- Go to **slido.com**
- Enter event code **SETOSC**
- Submit and Upvote Questions for Q&A

Overview of SETO Soft Costs Programming

Introduction to the Soft Costs Track

Garrett Nilsen

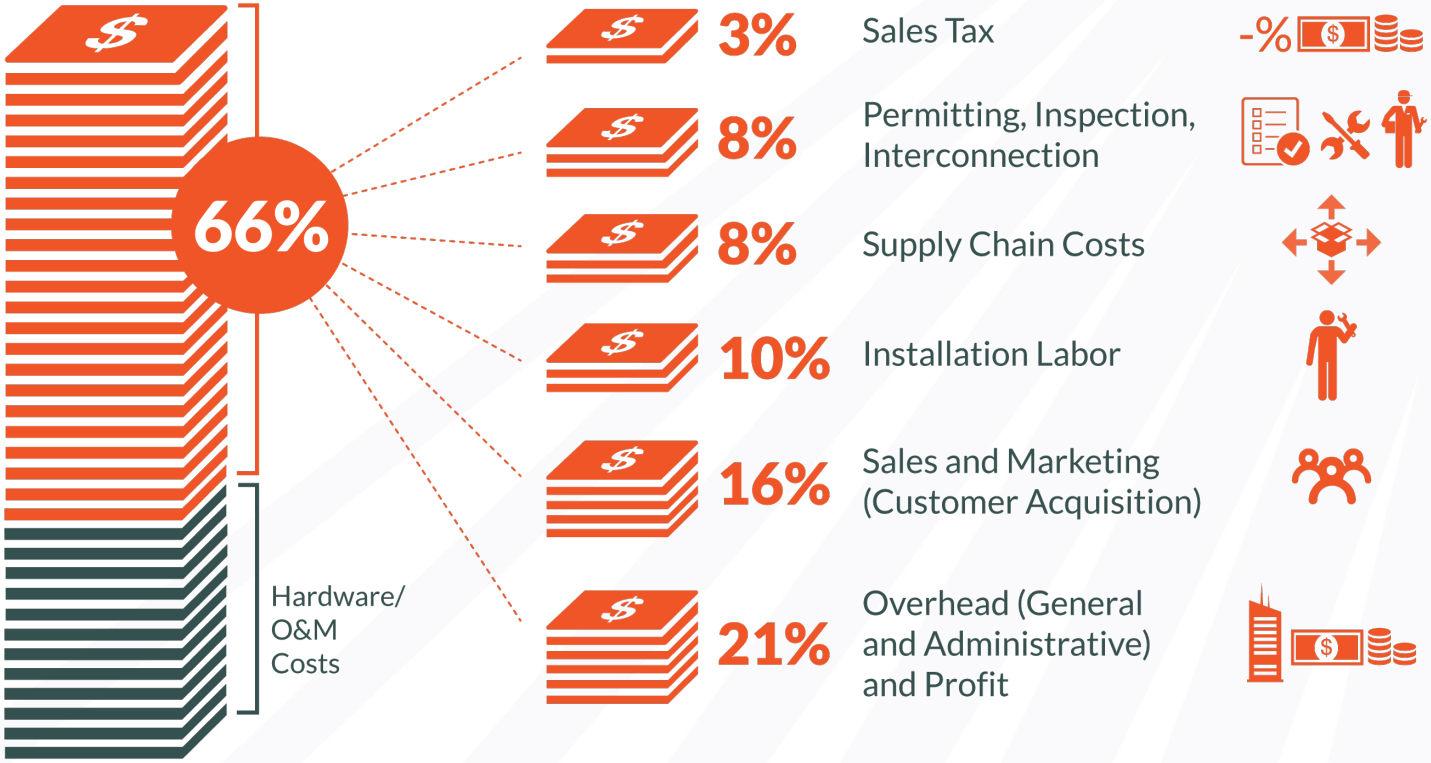
Reviewer Introductions (please go in order)

- Karen Wayland (Chair)
  - kW Energy Strategies
- Benjamin Airth
  - Center for Sustainable Energy
- Harshul Banthia
  - Offset Renewables
- Gilbert Campbell
  - Volt Energy
- Marni Carroll
  - OneEnergy Renewables
- Danielle Deane-Ryan
  - Independent
- Josh Earn
  - National Housing Trust
- Isabelle Hazlewood
  - CT Green Bank
- Luther Jackson
  - NOVA Works
- Brian Jones
  - Center for Sustainable Energy
- Philip Jordan
  - BW Research
- Richard Keiser
  - Common Energy
- Jaqueline Patterson
  - NAACP
- Mary Ann Rawls
  - NRECA
- MJ Shaio
  - Arcadia Power

How can you help us?

