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Italy Fact Finding Mission

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## Italy Fact Finding Mission

Assessing the Impact of Bold Policy Measures on the  
Development of a Sustainable Solar Market

*May 7 - 14, 2011*

July 2011

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**SEPA****EPRI****ELECTRIC POWER  
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## Acknowledgements

SEPA would like to extend special thanks to lead contributor Sun Edison for its support of the Italy Fact Finding Mission. In addition, SEPA is grateful for the important contributions extended by SunPower, the U.S. Consulate, Assolombarda, the U.S. Department of State (Vatican), the Italian Trade Commission, GSE, E.ON Climate & Renewables, ENEL and the many other individuals and organizations cited in this report that contributed to the success of the mission.

SEPA also thanks the Fact Finding Mission participants for their support, and in particular Alvin Razon of the U.S. Department of Energy (DOE) and Ed Regan of Gainesville Regional Utilities (GRU), and Tom Key of the Electric Power Research Institute (EPRI) for their editorial contributions.

## Feedback

The Solar Electric Power Association would appreciate feedback on this and past reports, as well as new areas of research we should consider in the future. Please take a moment to provide comments and suggestions through an online survey:

<http://tinyurl.com/SepaReportFeedback>

## About the Author

This report is part of an occasional series of SEPA-EPRI collaborative studies on solar market and technical trends.

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## Cover Photo

70 MW<sub>DC</sub> SunEdison PV facility in Rovigo, Italy;  
Courtesy: Bianca Barth.

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# Executive Summary

The U.S.-based Solar Electric Power Association (SEPA) annually leads a group of utility leaders on a fact finding mission (FFM) outside of the U.S. to learn how solar markets are developing in different parts of the world.

In May 2011, SEPA traveled to Italy to study the country's successes, current challenges, and future approaches surrounding the development and grid integration of distributed solar photovoltaic (PV) resources. The 4<sup>th</sup> annual fact finding mission<sup>1</sup> was attended by 20 executives and managers from a mix of U.S. utilities, including supporting experts from government agencies and research organizations. The week-long SEPA event, held May 7-14, unearthed many of the key issues that are aiding and, in some ways, hindering the further commercialization and adoption of solar PV technologies throughout Italy—including solar policymaking, technology and grid integration research efforts, as well as electricity landscape structures.

After a recent surge in growth, Italy now represents the second-largest global solar market behind only Germany. Despite stagnant economic growth over the last decade<sup>2</sup>, the country's cumulative PV installations have grown exponentially, thanks primarily to attractive tariffs and government support. Four iterations of the country's solar policy, known as the Conto Energia, and embedded feed-in tariff (FIT) rates have stimulated the installation of upwards of 8 GW<sub>DC</sub><sup>3</sup> of new capacity since 2007, with almost all of that growth occurring over the last two years.

In 2009 and 2010, Italy installed roughly 720 MW and 5,000 – 6,000 MW<sup>4</sup>, respectively—compared with ~450 MW and 900 MW in the U.S.—as solar industry participants flocked to exploit Italy's healthy FIT payments and, in turn, pick up the market slack created by reduced FITs in Germany and Spain.<sup>5</sup> However, the resulting overheated market and associated interconnection and grid planning headaches have led to a recent restructuring and reduction of FIT rates in the 4<sup>th</sup> Conto Energia, announced this May. The latest changes to the country's solar policy cap annual FIT expenditures, reduce the size and location of installations (moving the country away from large 'greenfields' projects), but still set ambitious goals for future solar capacity additions. With these changes, it is an open question as to whether Italy can sustain market momentum. At the same time, the dramatic growth to date has raised significant grid integration and management issues that must be addressed.

During the FFM, group participants met with a number of government, business, utility and solar industry organizations. These included utility executives from Italy's primary energy provider, [ENEL](#); officials from [GSE](#) and [TERNA](#)—responsible for regulating the country's electricity market and administering its transmission and distribution system, respectively; members of various Italian solar associations and industry groups; turnkey solar developers; research analysts; and university academics. In addition, the group participated in several field trips, including:

- A technical tour of [SunEdison's](#) 70 MW<sub>DC</sub> Rovigo Photovoltaic Power Plant located in northeast Italy, the largest PV plant to date in the EU (with a single point of interconnection);
- A visit to a 221 kW building integrated PV (BIPV) system, composed of 2,400 custom manufactured crystalline PV panels, sited atop the 5,000 m<sup>2</sup> roof of the San Paolo VI Auditorium building (where Catholic popes hold general audiences during poor weather) in the Vatican City; and

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<sup>1</sup> SEPA's first international FFM was organized in Germany in 2008, with successive missions run in Spain and Japan in 2009 and 2010, respectively.

