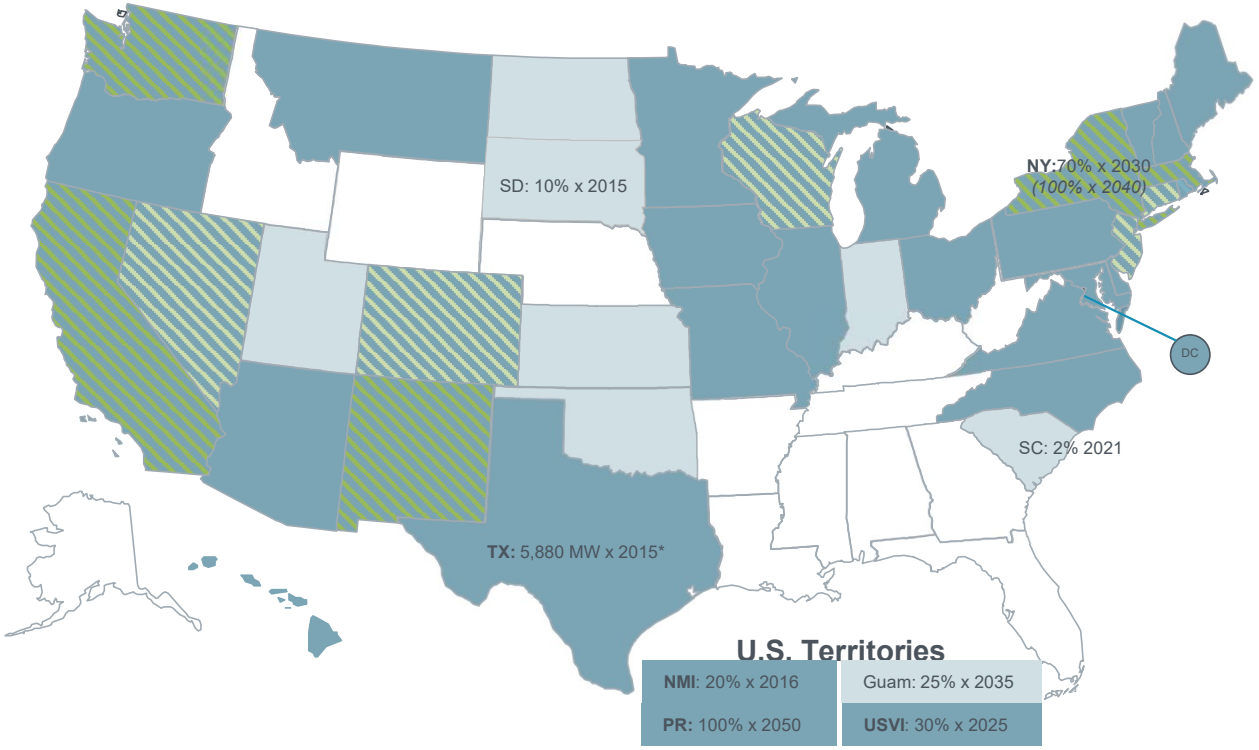
Sources: Wood Mackenzie

U.S. Jobs in the Solar Industry



Source: The Solar Foundation

Policies Are a Demand Driver



NH: 25.2% x 2025

VT: 75% x 2032

MA: 35% x 2030 + 1% each year thereafter (new resources)
6.7% x 2020 (existing resources)
(80% x 2050)

RI: 38.5% x 2035; 100% x 2030 Goal

CT: 40% x 2030; *(100% x 2040)*

NJ: 50% x 2030; (*100% x 2050)*

PA: 18% x 2021†

DE: 25% x 2026*

MD: 50% x 2030

DC: 100% x 2032

The Federal Investment Tax Credit provided 30% off the system cost.

State and local governments, as well as corporations, have been driving demand with their own policies and incentives.

Renewable portfolio standard

Renewable portfolio goal

Clean energy standard

Clean energy goal

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources

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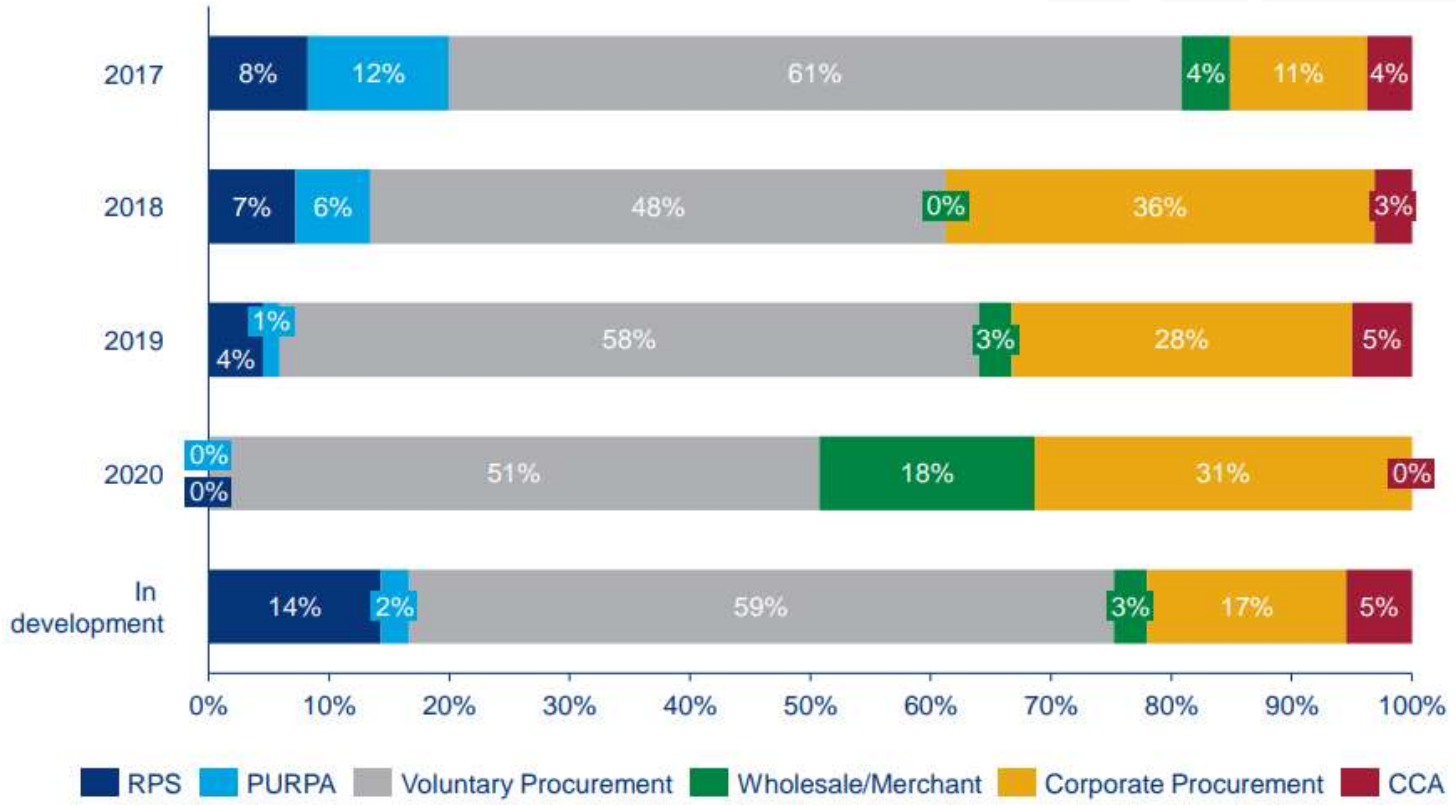
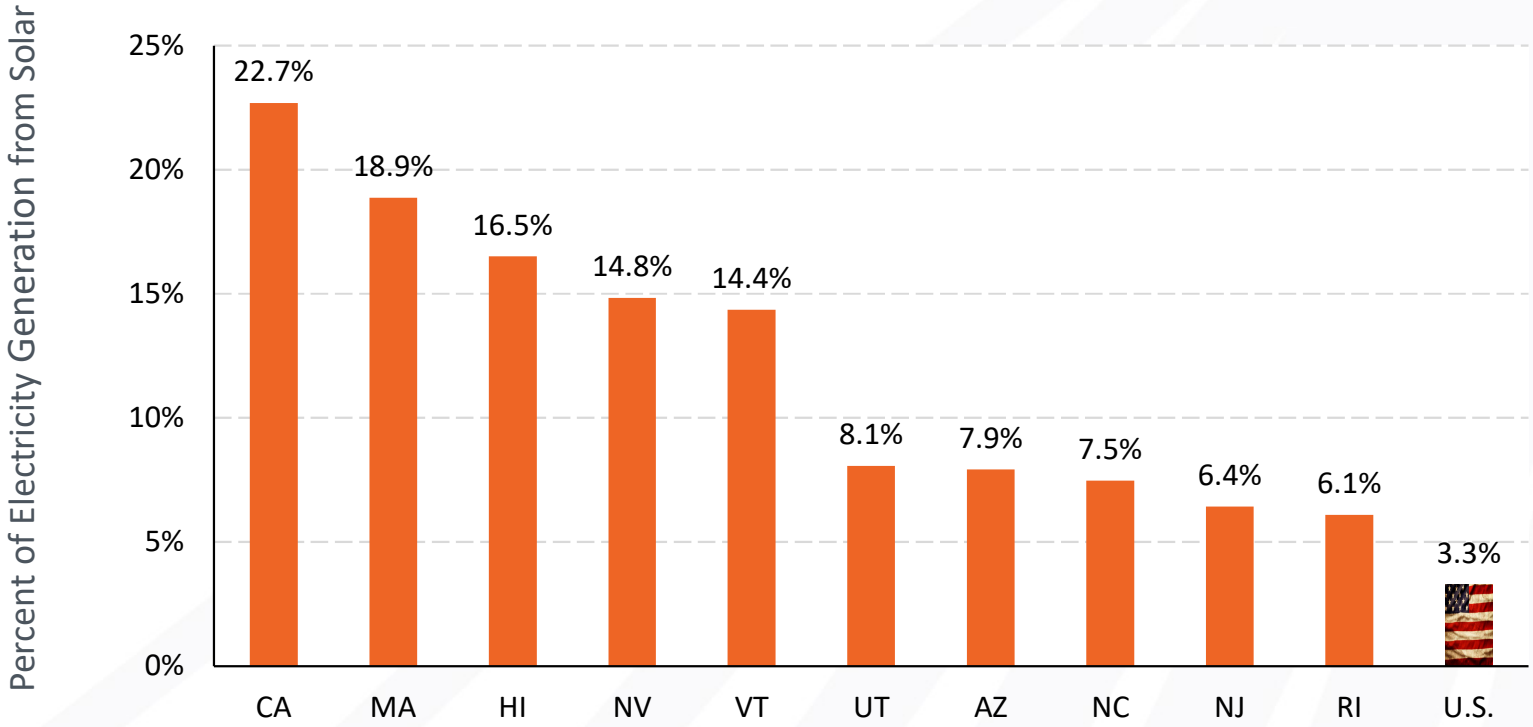
Voluntary Demand Playing Larger Role For Utility Sector



Source: Wood Mackenzie "U.S. utility PV market: quarterly update Q3 2021"

Percent of U.S. Electricity from Solar (2020)



Sources: U.S. Energy Information Administration, "Electric Power Monthly," forms EIA-023, EIA-826, and EIA-861. U.S. Energy Information Administration, "Electricity Data Browser." Accessed March 27, 2021.

Note: EIA monthly data for 2020 are not final. Additionally, smaller utilities report information to EIA on a yearly basis, and therefore, a certain amount of solar data has not yet been reported. "Net Generation" includes DPV generation. Net generation does not take into account imports and exports to and from each state and therefore the percentage of solar consumed in each state may vary from its percentage of net generation.

