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

SOLAR ENERGY TECHNOLOGIES OFFICE

Solar Energy Technologies Office

Quarterly Stakeholder Webinar

energy.gov/solar-office

Solar Energy Technologies Office

Solar Energy Technologies Office

Dr. Charlie Gay
Director

Dr. Becca Jones-Albertus
Deputy Director and Acting Soft Costs Program Manager

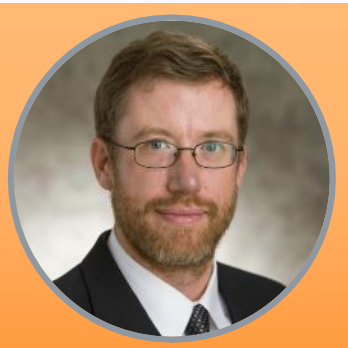
Dr. Elaine Ulrich
Acting Senior Advisor

Ebony Brooks
Operations Supervisor

Dr. Lenny Tinker
Photovoltaics Program Manager

Dr. Avi Shultz
Concentrating Solar-Thermal Power Program Manager

Dr. Guohui Yuan
Systems Integration Program Manager



Garrett Nilsen
Technology to Market Program Manager

Agenda

SETO Overview and Updates
Becca Jones-Albertus, Deputy Director, Solar Energy Technologies Office

American-Made Solar Prize
Garrett Nilsen, Program Manager, Solar Energy Technologies Office

Solar Energy Innovation Network
Becca Jones-Albertus, Deputy Director, Solar Energy Technologies Office
Guest Speaker, Luis Reyes, CEO, Kit Carson Cooperative

Solar Energy Technologies Office

WHAT WE DO

The Solar Energy Technologies Office funds early-stage research and development in three technology areas: photovoltaics, concentrating solar power, and systems integration with the goal of improving the **affordability**, **reliability**, and **performance** of solar technologies on the grid.

HOW WE DO IT

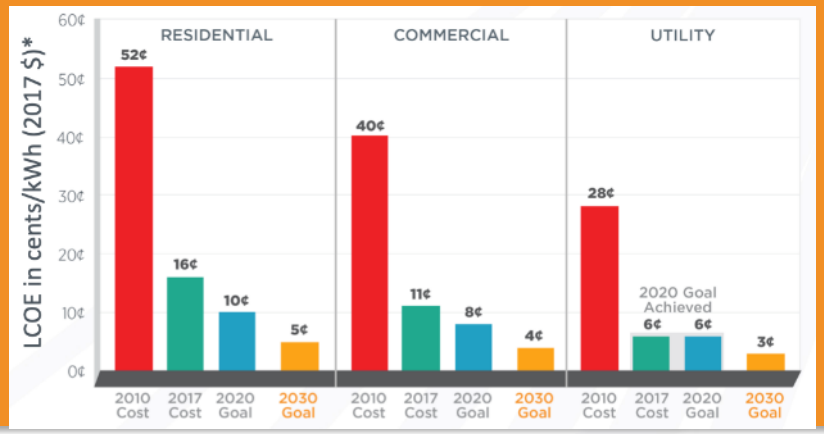
Cutting-edge **technology development** that drives U.S leadership and supports a growing and skilled workforce.

Research and development to **address integration of solar** to the nation's electricity grid.

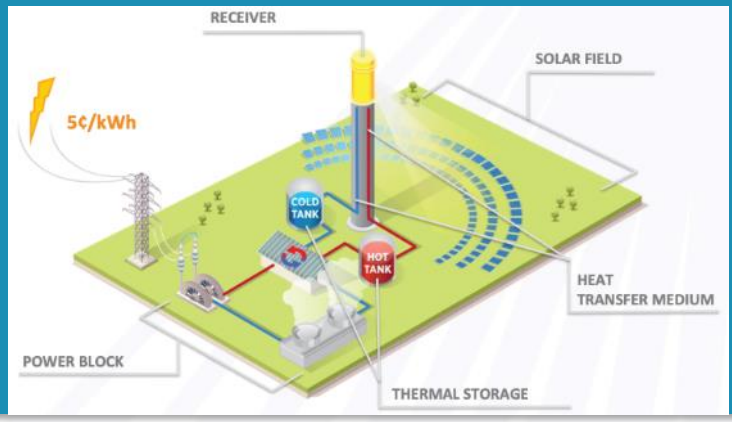
Relevant and objective technical information on solar technologies to stakeholders and decision-makers.

