

Energy Regions

in Transition

Europe-
California
Tour 2015





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About this Report

The report was published by the Renewables 100 Policy Institute, a 501(c)3 non profit organization. Our mission is to study and accelerate the global transition to 100% renewable energy.

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I. EXECUTIVE SUMMARY

Introduction

In October 2015, a Delegation of European grid operators, energy policy leaders, regulators and non-profit clean energy advocates visited California to learn about how the state is handling its transition to 50+% renewable electricity and to exchange experiences from both sides of the Atlantic in decarbonizing the power grid.¹

The Renewables 100 Policy Institute and Renewables Grid Initiative (RGI) organized the Tour with the aim of facilitating collaboration between frontrunner regions in the energy transition and sharing best practices on improving grid reliability, increasing economic benefits, limiting environmental impacts, and strengthening public acceptance.

Included among the topics of focus were:

- Evolving models for grid operation based on expanding regional cooperation
- Technical and market design best practices to integrate renewables and other disruptive technology market entrants
- Emerging new business models in the electricity sector and requirements for greater vertical and horizontal integration
- New cross-sectorial relationships in the energy system (e.g. between energy, transportation, water, building environment, etc.)
- Implementing related regulatory frameworks

For video highlights and interviews from the Tour, please click [here](#).

¹ By “decarbonizing the power grid,” this report means transitioning the electricity grid supply to renewable sources that do not add carbon dioxide or other greenhouse gases to the atmosphere.

Key Takeaways

During the intense four days of discussion, which included both formal meetings and informal dialogue, three dominant themes recurred among the grid operators present:

- **Larger electricity markets** result in lower costs and are better able to accommodate more renewables.
- **Balancing Area consolidation** improves reliability and increases efficiencies, thereby reducing costs.
- **More transmission is essential**, in order to share resources and support larger markets.

The following is the broader list of key takeaways from the delegation discussions that are recommended to inform future planning:

1. **California and European countries are facing many common challenges in their efforts to decarbonize the grids and share growing and widespread optimism about identifying and implementing solutions.**
2. **Expanding a regional approach to grid operation is strongly needed to successfully decarbonize the transmission grid.**



3. Upgrades must be made to grid infrastructure to ensure maximum efficiency.
4. Deeper inter-regional and international collaboration is needed on specific best practices for technically integrating renewable energy sources and complementary new market players onto the grid.
5. Further collaboration is also needed to identify, track, and strengthen business models of the future, which will require greater horizontally and vertically integrated planning.
6. Regulators and policymakers around the world must strengthen their capacity to respond to rapidly developing clean electricity technologies and consumer demand.
7. The energy transition specifically requires two sets of policy and regulatory mechanisms: one to transform the energy system, and the other to ensure efficient and reliable running of the energy system.
8. Stakeholders must be engaged in transparent transmission grid planning from the start.
9. The energy transition is cross-sectorial, and further collaboration and exchange among frontrunners is needed to better understand, navigate, and indeed create this new energy playbook.
10. The international multi-stakeholder dialogue on the Tour needs to be institutionalized into a long-term, regular exchange.



Tour Overview: Snapshot of Main Events

The four-day packed agenda included a wide range of meetings with a broad group of stakeholders in the California energy field, including industry and technology leaders, academics and researchers, regulators, economists, non-profits, and transmission grid operators. The following is a brief overview of the tour's major events. A detailed description is offered later in the report. (See Attachment D for the Tour Master Schedule.)

Tesla Manufacturing Facility Tour



Being led on a tram through the factory where some of the world's most innovative and luxurious automobiles are made was like starting the meal with dessert. The Delegates had the chance to sit in sleek sedans and watch giant robots assemble the Model S and the Model X, while also witnessing up close the interface of information and energy technology, innovation in the electric transportation sector, developments in battery storage, and the inner operations of a young company that has been trailblazing its way to a prominent place in transitioning to a decarbonized energy system. There were also several concrete examples onsite of California-European collaboration in action.