What are SETO's Goals to Expand Solar in the US?

- SETO 2021 Multi-Year Program Plan
- Released Spring of 2021
  - Released approximately every other year
- The Multi-Year Program Plan explains the purpose and the priorities of the office and sets goals for solar energy for 2025. Additionally, it explains how we will accelerate progress toward these goals

SETO MYPP Goals for 2025

Low-cost electricity

Lowering the cost of electricity from PV

Goal · Levelized cost of energy (LCOE) is less than $0.03/kWh in utility-scale PV systems (PV, SC, MC)
Goal · LCOE is less than $0.08/kWh for commercial PV systems and $0.10/kWh for residential PV systems (SC)

Increasing flexibility to reduce grid integration costs

Goal · Utility-scale PV plus energy storage systems cost less than $1.36/$W_{DC}$ (SI)

Lowering the cost of electricity from CSP

Goal · Solar-thermal electricity with a ≥50% efficiency power cycle is demonstrated (CSP)

Reliable electricity

Supporting the reliability of the power system

Goal · Reliable operation is demonstrated at scale in a power system with 75% power contribution from inverter-based sources (solar, wind, and battery storage) (SI)
Goal · Specific long duration thermal energy storage (TES) system configurations with positive NPV are identified (CSP)
Goal · A pumped TES system has a round-trip efficiency of >50% (CSP)

Enhancing the resilience and security of the grid

Goal · A power system uses PV and storage to demonstrate rapid recovery of critical electricity services after a cyberattack or physical event (SI)

SETO MYPP Goals for 2025 (cont'd)

Rapid deployment

Growing the U.S. solar industry

Goal · A well-supported and diverse solar workforce meets the needs of the industry and of disadvantaged communities and grows to employ at least 300,000 workers (SC)
Goal · 1 GW/year of new U.S. PV manufacturing capacity is based on technology that was not yet commercialized in 2020 (MC)
Goal · The solar hardware installed in the United States has at least 40% domestic value (MC)

Reducing the life cycle impacts of solar energy

Goal · New materials, designs, and practices are demonstrated for reducing the environmental impact of PV technology, prioritized based on a life cycle impacts benchmark (PV, SC)

Opening new markets

Goal · 1 GW_{AC} of PV installed in 2025 is combined with another use, such as agriculture or building surfaces (SC, MC)

Ensuring that solar energy benefits all

Goal · 100% of U.S. energy consumers can choose residential solar or community solar that does not increase their electricity cost (SC)

Energy beyond electricity

Reducing industrial emissions using solar thermal technology

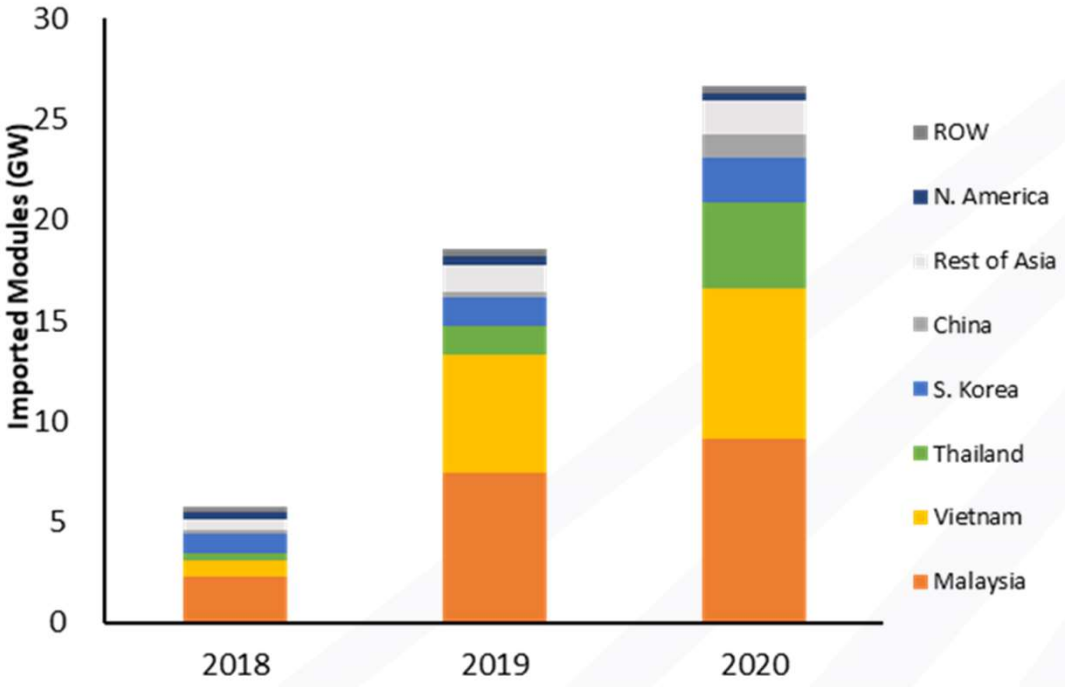
Goal · System concepts are defined and key components are validated for solar process heat in carbon-emissions-intensive, high-heat-demand industries (CSP)

Finding the best ways to make solar fuels

Goal · System concepts are defined and key components are validated for producing fuels from concentrated solar energy (CSP)

What policy or trade factors are impacting the US Solar Industry?

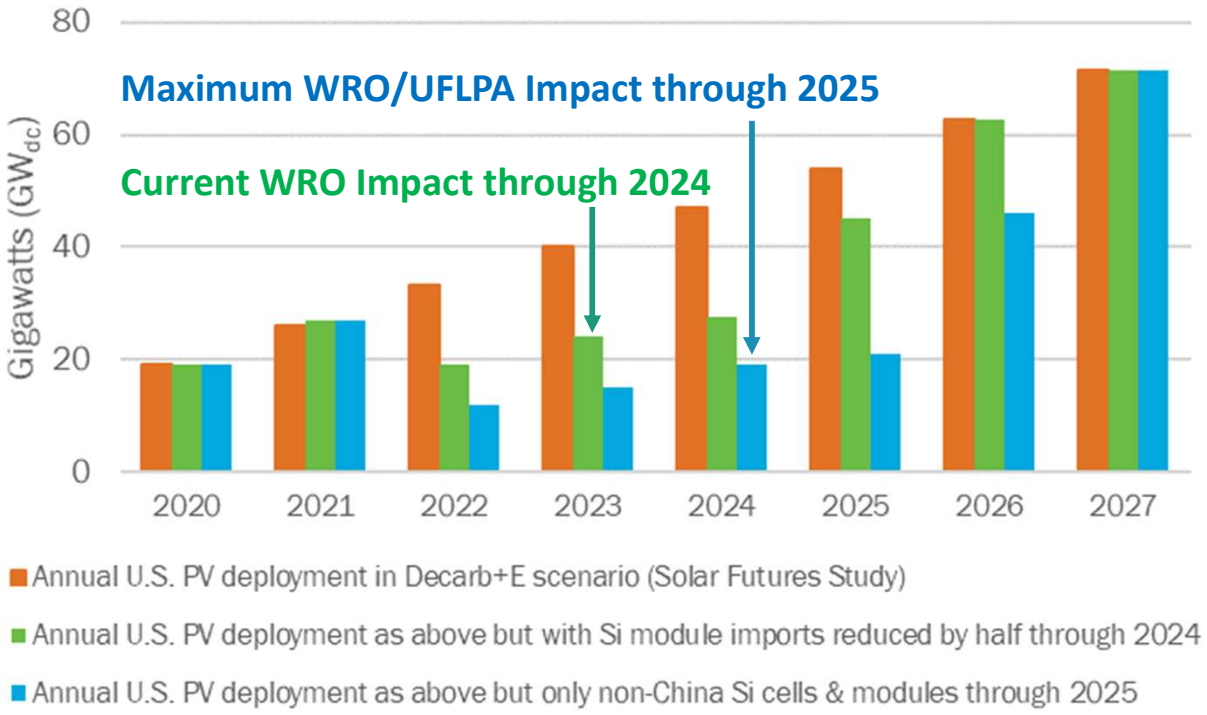
Recent Trade and Policy Impacts: Duties



- Anti-dumping and countervailing duties (AD/CVD) on Chinese silicon cells since 2012 and modules since 2015, and Section 301 duties on all Chinese solar products since 2018.
- Hence, cells and modules for the U.S. are mostly made in SE Asia. Cells imported for U.S. module assembly are mostly made in Korea.
- A 2021 petition to apply AD/CVD to SE Asian producers was rejected by the Dept. of Commerce.

- Late News: Status of the Solar Energy Manufacturing for America Act?
  - Cost parity by subsidizing domestic production instead of penalizing imports

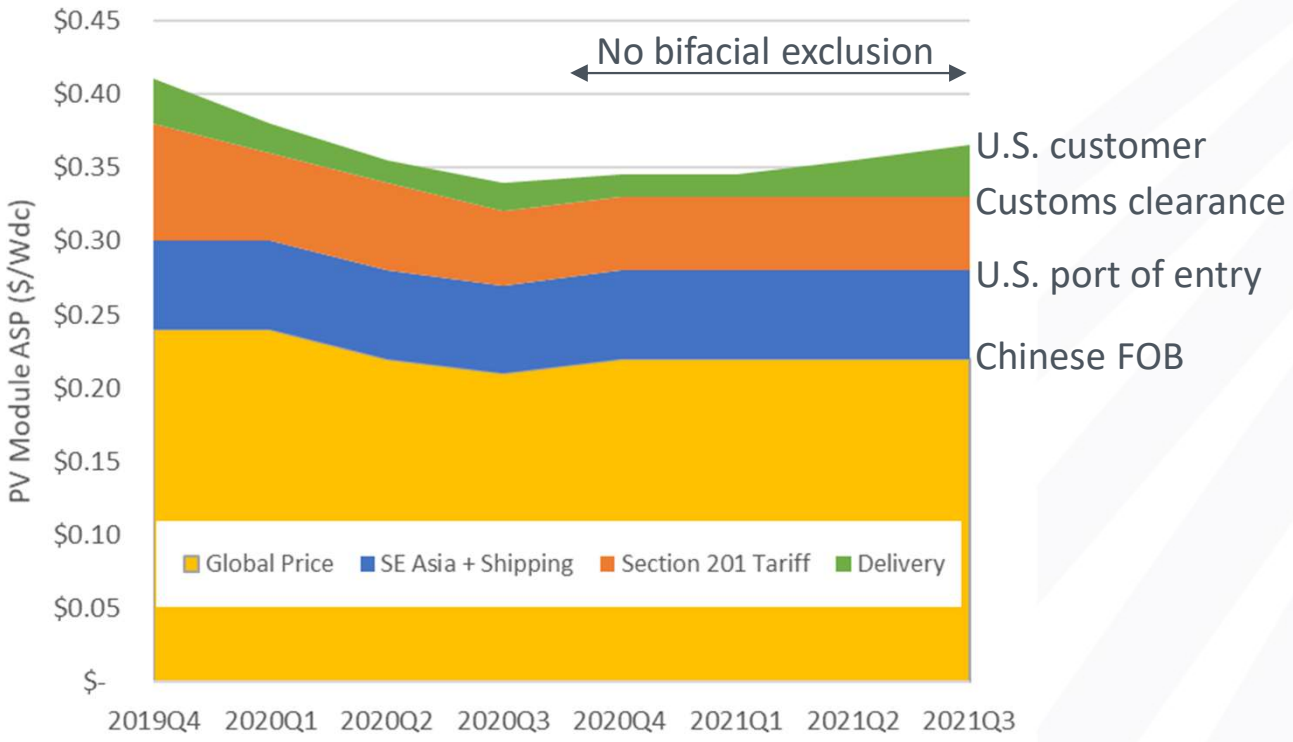
Recent Trade and Policy Impacts: WRO/UFLPA



- A British academic linked Hoshine Silicon in Xinjiang, China to Uyghur forced labor.
- The resulting Withhold Release Order reduced 2021 module imports by 7 GW_{dc}, according to the American Clean Power Association.
- The Uyghur Forced Labor Protection Act was enacted, with presumptive prohibition of products from Xinjiang.