SETO Subprograms

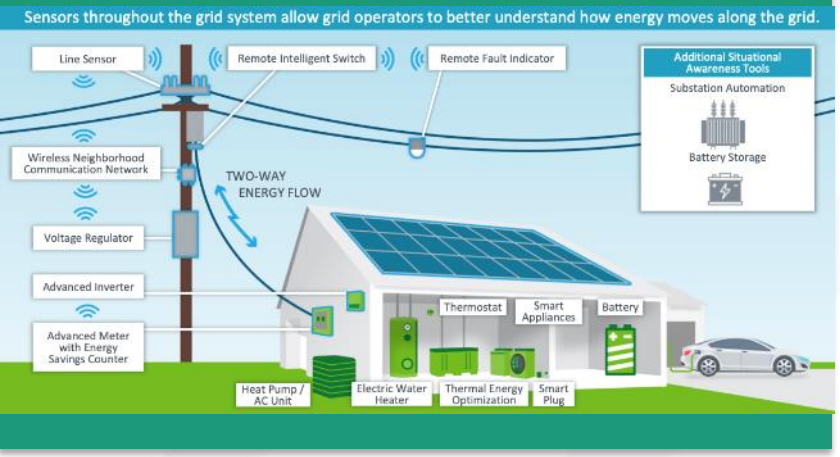
PHOTOVOLTAICS



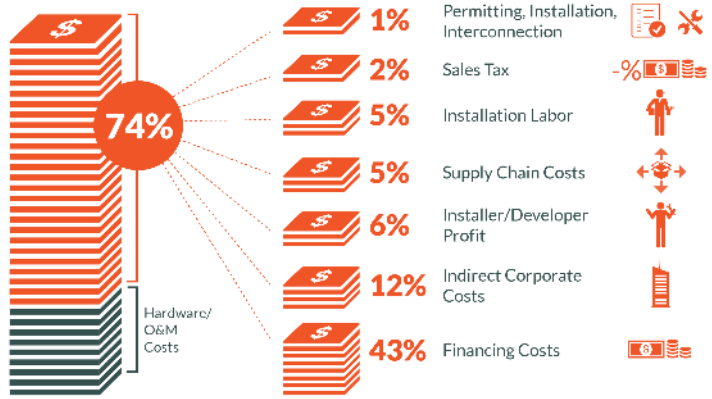
CONCENTRATING SOLAR POWER



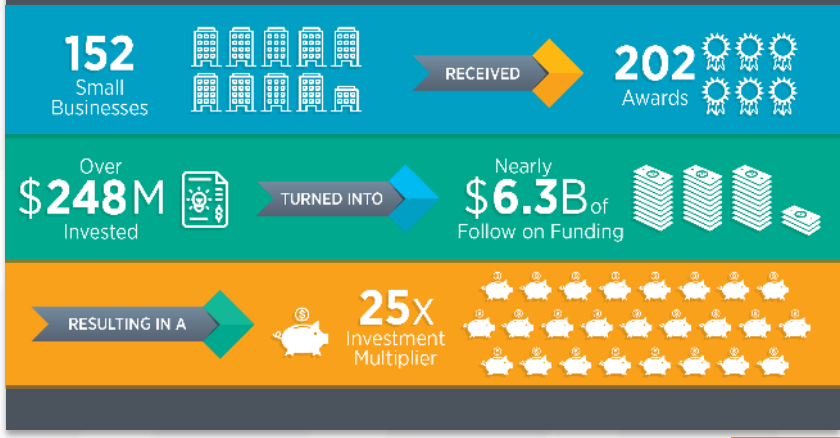
SYSTEMS INTEGRATION



BALANCE OF SYSTEMS (SOFT COSTS)



TECHNOLOGY TO MARKET



DOE Solar Office Funds 350+ Active Projects

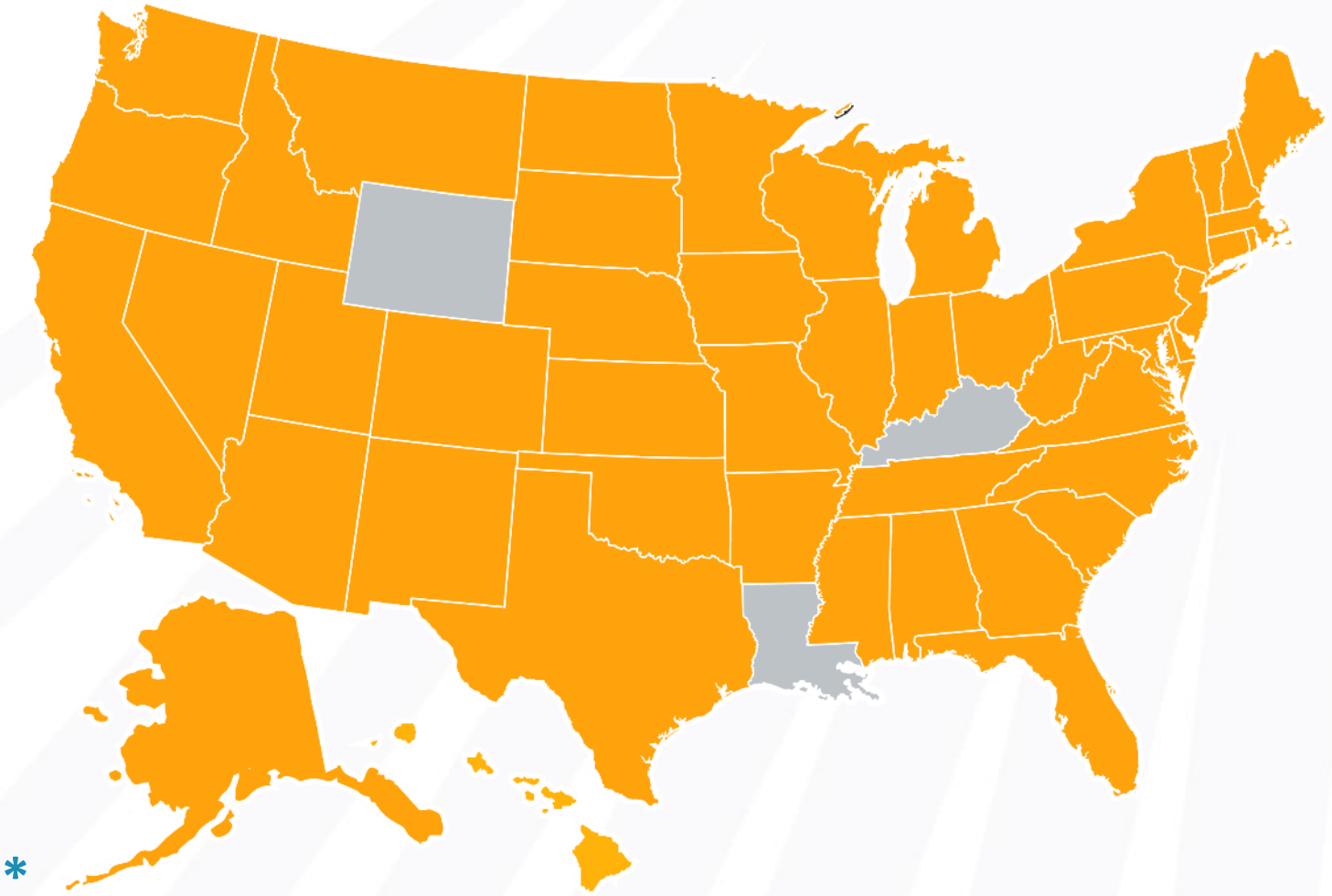
Projects and partners in **47** states

plus the **District of Columbia**

40% of projects at **national labs**

25% of projects with **universities**

35% of projects with **businesses & non-profits***



Note: SETO has funded past projects in Kentucky, Louisiana, and Wyoming.
*2% of state and local government

SETO Budget

SETO SUBPROGRAM	2016	2017	2018	2019
Concentrating Solar Power	$48,400,000	$55,000,000	$55,000,000	$55,000,000
Photovoltaic R&D	$53,152,000	$64,000,000	$70,000,000	$72,000,000
Systems Integration	$52,447,000	$57,000,000	$71,200,000	$54,500,000
Balance of Systems (Soft Costs)	$34,913,000	$15,000,000	$11,000,000	$35,000,000
Innovations in Manufacturing (Technology to Market)	$43,488,000	$16,600,000	$34,400,000	$30,000,000
NREL Facility Support	$9,200,000			
TOTAL	**$241,600,000**	**$207,600,000**	**$241,600,000**	**$246,500,000**

Update of SETO Activities in Q2-Q3 2019

- Announced $130M for SETO Fiscal Year 2019 Funding Opportunity
- Shared NREL's Success in Silicon Module Performance Measurements

What's next for SOLAR?