<sup>2</sup> Despite a sluggish GDP of 1.2%, Italy's economy is the 8th largest in the world.

<sup>3</sup> All system or market capacity references (GW, MW, kW, etc) are in DC nameplate capacity rating.

<sup>4</sup> Estimates of Italy's actual 2010 new capacity installations vary widely; an official tally is expected once new PV connected to the grid as of end-May 2011—the deadline to qualify for 2010 FIT incentives—is calculated.

<sup>5</sup> Changes to Italy's permitting laws, instituted to combat bureaucratic red tape, also helped fuel PV deployments. For a time, Italy did not require inspection for installations up to 1 MW.

- A site tour of [SunPower's](#) 84 MW<sub>DC</sub> Montalto Di Castro PV Park located in the Lazio region ~100 km north of Rome.

### Key Takeaways from the Mission

At its core, SEPA's FFM offered insight into the policy, economic and technology approaches that Italy is undertaking to drive greater solar adoption, support solar industry maturation, and develop high penetration solar grid management techniques. The tour of Italy offered the U.S. delegation a "living laboratory" to compare and contrast with the solar development in the U.S., and provided useful perspectives as U.S. utilities tackle solar market, RD&D, and integration challenges.

*Solar remains a policy-driven market.* Public policy incentive mechanisms and targets are the main factors driving Italy's solar market. The country's high feed-in tariff and the 2020 EU renewables mandate<sup>6</sup> are the stick and carrot that have created Italy's hot PV market. The issuance of the new Conto Energia with its tighter controls on both public financial expenditure and on the size and location of solar development is evidence that the excessively aggressive approach was unsustainable.

*The policy and energy context for renewable energy development in Italy is demonstrably different from the U.S.* In the European Union, there is political and public consensus on curbing climate change through changes in energy use. In addition, Italy has scarce domestic coal and natural gas resources, and electricity rates are high. Moreover, the country's electricity mix has a relatively small portion of coal-fired generation, and relatively large portions of hydropower and imported gas-fired generation (which are more suitable for supporting variable renewable resources).

*The feed-in tariff is a blessing and a curse.* Though Italy's FIT resulted in a surge of new capacity additions, its generosity created an overheated market and, to a certain extent, waste. The solar gold rush that occurred between 2007 and 2010 attracted incompetent installation and alleged fraud, pointing to the need for better price setting, volume control and compliance. Continued experimentation will be required to properly align the extent and differentiation of FIT incentives with falling technology costs (i.e. set the right rate of incentive degeneration). For example, Germany's FIT is half of Italy's (though Germany also has many fewer non-economic barriers). Italy's FIT remains a work in progress.

*There is an apparent current lack of grid integrated planning within Italy.* Overarching strategies for managing Italy's sudden influx of variable grid resources remain under development, creating some confusion and inefficiency surrounding coordinated generation, T&D, grid integration, and smart grid initiatives. The country's National Energy Plan, scheduled to be released by end-2011, is a step toward engaging in a holistic planning process.

*The Smart Grid is perceived as a PV grid integration and management savior.* In an effort to shift consumer demand and instill conservation, Italy has deployed over 30 million two-way smart meters that allow for two-tier, time-of-use pricing. This initiative is part of the country's broader smart grid development strategy which also includes public-private research of smart inverters and other equipment capabilities to enable grid automation and advanced voltage regulation, among other functions. Yet there is an apparent mismatch between the commercial readiness of various elements of the smart grid and near-term expectations for its key role in remotely managing PV integration issues. For one, a standard communications interface must first be developed before these smart devices can fulfill their envisioned potential.

*Streamlining the PV permitting, authorization, and grid interconnection administrative processes is a work in progress.* Italy's permitting and interconnection processes have been difficult to navigate and time consuming. The country's "unique authorization" process for presenting projects (e.g., environmental studies, etc.) to regional governments for their approval takes an average of two years to

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<sup>6</sup> In 2007, European leaders signed up to a binding EU-wide target to source 20% of their energy needs from renewables, including biomass, hydro, wind and solar power, by 2020.

complete. Meanwhile, permitting can, in some cases, require 20 to 60 permits from multiple federal and regional agencies (e.g., utility, archeological, environment, military, etc.). Compounding matters are speculative filings and misleading applications for the grid interconnection of new PV projects (oftentimes the result of under education and lack of direction). For example, ENEL has received about 55,000 grid interconnection requests, equivalent to 24 GW, many of which it expects have been filled out incompletely rendering them invalid. The utility hopes that a website created to certify applications along with a higher application fee will help it more efficiently manage the process.