- Late News: Public release of Solar PV supply chain report?
  - Supply-chain mapping to inform trade policy (e.g., MGS vs. poly)

Recent Trade and Policy Impacts: Section 201 Tariff



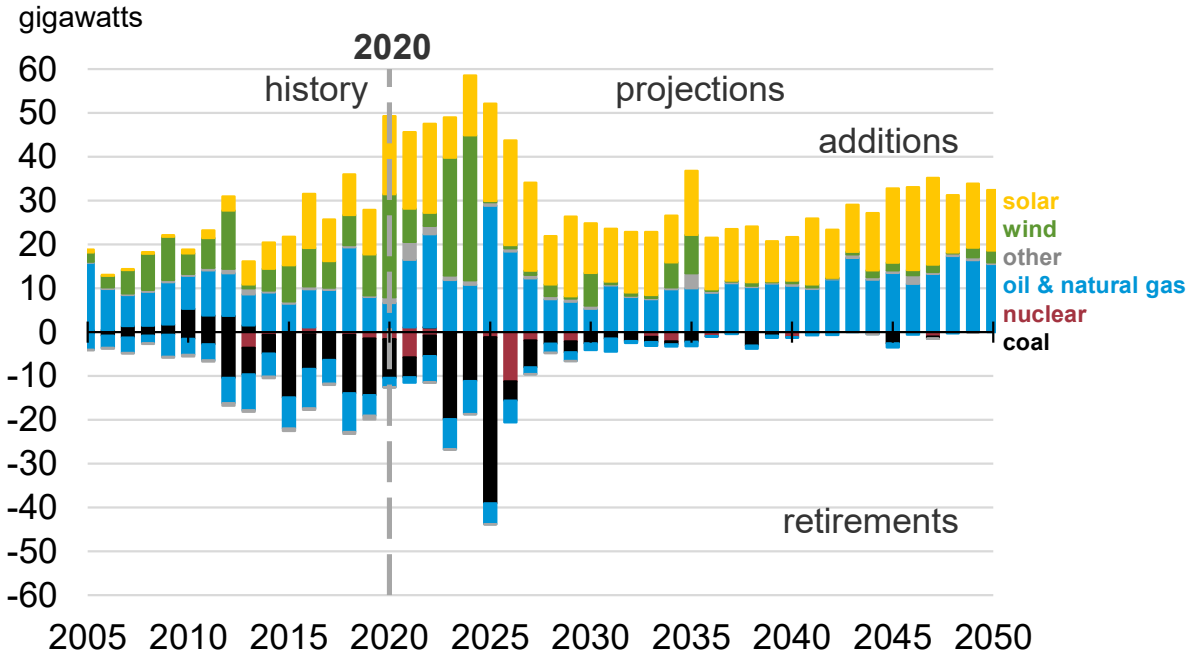
- Applies to imported c-Si cells and modules
- Added 30 – 15% to imported c-Si modules from Feb 2018 – Feb 2022
- 2.5 GW_{dc} c-Si cell quota, not met until 2021
- IBC cell/module exclusion
- Bifacial exclusion except Oct 2020 – Nov 2021
- Spurred ~3 GW_{dc} module assembly, but not cells

- Late News: Presidential decision to extend Section 201 tariff?
  - Weighing domestic manufacturing jobs vs. solar deployment jobs

What does the future hold for solar in the US?

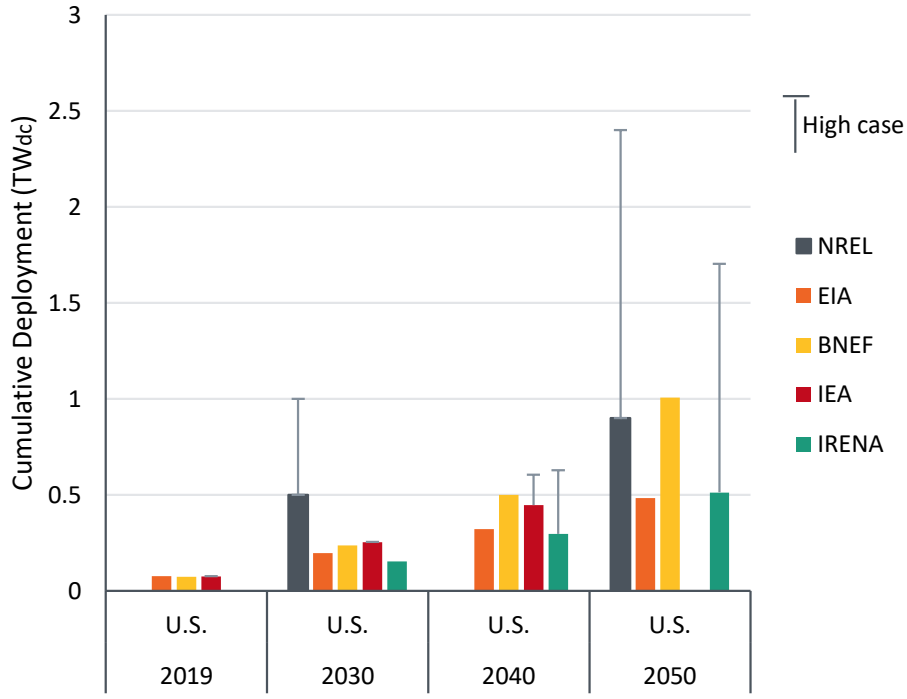
Looking Forward: Solar Continuing to Grow

Annual electricity generating capacity additions and retirements
AEO2021 Reference case



Source: Energy Information Administration, 2021 Annual Energy Outlook

Cumulative U.S. PV Projections



Sources: BNEF, "New Energy Outlook 2020;" EIA, "2021 Annual Energy Outlook;" reference case; IEA, "World Energy Outlook 2020"; IRENA, "Global Renewable Outlook 2020"; NREL, "Solar Futures Study," reference case & "95-by-35+Elec.Mod".

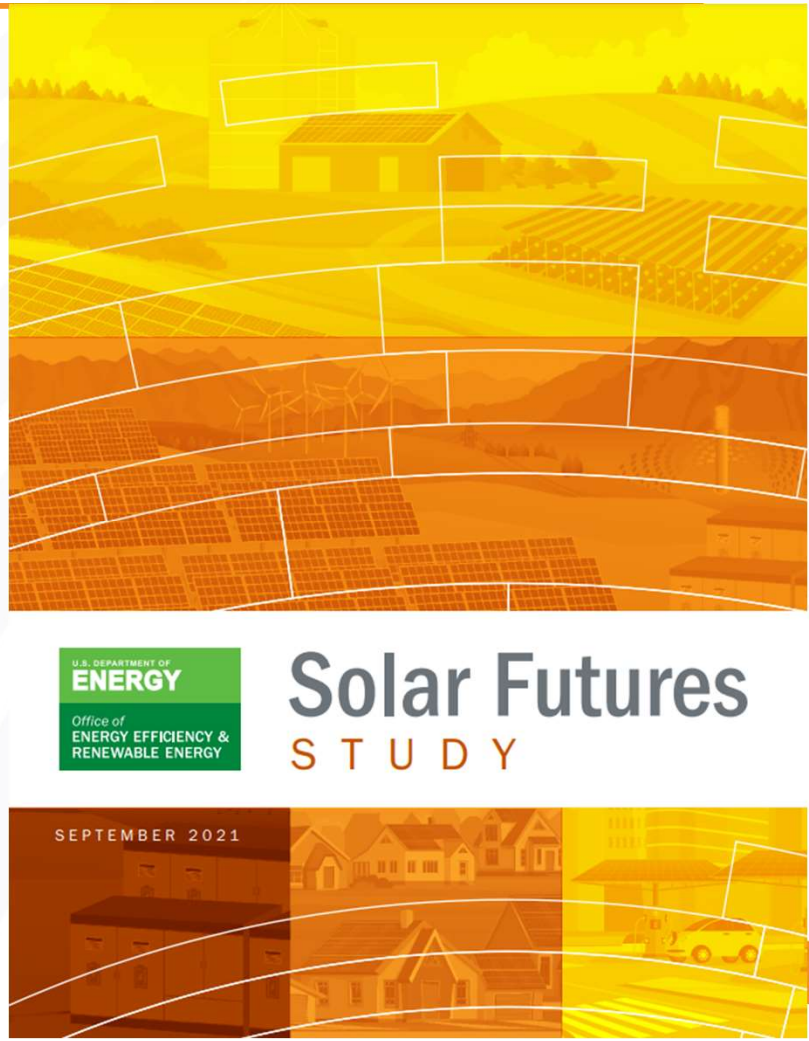
Solar Futures Study Overview

PURPOSE

- Comprehensive review of the potential role of *solar* in decarbonizing the electricity grid by 2035 and the energy system by 2050.
  - Addresses other large trends and activities across the U.S. economy that are necessary to achieve a zero-carbon energy system.
  - Builds analytical foundations to guide the next decade of solar research.

SCOPE

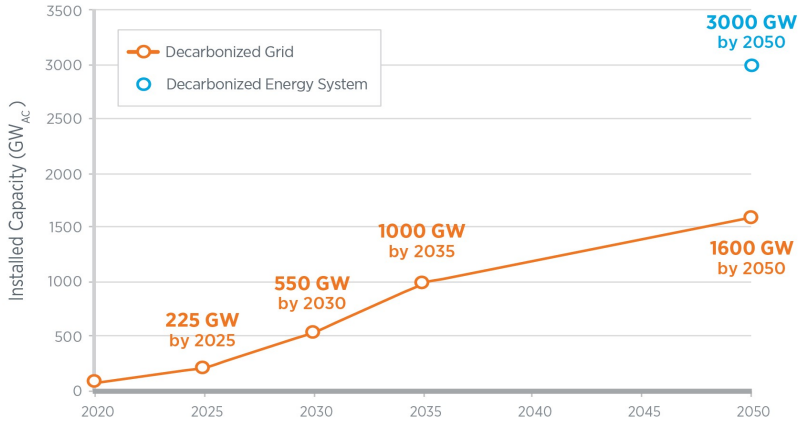
- Chapters cover future scenarios, technology advances, equity, grid integration, cross-sector interactions, supply chain, and environmental impacts.



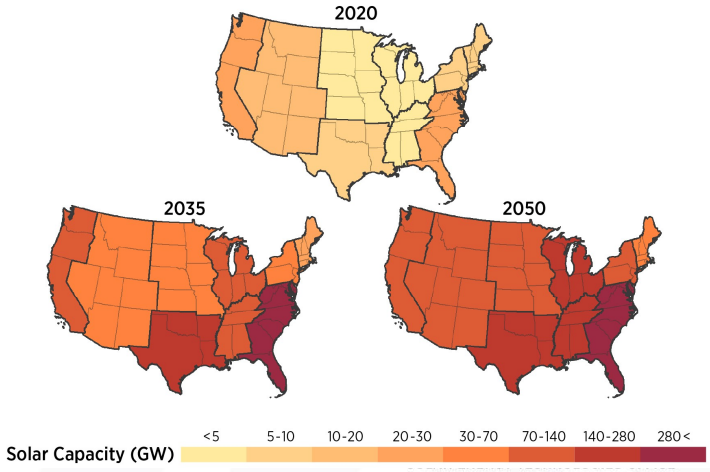
Solar Futures Study

1. **Deploy, deploy, deploy.** We must install an average of 30 GW of solar capacity per year between now and 2025 and 60 GW per year from 2025-2030. (In 2020 the U.S. installed 15 GW.)
   - 1,000 GW of solar meets 40% of electric demand in 2035, 1,600 GW meets 45% in 2050.
   - We must reshape workforce development, supply chains, siting and permitting, and regulation.
   - Major growth in wind and storage are also required.
2. **With continued technological advances, electricity prices do not increase through 2035.** This includes solar, wind, energy storage, and other technologies.
3. **The grid will be reliable and resilient.** Storage, transmission, and flexibility in load and generation are key.
4. **Expanding clean electricity supply yields deeper decarbonization.** Electrifying buildings, transportation, and industry reduces carbon emissions.
5. **Policy changes are necessary**. Limits on carbon emissions and/or clean energy incentives.

