

Distributed Generation Campaign Study Tour from 5-9 November 2018

I. Accelerating the Adoption of Distributed Generation (DG) in Strategic Regions Campaign

This campaign aims to assist developing nations to accelerate the deployment of clean distributed generation technologies based on sound economic and public policies, appropriate regulation, and advanced technical solutions.

Initial work for this campaign is in Latin America. Currently, electricity generation in Latin America heavily depends on large hydro resources, and the need exists for adding other resources and distributed generation to revitalize the electricity market and provide flexible resources. To focus the development of this campaign, Brazil, Chile, Mexico, OLADE, and other partners have assessed knowledge gaps and defined specific questions:

- What is the current status of DG in Latin America?
- What are the main barriers for DG deployment?
- What are the specific opportunities and motivators for implementing DG in Latin America?

II. Study Tour Overview

A Study Tour for Latin American partners was recently held to provide an interactive, in-depth introduction to best practices and key issues in planning and deploying distributed generation (DG). The Study Tour aimed to provide participants exposure to diverse viewpoints on how to deploy DG, through presentations and discussions with regulatory, policy, and technical experts in the United States. The Study Tour was supported by CIFF, USAID Columbia, GIZ, and DEA. The following topic areas were addressed:

- DER Interconnection Processes and Tariffs
- Advanced Utility Rate Structures
- Increasing DER Hosting Capacity
- Utility Grid Modernization Plans for Increased DG
- Pilot Project Initiatives with Customer Sited Resources

III. Study Tour Itinerary

A brief summary of the Study Tour is provided below. Please see the appendix to this document for the full agenda. 15 participants from government, regulatory, utility/grid operator organizations from the following countries attended: Argentina, Brazil, Chile, Colombia, Dominican Republic, Germany, Honduras, Mexico, Panama, Peru, and Uruguay.

Day 1: National Renewable Energy Laboratory in Golden, CO to meet with Colorado utility representatives, NREL's technical researchers, Colorado state government, and non-governmental organizations. The following issues were presented:

- Utilities' Experience with DG Deployment – Discussion with Colorado utilities
- High Penetration Distributed Energy Resources Deployment in the United States – Presentation by NREL Researchers
- Regulatory Frameworks for DG – Roundtable Discussion with NGOs, Colorado Public Utilities Commission, and Colorado State Energy Office
- Networking event to meet Solar Energy Innovation Network teams – stakeholders from the U.S. paired into teams to implement pilot projects to demonstrate new ways for solar energy to improve the affordability, reliability, and resiliency of the nation's grid.

Day 2: Colorado Battery Pilot Demonstration and Arizona State University

- Tour of Xcel/Panasonic Battery Pilot Demonstration
- Overview of Regulatory and Technical Deployment of Solar PV – Arizona State University policy and technical experts

Day 3: Arizona Utilities

- Arizona Utilities' Experience with Solar DG PV and Customer Sited Resources – Arizona utility representatives
- Tour of APS Utility Distribution Control Center – Discussion on planning and operation of their distribution grid for high deployments of DG
- Arizona Corporation Commission – Arizona Regulatory Body

Day 4: California Public Utilities Commission and Utilities

- Regulatory Issues Related to Distributed Generation – California Public Utilities Commission
- City of San Francisco
- Pacific Gas and Electric Utility

Day 5: California Independent System Operator, Sacramento Municipal Utility District, and California Energy Commission

- Overview of California's Wholesale Market, Operation, DEF, Integration and Planning – California Independent System Operator
- Distributed Energy Strategy, Grid Planning, and Rates – Sacramento Municipal Utility District
- DG/Building Codes, Renewables, and Electric Vehicles – California Energy Commission

IV. Next Steps

The Distributed Generation campaign continues with developing webinars and publishing reports in advance of the 10th Clean Energy Ministerial (CEM 10) in Vancouver in May 2019. In addition, the campaign will be exploring the possibility of replicating the DG Campaign and Study Tour in other regions.



