

Overview of SETO Soft Costs Programming

Introduction to the Soft Costs Track

Summary of Solar Soft Costs (Residential)



Source: National Renewable Energy Laboratory (unpublished) "U.S. Solar Photovoltaic System Cost Benchmark: Q1 2019."

New Markets: Defining and Addressing Soft Costs

Utility-scale PV

Soft Costs = \$.39/watt

SOFT COSTS



Residential/Commercial PV

Soft Costs = \$1.86/watt

SOFT COSTS



More Complex Applications (e.g., Agricultural PV)

Costs are unknown

SOFT COSTS



Existing benchmarks don't work

COMPLEXITY

2020 SETO Peer Review

Concentrating Solar-Thermal Power Soft Costs

- Location!
 - Location!
 - Location!



- »the costs to control land and get approvals
 - Environmental Permitting
 - Land acquisition
 - Interconnection
 - And More!

Image By Craig Butz - Own work, CC BY-SA 4.0,
<https://commons.wikimedia.org/w/index.php?curid=34568236>

Soft Costs Strategic Areas



Soft Costs Topic Area Scopes

PV Markets and Regulation

- Collecting data, developing tools and conducting analysis to help solar stakeholders navigate the U.S. solar energy markets and reduce soft costs

Solar Energy Access

- Increase access for solar to individuals, particularly individuals that do not have regular access to onsite solar, including low- and moderate-income individuals, businesses, nonprofit organizations, and states and local and tribal governments.

Workforce

- Providing solar energy and grid technology stakeholders with a trained and properly skilled workforce (installation, grid, cyber)

Impacting Solar Soft Costs

- Identification of who plays a role
- Delivery of accurate and actionable information
- Drive agreement on what is needed: where and when

Workforce

2020 US Energy and Employment Report



The Electric Power Generation sector employed

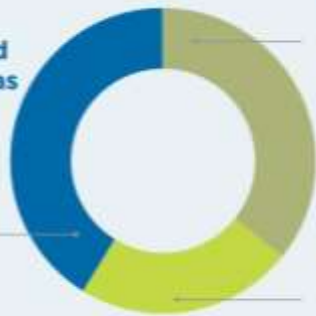
896,800*

and grew by almost 2 and a half percent, gaining over **21,200 jobs**. Job losses in nuclear and coal generation were offset by increases in natural gas, solar, wind, CHP, hydro, and geothermal.

FASTEST GROWING SECTORS

Advanced/low emissions natural gas, solar, and wind generation were the fastest growing new sources, increasing employment by more than:

Advanced Natural Gas
6,500
+9.4%



Wind
3,600
+3.2%

Solar
5,700
+2.3%

SOLAR



Solar energy firms employed

248,000

employees who spent the majority of their time on solar.² An additional **97,400** employees spent less than half their time on solar-related work. The number of employees who spend the majority of their time on solar increased by **2.3 percent** or nearly **5,700 jobs** in 2019.

ZERO EMISSIONS

509,697

worked in zero emissions' generation technologies, including solar, wind, hydro, geothermal, and nuclear.