- Feedback on:
  - Overall portfolio and strategy
  - Project portfolio
  - How we address (or not) different soft costs
  - Gaps in our portfolio
  - How we can better engage with the community
- Ideas for future areas of focus, funding topics
- Identification of factors which could influence our work over the next 5 years

Summary of Solar Soft Costs (Residential)

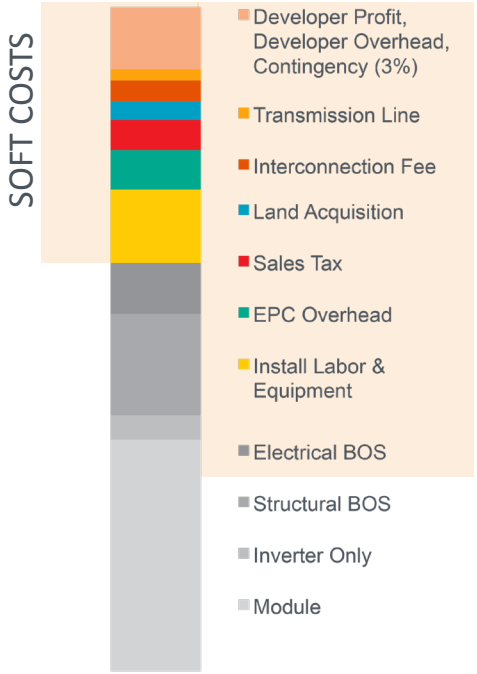


Source: National Renewable Energy Laboratory (unpublished) "U.S. Solar Photovoltaic System Cost Benchmark: Q1 2019."