*Intermittency issues are on the horizon, so now what?* To date, intermittency has not been a problem, but TERNA and Italy's local distribution companies recognize that continued rapid market expansion of renewables will likely compromise future grid reliability at some point. Still, Italy's electricity industry has not yet chosen a clear mitigation strategy. High level approaches include T&D system build-out to increase grid capacity, greater usage of existing natural gas and hydro assets for grid support and back-up, smart grid investment, and battery storage deployment (post-2012). The 4<sup>th</sup> Conto Energia also incentivizes PV development on industrial sites that are capable of consuming most of a system's generation should grid fluctuations occur.

*PV plant O&M is becoming an increasingly important issue.* Greater premium is being placed on monitoring and O&M services, especially for larger plants (10 MW+) for which changes in performance can have larger financial implications. Some of the larger plant operators, such as SunEdison, are deploying proprietary remote string-level monitoring to measure ~70 variables for each 5 kW array section of larger plants. More generally, other players, such as E.ON Climate & Renewables (EC&R) are interested in performing greater project management and O&M to further develop their solar businesses and cut the margins of EPC contractors.

*What seems daunting to U.S. utilities appears to strike Italian utilities as doable.* Despite the very real challenges posed by the market management and grid integration of solar capacity expansion, U.S. utility mission participants were struck by the lack of alarm or doubt expressed by Italian counterparts during talks and side conversations. The prevailing attitude: "Yes, we face challenges, but we can meet them; we'll adapt to these changes."

This report provides a detailed summary of the 2011 Solar Fact Finding Mission to Italy. It presents background and insight into country-specific electricity and solar market, policy, and R&D approaches; and delineates tour activities and highlights. In addition, an appendix contains a list of presentations and materials that are accessible to SEPA and EPRI members via download (see access instructions provided in Appendix C).

# SEPA Research Report Summaries

## **Utility Solar Business Models Phase II: Developing Value in Solar Markets (2010)**

Utilities, regulators, and solar companies have been thinking creatively about new Utility Solar Business Models (USBM) that better align utility interests with policies favoring solar development. USBMs are distinct in that they offer present or future value to utilities, as well as to utility customers and society, to support utility actions that advance larger renewables and carbon reduction goals. To help in the development of USBM strategies, SEPA has also developed a decision mapping tool that can be used as a complement to this report, or as a stand-alone thought exercise. The accompanying report and decision mapping tool represents the second phase of this project.

## **National Solar Jobs Census 2010 (2010)**

The National Solar Jobs Census 2010, conducted by The Solar Foundation and Green LMW with technical guidance from SEPA, SEIA, and Cornell University, quantifies the current employment and projected growth of the United States solar industry, including utility jobs within the solar industry, which may grow by more than 20 percent over the next 24 months.

## **EPRI/SEPA Utility Solar Business Model (USBM) Quarterly Bulletin (Q1 2011) (2011)**

This electronic bulletin is part of an ongoing collaborative research effort between SEPA and EPRI to document and examine the expanding range of utility solar business model activities in acquiring solar energy and owning PV assets. The inaugural bulletin includes an article on Emerging Utility Solar Business Models: Providing Utility Experience and Value, and two USBM Case Studies: SMUD SolarShares Program and Arizona Public Service Community Power Project. In addition, it announces the new EPRI SEPA USBM Database.

## **Centralized Solar Projects Quarterly Bulletin (Q1 2011) (2011)**

SEPA's members-only quarterly solar bulletin will provide a summary and commentary on the large-scale PV and CSP project activity in the United States. The Q1 2011 solar bulletin covers 44 projects in various stages of development, from announcements to completions, as well as any cancelations, that have occurred in the first quarter. Also included, the bulletin's featured issue covers project viability.

## **Hybrid Utility Solar Business Models Technical Brief (2011)**

U.S. electric utilities are developing solar projects that employ a variety of utility solar business models (USBMs), including utility ownership, customer programs, financing, or energy purchases. These developments have been well documented in SEPA's prior 2008 and 2010 USBM reports. However, utilities are now combining these approaches in customized 'hybrid' USBMs that combine two or more of these business strategies that are tailored to their specific regulatory and operating environments in ways that increase utility, industry and social benefits. This Technical Brief explores these hybrid USBMs strategies and considers whether it signals an important trend toward greater utility engagement in the solar business.

## **2010 SEPA Utility Solar Rankings (2011)**

The fourth annual Utility Solar Rankings report ranks U.S. electric utilities based on the solar megawatts and watts-per-customer in their solar generation portfolios. The top ten rankings include national, regional by utility-type rankings. The report further examines key utility solar trends.