Further Information from USEER

Figure 41.
Solar Electric Power Generation – Employment by Industry

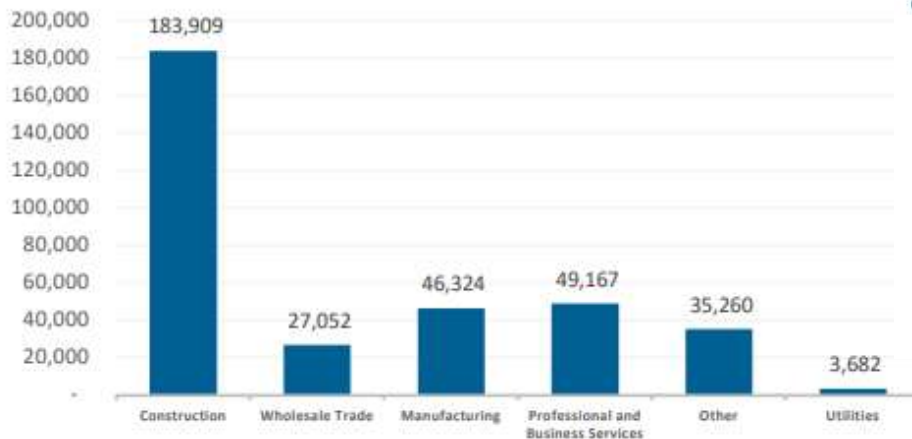


Figure 43.
Estimated Percentage of Solar Generation Installed – 2019

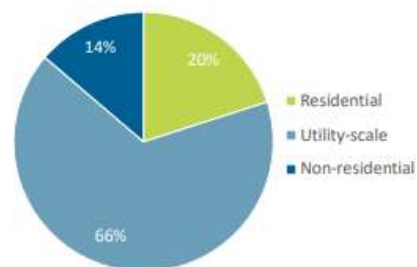


Figure 42.
Majority-Time Solar Employees by Type of Project – 2019

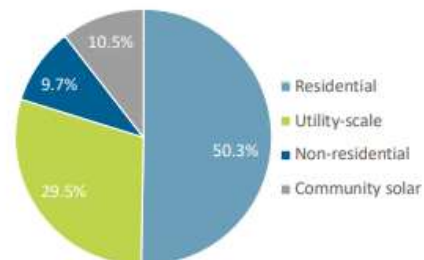


Figure 45.
Solar Electric Power Generation – Hiring Difficulty by Industry



Source: <https://www.usenergyjobs.org/>

Diversity in the Solar Industry

Table 19.
Solar Electric Power Generation – Demographics, Q4 2019

Demographic	Solar Photovoltaic	Concentrating Solar Power	National Workforce Averages
Male	70%	68%	53%
Female	30%	32%	47%
Hispanic or Latino	20%	21%	18%
Not Hispanic or Latino	80%	79%	82%
American Indian or Alaska Native	1%	1%	>1%
Asian	9%	9%	6%
Black or African American	8%	7%	12%
Native Hawaiian or other Pacific Islander	1%	1%	>1%
White	71%	70%	78%
Two or more races	9%	11%	2%
Veterans	9%	8%	6%
55 and over	11%	9%	23%
Union	4%	6%	6%

Source: <https://www.usenergyjobs.org/>

Workforce Themes

- Installer capacity building



- Expansion of worker pools



- Upgrading curriculum



- Developing new capacity



- Diversifying skill sets of the future



Future Themes in Workforce

1. How to help the industry during and after COVID-19
2. Leaving no profession related to soft costs behind
3. Solar energy jobs vs careers
4. Proactive roles on the way to mass electrification

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Soft costs related to installation do not stop at installers...

Educational Materials for Professional Organizations Working on Efficiency and Renewable Energy Developments (EMPOWERED) FOA

Federal Funds: \$4.5M

- Collaborative Opportunity between *Solar, Building and Vehicle Technologies Offices*
- Goal: provide training materials for professionals whose jobs are **not primarily** working with solar, building efficiency or vehicle energy technologies, but who have significant involvement and authority over these technologies' implementation. (First Responders, Building, Fire and Safety Officials)

Permitting, Inspection and Interconnection

Permitting Work Themes

- Local vs Federal jurisdiction
- Converge on best and uniform practices
 - Develop tools and resources to ease local implementation
- Expand and update resources on solar and other energy technologies (EMPOWERED)
 - Identify the right audience, right dissemination method
 - Speak with a single voice
- **Need to address storage in tandem!**

Why addressing permitting/interconnection are important

- Area of bipartisan interest
- Business environment
- Opportunity to impact other soft costs



Investing in time and tools- Permitting



SolarAPP



**Permitting Operational
Efficiencies and Reduced Costs**

Interconnection Work Themes

- Converge on best and uniform practices
 - Develop tools to ease local implementation
- Identify, quantify and dissemination information on efforts to increase hosting capacity
- Need to address storage in tandem!