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DG Study Tour Participants



DG Study Tour Participants in California



DG Study Tour Participants in Colorado



Touring Solar Charging Lot on DG Study Tour

Appendix

Distributed Generation Study Tour – Background

The Ministerial de Energias Limpas (CEM, Clean Energy Ministerial) is a global forum of 25 of the world's energy leaders plus the European Union that occurs on an annual basis. It is focused on promoting policies to advance clean energy technology, share lessons learned and accelerate the transition towards a global economy with clean energy. The 21st Century Power Partnership (21CPP) is a CEM initiative with a focus on the proactive planning of the energy transition based on clean energy and targeting electrical systems. During the CEM 9 meeting in Copenhagen a proposal was made by Mexico to organize, in partnership with the 21CPP, a new Campaign called “Accelerating the Adoption of Distributed Generation in Strategic Regions”.

Among the activities supported by the “Accelerating the Adoption of Distributed Generation in Strategic Regions” campaign, such as webinars and reports, there is the realization of a “Distributed Generation (DG) Study Tour” to Colorado, California and Arizona in the United States, to showcase successful applications of policy, regulation, business models, and technical analysis, and explore state of the art research for advancing DG deployment. Experts from utility companies, regulatory and research organizations from the US will be invited to share their experience and expertise in the following topic areas:

- DER Interconnection Processes and Tariffs
- Advanced Utility Rate Structures
- Utility Business Models
- Increasing DER Hosting Capacity
- Utility Grid Modernization Plans for Increased DG
- Pilot Project Initiatives with Customer-Sited Resources

On August 2018, the Latin American Energy Organization (OLADE, in Spanish) in coordination with Mexico’s Secretary of Energy (SENER) and the National Renewable Energy Laboratory (NREL) carried out a survey within the Latin American region, in order to understand the main necessities of each country regarding distributed generation deployment. The primary roles of the participants includes: energy officers, policy makers, technical advisors, utility representatives, regulators, DG integrators, research and others. The main areas of interest identified by the survey participants are listed below:

- *DG Drivers*
 1. Cost-effective DG
 2. DG Capacity Targets
 3. Electrification of rural areas
- *DG Barriers*
 1. Access to finance (local or other)
 2. Utility Concerns (technical, DG compensation)
 3. Local rules and permitting
- *Useful Support for DG Objectives*
 1. Legislative DG policy-making support (targets, incentives)
 2. Utility rate design for DG
 3. Utility assistance with planning for DG deployment
 4. Technical integration of DG into the grid

Schedule:**November 4th, 2018 – Flight from Delegate Country to Denver, Colorado.**

Flights	Arranged individually by each participant Origin: [Delegate Country] Destination: Denver International Airport
Hotel Options: Nights of 11/4 and 11/5	<ul style="list-style-type: none"> Denver Marriot West (Recommended, walking distance to NREL) http://www.marriott.com/hotels/travel/denwe-denver-marriott-west/ 1717 Denver West Marriott Blvd, Golden, CO 80401
Transport from Airport	<ul style="list-style-type: none"> Rental cars are available, please carpool if possible. RTD Light-Rail: Buy a \$9 airport ticket, then take the RTD Lightrail A line from the Denver Airport Station to Union Station. Then transfer to the W line and take it to the Jeffco Government Center Station (terminus). <u>A short Uber/Taxi ride will still be required at this point to get to the hotel.</u> Ride-Sharing Services (Uber/Lyft) and taxis are available at DIA.

November 5th, 2018 – NREL, Golden, CO

7:45 am – 8:00 am	Arrive at NREL East Gate (15013 Denver W Pkwy, Golden, CO 80401) <ul style="list-style-type: none"> Bring your valid passport and visa <p>Upon arrival to the NREL east gate, you will be in the left lane. At the entrance gate the security guard will check that you are on the visitor notification list and will check your identification. You will then be directed to visitor parking and will enter the Research Support Facility (RSF) where the receptionist will check your identification and provide you with a visitor badge. U.S. citizens are required to provide a valid government issued photo identification upon their arrival. Foreign national visitors are required to provide a passport and visa (if required) upon their arrival.</p>
8:15 am – 8:30 am	Welcome to NREL, Juan Torres Associate Laboratory Director, Energy Systems Integration (NREL)
8:30 am – 10 am	DG Study Tour – Campaign Introduction A general overview of the campaign will be provided by SENER and NREL, and each country will briefly introduce the initiatives and goals for DG deployment in their country, and what they most want to learn during the study tour. <ul style="list-style-type: none"> Riccardo Bracho - NREL Efraín Villanueva - SENER Philipp Hauser - Agora