Solar Deployment 2020–2050



Solar Capacity by Census Division in 2020, 2035, and 2050

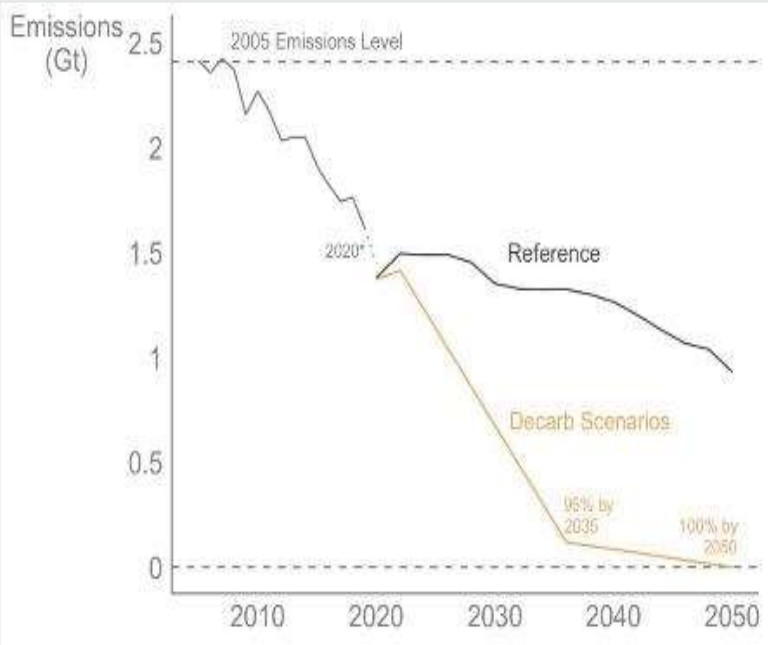


Three Core Scenarios

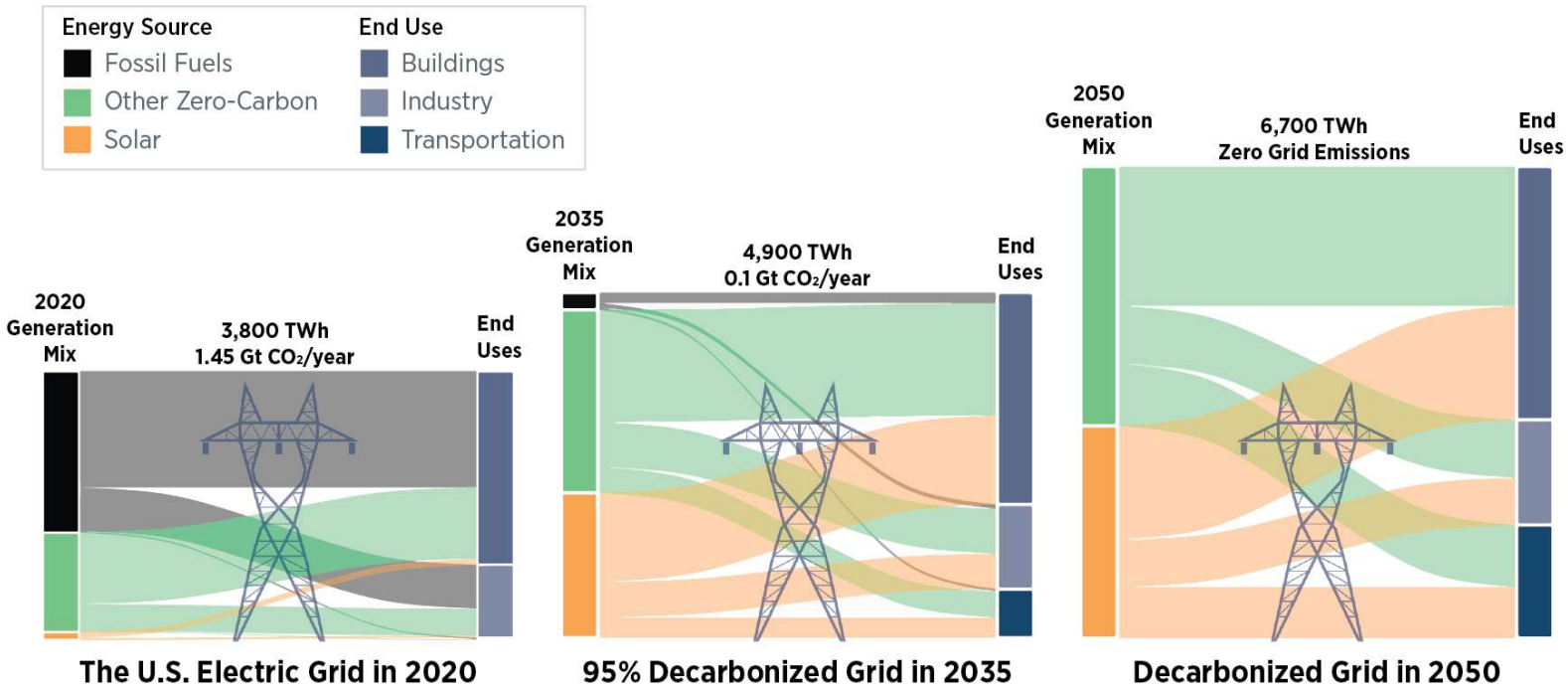
Solar Futures Study models three core scenarios for the evolution of the U.S. grid:

- **Reference:** business-as-usual costs, policies, electricity demand
- **Decarb:** carbon constraint, BAU electricity demand, advanced technology improvements
- **Decarb + E:** same as Decarb but with enhanced electrification and demand flexibility

Scenario Name	Renewable Energy & Storage Technologies	Electricity Demand	Policies
Reference	Moderate cost reductions	U.S. Energy Information Administration Reference	Existing policies as of June 2020
Decarbonization (Decarb)	Advanced cost reductions		95% reduction in CO_2 emissions from 2005 levels by 2035, 100% by 2050
Decarbonization with Electrification (Decarb+E)		Electrification Futures Study: High Electrification with Enhanced Flexibility	



U.S. Energy Mix 2020-2050



The U.S. Electric Grid in 2020

Solar: 3% of electricity demand, 80 gigawatts AC installed

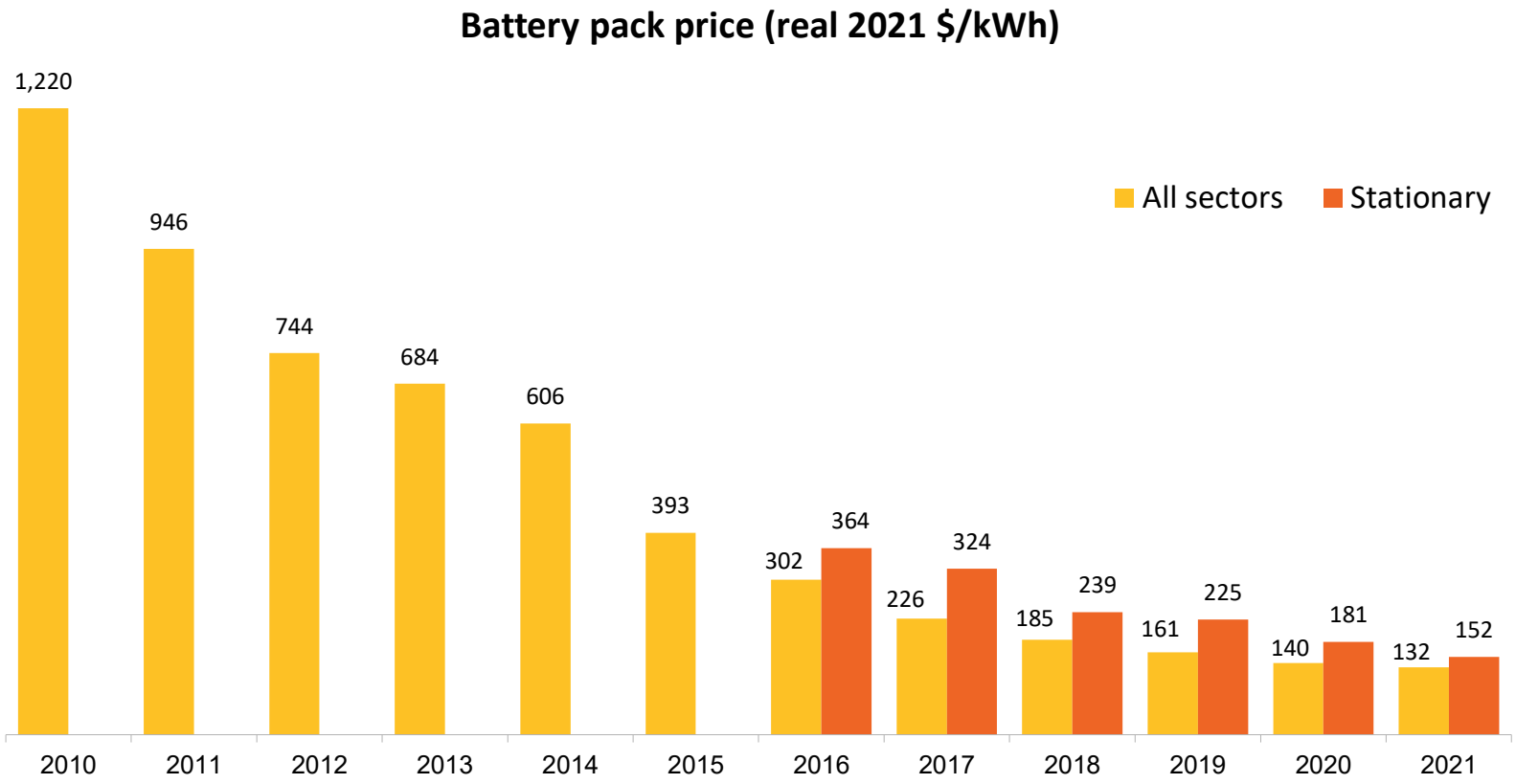
95% Decarbonized Grid in 2035

Solar: 40% of electricity demand, 1,000 gigawatts installed

Decarbonized Grid in 2050

Solar: 45% of electricity demand, 1,600 gigawatts installed 3,000 GW in decarbonized energy system