Investing in time and tools- Interconnection



**Interconnection Operational
Efficiencies and Reduced Costs**

Future Themes in Permitting and Interconnection

- Continued focus on quantification of challenges and value in solutions
- Fund the time, space and analysis to identify, disseminate and implement process improvements
- Storage, Storage, Storage

Solar and the Environment

Impact of Environmental Considerations

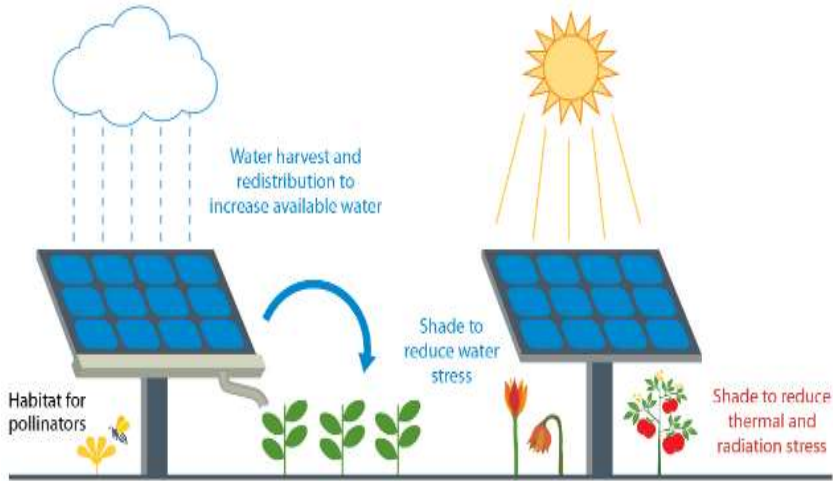
 Drive soft costs to infinity



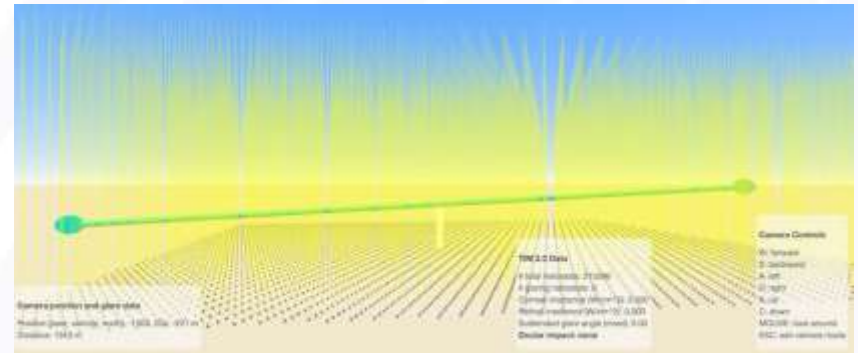
 Open up new value streams to developers/system owners



Investing in Data, Research Community, Tools



Bringing together communities, developing data sets and making tools for decision makers



Future Themes in Solar and the Environment

- Quantification of costs and benefits of solar co-location
- Quantification of the true impacts on water resources, flora and fauna
- Dissemination of analysis to provide factual information for decision makers at all levels

Analysis and Planning for Institutions

Value of Empowering Institutions

Institutions include, but are not limited to, state/local gov't, non-profits, for-profits

- Intimate knowledge of constituents needs
 - Can meet people where they are (physically and informationally)
- Ability to work across or with similar stakeholders

Developing Resources, Convening and Assisting (examples)

Resource Development



WORLD
RESOURCES
INSTITUTE

Assistance



Convening

ICMA

INTERNATIONAL CITY/COUNTY
MANAGEMENT ASSOCIATION

All of the Above



**SOLAR ENERGY
INNOVATION
NETWORK**
U.S. DEPARTMENT OF ENERGY



Future Themes in Analysis and Planning

- Engagement across industries and DOE offices
- Nationwide Community Solar
- Packaging and dissemination of materials for use at all levels of sophistication
- Continue to expand population for which resources and assistance are available

Solar Energy Access

Value of Increasing Access to Solar Energy

- Allow financial benefits from solar to flow to everyone and every community
- Increase the demand for solar energy
- Drive innovation
 - More actors + More familiarity = More ideas

Multiple Approaches to Increasing Access (examples)

- Financing and business models



HARC



CleanEnergy
States Alliance



SOLSTICE
INITIATIVE

- Empowering local strategies



**University of
New Hampshire**



ASU

Multiple Approaches to Increasing Access

National Community Solar Partnership



The National Community Solar Partnership is a coalition of community solar stakeholders working to expand access to affordable community solar to every American household by 2025.