10 am – 12 pm	<p>NREL Overview of DG Deployment in the US NREL will present past and current collaborations in high penetration of DER and DER deployment in the US, such as:</p> <ul style="list-style-type: none"> • DG Policy (Alexandra Aznar, NREL) • DOE Solar Energy Innovation Network (Sara Farrar, NREL) • IEEE 1547 DER Interconnection Standards (Dave Narang, NREL) • High-penetration of PV and storage deployments in the US including the following examples: Hawaiian Electric Company, Sacramento Municipal Utility Project, Xcel/Panasonic, Salt River Project, etc. (Adarsh Nagarajan and Julieta Giraldez, NREL) • ADMS/DERMS Platforms and DER Controls (Annabelle Pratt, NREL)
12 pm – 1 pm	Lunch
1 pm – 3 pm	<p>Roundtable Discussion - Utilities' Experience with DG Deployment Moderator: Michael Coddington, Principal Electrical Engineer, NREL</p> <ul style="list-style-type: none"> • <i>Richard Martinez</i>, COO and Lead Engineer, Kit-Carson • <i>Chris Bilby</i>, Engineering Lead for Integration of Distributed Energy Resources and Emerging Technologies, Holy Cross Energy
3 pm – 5 pm	<p>Roundtable Discussion - Regulatory Frameworks for DG Moderator: Matt Futch, Global Strategy and Business Development Director, NREL</p> <ul style="list-style-type: none"> • <i>Mark Dyson</i>, Principal, Rocky Mountain Institute • <i>Keith Hay</i>, Advisor, Colorado Public Utility Commission • <i>Chris Hansen</i>, Colorado State Representative, Colorado House of Representatives

November 6th, 2018

<p>8 am – 9:30 am Address: 6144 Panasonic Way, Denver, CO 80249</p>	<p>Tour of Xcel/Panasonic Battery Pilot Demonstration</p> <p>Xcel Energy, Panasonic and Denver International Airport (DEN) are partnering on a battery demonstration project. The pilot project examines how a battery storage system helps:</p> <ul style="list-style-type: none"> • Facilitate the integration of renewable energy • Enhance reliability on the distribution system • Assist in providing voltage management and peak reduction • Provide power to Panasonic as a microgrid
<p>10 am – 3 pm</p>	<p>Flight from Denver International Airport to Phoenix Sky Harbor Airport, AZ</p> <p><u>3 recommended flight options are listed below:</u> American Flight 482: 12:04-2pm United Flight 739: 11:53 – 1:47pm Southwest Flight 892: 11:20-1:15pm</p>
<p>3 pm -5:30 pm Address: Wrigley Hall, 800 Cady Mall, Tempe, AZ 85281</p>	<p>Arizona State University – Overview of Regulatory and Technical Deployment of Solar PV</p> <ul style="list-style-type: none"> • <i>Kris Mayes</i>, Professor of Practice, Utility Law and Policy, Director, Utility of the Future Center and Co-Director, Energy Policy Innovation Council, ASU • <i>Nathan Johnson</i>, Senior Sustainability Scientist, Julie Ann Wrigley Global Institute of Sustainability and Assistant Professor, and the Polytechnic School, Ira A. Fulton Schools of Engineering, ASU • <i>Commissioner Andy Tobin</i>, Arizona Corporation Commission • <i>Daniel P. Schwiebert</i>, Deputy Policy Advisor to Commissioner Andy Tobin, Arizona Corporation Commission <p>ASU will present and discuss on Arizona’s energy goals and clean energy technologies studies. AZ Commissioner and his staff will present on the Arizona’s Energy Modernization Plan to accomplish cleaner energy resources and lower prices for consumers, including topics like energy storage, electric vehicles, energy planning and DERS.</p>
<p>Lodging Night of 11/6</p>	<p>Springhill Suites 802 E Van Buren St, Phoenix, AZ 85006</p> <p>Holiday Inn Express 620 N 6th St, Phoenix, AZ 85004</p> <p>Hyatt Regency Phoenix 122 North 2nd Street, Phoenix, AZ 85004</p>