Silicon Valley Luncheon Forum



The Delegation joined representatives from pioneering Silicon Valley companies, including Google, Sunpower, and linear generator innovator Etagen to gain their perspectives on the changes happening in the energy sector. Topics of discussion ranged from the diminishing role of conventional power sources in integrating renewable generation into the electricity grids, IT leaders like Google's renewable energy efforts, and power storage to grid markets.

Stanford University Roundtable and Dinner



There was broad agreement that this unusual gathering of high level of experts in the energy field hosted by Stanford University was not only intellectually rewarding, but an example of the multi-stakeholder dialogue needed at this juncture in the transformation of energy systems around the world. As one Delegate shared, decarbonizing the grid is akin to "changing the tire while the car is running," and we will meet the challenge more successfully by collaborating and sharing points of view among various sectors than by remaining in separate silos.

California Public Utilities Commission Roundtable



This meeting, chaired by Renewables 100 Policy Institute in collaboration with Commissioner Michel Florio and additionally attended by California Energy Commissioner David Hochschild and senior CPUC and CAISO staff, allowed the Delegates to dive more deeply into the nuts and bolts of regulatory policy, to consider how these policies can create solutions or stumbling blocks, and to exchange different perspectives, approaches, and lessons learned for their various regions.

Bloomberg New Energy Finance (BNEF) Roundtable



BNEF hosted a roundtable discussion at their San Francisco headquarters, where the Delegates had the opportunity to hear BNEF Founder and Advisory Board Chair Michael Liebreich's perspective on the global energy transition's economics, as well as to question, debate, and inform these views. It served in part as a preparation and preview to Liebreich's Keynote later that week at the CAISO Symposium on similar themes and to the International Panel that he moderated at the Symposium on which several Delegates were panelists.

CAISO Stakeholders Symposium



The international Delegation was warmly welcomed as the headlining addition to this cornerstone event of the tour. The October 2015 Stakeholders Symposium enjoyed the largest attendance in the event's history, with more than a thousand registered participants and another thousand attending via live stream from all over the world. More than 30,000 people followed the Keynotes and International Panels on social media. Delegates delivered both a Keynote on the first day and the panels on the second day, which gave the audience a unique chance to learn directly from a broad spectrum of European energy experts on how they are welcoming the new opportunities for technology and market innovation in the context of the energy transition in their various regions.

CAISO Headquarters Tour and Discussion



The tour wrapped up with a site visit to CAISO's headquarters, where the Delegation was privileged to see California's grid at work in the control room and to be able to ask questions directly of California's transmission grid operators, executives and IT experts. A roundtable discussion capped the full and informative week.

Background

The 2015 Energy Regions in Transition EU-California Tour followed up the 2014 California-Germany Learning and Collaboration Tour to Germany in March 2014, which the Renewables 100 Policy Institute organized to bring top level grid operators and regulators from California together with their German counterparts.²

The first of their kind discussions that took place on the Tour focused on creating opportunities for continued dialogue and a platform for an exchange of ideas, policy, technological breakthroughs and grid management mechanisms.

This successful trip was the next step in a series of high level Transatlantic meetings organized and facilitated by the Renewables 100 Policy Institute dating back to 2011 that have focused on identifying areas of mutual interest and opportunities for bilateral support between California and Europe on meaningful climate and clean energy goals.

One of the highlights of the 2014 tour was a dinner in Berlin hosted by Dutch TSO TenneT and organized by Renewables Grid Initiative (RGI), a European non-profit organization with a mission to facilitate 100% grid integration of renewable sources and with extensive experience bringing key players together in Europe. Out of this collaboration, the Renewables 100 Policy Institute and RGI agreed to work together on organizing the recent 2015 tour to California as a next step in building on this critical dialogue.



² See: <http://www.renewables100.org/en/programs/leadership-education/examples/germany-california-learning-and-collaboration-tour-2014/>