New Markets: Defining and Addressing Soft Costs

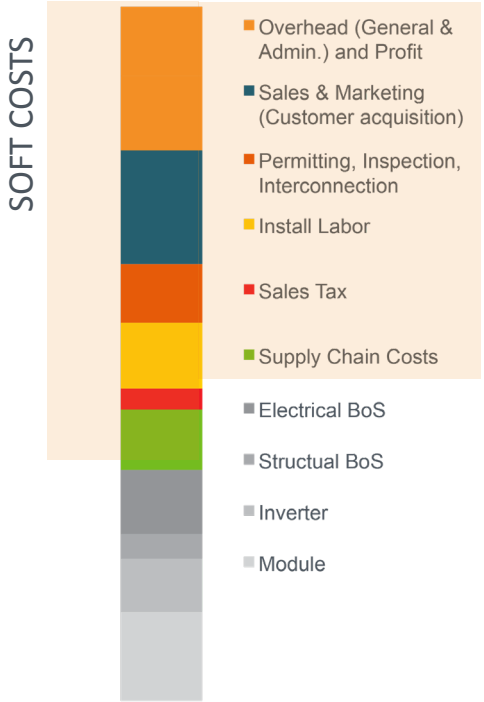
Utility-scale PV

Soft Costs = $.39/watt



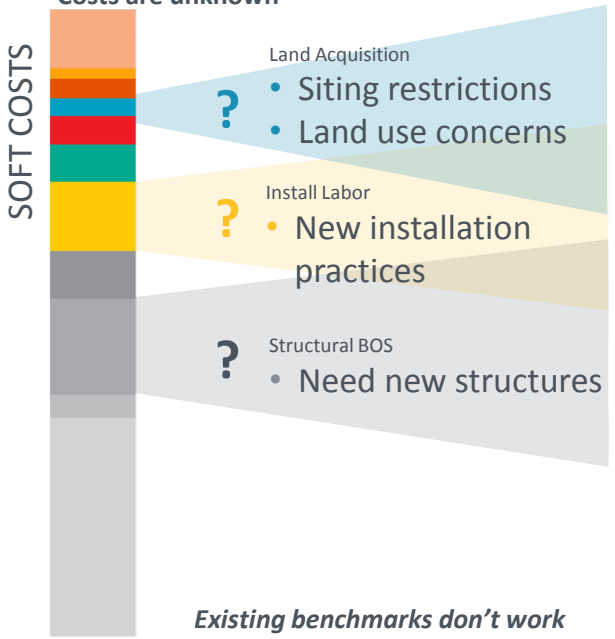
Residential/Commercial PV

Soft Costs = $1.86/watt



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

Costs are unknown



Existing benchmarks don't work

COMPLEXITY

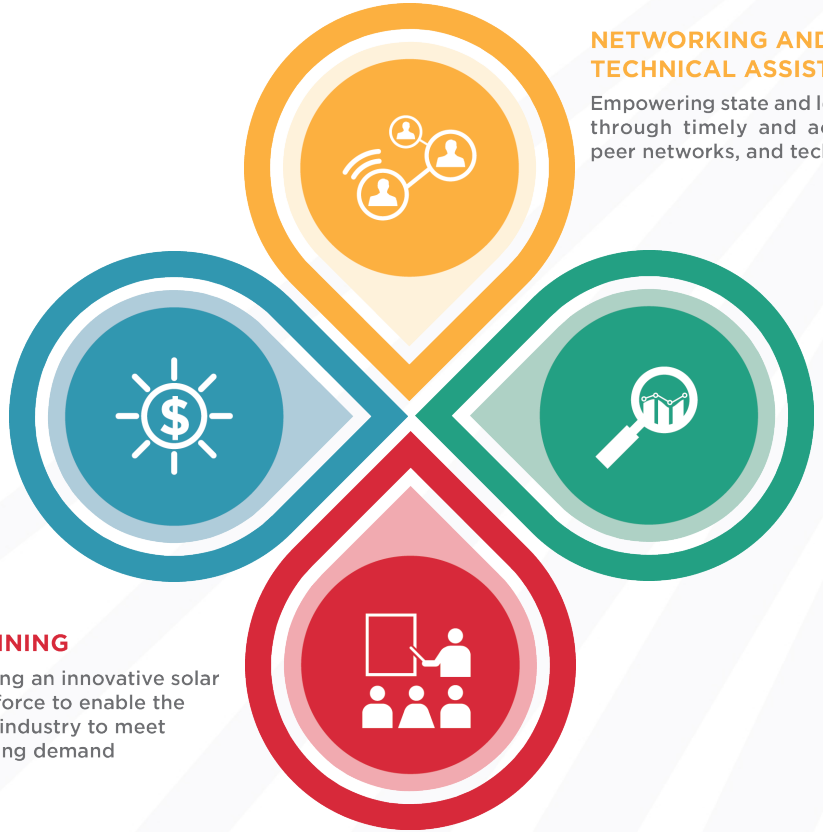
Concentrating Solar-Thermal Power Soft Costs

- 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



NETWORKING AND TECHNICAL ASSISTANCE

Empowering state and local decision-makers through timely and actionable resources, peer networks, and technical assistance

BUSINESS INNOVATION

Developing solar finance and business solutions to expand access to capital and accelerate market growth

DATA ANALYSIS

Harnessing big data analysis and technical solutions to support the many stakeholders involved in solar deployment

TRAINING

Training an innovative solar workforce to enable the solar industry to meet growing demand

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)

What drives soft costs?

- People
- People
- Sometimes birds or tortoises....
- But really the people who care about birds and tortoises

(picture of solar soft costs in 2010's)

Image: https://madlyodd.com/cowboys-herding-cats/

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

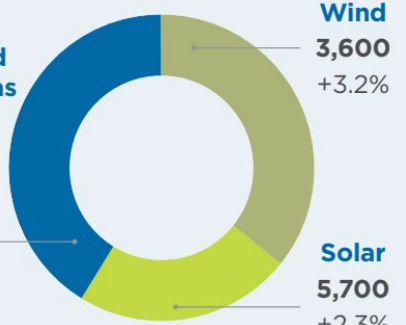
The Electric Power Generation sector employed

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.

