PROCEEDINGS

7th Solar Integration Workshop

International Workshop on Integration of Solar Power into Power Systems

24 - 25 October 2017 | Berlin, Germany
PROCEEDINGS
Edited by Uta Betancourt / Thomas Ackermann

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Welcome…

to the 7th International Workshop on Integration of Solar Power into Power Systems

It is a great pleasure for us to welcome you to the 7th International Workshop on Integration of Solar Power into Power Systems in Berlin, Germany. Looking back on the past years, I am happy to say: it has been a great experience!

We managed to establish the Solar Integration Workshop as one of the premier conferences in its field and to continuously improve the workshop experience for our participants. Let me seize this opportunity to announce that next year’s Solar Integration Workshop will take place at the location of our very first Wind Integration Workshop in 2000: Mark your calendars and save the date for the 8th Solar Integration Workshop in Stockholm, Sweden from 15 – 19 October 2018!

I would like to thank you all for making this workshop to what it has become over the years: a great communion of like-minded PV/CSP/storage system developers and project developers, power systems operators and other professionals. Exchanging knowledge and discussing experience in matters relating to the integration of solar energy into the power systems: that’s what we do at the workshop. I would also like to welcome all our new participants and tell you: you have come to the right place to immerse yourselves in the area of solar power integration. Brace yourselves for an exciting mix of both theoretical discussion and practical applications!

The share of solar power in power systems is increasing at a remarkable speed in many countries worldwide. This results in the increasing need to discuss the technical and economic issues of the integration of solar power into power systems. It took some years and lots of effort before the rising interest in the topic finally led to the realization of the first Solar Integration Workshop in Aarhus, Denmark five years ago.

While bringing people together has always been the workshop’s purpose, it is our guests’ participation, their papers and their presentations that fill the frame we set with life. Their enthusiasm combined with our determination brought the first workshop edition into being in 2011. With close to 100 submitted abstracts in 2011 the feedback was much better than we anticipated, which allowed us to compile a remarkable program. This year we have yet again received many outstanding abstracts that will provide stimulating presentations and thought-provoking impulses. We strive to reflect the shifting focuses in the area of solar integration and come up with new ideas to improve your workshop experience. This year we take the next step towards a comprehensive yet diverse RE conference experience and commemorate the first edition of the E-Mobility Power System Integration Symposium as we feel it necessary to discuss the impact of a larger share of EVs in transportation on the grid.

I am sure it is one of our shared goals to contribute with our work to assisting the goals outlined in the Paris Agreement. Yet, several studies show that with the current commitments, the probability of keeping the increase in global average temperature below 2 °C is only 5%. We need to do even more to increase that probability and to give our planet a fair chance!

One goal that many countries have committed to apart from integrating a larger share of renewable energies is to also decrease Greenhouse emissions in the transport sector substantially by increasing the share of electric mobility. Yet, E-Mobility can only be considered a sustainable climate protection measure if vehicles are charged with power from renewable energies. Otherwise, emissions are only shifted to the location of the generation plants. New questions and challenges arise regarding the grid integration of a larger share of fluctuating power supply from renewable energies. Energynautics reflects this correlation with its new Workshop Setup and offers three conferences in one week that go hand in hand. The newly established Berlin Workshop Week offers many combination opportunities for its participants to account for the inherent synergies of the conference topics.

The programs of the Wind and Solar Workshops for example are especially designed to include sessions that are suitable for both interest groups on the shared Wednesday, like the IEA session "Recommended Practices for Wind / PV Integration" (IEA Tasks 14 and 25) or the ENTSO-E session "System Challenges & Solutions to Move Towards 100% RES Penetration". Make sure to check out the conference programs for those presentations that are most interesting to you and your line of work.
We work hard at these Workshops, but it is very important to me personally to give our participants the time to mingle and network in a more casual setting as well. On Tuesday, the spotlight will be on our poster presenters. Researchers and practitioners present their projects in poster sessions during the Workshop and at the especially dedicated Poster Reception on 24 October 2017. This Networking Event is a platform for poster presenters to showcase their findings and discuss them with workshop participants in a casual get-together. This year for the first time, we offer a combined Solar and Wind Dinner (25 October 2017) that will take place at the Wasserwerk, a former water works facility. It is the perfect opportunity to mingle with both solar and wind experts. I encourage you to make good use of these unique educational and networking opportunities!

The most interesting papers from the Solar and Wind Workshops will again be published in a Special Edition of the *IET Renewable Power Generation (due late 2018)*. Because of the high interest in the workshop proceedings, we will again submit this year’s proceedings to international libraries and organizations who operate citation index systems such as the (i) FIZ – Fach Informations Zentrum Karlsruhe, (ii) Elsevier, (iii) ETDE, (iv) Reuters, (V) Compendex, (Vi) Thomson Citation Index so that the proceedings are more easily available for academia and industry worldwide.

This workshop would not be possible without the support of our Giga Sponsors **TenneT** (Germany) and **DiGSIlENT**. In addition, the workshop is supported by the IET Digital Library (United Kingdom), Renewables Grid Initiative (Germany), HTW – Hochschule für Technik und Wirtschaft Berlin (Germany), ENTSO-E (Belgium), UVIG – Utility Variable Generation Integration Group (USA) and the European Energy Students Network (EESN) as well as the media partners SmartGridSpain (Spain), et - Energiewirtschaftliche Tagesfragen (Germany), Sun & Wind Energy (Germany) and the LinkedIn Group “Energy Storage Demand Response and Grid Technologies”.

I would also like to thank all those who supported the organizers of this workshop: all the members of the International Advisory Committee as well as Uta Betancourt, Ines Drewianka, Elke Müller, Anke Ost and Elvan Varvoda (all Energynautics, Germany).

Enjoy some inspiring days in Berlin and seize the numerous networking opportunities!

**Thomas Ackermann**

*Energynautics*

PS: Comments are always welcome, feel free to contact me at: t.ackermann@energynautics.com

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1. The first special edition based on the 2013 Workshop was published in January 2015 (Volume 9, Issue 1), the special edition from the 2014 Berlin Workshop was published in January 2016 (Volume 10, Issue 1), and the special edition from the 2015 Brussels Workshop was published in February 2017 (Volume 11, Issue 3), see [http://digital-library.theiet.org/content/journals/iet-rpg](http://digital-library.theiet.org/content/journals/iet-rpg)
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- Essential Reliability Services from Utility-Scale PV Power Plants
  M. Morjaria, V. Chadliev (First Solar, USA), V. Gevorgian (NREL, USA), C. Loutan (CAISO, USA)

- Inspiring the Science Community to Develop Solutions for the Operational Challenges of the Future Initiated by Solar
  M. Abbenhuis (Tennet, Netherlands)

- Greening the Grid: Pathways to Integrate 160 Gigawatts of Wind and Solar Energy into India's Electric Grid
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09:00 – 10:50 / 25 October 2017 / Room Alexander 1 / Session chair: TBA

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F. Meier (Fraunhofer IWES | University of Kassel, Germany), J. Kupka (University of Kassel, Germany), C. Töbermann (Fraunhofer IWES, Germany), M. Braun (Fraunhofer IWES | University of Kassel, Germany)

Session 6: Closing Session – Panel Discussions

Podium discussions

The contributions and discussions of this session are not part of the proceedings.

Poster Presentation Papers

Workshop Participants