Solar Energy and Building Physics Laboratory LESO-PB

LESO LUNCHTIME* LECTURES

Friday 13 March 2020, 12:15-13:15
EPFL – CM 1 106

Switzerland's bright future: the use of Big Data and Machine Learning to evaluate the national capacity of rooftop solar photovoltaics

Roberto Castello, PhD

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Introduction by Dasaraden Mauree – Followed by open discussion

Summary

The large-scale deployment of photovoltaics (PV) on building rooftops can play a significant role in the transition to a low-carbon energy system. Switzerland is one of the most innovative countries when it comes to solar energy but a quantitative assessment of the potential of this technology is needed in order to formulate effective incentive policies for its integration at the national scale. Key questions are: how much could we extract if we were to cover all the suitable existing buildings roofs with PV panels? How many rooftop PV have been installed so far and how can we foster solar technology adoption in urban areas using environmental and socio-economic data collected there? To address these questions we leverage the large amount of data available in national database and federal officies in combination with Machine Learning algorithms, Geographic Information Systems and physical models. As a result, we are able estimate the technical PV potential for all 9.6 million rooftops in Switzerland at hourly temporal resolution. In addition, we developed a fast inference algorithm to assess locations and sizes of existing PV installations on building rooftops by using Convolutional Neural Networks combined with satellite and aerial imagery. The resulting spatial map, in combination with local environmental and socio-economic factors, can then be used to model and to predict future solar technology adoption in urban areas for increasing the use of renewable energy towards the implementation of the Energy Strategy 2050.

About the speaker

Roberto Castello is a scientific collaborator at the EPFL Laboratory of Solar Energy and Building Physics (LESO-PB). He holds a PhD in Physics and has previously worked at CERN on collecting and interpreting large datasets by means of advanced data mining techniques. Currently he works on computational techniques for urban sustainability using Big Data and Machine Learning. His research topics focus on the modelling of renewable energy potential at large scale, energy efficiency optimisation and the monitoring of the energy transition in the built environment.

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Open to all !

*Presentations are followed by drinks & snacks, to give the opportunity to guests and speaker to further discuss the topic.

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