FASTING GROWING SECTORS

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



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.

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

Further Information from USEER

Figure 41.
Solar Electric Power Generation – Employment by Industry

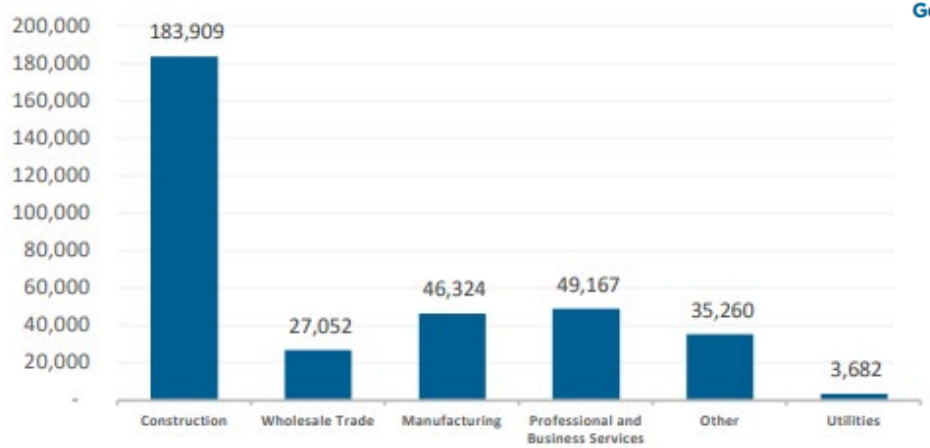


Figure 43.
Estimated Percentage of Solar Generation Installed – 2019

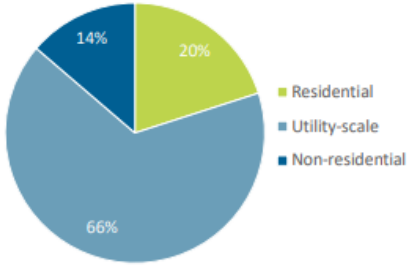


Figure 42.
Majority-Time Solar Employees by Type of Project – 2019

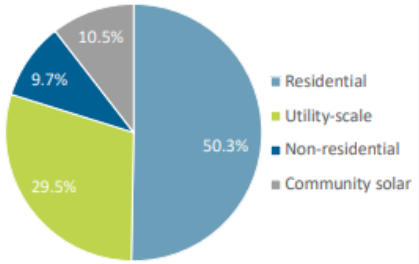
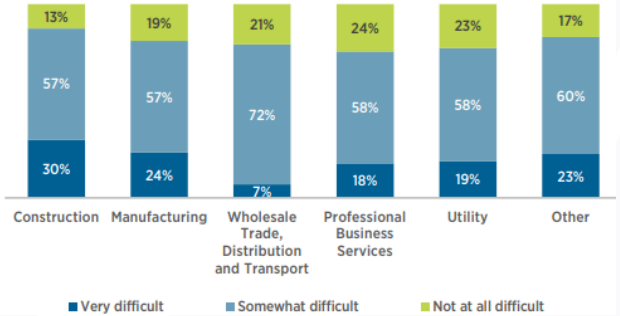


Figure 45.
Solar Electric Power Generation – Hiring Difficulty by Industry



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

COVID-19 Impact on solar workforce

Bloomberg Green

Energy & Science

Coronavirus Is Starting to Slow the Solar Energy Revolution

Bloomberg News
February 27, 2020, 4:07 AM EST *Updated on February 27, 2020, 7:35 AM EST*

7.0

grist GRIST 50: 2020 CLIMATE JUSTICE POLITICS ADVICE SCIENCE FOOD VIDEO FIX

SUNSET ON SOLAR

Solar power has been growing for decades. Then coronavirus rocked the market.

By Emily Pontecorvo on Mar 16, 2020

gtm: Solar Grid Edge Storage Wind Trending Podcasts Downloads

SOLAR

'No One Is Being Spared': Coronavirus Shutdowns Sap Demand for Residential Solar

Shelter-in-place and stay-home orders in key state solar markets have left many residential developers in limbo.

