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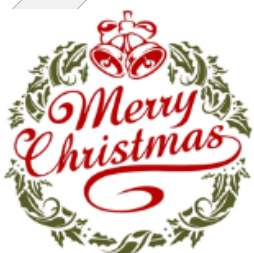
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Key dates

25 February – 1st March 2019



Welcome

Dear members, we have great news for you!

COST Action PEARL PV is doing well! Our PV network is still growing and we have 30% more members since our last Newsletter, with 180 registered PV experts in our Action!

In the past 6 months COST Action PEARL PV has been maturing, becoming visible to the wider public through events ranging from national meetings to international conferences such as the WCPEC which took place in Hawaii in June and the EU PVSEC in Brussels in September.

An important milestone was reached where PEARL PV was invited to contribute to the White Paper from SolarUnited (Global Solar Business Technology Association), and ETIP PV (European Technology and Innovation Platform for Photovoltaics) to give input into questions of quality, reliability and performance for the European PV Industry.

Further to this, our internal research plans were agreed through a widely supported Workplan for the period from 2018 until the end of the Action in 2021. Three surveys have been carried out on the use of simulation tools, the availability of PV data and the wishes and demands of our network regarding the data that will be analysed in the near

future. At the moment a small group of PEARL PV experts is focused on the technical execution of a data bank which will be able to store vast amounts of data – in the order of terabytes - from monitored PV systems from all over Europe and which will be easily accessible for and can be securely used by our Action's participants. More news about this new significant development will follow by the beginning of 2019.

If you did not have the opportunity to attend the wonderful meeting of PEARL PV in Cyprus, please visit the website for a summary of this very successful event, <https://www.pearlpv-cost.eu/news/>. The University of Cyprus, with support of Deloitte, were excellent hosts. Thank you very much for this hospitable experience!

The first day was opened by the Ambassador of the Kingdom of the Netherlands to Cyprus Ms. Nathalie Jaarsma. She gave an inspiring address to the audience consisting of PV experts from 31 countries from Europe and beyond. The Seminar was followed by a four-day training school on "Monitoring and simulation of the performance and reliability of photovoltaics in the built environment", with 50 participants from the field of research and development in the renewable energy sector. From the evaluation by the attendees of this Training School we learnt that the program was very highly rated. Thanks to the Trainers and the Training

School Managers, Gabi Eder and Aleksandra Krstic-Furundzic.

Our next events, namely our 3rd MC Meeting and Workshops for each of the 5 Working Groups will take place from **25 to 28 February 2019** at the University of Lisbon in Portugal. More information will be available on the website of our Action shortly, see here: <https://www.pearl-pv-cost.eu/>. However, for now we ask you to save these dates: 25 to 28 February 2019.

Apart from sending our Season's Greetings to you, we would like to sincerely thank you, all volunteering PV experts, for your energy, enthusiasm and efforts! PEARL PV's success story will be based on your contributions to the Action as a whole and to the programs of the Working Groups.

Having said this, we are looking forward to meeting you all again in February 2019 in Lisbon.

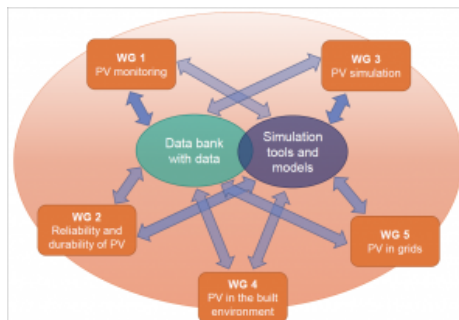
Merry Christmas, Happy New Year and Enjoy your holidays!
Warm regards,

Chair Prof Angèle Reinders
(University of Twente) & Vice Chair
Dr David Moser (EURAC)

Introduction

The aim of PEARL is to improve energy performance and reliability of PV systems in Europe leading to lower costs of electricity produced by PV systems by a higher energy yield, a longer life time eventually beyond the guaranteed 20 years as specified by manufacturers, and a reduction in the perceived risk in investments in PV projects. This Action entails the formation of an inclusive network of PV system researchers, data resources that will be analysed by researchers, forming a very large agglomeration of PV systems performance data for Europe, and experts that can include more-nuanced evidence-based reliability in PV system, evaluation

methods and simulation and design tools. Five Working Groups (WG) have been set up which will conduct research using a shared data bank and shared simulation tools and models. An update on each WG follows.