Solar Energy Technologies Office FY2019 Funding Program

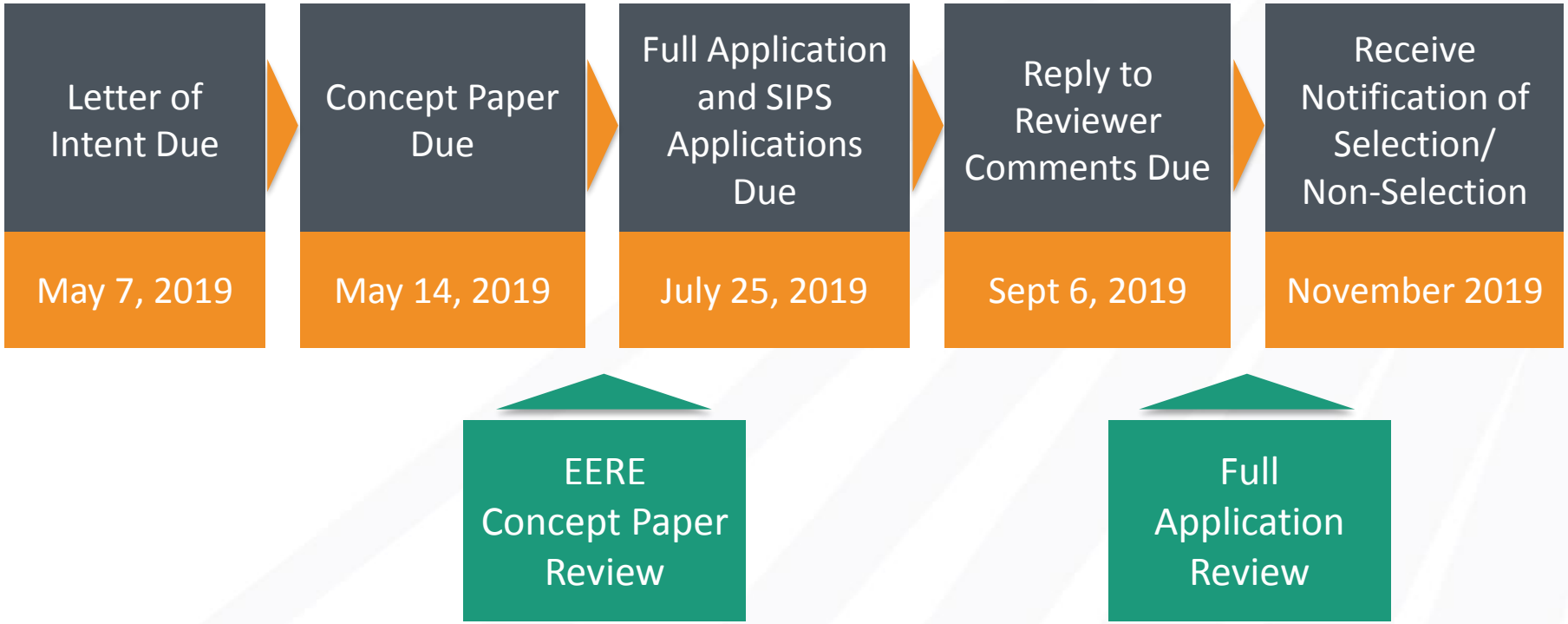
$130 Million for Advanced Solar Energy Research

The U.S. Department of Energy Solar Energy Technologies Office is looking to fund up to 80 projects that lower the cost of photovoltaic and concentrating solar-thermal power technologies, improve grid integration, develop manufacturing solutions, and lower soft costs by reducing regulatory burdens.

Funding Opportunity Topic Areas

- Photovoltaics Research and Development
- Concentrating Solar-Thermal Power Research and Development
- Balance of Systems Soft Costs Reduction
- Innovations in Manufacturing – Hardware Incubator
- Advanced Solar Systems Integration Technologies

FY 2019 FOA Timeline



Expected Timeframe for Award Negotiations: November 2019 - February 2020

Technical Merit Review Criteria

Full Applications will be evaluated against the merit review criteria shown below:

Criterion 1: Innovation and Impact (50% weight)

The project is innovative and impactful, assuming the stated outcomes can be achieved as written. The project is differentiated with respect to existing commercial products, solutions, or technologies. If successful, the project is scalable to have a broader impact and maintained at a sufficiently large scale after project completion.

Criterion 2: Quality and Likelihood of Completion of Stated Goals (30% weight)