Future Themes in Solar Energy Access

- Identification and capacity building of proper messengers
- Continued experimentation with new approaches
- Quantification of baseline knowledge and challenges for all stakeholders
- Deepen understanding of human behavior in technology adoption

Additional areas of relevance to soft costs reduction

- Hardware development, testing and validation
 - PV, SI, CSP, M&C teams
- Performance data aggregation and analysis
 - PV, SI, CSP teams
- Supply chain development
 - Private Sector

2025 Goals: Soft Costs

LCOE for PV is <0.05 USD/kWh on new houses and existing commercial roofs and <0.10 USD/kWh for residential retrofit systems

100% of US energy consumers have access to solar electricity that does not increase their energy costs

In 95% of cases, between permit application and permission to operate, no more than 30 days elapse for residential PV systems and no more than 100 days elapse for utility PV systems

MECHANISMS

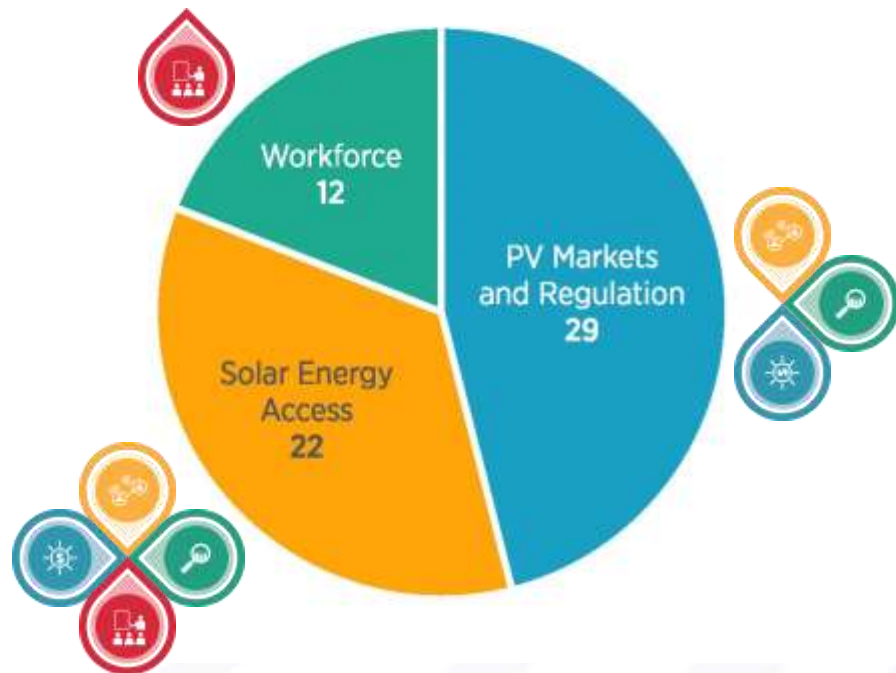
- Providing tools and training to make permitting and interconnection fast and easy
- Performing analysis to support the scalable and equitable integration of solar technology into the energy system
- Supporting new processes and mechanisms for efficient solar integration and deployment
- Providing objective information and analysis to inform decision-makers in business and government
- Offering workforce development for solar workers

Tools we have at our disposal, timeframes to impact

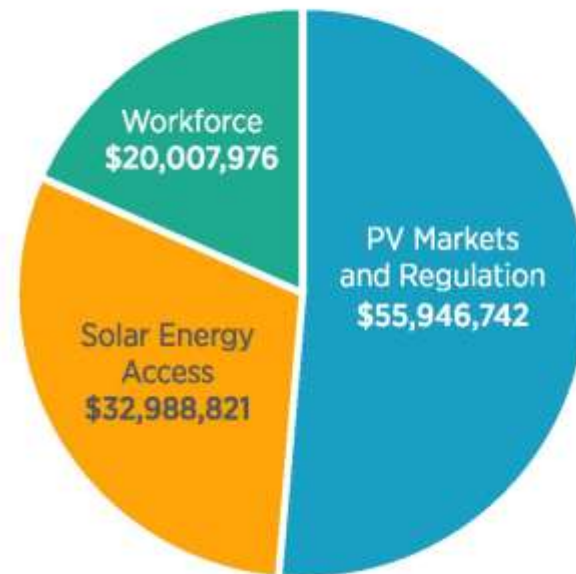
- Funding Opportunity Announcements (FOA)
- National Lab Solicitations
 - National Lab Core Research
- Convening Power
- Analysis Products
- Technical Assistance
- Information Aggregation and Dissemination
- Introductions