WG1: PV Monitoring

In recent months, WG1 members have been active in analysing the survey on PV monitoring guidelines. The results have been discussed at the WG1 seminar that was held at the University of Cyprus on Oct 22, 2018. Representatives of all WGs took active part in this seminar, and the lively discussion led to the conclusion that the intended database structure holding all necessary data should be very flexible. Part of the data needed are time-series of power, irradiation, temperature but another part is more static, with metadata such as orientation and tilt, but also data on degradation, which may include EL photographs, or indoor comfort assessments in case of BIPV applications.

At present, WG1 members are deciding on the proper database platform that would allow all data to be stored in an easy accessible manner, respecting privacy issues via NDAs.
Chair Dr Wilfried van Sark (Utrecht University) & Vice Chair Dr Christian Braun (FhG-ISE)

WG2: PV Reliability & Durability

In the first grant period, the work of WG2 was focused on the proper definition of reliability and durability metrics for PV modules, components and systems. Taking into account views of different PV stakeholders (Consumers, investors, manufacturers, researchers, utilities). As

well as taking into account different metrics for different PV technologies (c-Si, thin film, organic). Also metrics dependent on different applications like PV for consumer products, utility-scale power production, mobility, building integration will be evaluated.

Finally discrepancies between high durability and easy end-of-life management will be addressed. The main outcome of Task 2.1 is Deliverable 5: White paper on definition of reliability and durability of different PV technologies, which is planned to be published mid 2020. The tentative paper structure has been discussed and defined by the main contributing authors, but additional contributions are highly welcome.

Chair Dr Gernot Oreski (PCCL) & Vice Chair Hristina Spasevska (University of Skopje)

WG3: PV Simulation

WG3 is investigating the simulation models that are being used by the PV community to determine best practices and where development is required. As one of the first tasks, we have created an inventory of simulation packages that can be extended and updated as the studies progress. WG3 has also conducted a survey of software usage among the PEARL PV community, allowing us to identify the most popular packages, the reasons why these packages are used and the perceived gaps in provision that could be addressed in PEARL PV. We now intend to extend the survey outside the PEARL PV network so as to include other sectors of the PV community.

Chair: Prof Nicola Pearsall (Northumbria University) & Vice Chair Prof João Serra (Universidade de Lisboa)

WG4: PV in the Built Environment

The topics and the research issues related to WG4 have been the focus of the first PEARL Training School (Monitoring and Simulation of the Performance and

Reliability of PV in the Built Environment), held the last October (23-26) at the University of Cyprus in Nicosia.

Experts from several disciplines participated as trainees, by giving lectures and assisting in workshops for the week. Meanwhile, collaboration among the members of WG1 has been strengthened through the publication of papers, as well as through planning of STSMs. At present WG4 consists of about 25 members.

Chair Dr Alessandra Scognamiglio (ENEA) & Vice Chair Dr Francesco Frontini (SUPSI)

WG5: PV in Grids

Work in WG5 was delayed in 2018 due to lack of necessary data for analysis. Good news, Santa Clause is bringing in the data! We now have a database that contains energy production data and metadata of about 30,000 PV systems in Europe (mainly France and Belgium). On about 6,000 of these PV systems, we possess the energy production data from 2011 to 2018 with a 10-min time resolution, which allows us to start many interesting research activities. These data will be made available for all the participants of WG5 by the start of January 2019.

A number of tools will be developed: (i) Peer-to-peer prosumer cooperation, e.g. using blockchain technology are increasingly appearing as a viable option for the future development of PV generation. Therefore, a tool will be developed to allow for these considerations, and it will contain spatio-temporal forecasting using data from distributed PV systems. (ii) A tool will allow the assessment of the PV power mitigation potential from the geographic dispersion of PV systems. (iii) A tool will be developed for the assessment of PV power fluctuations at one PV system, as well as for PV system fleets,

including the study of the correlation between the fluctuations in PV power between neighbouring installations. (iv) The evaluation of the Power Quality indicators at the connection of PV systems to the grid is going to become increasingly important along with the increasing PV penetration into the grid, and a tool will therefore be developed to analyze these aspects.

Better energy management and storage control at the interface between PV systems and low voltage distributed grids are needed and they will be investigated. There will be a link with the smart solar charging of electric vehicles, and domestic uses of PV such as smart appliances. This includes the study of the relationship between the PV production and the local consumption, the possible use of batteries, the economic viability of alternative options.