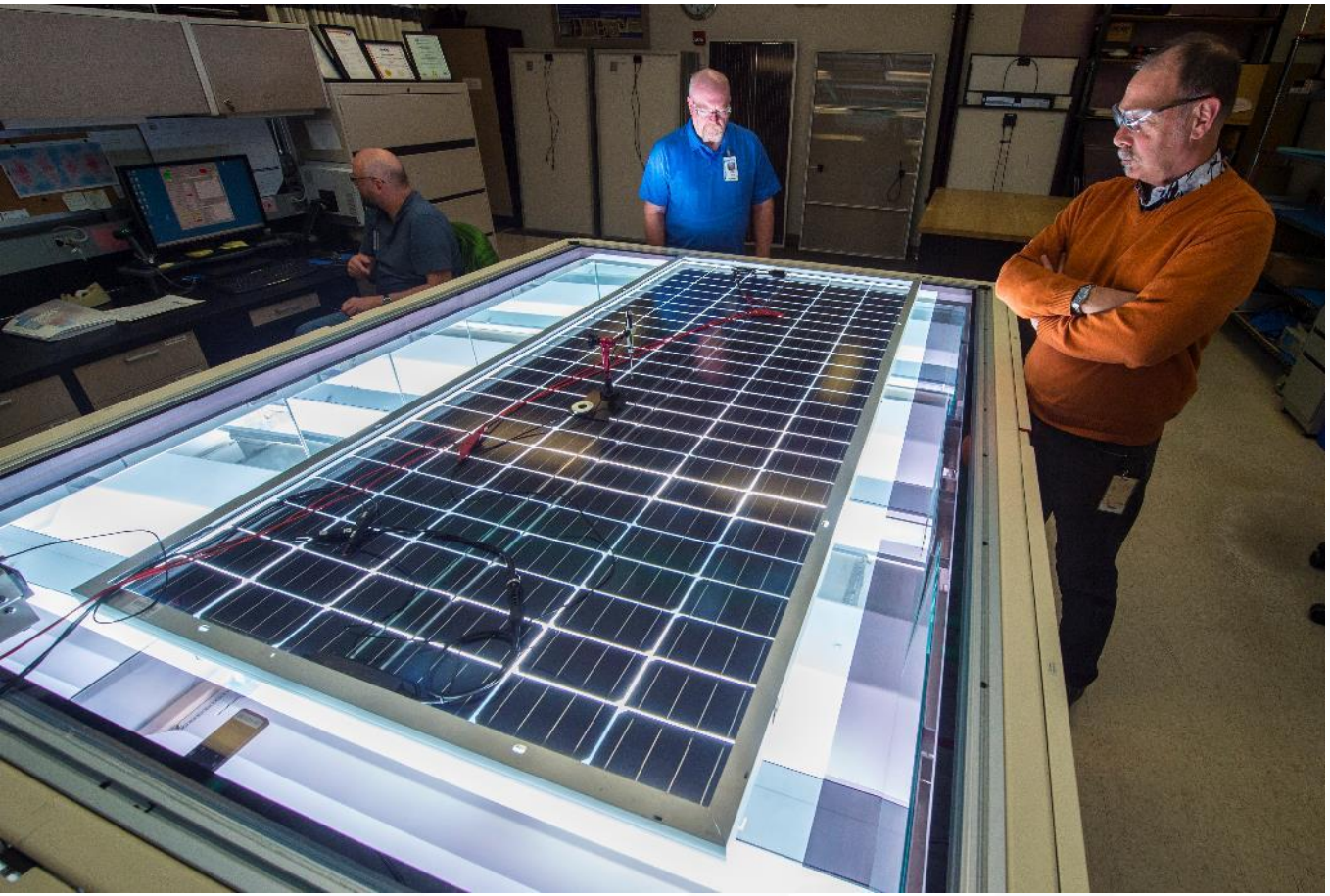
The application demonstrates an understanding and appreciation of project risks and challenges the proposed work will face and incorporates reasonable assumptions related to the execution of the project (i.e. market size, customer participation, costs, speed of proposed scale-up or adoption). The information included for the project is validated through customer trials, data from prior work, report references, technical baselines established, etc. The stated goals of the project are SMART (Specific, Measurable, Achievable, Relevant, and Timely) and likely to be accomplished within the scope of this project. The proposed budget is reasonable to achieve the objectives proposed.

Criterion 3: Capability and Resources of the Applicant/Project Team (20% weight)

The team is well qualified and has the capability and resources necessary to successfully complete the project. The team (including proposed subrecipients) have the training and experience to achieve the final results on time and to specification. The project team is fully assembled and committed to the project (verified through letters of support) and has a demonstrated record of successful past performance.

Learn more about the funding process.

Success Story: NREL Achieves World's Most Accurate Silicon Module Performance Measurements



BACKGROUND

- Module ratings estimate how much electricity a panel can create from the sun; project developers and plant owners use these ratings to know how many panels they need to buy and the total cost of their system.
- The precision of this measurement affects module prices and manufacturers' revenue.

SUCCESS

- In 2015, NREL researchers recently configured the **world's most precise** performance measurement for silicon modules. They **reduced the uncertainty** from 3% **to within 1.1%**.
- For a PV manufacturer, the 3% to 1.1% difference could **increase profits by up to about $5 million per gigawatt** of modules produced.

Update of SETO Activities in Q2-Q3 2019

- Announced $130M for SETO Fiscal Year 2019 Funding Opportunity
- Shared NREL's Success in Silicon Module Performance Measurements
- Announced the second round of the American-Made Solar Prize
- Announced the Round 1 finalists for the American-Made Solar Prize
- Announced the winners of the Solar in Your Community Challenge
- Announced a new collegiate challenge, the Solar District Cup


AMERICAN MADE
SOLAR PRIZE
U.S. DEPARTMENT OF ENERGY
American-Made
SOLAR PRIZE
Up for the challenge? Visit herox.com/SolarPrize to compete.

What is the Solar Prize?

An open prize competition that allows entrepreneurial teams to compete, through a series of progressive contests, to build and develop new ideas, products, and solutions that will lead to the creation of:

- New domestic businesses and jobs
- Innovative solar solutions and products
- Improved manufacturing processes
- Public-private partnerships that will accelerate innovation

Solar Prize

The potential for innovation is all around us, but many thought-leaders need a kick-start to build connections and secure investments to advance their ideas.

The Solar Prize will:

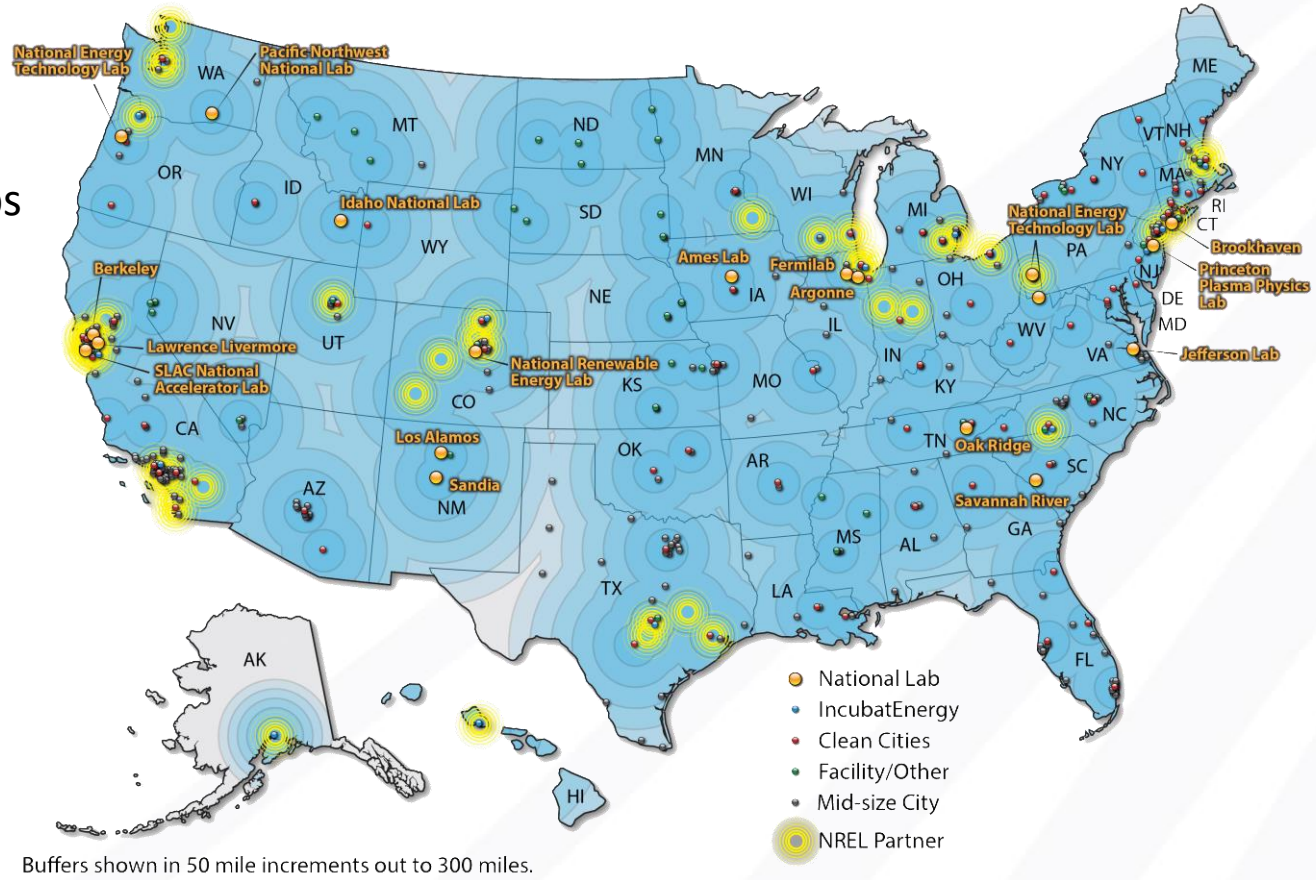
- Provide serious prize opportunities to accelerate new innovation
- Make invaluable expert connections that could not easily be made without this competition
- Tap into national laboratory expertise and IP opportunities
- Provide opportunities for teams and investors to connect at the early stages of business and product development

Activating the American-Made Challenges Network

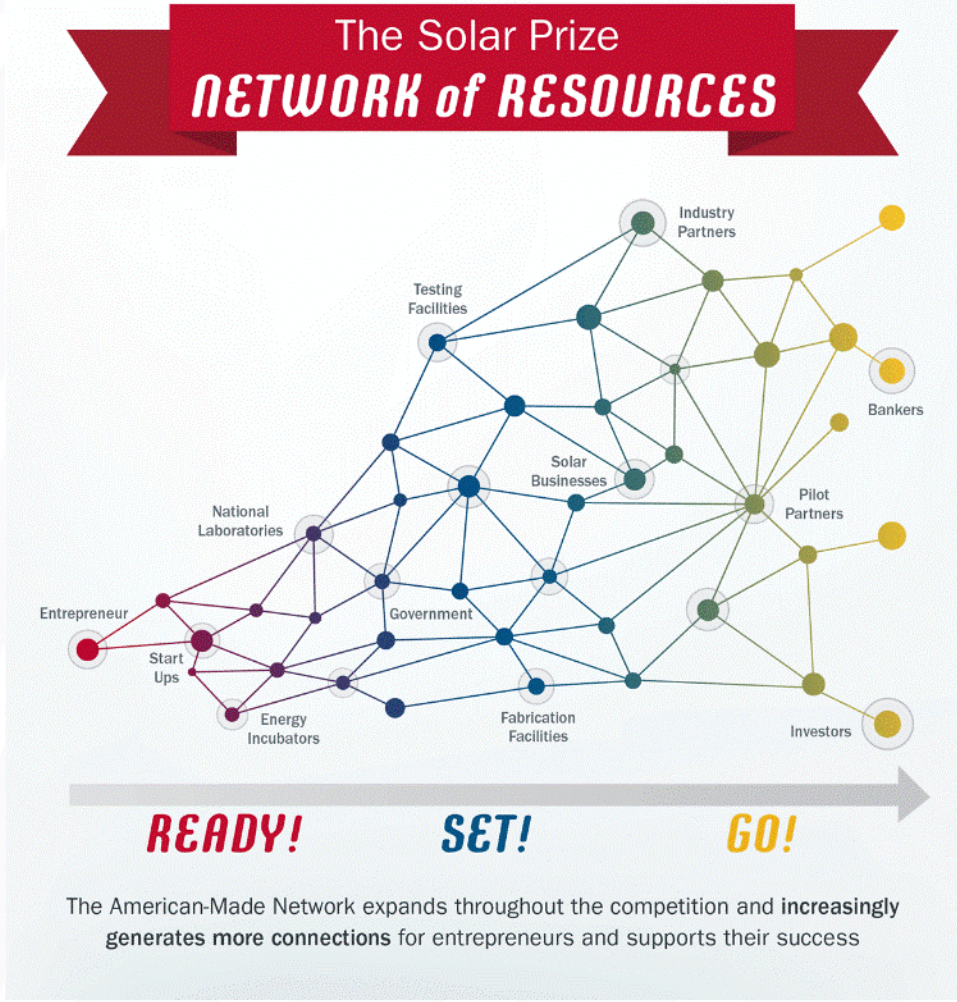
17
National Labs

35
Energy Incubators

83
City Coalitions



Buffers shown in 50 mile increments out to 300 miles.



Learn more about the [American-Made Network]

Solar Prize Round 1 Finalists

Solar Prize Round 2

- The *Ready! Contest* opened on March 22, 2019.
- The *Ready! Contest* submission deadline was July 16, 2019.
- Semifinalists will be announced in September 2019.
- The *Set! Contest* will open in September 2019. Finalists will be determined at a demo day in early 2020. This will mark the beginning of the final *Go! Contest* period.
- The final winners will be determined at a demo day in late 2020.