EMMA FOEHRINGER MERCHANT | APRIL 02, 2020

Layoffs have started across the residential solar sector. (Binh Nguyen/GTM)

Changing America

Shared Destiny. Shared Responsibility.

THE HILL

ilience Enrichment Well-Being Opinion Who We Are

Sustainability › Infrastructure

nergy industry
d by coronavirus
andemic

y is facing detrimental supply chain and labor force interruptions.

By Alexandra Kelley

Storage Wind Trending Podcasts Downloads

ar **WoodMac: Coronavirus Could Delay Construction of 5 Gigawatts of US Utility-Scale Solar**

U.S. solar energy projects are in danger of missing deadlines and needing to rely on force majeure claims.

RAVI MANGHANI | APRIL 02, 2020

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

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

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

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

Unlike physics, where we can fundamentally figure out the upper limit for the efficiency of solar cells, there is no such limit to bureaucracy.

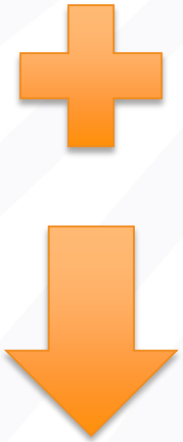
Permitting Work Themes

- 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

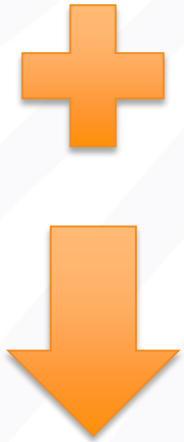


Permitting Operational Efficiencies and Reduced Costs

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

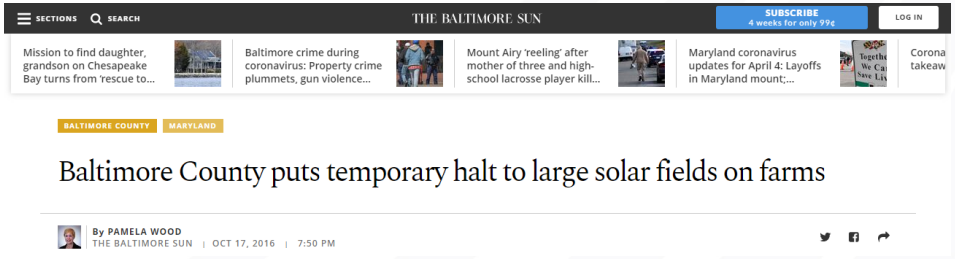
Future Themes in Permitting and Interconnection

- 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



SECTIONS SEARCH THE BALTIMORE SUN SUBSCRIBE 4 weeks for only 99¢ LOG IN

Mission to find daughter, grandson on Chesapeake Bay turns from 'rescue to...

Baltimore crime during coronavirus: Property crime plummets, gun violence...

Mount Airy 'reeling' after mother of three and high-school lacrosse player kill...

Maryland coronavirus updates for April 4: Layoffs in Maryland mount;...

Corona takeaw

BALTIMORE COUNTY MARYLAND

Baltimore County puts temporary halt to large solar fields on farms

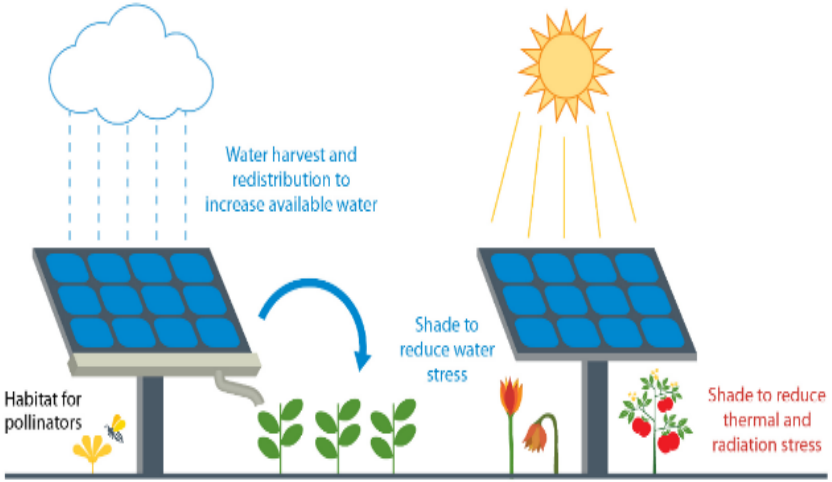
By PAMELA WOOD
THE BALTIMORE SUN | OCT 17, 2016 | 7:50 PM