SFS Side Bar: Battery Costs Falling



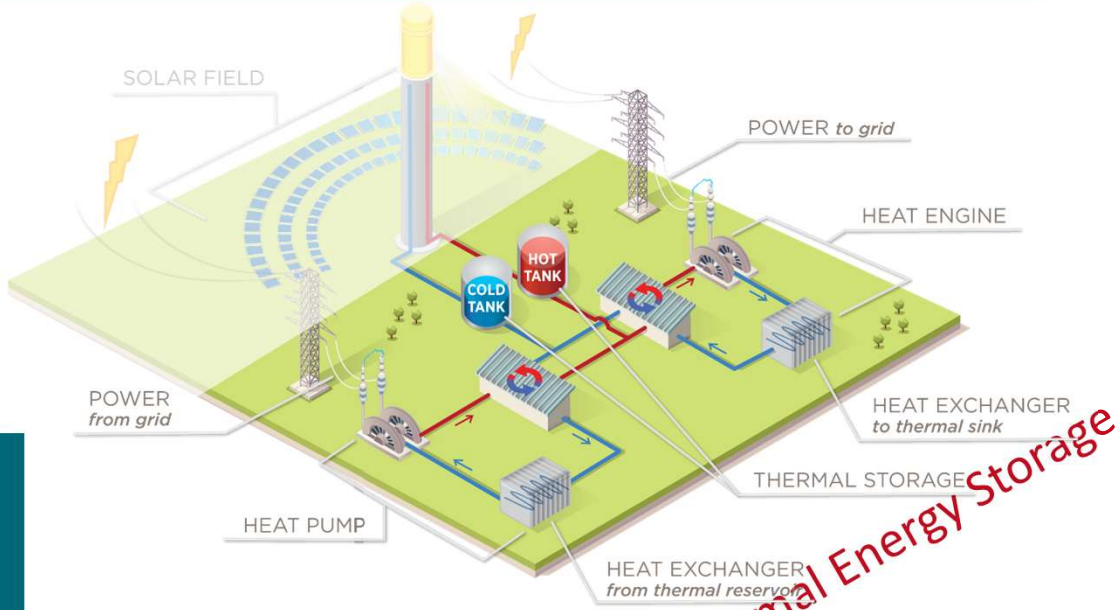
SFS Side Bar: CSP+TES and Long Duration Energy Storage

ENERGY earthshots U.S. DEPARTMENT OF ENERGY | Storage

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

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

…in **1** decade

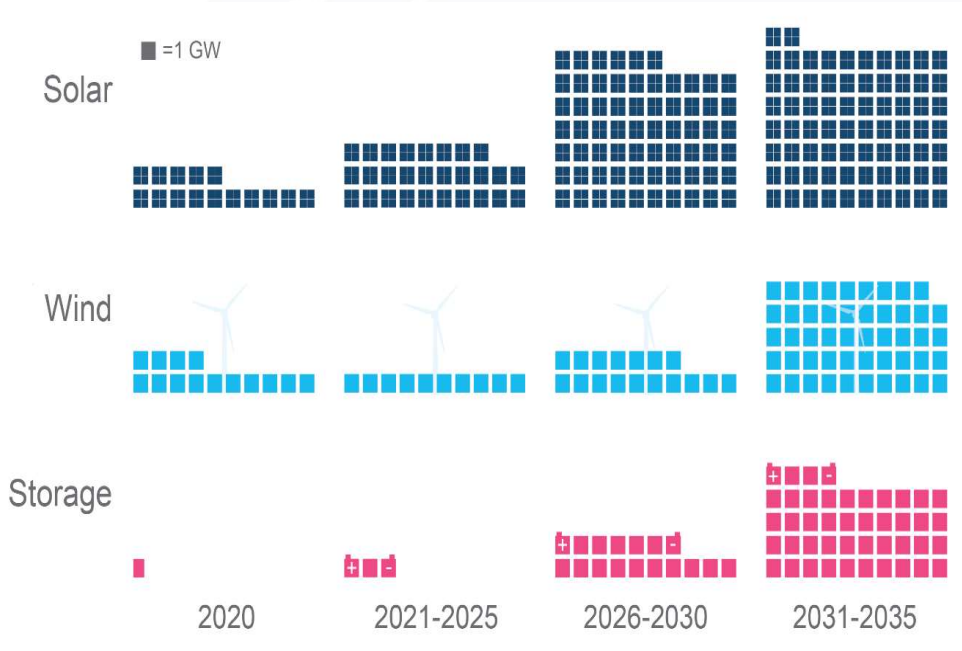


Thermal energy storage is a promising pathway for long duration energy storage due to the low cost of additional energy capacity

Is it possible to ramp up as the Solar Futures scenarios envision?

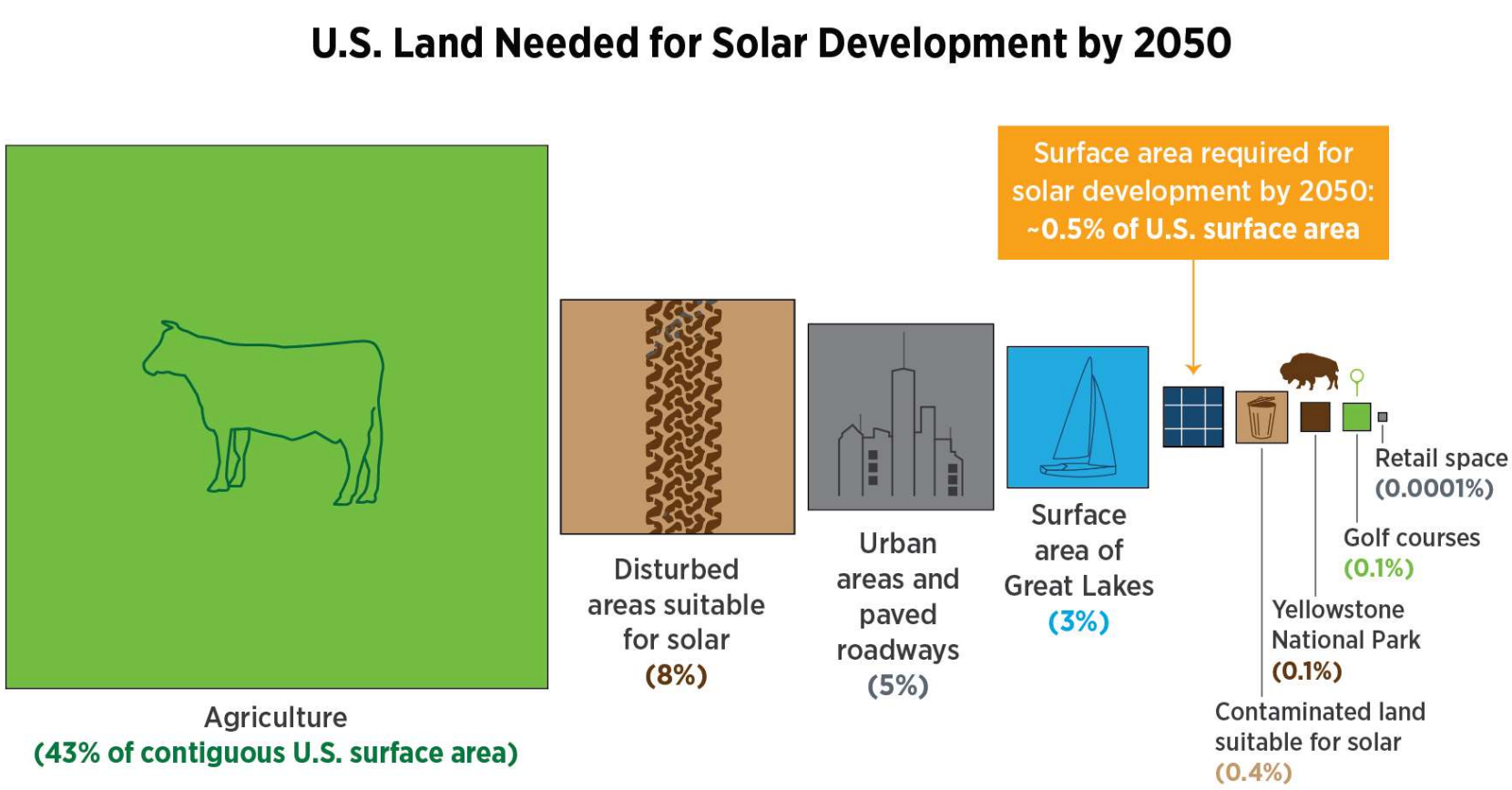
Decarbonization requires significant, but achievable acceleration of clean energy deployment.

- For 95% grid decarbonization by 2035, U.S. must install ~30 GWac of solar each year between now and 2025 and ramp up to ~60 GWac per year from 2025-2030.
- Deployment rates accelerate for wind and energy storage as well.

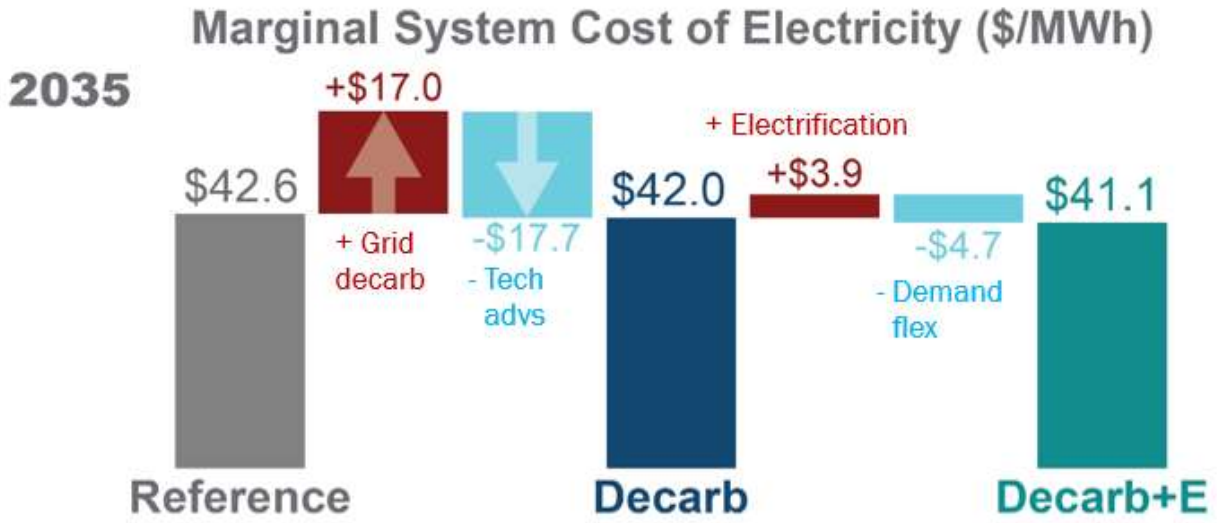


Historical annual technology deployment rates vs. projected average annual deployment rates during 5-year periods under the Decarb+E scenario

How much land will be required to achieve the scenarios?



Will achieving the Solar Futures Scenarios be costly?



- Solar facilitates deep decarbonization of U.S. grid by 2035 without increasing projected 2035 electricity prices if targeted technological advances are achieved.
- Cumulative system costs 2020-2050 higher in the Decarb (10%) and Decarb+E (25%) scenarios but avoided climate damages and improved air quality more than offset those additional costs.
  - Resulting net savings of $1.1 trillion (Decarb) and $1.7 trillion (Decarb+E)

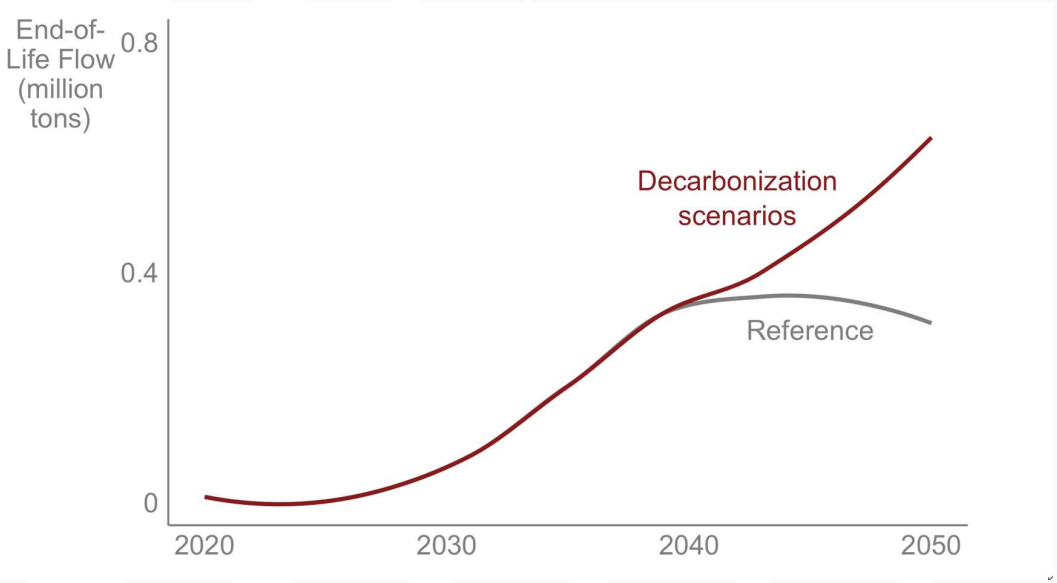
Will achieving the Solar Futures scenarios create a lot of waste?