Solar Power International

Join SETO for a few events at SPI!

Tuesday, September 24, 2019

- **Solar Prize *Go! Contest* Demo Day Pitch**
  9:00-11:00 a.m. on the main stage immediately following the general session
- **Solar in Your Community Challenge Panel**
  2:30-3:30 p.m. on the show floor
- **Power Hour – American Made Challenges Solar Prize**
  5:00-6:00 p.m. at the Innovation Theater
  - We will announce the two Round 1 *Go! Contest* winners and plan to announce the Round 2 *Ready! Contest* semifinalists.

Solar District Cup

The Solar District Cup prepares students to become leaders in the next generation of distributed solar energy. As competitors, students will:

- Engage with industry leaders and industry professionals to forge mentorships and connections that will aid their transition to the solar energy workforce upon graduation
- Incorporate real-world electricity data and energy-use constraints in the development and design of their energy systems
- Create conceptual physical and electrical layouts, build financial models, perform data analysis, and evaluate for land use, permitting, and other regulations
- Build experience with real-life examples of innovative, integrated renewable energy design in the marketplace
- Compete to win a Solar District Cup division!

Update of SETO Activities in Q2-Q3 2019

- Announced $130M for SETO Fiscal Year 2019 Funding Opportunity
- Shared NREL's Success in Silicon Module Performance Measurements
- Announced the second round of the American-Made Solar Prize
- Announced the Round 1 finalists for the American-Made Solar Prize
- Announced the winners of the Solar in Your Community Challenge
- Announced a new collegiate challenge, the Solar District Cup
- Hosted the SETO CSP Program Summit 2019 in California

Upcoming Request for Information: Modeling and Analytics for Solar Grid Integration

The **Planning and Operation Models and Data Analytics for Solar Grid Integration RFI** will inform strategies relating to the modeling, monitoring, predicting, and controlling of solar photovoltaic (PV) systems. As the penetration of solar PV on the grid grows, these activities will become more important as grid operators consider how solar adoption impacts grid planning and operations technologies.

This RFI covers three broad categories:

- Real-time and forecasted data acquisition and ingestion for high penetration of PV
- Distribution network analysis for high penetration of PV
- Power system stability for high penetration of PV

Subscribe to our newsletter at energy.gov/solar-newsletter to be informed!

Interested in Joining Us?

Join our team. Design national R&D strategies across:

- Photovoltaics
- Systems Integration
- Technology to Market
- Concentrating Solar-Thermal Power
- Balance of Systems (Soft Costs)

Visit *energy.gov/seto-jobs* or email *ops.solar@ee.doe.gov* for more info.

SETO Newsletter – Stay in Touch

The SETO newsletter highlights the key activities, events, funding opportunities, and publications that the solar program has funded.

SIGN UP NOW:
energy.gov/solar-newsletter

QUESTIONS?

Please use the Q&A feature to ask your questions.

Solar Energy Innovation Network

The Solar Energy Innovation Network is a collaborative research program that supports multi-stakeholder teams to research and share solutions to real-world challenges associated with solar energy adoption.

APPROACH

- Teams identify local and regional challenges, and receive technical and financial assistance to formulate and test innovations, and validate new models
- Teams meet in person for several multiday work sessions to further refine solutions and learn from other teams
- Research and innovative solutions shared through peer network

OBJECTIVE

- Develop innovative solutions that make solar energy adoption easier and enable stakeholders across the United States facing similar challenges to replicate them.

SOLAR ENERGY INNOVATION NETWORK
U.S. DEPARTMENT OF ENERGY

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

BERKELEY LAB
Lawrence Berkeley National Laboratory

ROCKY MOUNTAIN INSTITUTE

Innovation Network – Round 1

SOLAR ENERGY INNOVATION NETWORK
U.S. DEPARTMENT OF ENERGY

ROUND 1 TOPICS (*January 2018–June 2019*)

- **Improving Reliability and Affordability of Solar Energy through Options Analysis and Systems Design**
  - Grid impacts and costs anticipated for various penetration levels of solar and other DERs
- **Improving Grid Flexibility and Resiliency through Advanced Siting and Operations of Solar + DER**
  - Value of combining solar and other DERs, such as storage, for grid flexibility, reliability, and resiliency

ACTIVITIES

- Identified solar potential on a city-wide scale to inform planning
- Modeled the economics of novel applications of PV, such as pairing it with electric vehicle charging at workplaces or with storage for peak demand reduction
- Produced a distribution system modeling tool to support distribution utility decisions by identifying the benefits and impacts of adding DERs to specific locations on the grid
- Worked with stakeholders to prioritize energy goals and design pilot projects that demonstrate novel, cost-effective solar and DER solutions
- Assessed the resiliency value of DERs and other value streams.

Products and tools from Round 1 will soon be available at
https://www.nrel.gov/solar/solar-energy-innovation-network.html

Innovation Network – Round 1 Participants

SOLAR ENERGY INNOVATION NETWORK
U.S. DEPARTMENT OF ENERGY

Utilities and ISOs	Industry	Non-Profits	Universities	State and Local Governments
Kit Carson Electric Cooperative Rocky Mountain Power Xcel Energy PJM Interconnection Holy Cross Energy Glenwood Springs Municipal Utility Aspen Municipal Utility Redwood Coast Energy Authority New York Power Authority Orlando Utility Commission Lancaster Choice Energy Peninsula Clean Energy Illinois Community Choice Aggregation Network	ZEF Energy Guzman Renewable Energy Partners Converge Strategies Chris Cone Consulting TerraVerde Energy, LLC Extensible Energy Cliburn and Associates The Greenlink Group The Energy Authority Renewable Taos, Inc. Community Office for Resource Efficiency	Montana Renewable Energy Association (MREA) Utah Clean Energy Center for Climate Protection Clean Energy States Alliance Great Plains Institute National Association of Regulatory Utility Commissioners (NARUC) Florida Renewable Energy Association Seven Generations Ahead Clean Coalition Clean Energy Economy for the Region Yellowstone-Teton Clean Cities Minnesota SEIA Center for Energy and Environment	University of Central Florida University of Hawaii at Manoa University of Montana Humboldt State University	Connecticut, District of Columbia, Florida, Hawaii, Minnesota, Montana, New Hampshire, New Mexico, Rhode Island, Washington, Wisconsin Bozeman MT, Chicago IL, Eagle County CO, Garfield County CO, Humboldt County CA, Missoula MT, Moab UT, Oak Park IL, Orlando FL, Park City UT, Pitkin County CO, River Forest IL, Saint Paul MN, Salt Lake City UT, San Diego CA, Whitefish, MT

