



Summary of the IEA-PVPS Task 14 Workshop

**High Penetration of PV Systems in Electricity Grids
Beijing, China
October 10, 2011**



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Task 14 Workshop “Projects and Experiences with high penetration PV in electricity grids”

Workshop Agenda

The workshop was organized in two sessions, with session 1 dedicated to Markets, industry and policies of PV in China and Europe and session 2 focusing on Technology of distributed generation and utility grids.

First Session: Markets, industry and policies of PV		
14:00	Welcome speech	Wang Sicheng
14:10	Status and Trends of PV Industry and Technology in China	Wang Yibo
14:25	Distribution PV and Incentives in China	Wang Sicheng
14:40	Activity, Issues and Plan for PV systems in China Guodian Corp.	Wang Yao
14:55	Task14: German Guidelines and Laws for PV Grid Integration	Thomas Stetz (IWES)
15:10	Discussion	
15:30	Coffee break	
Second Session: Technology of distributed generation and utility grids		
15:45	Status, Issues and Trends concerning High Penetration of PV Systems in Electricity Grids	Wang Weisheng
16:00	Grid-Friendly™ PV Station Integration and Coordinated Operation in Power System	Lu Zongxiang
16:15	Technology of High Penetration Distributed Generation and Smart Grid in China (CAS)	Qi Zhiping
16:30	The demonstration project Meta PV	Karel De Brabandere (3E)
16:45	Utility scale PV in USA	Ben Kroposki (NREL)
17:00	Discussion	
17:20	Summary speech	Roland Bruendlinger
18:00	Dinner (Zuai restaurant)	

Summary of the workshop

Following the previous workshops in Spain, the U.S.A. and Portugal, where representatives from the local electricity sector and IEA-PVPS Task 14 experts came together to discuss technological solutions, experiences and projects, a joint workshop was organized by the Institute of Electrical Engineering of the Chinese Academy of Sciences together with IEA-PVPS Task 14. The objective was to present the current state of and solutions for high penetration PV in electricity grids, focusing particularly on the recent developments in China.

In the first session, presentations by the Chinese Experts highlighted the remarkable development of PV in China. From 2008 to 2010, a 10 times increase of the market size to 500 MW annually in 2010 has been reported in the presentations by researchers from the National Development and Reform Commission and the Chinese Academy of Sciences. The recently published 5 years plan also outlines impressive figures for the coming years, with targets of 50 GW cumulative and 5 GW annually by



2020. Support schemes in China include concession bidding, a new feed-in tariff (FIT) of 1,15 yuan/kWh introduced in 2011 and rebates. Main applications for PV in China today include rural electrification, PV hybrid micro grids in the 10 MW range, large scale PV power plants in the 10 MW+ range as well as showcase BIPV projects such as the 3 MW installation at the new Shanghai central railway station. The main aim in the near future is to use the huge solar resources available in the country, where 2/3 of the area receives more than 2200 hours of sunshine per year. However, technical challenges related to transporting and dispatching the energy arise as the main location of the resources is in western China, far away from the electricity load centers. The presenters highlighted the need for a new electricity network 'backbone' in order to efficiently use the resources available.

Related to the overall power generation capacity of 900 GW available in China today, PV still plays a minor role from a country wide perspective. However, as highlighted by Prof. Wang Weisheng from the Chinese Electric Power Research Institute (CEPRI), in Qinghai province in central China 830 MW of PV are expected to be installed by the end of 2011, which equals about 10% of the total generation capacity in that region.

With regard to the integration of PV into the power system, experts from the Chinese Academy of Sciences, the Chinese Electric Power Research Institute and Tsinghua University highlighted the need for technology advancements. Today, there is still a discrepancy between the needs from the power system point of view and the actual capabilities of PV systems. In addition, the accurate forecast of PV generation will play an important role to efficiently dispatch the PV generation.

International representatives from IEA-PVPS Task 14 as well as Chinese Experts highlighted the key role of grid codes and interconnection standards. Following the presentation of the German example, where since 2011 new PV systems are required to contribute to frequency control and in the near future will also be linked to the dispatch centers in order to guarantee grid stability, the need for appropriate grid codes has been clearly identified as a fundamental requirement for the further deployment of PV at high penetration levels.

In order to show the opportunities associated with new strategies for PV system integration, demonstration projects play an important role. This was highlighted by the Task 14 experts from the U.S.A. and Belgium, who presented recent demonstration activities in these countries. These projects aim at overcoming barriers and limits as well as developing, testing and validating new features of PV installations in a real-world environment. The key objective is to show that it is feasible to run a power grid based on a high penetration of PV. Showcases today are the European MetaPV project as well as the numerous distribution and transmission integration projects underway in the U.S.A.

In summary, the workshop once more showed the importance and value of international collaboration and exchange of experiences in the field. In this context, IEA-PVPS Task 14 provides a solid platform for experts to discuss and share ideas and visions on an international level.