Waste volumes increase as PV panels reach the end of their useful lives (typically 30 years), but can be reduced through sustainable end of life practices e.g.

- Recycling, re-use, re-manufacturing

Governments, industry, and associated stakeholders can begin preparing now for higher end-of-life solar volumes through various measures e.g.

- Development of low-cost recycling approaches
- Maximizing value from recovered materials
- Matching recovered materials with markets
- New policies and incentives for sustainable end-of-life practices



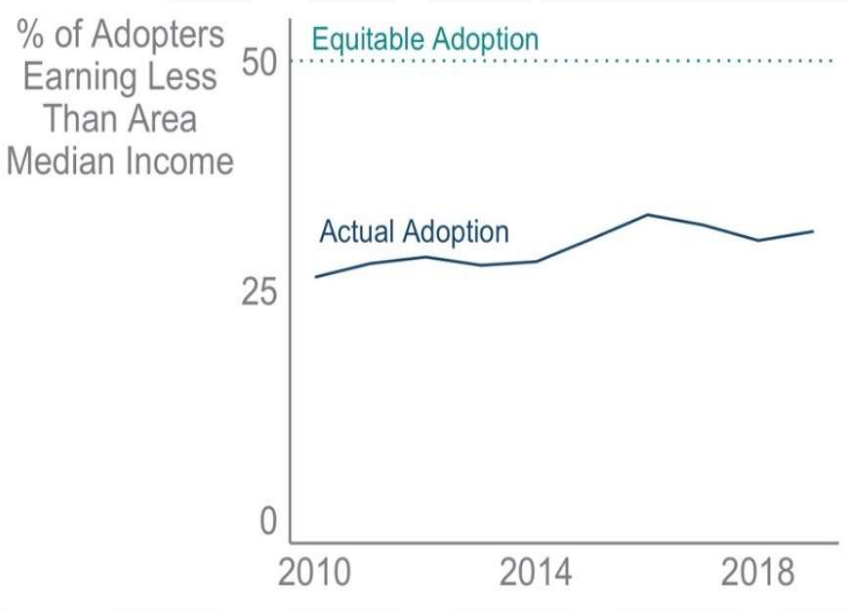
End of life material mass (million tons), Decarbonization scenarios vs. Reference Scenario

How can clean energy costs and benefits be distributed equitably?

Challenges must be addressed to ensure solar costs and benefits are distributed equitably.

Solar Futures Study explores:

- Cost and benefit distribution
- Procedural justice
- Workforce transition
- Negative externalities related to energy project siting and material disposal



Percentage of rooftop solar adopters earning less than area median income over time; Based on data from (Barbose et al. 2021)

Future Deployment Needs and Workforce

Decarbonization requires significant, but achievable acceleration of clean energy deployment.

- For 95% grid decarbonization by 2035, U.S. must install ~30 GWac of solar each year between now and 2025 and ramp up to ~60 GWac per year from 2025-2030.
- Solar workforce would need to grow from ~230k today to 500k-1.5M by 2035
- Developers *today* have challenges finding adequate labor

Clearly there is A LOT of work to be done...
But how does the world hear about it?

Communications Strategic Priorities

Messaging

- DOE is working to create an equitable clean energy economy, putting America on a path to **net-zero carbon emissions by 2050**.
- The energy transition can revitalize the U.S. energy and manufacturing sectors and create millions of **good-paying union jobs**.
- The clean energy revolution must increase **energy justice**, making sure those who have suffered the most are the first to benefit.

SHOW HOW DOE EFFORTS IMPACT PEOPLE'S LIVES.

KEY SOLAR THEMES

- Increasing equity/energy justice
- State and local support
- Creating family-sustaining jobs
- Technology innovation
- Speeding deployment

SETO Communications: Where We Fit

DOE Public Affairs

Communicates about all of DOE efforts.
Determines DOE messaging priorities.

EERE Communications

Coordinates across EERE offices and with Public Affairs.

SETO Communications

Leads solar-focused campaigns, manages external communications for office.

Key Collaborators:

- Awardees
- Solar industry
- Other DOE/EERE offices
- Lab comm teams
- Media

2021 Highlight: Solar Futures Study

Metrics:

- 36 stories
- 46+ AP pickups
- 19 radio stories
- 18 TV syndicated

SETO Comms Support for Awardees

- Worksheet: Develop Your Communications Plan
- Communications Plan Outline
- Media Engagement Tips and Tricks
- Successful Example of Communicating Results

Send us your stories! First customers, high-profile partnerships, awards, major milestones.

Share Your Research

- Awardees are encouraged to publish all reports, presentations, and manuscripts on OSTI

Guess the Most Cited Report

DC microgrid fault detection using multiresolution analysis of traveling waves

Deciphering Degradation: Machine Learning on Real-World Performance Data

High-efficiency solution-processed perovskite solar cells with millimeter-scale grains

The Influence of Novel Behavioral Strategies in Promoting the Diffusion of Solar Energy

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

2022 SETO PEER REVIEW

DOE-EERE Energy and Environmental Justice

Elizabeth Doris, *Senior Advisor Energy and Environmental Justice, DOE Energy Efficiency and Renewable Energy*

Elizabeth.Doris@ee.doe.gov; 202-277-4012

January 31, 2022

Justice as an Administration Priority

"We have the tools to put America on an irreversible path to achieve net-zero carbon emissions by 2050... Here at the Department of Energy, we have the world's most brilliant scientists and energy experts figuring out all the ways to make it happen. Deploying these solutions will create millions of good paying jobs — all kinds of jobs for all kinds of people. And those jobs will lift communities that have been left behind – communities whose children can't inhale a full breath because they've been poisoned by pollution from the smokestacks of dirty factories; coal, oil, and gas communities who are now seeing their jobs vanish because the world is demanding cleaner energy.

We are going to make sure every worker and every community can benefit from— and see their future in —these clean energy solutions."

- Secretary Jennifer Granholm, February 25, 2021

Diversity of Voices Improves Science

- This Nature 2018 editorial articulates potential benefits to science.
- This 2019 paper provides a basis for diversity in reviewers, illustrating that over a 5-year period, reviewers were more likely to choose similar gender and nationality characteristics in their selections.

National and Ethnic Diversity on Research Teams:

- Bibliometrics suggest that teams with greater ethnic diversity generate papers that make more of a splash in the scientific literature.
- AlShebli BK, Rahwan T, Woon WL. The preeminence of ethnic diversity in scientific collaboration. Nat Commun 2018; 9:5163. Woon and his Khalifa colleagues Talal Rahwan and Bedoor AlShebli probed the Microsoft Academic Graph, a database of scholarly publications. The trio analyzed papers published between 1958 and 2009 by universities in the United States, United Kingdom, Canada and Australia, assigning impact to about 1 million papers and their groups of co-authors based on 5-year citation counts. The data scientists also used authors' surnames to gauge ethnicity, first names to infer gender and first publication date to assess academic age. They also accounted for authors' discipline and affiliation.

In Healthcare Science:

- Meta analysis shows that healthcare outcomes and quality are better with diverse teams.

In Business:

- 2019 update on business diversity improving innovation and outcomes in business – includes discussion of why it's so challenging/slow to implement.
- This HBR article considers market share benefits as innovation outcomes

In Society:

- Platforms for girls' education in Climate Strategies - Social mobility and inclusion in decision-making and capacity-building (education, local engagement, etc.) in communities improve environmental resilience.

Photo Credit: OIST https://www.nature.com/articles/d41586-018-05316-5

DOE Justice40 Policy Priorities

(1) Decrease **energy burden** in Disadvantaged communities (DACs).
(2) Decrease **environmental exposure and burdens** for DACs
(3) Increase **parity in clean energy technology** (e.g., solar, storage) **access and adoption** in DACs.
(4) Increase **access to low-cost capital** in DACs.
(5) Increase **clean energy enterprise creation** (MBE/DBE) in DACs.
(6) Increase the **clean energy job pipeline and job training** for individuals from DACs.
(7) Increase **energy resiliency** in DACs.
(8) Increase **energy democracy** in DACs.

Next iteration of growth for clean energy transcends technology silos

EERE EEJ Goals (FY22CBJ)

The end goals will be to advance energy democracy, reduce energy burden, and to alleviate energy insecurity and poverty for all Americans in a fair and equitable manner. EERE aims to:

- Provide equitable research, development, and deployment opportunities throughout its activities.
- Increase support for collaborations with disadvantaged and energy transition communities
- Take a strategic approach to partnering with a broader array of stakeholders across the RDD&D portfolio.

Guiding Principles

Programmatic Leadership + Central Coordination + Crosscutting Programming

Working Teams

DEI Language in FOA

In the technical volume requirements:

The Diversity, Equity, and Inclusion Plan should contain the following information:

- Equity Impacts: the impacts of the proposed project on underserved communities, including social and environmental impacts.
- Benefits: The overall benefits of the proposed project, if funded, to underserved communities; and
- How diversity, equity, and inclusion objectives will be incorporated in the project. See Section IV.D.xvii for more information on the contents of the Diversity, Equity, and Inclusion Plan.

Referenced section above:

Diversity, Equity and Inclusion Plan

As part of the application, applicants are required to describe how diversity, equity, and inclusion objectives will be incorporated in the project. Specifically, applicants are required to submit a Diversity, Equity, and Inclusion Plan that describes the actions the applicant will take to foster a welcoming and inclusive environment, support people from groups underrepresented in STEM, advance equity, and encourage the inclusion of individuals from these groups in the project; and the extent the project activities will be located in or benefit underserved communities (also see Section I.A.iii). The plan should include SMART milestones supported by metrics to measure the success of the proposed actions. The following is a non-exhaustive list of actions that can serve as examples of ways the proposed project could incorporate diversity, equity, and inclusion elements. These examples should not be considered either comprehensive or prescriptive. Applicants may include appropriate actions not covered by these examples. a. Include persons from groups underrepresented in STEM as PI, co-PI, and/or other senior personnel; b. Include persons from groups underrepresented in STEM as student researchers or post-doctoral researchers; c. Include faculty or students from Minority Serving Institutions as PI/co-PI, senior personnel, and/or student researchers, as applicable; d. Enhance or collaborate with existing diversity programs at your home organization and/or nearby organizations; e. Collaborate with students, researchers, and staff in Minority Serving Institutions; f. Disseminate results of research and development in Minority Serving Institutions or other appropriate institutions serving underserved communities; g. Implement evidence-based, diversity-focused education programs (such as implicit bias training for staff) in your organization; h. Identify Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses and Veteran Owned Businesses to solicit as vendors and sub-contractors for bids on supplies, services and equipment. Save the Diversity, Equity and Inclusion Plan in a single PDF file using the following convention for the title "ControlNumber_LeadOrganization_DEIP".

In the Merit Criteria:

Criterion 4: Diversity, Equity, and Inclusion (10%) This criterion involves consideration of the following factors:

- The quality and manner in which the measures incorporate diversity, equity and inclusion goals in the project; and
- Extent to which the project benefits underserved communities.