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

SOLAR ENERGY TECHNOLOGIES OFFICE

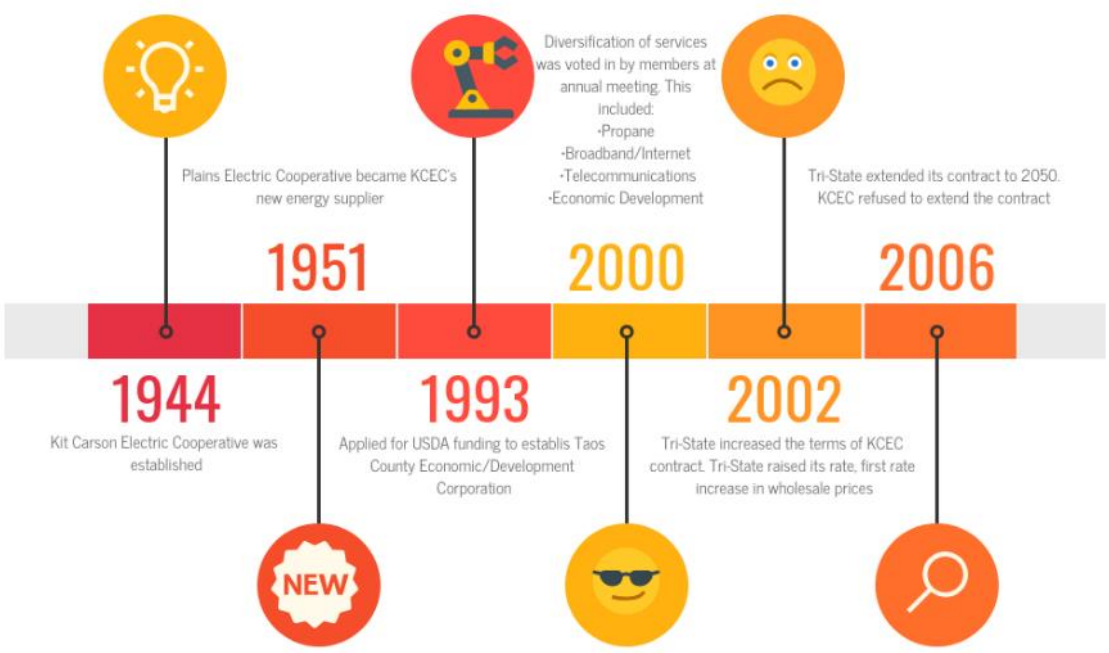
Kit Carson Electric Cooperative

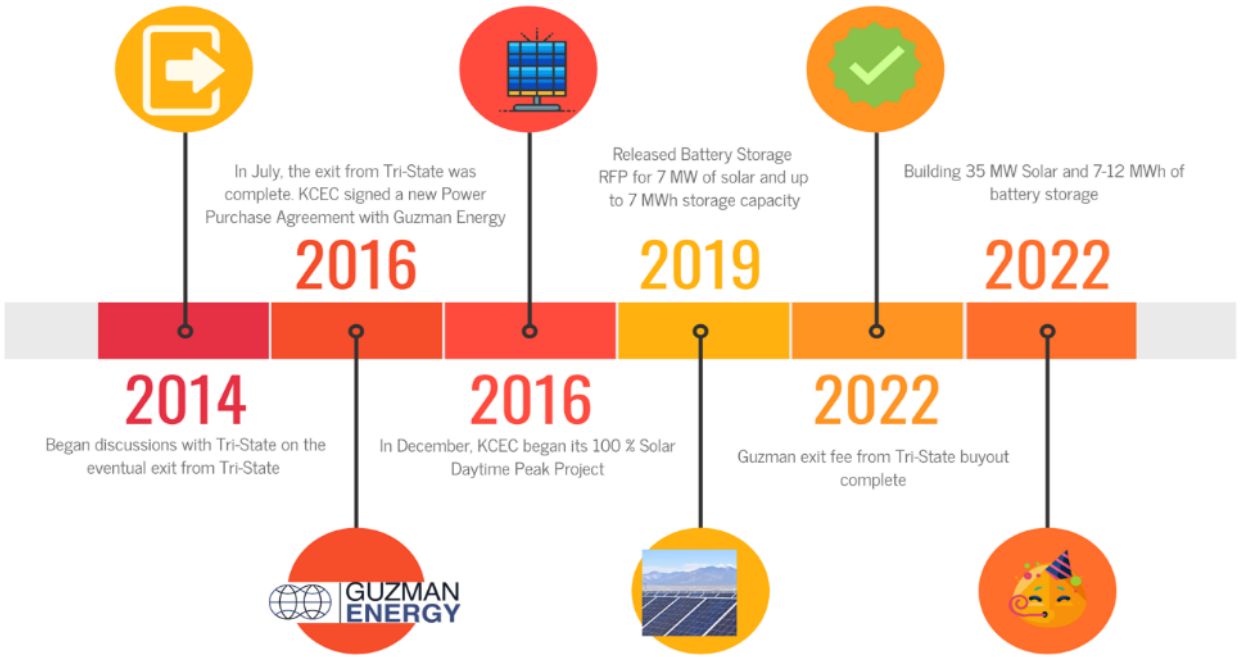
…and the Solar Energy Innovation Network

Luis A. Reyes, Jr.

CEO Kit Carson Electric Cooperative, Inc.