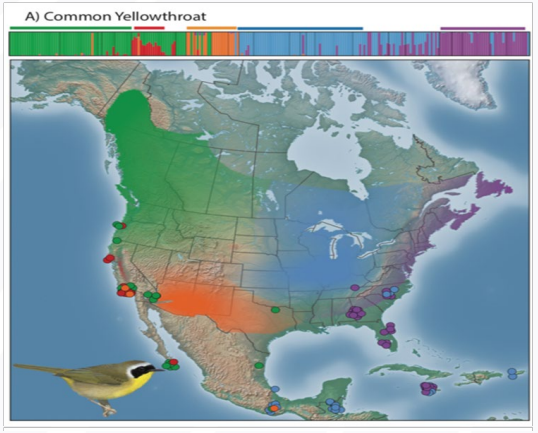
Open up new value streams to developers/system owners

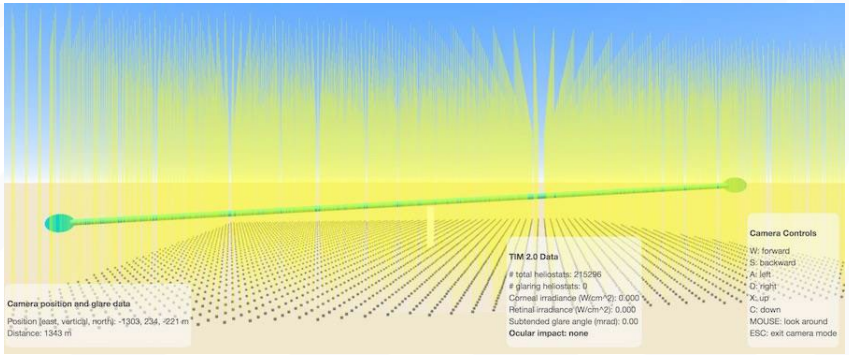
https://www.baltimoresun.com/maryland/baltimore-county/bs-md-co-county-council-solar-20161017-story.html

https://fresh-energy.org/solarama-crush/

Investing in Data, Research Community, Tools







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

Resource Development

WORLD RESOURCES INSTITUTE

Assistance

SOLSMART
NATIONALLY DISTINGUISHED. LOCALLY POWERED.

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

- 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

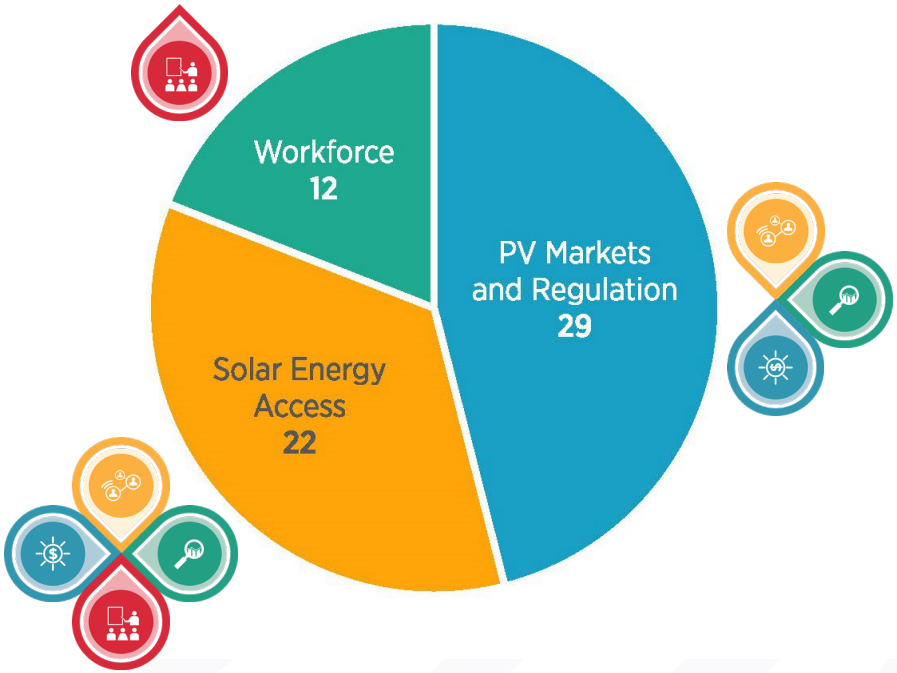
- Providing tools and training to make permitting and interconnection fast and easy
- Performing analysis to support the scalable and equitable integration of solar technology into the energy system
- Supporting new processes and mechanisms for efficient solar integration and deployment
- Providing objective 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