SAMPLE Approaches to DEI plans

Diversity of Project Execution Teams

- Include persons from groups underrepresented in STEM or from MSIs as PI, co-PI, and/or other senior personnel or postdoctoral researchers
- Include a diversity of disciplines on project teams: commercialization specialists, techno-societal integration specialists
- Mentoring programs with underrepresented researchers in science within the research project

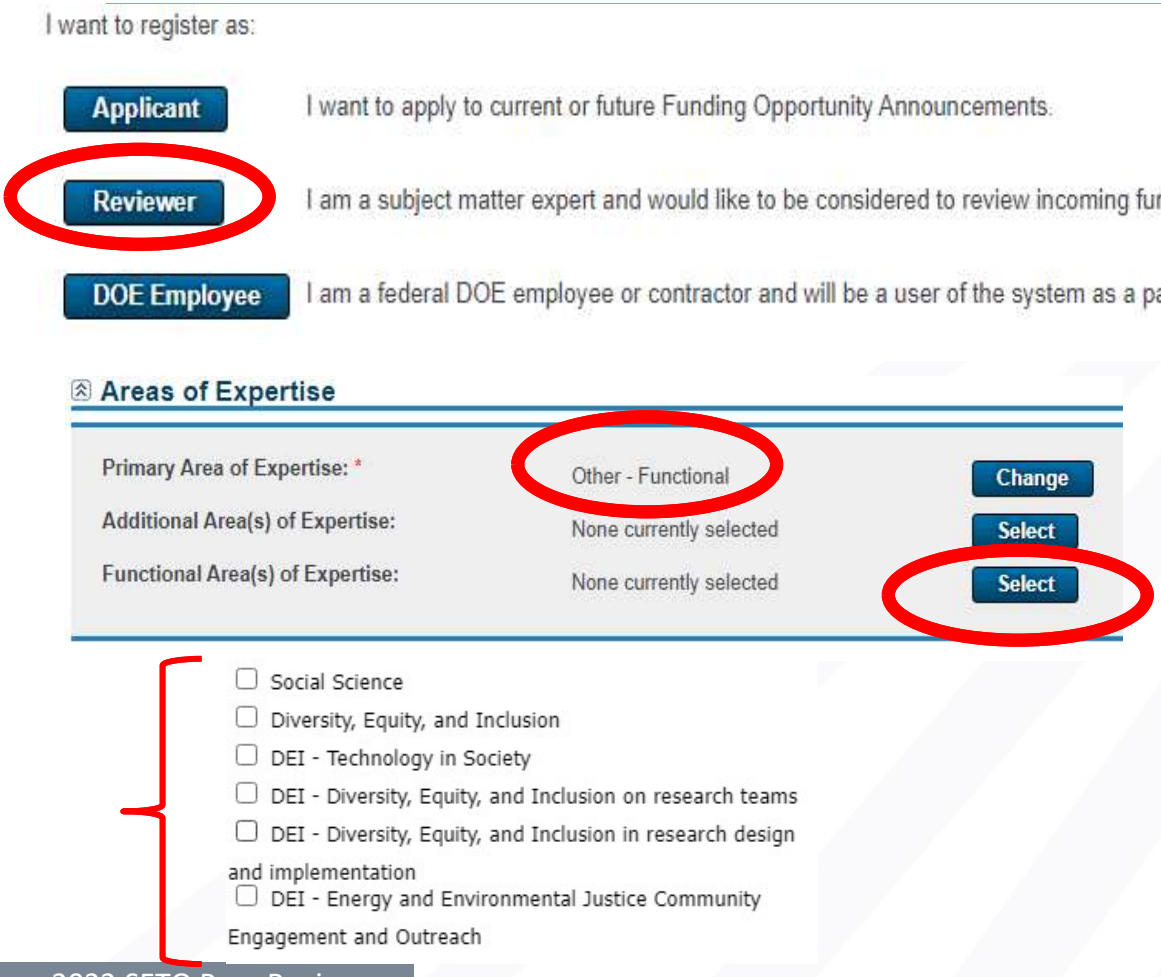
Diversity of Input in Research Design

- Valued input from eventual end users of the technology integrated rigorously into project design
- Diverse disciplines and demographics in research design charettes planned into projects

Diversity in Geographic Extent of Impact

- Develop technologies that are more likely to have disproportionate benefit in disadvantaged communities: clean energy tech that enables community ownership;
- Thoughtful and responsible inclusion of disadvantaged communities in pilot programs and demonstrations (don't know how? See 'diverse project teams' above)
- Inclusion of input and outreach on efforts throughout project

Getting Involved: Suggest or Become an EERE Reviewer



- Go to the EERE Funding Opportunity Exchange website.
- Under "Registration," select the "Reviewer" button.
- Under "Reviewers Registration," complete all four sections:
  - General Information--Provide your contact information, resume, and answer a few questions about your background.
  - Account Information - Create your account username and password.
  - Areas of Expertise –
    - Under Areas of Expertise, Select "Other-Functional"
    - Under "Functional Area(s) of Expertise" select one of the following areas:
  - Education and Experience
- Check the box to certify that the information provided is accurate and complete.
- Select the "Complete Reviewer Registration" button.

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

2022 SETO PEER REVIEW

SETO Justice, Equity, Diversity, and Inclusion

Nicole Steele, Workforce and Equitable Access Program Manager

energy.gov/solar-office

January 31, 2022

SETO JEDI Mission Statement

In the U.S. Department of Energy Solar Energy Technologies Office, we drive positive change by infusing justice, equity, diversity, and inclusion (JEDI) in our office culture, our solar community, and our country.

SETO Justice, Equity, Diversity, and Inclusion Group

- Internal coordination and resource group of SETO employees committed to JEDI
- All SETO Teams represented and includes federal employees, contractors, fellows

Current JEDI Group Leadership

Jamal Ferguson
(he/him)

Ben Burch
(he/they)

Marie
Mapes
(she/her)

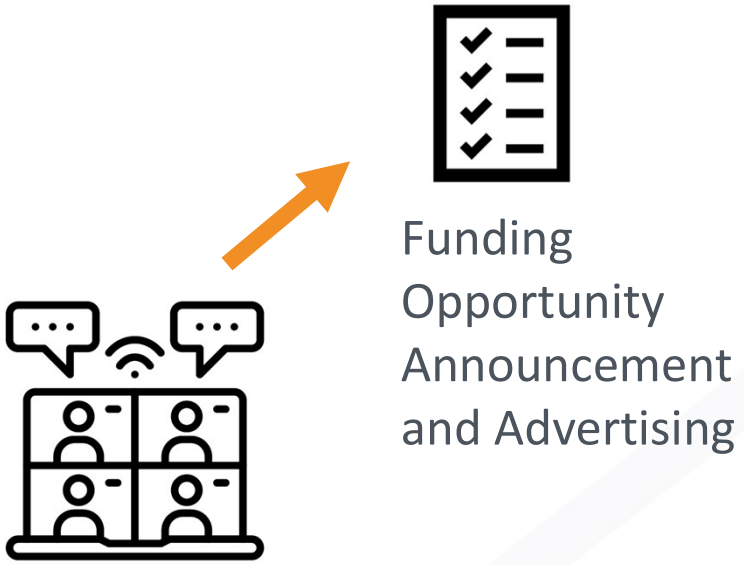
Summary: 2021 Internal JEDI Efforts

- 9 topics/celebrating monthly (e.g., Black History Month, Jewish American Heritage Month, Indigenous History Month, Pride Month, Hispanic Heritage Month)
- 2 Energy Justice Workshops
- 1 SETO JEDI Mission Statement
- 1 SETO JEDI Guidance Document
- 9 Chat n' Chews: sharing our stories
- 24 JEDI Leadership Tag-ups
- 20 JEDI Working Group Meetings

SETO JEDI Coordination

- Justice 40 Executive Order *(Whole of Government)*
  - National Community Solar Partnership Pilot Program
  - SETO Covered Programs – Metric Tracking
- Office of Energy Efficiency & Renewable Energy *(EERE)*
  - Energy & Environmental Justice (EEJ) Tiger Team
  - Equity Community of Practice
- External Stakeholder Engagement

Engaging Stakeholders and Expanding Researcher Base



- Small Innovative Projects in Solar (SIPS, FY16-22) explicitly designed engage broader group of researchers
- SETO FOAs now require plan on how work will engage underrepresented members in STEM
- Intentional advertising of FOAs to broad audience and non-traditional applicants

Engaging Stakeholders and Expanding Researcher Base

Brainstorming, Requests for Information, and Workshops

Funding Opportunity Announcement and Advertising

Proposal development

Engaging Stakeholders and Expanding Researcher Base

Brainstorming, Requests for Information, and Workshops

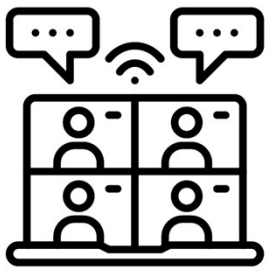
Funding Opportunity Announcement and Advertising

Proposal development

Merit review and selection by DOE and External Reviewers

- Solicit reviewer panels with diverse backgrounds and expertise
- Reviewer panels do not reach consensus; all opinions are documented and considered by DOE

Engaging Stakeholders and Expanding Researcher Base



Brainstorming, Requests for Information, and Workshops

Funding Opportunity Announcement and Advertising

Proposal development

Merit review and selection by DOE and External Reviewers

SETO Equity Planning

- Team Planning for Equity
  - Process began in Spring 2021
- Developed new merit review criteria
- Diversified reviewer pools
- MSI STEM Research & Development Consortium (MSRDC) outreach

SETO JEDI Projects – SAIS Team

- **Solar Energy Innovation Network (SEIN) –** Round 3 topic on Equity in Residential and Commercial Solar; CBOs must lead or be on core leadership team and receive direct funding
- **SolarAPP+ –** Quantified goals for outreach to underserved communities and their adoption of the SolarAPP+, and evaluation
- **SolSmart FOA –** Emphasis on TA and outreach to support underserved communities; Diversity in external FOA reviewers, including EJ expert
- **LabCall -** Diverse project advisory groups, including impacted communities, energy justice experts; Projects on low-income solar financing mechanisms and understanding underserved community concerns about siting large-scale solar
- **STEM –** Focus on engaging MSIs in Solar District Cup program

SETO JEDI Projects – Systems Integration Team

JEDI Strategy for SI:

- Diversify Merit Reviewer pool
- Diversify selection of Awardees
- Technology demonstrations in DAQ communities

Recent JEDI Successes for SI:

- Bronzeville, Chicago microgrid project successfully completed final testing (1/2022)
- Diversity of SI subprogram team
- 14 applications for SI focus area of MSI STEM Research and Development Consortium (MSRDC)

7.7 MW community microgrid that will provide service to approximately 770 customers in the historically Black neighborhood of Bronzeville, Chicago. Photo courtesy of ComEd

SETO JEDI Projects – M&C Team

- AMC JEDI contest in R5 of AMSP software track
- AMN pre-application support for SBIR with focus to reach out to a more diverse pool and increase the number of 1st time applicants (this was executed in late Q1 FY22 and we are currently compiling & analyzing the data)
- AMN pre-application support for Incubator (same focus as above and this will be executed in Q2 FY22 starting in about 2 weeks)
- Diversifying our reviewer pool; ongoing effort
- We are also conscientiously applying diversity to new hires

SETO JEDI Projects – WEA Team

- **National Community Solar Partnership** – Supporting the expansion of community solar access through technical assistance, resource and tool development, convenings
- **Workforce Portfolio** – Supporting access to clean energy workforce training focusing on disadvantaged communities and veterans
- **Low-Income and Access Financing Portfolios** – Creating broader access to solar financing strategies, products, and training

Thank You JEDI Reviewers!

Purpose of the Peer Review

Basis of Reviews

Projects	Topics and Tracks
• Goals, approach, and expected impact • Performance to date • Impact on and importance to industry • Stakeholder engagement	• Alignment with defined goals and strategy • Appropriateness of the funding level and number of projects • Uniqueness and value in achieving the strategic goals of this topic and SETO • Success at advancing the mission of SETO and the U.S. solar industry as a whole

SETO Funding Areas

PHOTOVOLTAICS

R&D advancing photovoltaic technologies to improve efficiency and reliability, lower manufacturing costs, and drive down the cost of solar electricity.