(v) Better procedures for cheap and effective Operation and Maintenance (O&M) of PV systems will be searched for, including soiling and cleaning strategies. A fault detection toolbox will be developed to improve the energy yield of grid-connected PV systems and reduce their power instability.

Chair: Jonathan Leloux (Polytechnic University of Madrid) & Vice Chair Marios Theristis (University of Cyprus)

Meeting Updates



Pearl PV's Core Group met in Stuttgart on 17 May 2018, in order to discuss the Action's progress in relation to the working groups. Markus Schubert, from University of Stuttgart, hosted the meeting and organized a very interesting lab tour of IPV and the excursion to ZSW.

PEARL-PV successfully held its first Training School entitled **"Monitoring and simulation of the performance and reliability of photovoltaics in the built environment"**, which took place in Nicosia from **22 to 26 October 2018**. The Training School focused on the special requirements and challenges of integrating PV in built environment and grids with focus on the determination and prediction of performance and reliability.



During the four-day training programme, trainees (students, researchers, educators and practitioners) participated in multiple introductory expert lectures, interactive seminars, practical courses and on-site excursions and gained an in-depth understanding of planning and building of integrated photovoltaics and learned about key topics from PEARL PV Working Groups such as performance monitoring, reliability and simulation issues. The Training School was managed by Gabriele Eder (Gabriele.Eder@ofi.at) and Aleksandra Krstic-Furundzic (akrstic@arh.bg.ac.rs) and supported by the PV Enerate project of SUPSI.

Recently, Pearl PVs Core Group met in Brussels on December 17th to discuss the progress of the action, the state of play in terms of each group's work plan and to define next steps. The framework of the forthcoming meeting and workshops in Lisbon was also discussed.

COST Member Profile



Hi! My name is Peter Jansen, the Grant Holder

Manager of this COST action. In my day job I coordinate spider-in-the-web for 4 Post-Master [PDEng programmes](#) at the University of Twente. These are 2-year programmes with a focus on technological designs in the field of Civil Engineering, Energy & Process Technology, Robotics and Maintenance.

I was honoured when PEARL PV COST Action Chair Angele Reinders asked me to fulfill the position as Grant Holder Manager in this prestigious COST Action. The Grant Holder Manager is the person from the GH-Institution who is responsible for overseeing the administrative management of the COST Action. On behalf of the Grant Holder I am the primary user of the e-COST Action management tool, so amongst others I take care of the e-COST invitations for meetings, STSM's and training schools, check if reimbursements conform to COST requirements

(see COST Vademecum) and monitor that reimbursements will be processed by our financial department.

The first year was a challenging year in which I have met many people and had to find my way in the COST regulations and tools. I am proud to see that we have now a great group with enthusiastic researchers from Europe and abroad.

The most common questions asked are about reimbursement of travel and meals. To clarify, a reimbursement process can take 1.5 to 2 months because participants can wait and do their reimbursement request at the latest a month after the meeting. This delays all reimbursement payments. It is only after all reimbursement requests have been received, all documents will be checked and subsequently the financial department will transfer the reimbursement to your accounts. So please send your reimbursement requests quickly after each meeting to ensure prompt payment for everyone! Thank you!

STSM Updates

STSMs are Short Term Scientific Missions which are institutional visits aimed at supporting individual mobility, fostering collaboration between individuals. They are primarily intended for PhD students and early career investigators (ECI) to visit other research groups, to acquire new expertise, contribute their expertise to projects and exchange ideas between participating institutions.

During the second Grant Period GP2 (May 2018 to April 2019) 3 STSMs were successfully completed. Additional budget availability will enable a number of additional STSMs in GP2. Therefore STSM applications and institutional STSM offers are most welcome **NOW!** For detailed information on STSMs, please visit <https://www.pearlpv-cost.eu/activities/stsm> or contact STSM Manager Dr Markus Schubert (University of Stuttgart) markus.schubert@ipv.uni-stuttgart.de

Click on the image for Video of the 1st EU COST Action PEARL-PV Seminar and Training School at the University of Cyprus
(October 2018)



1st EU COST Action PEARL-PV Seminar and Training School at the University of Cyprus

✦ ITC Conference Grants

These grants allow us to support conference visits of PhD students and Early Career Investigators (ECIs) from ITC countries. ECIs include post-doc researchers up to 8 years after receiving their PhD. Each grant is limited to a maximum of 1,500 EUR. We are looking forward to your applications! For details, requirements and applications, please consider <https://www.pearl-pv-cost.eu/activities/itc-conference-grants>

standard COST acknowledgment in any publication (poster, paper, book)
"This article/publication is based upon work from COST Action CA16235 PEARL PV supported by COST (European Cooperation in Science and Technology)"

Further texts are shown on page 55 of this workplan. Please also include the COST website as well as the PEARL PV, COST logo and EU logo in any publication. If space is limited then only the COST logo should be shown.