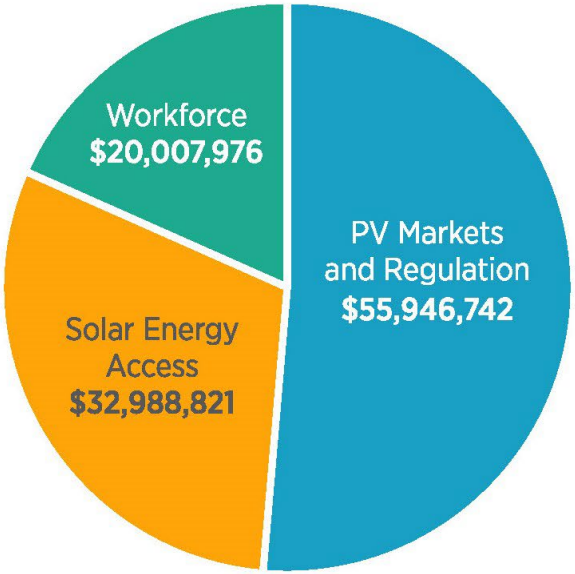
- Funding Opportunity Announcements (FOA)
- National Lab Solicitations
  - National Lab Core Research
- Convening Power
- Analysis Products
- Technical Assistance
- Information Aggregation and Dissemination
- Introductions

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

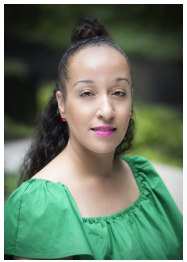

Megan DeCesar


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

Soft Costs Agenda (Monday, 4/6)

Time	Session	Location
1:15PM–2:15PM	**Introduction to SETO Soft Costs Work** *Garrett Nilsen, Program Manager*	WebEx link here
2:15PM–2:45PM	**Break**	
2:45PM- 4:00PM	**Workforce** *Andrew Graves, Shamara Collins*	
4:00PM- 5:00PM	**Discussion Time for Reviewers**	

Soft Costs Agenda (Tuesday, 4/7)

Time	Session	Location
11:00AM–11:45AM	**PV Markets and Regulation (PVMR): Permitting, Inspection and Interconnection** *Andrew Graves, Ammar Qusaibaty*	
11:45AM–12:30PM	**PVMR: Environmental Research** *Michele Boyd, Zach Eldredge*	
12:30PM–12:45PM	**Break**	
12:45PM- 2:15PM	**Solar Energy Access** *Chani Vines, Kyle Fricker, Shamara Collins, Ketan Ahuja, Shubha Jaishankar*	WebEx link here
2:15PM- 2:45PM	**Break**	
2:45PM- 4:00PM	**PVMR: Planning** *Michele Boyd, Andrew Graves, Megan DeCesar, Shamara Collins, Ammar Qusaibaty*	
4:00PM- 5:00PM	**Discussion Time for Reviewers**	

Content to come

- Overviews of our work in each area
- Discussion of sample projects including Q&A
- Final Q&A with SETO Staff and Reviewers
- If time remains, questions from SETO staff

How can you help us?

- Feedback on:
  - Overall portfolio and strategy
  - Project portfolio
  - How we address (or not) different soft costs
  - Gaps in our portfolio
  - How we can better engage with the community
- Ideas for future areas of focus, funding topics
- Identification of factors which could influence our work over the next 5 years

QUESTIONS?

Thank You

Garrett Nilsen, Program Manager
Garrett.Nilsen@ee.doe.gov