CONCENTRATING SOLAR-THERMAL POWER

R&D to develop low-cost concentrating solar-thermal technologies, which incorporate thermal energy storage to provide electricity when the sun is not shining, and which can be utilized for desalination, process heat, and fuel production.

SYSTEMS INTEGRATION

R&D to enable solar energy to support grid reliability and security as well as coupling with energy storage and smart load management to provide new opportunities for enhanced resilience.

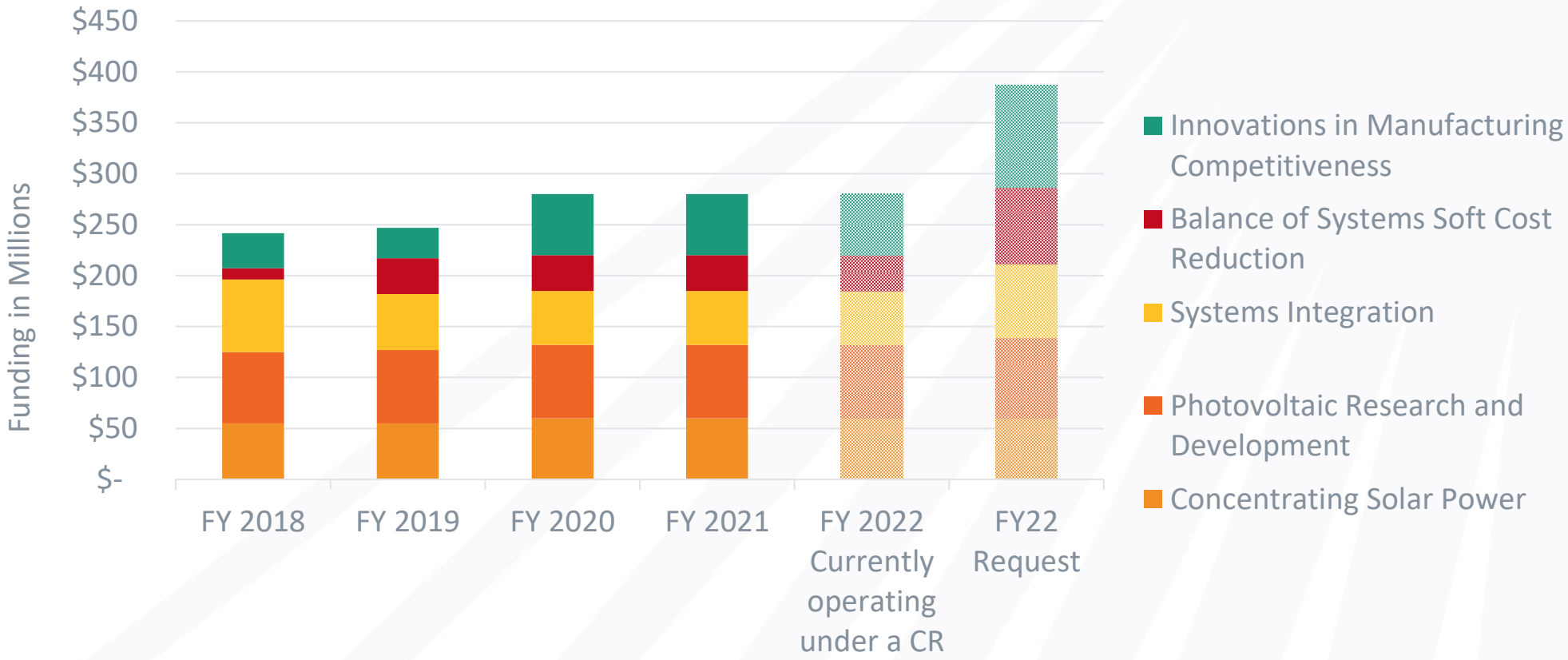
STRATEGIC ANALYSIS AND INSTITUTIONAL SUPPORT

Supports the development and dissemination of analysis, tools, and data resources related to the cost and value of solar technologies, and provides technical assistance to address specific challenges.

MANUFACTURING AND COMPETITIVENESS

Supports activities that amplify the impact of R&D projects and enable the private sector to develop and sustain new solar products with a focus on technologies with the strongest opportunities for manufacturing in the U.S.

SETO Congressional Budget Overview



Teams, Budget Areas, and Tracks

Teams

The office is structured into the following teams:

- Photovoltaics
- Concentrating Solar-Thermal Power
- Systems Integration
- Strategic Analysis and Institutional Support
- Workforce and Equitable Access
- Manufacturing and Competitiveness
- Operations

Budget Areas

Congress provides funding to SETO in the following areas:

- Photovoltaics
- Concentrating Solar Power
- Systems Integration
- Balance of Systems Soft Costs Reduction
- Manufacturing and Competitiveness

Tracks

The Peer Review will evaluate the portfolio in the following tracks:

- Photovoltaics
- Concentrating Solar-Thermal Power
- Systems Integration
- Soft Costs
- Manufacturing & Competitiveness
- JEDI

These tracks combine projects from different teams

Topic Areas within Tracks

Photovoltaics

- Systems Design And Energy Yield
- Reliability And Durability
- Emerging Cell And Module Technology
- Evolutions Of Existing Commercial Technology

Concentrating Solar-Thermal Power

- CSP Systems
- CSP High Temperature Components & Characterization
- Power Cycles
- Solar Collectors
- Solar-Heated Industrial Processes

Systems Integration

- Power Electronics and Enabling Technologies
- PV for Resilience and Cybersecurity
- System Operation Reliability
- System Planning Models and Simulation

Soft Costs

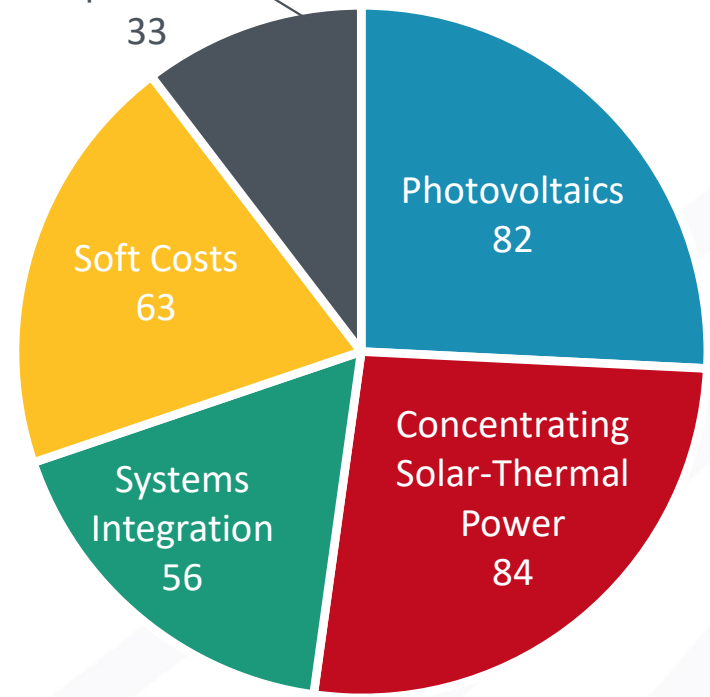
- Data, Analysis, and Tools
- Permitting, Inspection, and Interconnection
- Solar Access
- Solar Siting and the Environment
- Workforce

Manufacturing & Competitiveness

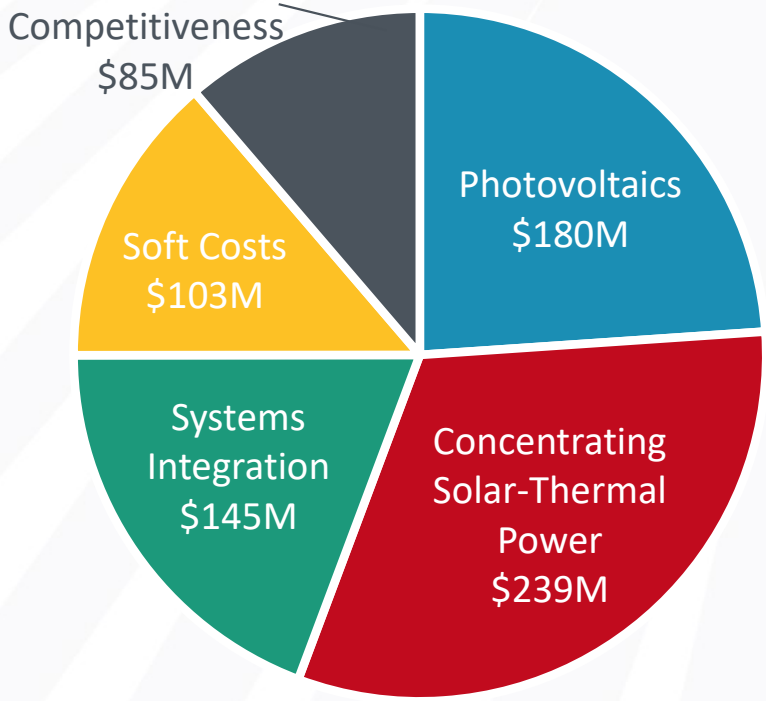
- Cell Technologies
- Grid/SI
- Installation
- Metrology
- Multi-Use
- Other

Breakdown of Projects and Funding by Track

Projects by Track



Funding by Track

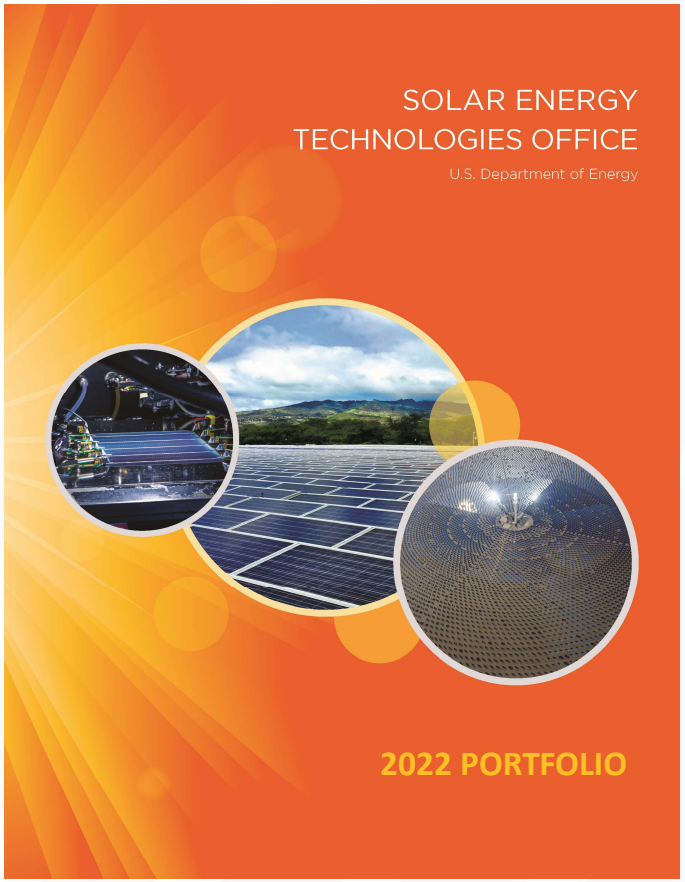


Funding Restrictions

- SETO cannot:
  - Fund development of policy at a local, state, or federal level
  - Fund advocacy work
  - Fund passive solar or solar hot water projects
  - Purchase solar systems for individuals or other entities
  - Provide loans for solar technology demonstrations
  - Provide grants upon request
  - Seek out entities to fund

Assessing Progress and Guiding the Future

- How effectively does our project portfolio address our goals?
- How well do our projects advance the solar industry?



From the SETO Team: THANK YOU!!