The Work Plan 2018-2021 will inform you in more detail about the publication policy.

WG5 Leader: Dr Jonathan Leloux (Polytechnic University of Madrid), jonathan.leloux@gmail.com Science Communication Manager: Dr Eliza Loucaidou (Deloitte Cyprus), eloucaidou@deloitte.com

Training School Managers:

Dr Gabriele Eder (OFI), Gabriele.Eder@ofi.at and Dr Aleksandra Krstic-Furundzic (University of Belgrade), akrstic@arh.bg.ac.rs

STSM Manager: Dr Markus Schubert (University of Stuttgart), markus.schubert@ipv.uni-stuttgart.de

Newsletter Editor: Dr Sarah McCormack (Trinity College Dublin), mccorms1@tcd.ie

✦ Publication Policy

With several deadlines for international PV conferences, such as the IEEE-PVSC-46, EU PVSEC and the Asian PVSEC in sight, it is useful to be informed about the publication policy of PEARL PV. Authors of papers are allowed to acknowledge PEARL PV only if at least 2 PEARL PV countries are represented. Please make sure that you circulate the author list and an abstract of the manuscript to the relevant WG leader(s), chair and vice chair:

- 2 weeks before submission in case of submission to a peer-reviewed journal, and
- 1 week before submission in case of submission to a conference.

Once published please send a communication to the Action's Science Communication Manager (Eliza Loucaidou) for further dissemination of the publication through the PEARL PV publication list

<https://www.pearl-pv-cost.eu/dissemination/publications>

Please follow the dissemination guidelines and COST corporate identity which can be found here <http://www.cost.eu/media/dissemination-corporate-identity>

Also please include the following

✦ Join Us

For all the latest news check out PEARL PV's website at <https://www.pearl-pv-cost.eu>

You can register for participation by this registration form <https://www.pearl-pv-cost.eu/about/registration>. Please feel welcome to share this registration form with interested colleagues.

PEARL PV is also visible in social media, namely you can follow PEARL PV by Twitter account

<https://twitter.com/CostPearl> and by our LinkedIn group

<https://www.linkedin.com/groups/8655031>



✦ Contact Us

For further info, please contact Action Chair: Prof Angèle Reinders (University of Twente), a.h.m.e.reinders@utwente.nl
Vice Chair: Dr David Moser (EURAC), David.moser@eurac.edu

WG1 Leader: Dr Wilfried van Sark (Utrecht University), w.g.j.h.m.vansark@uu.nl

WG2 Leader: Dr Gernot Oreski (PCCL) gernot.oreski@pccl.at

WG3 Leader: Prof Nicola Pearsall (Northumbria University), nicola.pearsall@northumbria.ac.uk

WG4 Leader: Dr Alessandra Scognamiglio (ENEA), alessandra.scognamiglio@enea.it

✦ Vacancy

Please notice that we have a vacancy for a COST Policy Manager. If you are interested in volunteering please do not hesitate to contact Jonathan Leloux for this Policy Manager position.

✦ Contribute

Thanks for reading, and if you would like to contribute to the next Newsletter please contact Sarah McCormack at mccorms1@tcd.ie before 1 March 2019. Next issue will be published in April 2019.

✦ Acknowledgement

This Newsletter is based upon work from COST Action CA16235 - Performance and Reliability of Photovoltaic Systems: Evaluations of Large-Scale Monitoring Data – also called PEARL PV, supported by COST (European Cooperation in Science and Technology): www.cost.eu

Newsletter

Dec 2018 🏠



P E A R L P V

Partners PEARL PV



Deloitte.



Technical University
of Denmark



University
of Cyprus



Ss. Cyril and Methodius University in Skopje



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COST Description

COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. COST Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.

