

## PROGNOSIS

### Intra-hour prediction of solar electricity generation from Photovoltaics

*Project duration: from 04.2018 to 03.2021*

*Report submitted: 07.2019*

#### **Publishable Summary**

The PROGNOSIS project is related to the development of a tool for intra-hour forecasting of solar irradiance over a specific area. The innovative concept of PROGNOSIS is based on the fact that the tool is based on models that do not utilize any meteorological data or specialized equipment but only the power output of a dense grid of connected Photovoltaics (PVs).

The continuous input data will be integrated to energy maps over the desired areas and the attenuation from the normalized power output will be used for predicting the motion and development of clouds/aerosols in time which cause a decrease in the solar irradiance reaching the PV when they cast a shadow over it. Through the development of this dynamic flow map of the power output of the PVs, the solar irradiance can be visualized and predicted not only over the PVs but over entire regions.

Regarding the development of the forecasting model the machine learning approach is adopted following which we can provide accurate predictions based only on knowledge acquired from historical data. For the PROGNOSIS purposes a model based on the “Recurrent Neural Network” architecture has already been built using the historical PV power data provided by JohnSun. Initial results indicate that our model can capture the overall trend and fluctuations of the power output and provide good predictions not only for PVs in Cyprus but also in other countries. Improving the accuracy of the predictions as well as the issue of incorporating spatial dependency into our forecasting model will also be examined.

Additional historical data have also been collected in Cyprus from Trikkis Energy Ltd through the support of the Cyprus Employers & Industrialists Federation (OEB) and for Central Europe and Indonesia through our recently established research collaboration with the COST Action “PEARL PV”. All relevant data will be stored in a database, but no private data will be displayed or stored.

PROGNOSIS is essentially a real-time decision-making tool primarily for the energy sector since the resulting forecasting will facilitate the decision-making process for the visualization, management and optimization of microgrids and electricity systems.

## Project consortium

Coordinator and all contact details:

Full name of organisation	Cyprus University of Technology
First and family name of coordinator:	Alexandros Charalambides
Full address:	Department of Environmental Science and Technology Cuprus University of Technology Corner of Athinon and Anexartisias, 57 3603 Limassol, Cyprus
E-mail:	a.charalambides@cut.ac.cy

Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Cyprus	2	205'500	198'000
Spain	1	111'000	111'000
<i>Total</i>	3	<i>316'500</i>	<i>309'000</i>

## Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Cyprus Research Promotional Agency	KOINA/SOLAR-ERA.NET/1216/0014 (PROGNOSIS)
Spanish State Research Agency – Ministry of Science, Innovation and Universities	PCI2018-093043