Soft Costs Track- Award Breakdown

Soft Costs Projects by Topic Area



Soft Costs Funding by Topic Area



Staff Working on Soft Costs

Technical Staff
Financial and Admin Staff
Fellows



Ketan
Ahuja



Yaser
Ahmed



Michele
Boyd



Shamara
Collins



Megan
DeCesar



Zach
Eldredge



Kyle
Fricker



Andrew
Graves



Shubha
Jaishankar



Tiffany
Jones



Ammar
Qusaibaty



Sara
Schneider



Dan
Stricker



Elaine
Ulrich



Chani
Vines

Chris Anderson
(Not Pictured)

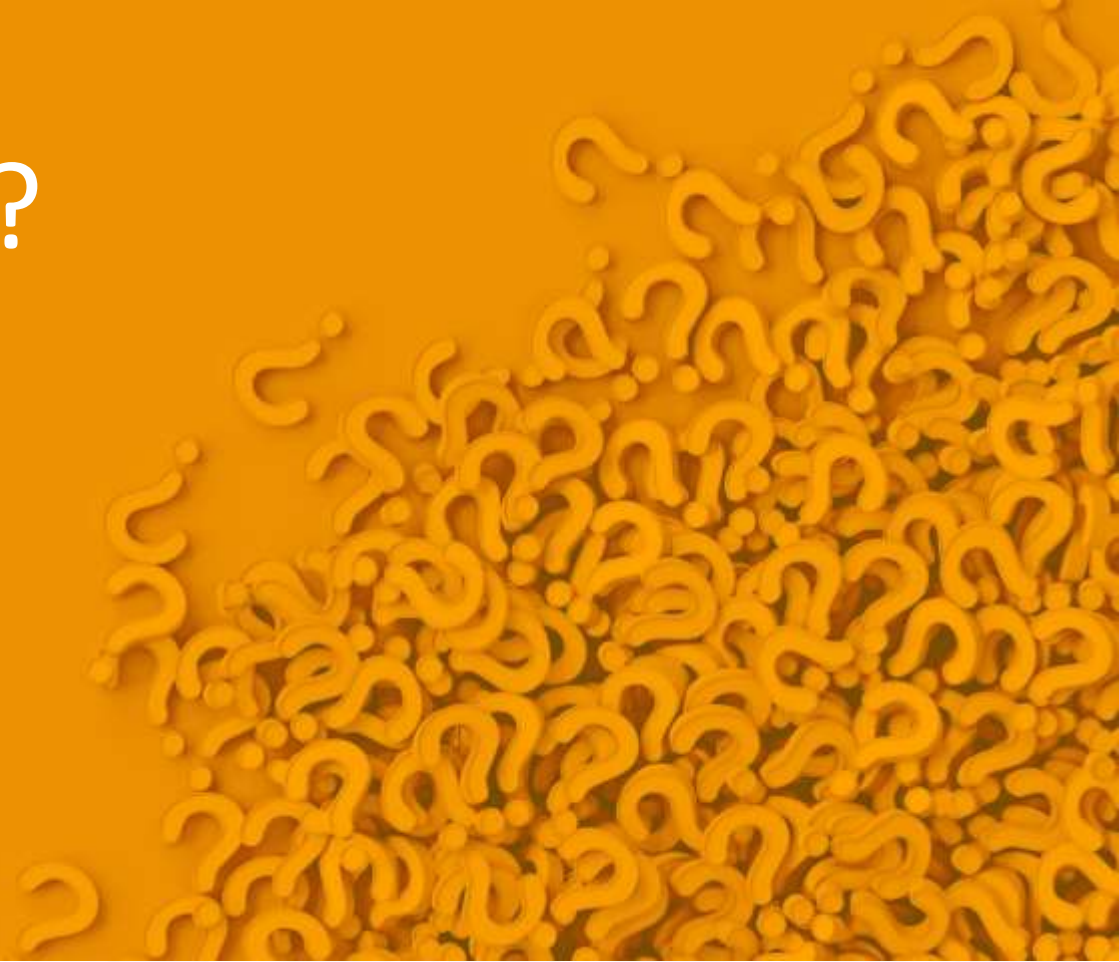
NREL Support

Robert Margolis

David Feldman

Monisha Shah

QUESTIONS?



Thank You

energy.gov/solar-office

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