November 7th, 2018

8:30 am – 11:30 am	Arizona Utilities' Experience with Solar DG PV and Customer Sited Resources (The Arizona Center, 400 N. 5 th St., Phoenix, AZ 85004) <ul style="list-style-type: none">• <i>Ben York</i>, Senior Project Engineer, Electric Power Research Institute• <i>Juan Cardona</i>, Senior Plannig Engineer, Salt River Project• <i>Daniel Haughton</i>, Manager of Distributed Energy Resource Integration Engineering, Arizona Public Service• <i>Ted Burhans</i>, Director of Emerging Technology and Innovations, Tucson Electric Power/UniSource Electric
11:30 am – 12:30 pm	Lunch at APS
1 pm – 3 pm	Tour of APS Distribution Control Center The Campaign will visit APS's distribution control center, from which SRP performs the planning and operation of their distribution system with high deployments of DG
5 pm – 7 pm	Flight to San Francisco Airport (SFO), CA United Flight 2352: 6:17 – 7:22pm
Lodging Night of 11/7	Holiday Inn San Francisco Golden Gateway 1500 Van Ness Ave, San Francisco, CA 94109 Holiday Inn San Francisco Civic Center 50 8th St, San Francisco, CA 94103 Argonaut Hotel 495 Jefferson Street, San Francisco, CA 94109

November 8th, 2018

<p>9:30 am – 11:30 am Address: 505 Van Ness Avenue, San Francisco, CA 94102</p>	<p>California Public Utilities Commission – Regulatory Issues related to Distributed Generation</p> <ul style="list-style-type: none"> • Rate Design • Grid Planning and Reliability, Including Smart Grid • Distributed Energy Resources and Action Plan • Smart Infrastructure – Including EV Infrastructure <p>Contact: Rajan Mutialu (510) 684-7905 *No electronics, No need for I.D., preferred drop off on McAllister Arrive by 9:15 am for check-in</p>
<p>12:00 pm – 1:00 pm</p>	<p>Lunch – On route to following meeting</p>
<p>1:30 pm – 3:00 pm Address: 77 Beale Street, San Francisco, 94111</p>	<p>Pacific Gas & Electric Headquarters Office San Francisco</p> <ul style="list-style-type: none"> • Grid and Integration Team to discuss DG <p>PG&E contacts for the day:</p> <ul style="list-style-type: none"> • Fedor Petrenko (Product Manager, Expert) <ul style="list-style-type: none"> ◦ Fedor.Petrenko@pge.com ; 415-215-6016 (mobile) • Mini Damodaran (Grid Innovation Engineer, Senior) <ul style="list-style-type: none"> ◦ Mini.Damodaran@pge.com ; 415-973-2462 (office) & 415-940-0417 (mobile) <p>Arrive by 1 :15 pm for check-in</p>
<p>7:00 pm – 9:00 pm</p>	<p>Head to Folsom</p>
<p>6:00 pm – 7:30 pm Night of 11/8 and 11/9</p>	<p>Dinner in Folsom Stay the Night in Folsom</p> <p>Hilton Garden Inn 221 Iron Point Rd, Folsom, CA 95630</p> <ul style="list-style-type: none"> • Larkspur Landing 121 Iron Point Rd, Folsom, CA 95630

November 9th, 2018

<p>9:00 am – 11:30 am 250 Outcropping Way Folsom, CA 95630</p>	<p>California Independent System Operator</p> <ul style="list-style-type: none"> • Tour of CAISO Control Room • Overview of California’s Wholesale Market, Operation, DEF, Integration, and Planning <p>Contact: Jordan Kingsbury (916) 608-1068 Arrive by 8:30 am to allow for check-in</p>
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12:00 am – 1:00 pm	Boxed Lunches at SMUD - Confirmed Lunch at 12:15
1:30 pm – 3:00 pm Address: 6301 S St, Sacramento, CA 95817	Sacramento Municipal Utility District <ul style="list-style-type: none"> • Distributed Energy Strategy • Grid Planning • Rates Lunch and Meeting in the Rubicon Room – First Floor on the right. Anita will meet us in the lobby Contact: Anita Clay (916) 732-6144
3:30 pm – 5:00 pm Address: 1516 9th St, Sacramento, CA 95814	California Energy Commission <ul style="list-style-type: none"> • DG/Building Codes • Renewables • Electric Vehicles Try to arrive by 3:20 pm if possible 7:30 pm

November 10th, 2018 – Flight from Sacramento, CA to Delegate Country.