Kit Carson Electric Cooperative





29,000 electric meters	9,000 broadband connections	3,200 propane customers	29 communities	2,900 miles of electric and high-speed fiber optic lines	183 critical facilities	20,500 households	3,600 businesses

The Challenge Brought to the Solar Energy Innovation Network

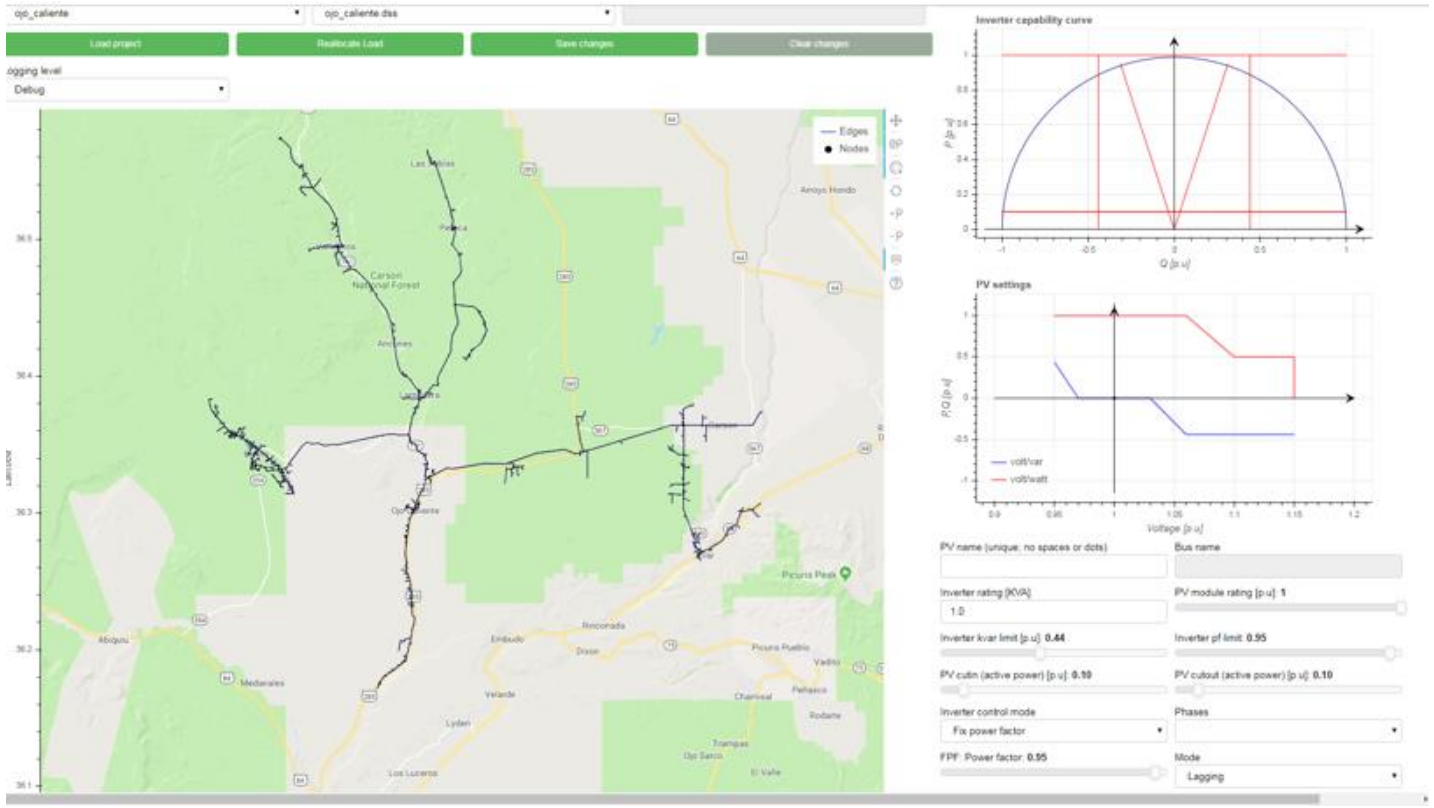
How to model DER integration into the grid?

- Integrating legacy infrastructure
- Front-of-the-meter utility scale solar installations
- Behind-the-meter rooftop solar installations
- Battery storage
- Electric vehicles

Thereby, determining cost-effective, strategic siting for proposed DER installations.

The $(DG)^2$ Tool

$(DG)^2$ Tool – Distributed Energy on Distribution Grids



A screenshot of the tool

The Tool

- $(DG)^2$ was developed by NREL
- Open-source tool with a licensing agreement
- The primary audience are the 900 U.S. cooperatives and municipal energy utilities
- It addresses core utility challenges:
  - Strategic siting – Renewable Energy Zones
  - Modeling the economic value DERs
  - Conducting a base-case analysis and a system impact study
  - Identifying lowest-cost grid infrastructure upgrades and/or cost-deferral opportunities
  - Answering technical questions:
    - What system weaknesses do we have?
    - Does it meet our engineering standards, create any backflow to transformers or transmission lines, create a voltage/disturbance issue, require upgraded equipment, etc.

Benefits of Participating in the Innovation Network

- Addressed the core utility challenges
  - Strategic siting is a new process
- Developed Renewable Energy Zones for strategic planning
  - Enabling land lease negotiations with substantive data
- High quality expertise of the NREL staff and its partners; e.g., RMI
- Encouraged KCEC's towards future planning
  - Improved KCEC's processes and systems
- Integrated Kit Carson's Partners
  - Guzman Energy
  - Others
- Established long term partnerships

Thank You!

Innovation Network – Round 2 Open Solicitation

SOLAR ENERGY INNOVATION NETWORK
U.S. DEPARTMENT OF ENERGY

ROUND 2 TOPICS

- **Solar in Rural Communities**
  - Proposals will support cooperative utilities, counties and other rural community stakeholders by analyzing and testing the potential for solar PV to improve energy affordability and resilience in rural contexts.
  - Topic includes solar in combination with other technologies, such as storage, and in microgrids.
- **Commercial-Scale Solar**
  - Proposals will address barriers and how to reduce the costs of solar energy for the commercial-scale solar market, which includes commercial buildings (e.g., offices, warehouses, hospitals, hotels, retail stores, schools, or higher-education facilities) and multifamily residential buildings.
  - Topics on rooftop PV and community solar are eligible.

APPLICATION DEADLINE

- Stage 1 Proposals (Concept Papers) due no later than 4:00pm MDT on September 4, 2019

Learn more at www.nrel.gov/solar/solar-energy-innovation-network-round-2.html

QUESTIONS?

Please use the Q&A feature to ask your questions.

Next Webinar

The next SETO Quarterly Webinar will be in October 2019. Sign up for our newsletter at energy.gov/solar-newsletter to be the first to know!