R&D NESTER

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EDITORIAL

Dear Reader,

The Energy landscape, and electricity networks in particular, continue to undergo intense innovation and research and development activities in order to deliver the needed energy transition towards a sustainable energy system.

That sustainability implies guaranteeing a system managed in an efficient manner, able to deploy the conditions for the required reliability and security of supply, while ensuring an environmental friendly system.

It is in that context that we bring you in the Highlights section of this edition two of the R&D Nester efforts in that direction.

One relates to R&D Nester efforts to develop system-aiding tools that allow for an increasing integration of renewable energy sources while maintaining the robustness of the system and simultaneously performing it in an efficient manner with benefits to all energy system stakeholders.

A second one addresses the modernization of the network infrastructure, namely substations, in order to benefit from an improved deployment and management of the assets under exploitation and thus bring benefits for the energy system.

In the Technical Information, we offer you updated information on ongoing storage projects aimed at grid and system operation support, a view on how the Internet of Things is entering also the energy landscape, a revolutionary approach to capture energy from wind and some regulatory challenges in the road ahead as per the European Electricity Regulatory Forum.

As in the previous edition, this section is also enriched with some interesting links and curiosities. Also don't forget to test your knowledge with our popular section "Quiz", this time dedicated to very appropriate seasonal hot topic: solar energy!

You will find more on this and other topics in the notes below. We hope that you find the minutes spent with us both relevant and rewarding. Please continue to share with us your feedback!

Sincerely,

Nuno de Souza e Silva
General Manager

HIGHLIGHTS

RR&D Nester to complement solar forecasting tool with a sky camera

The R&D Nester is committed to improve and develop the existing solar power forecasting tool, which currently provides forecasts up to 7 days ahead; since photovoltaic (PV) electricity is an intermittent energy source, very short-term forecasts (up to 30 minutes ahead) are crucial to predict future cloud patterns in the vicinity of the solar generation facilities. Accurate forecasts are necessary to optimize real-time grid power management, to eventually manage PV electricity storage and to prevent non-interconnected regions network from a load shedding. Although cloud satellite observations do not offer sufficient space and time resolution to study intra-hour irradiance variability, all-sky cameras track the cloud cover evolution from the ground providing pertinent information for such forecasts [1].

Solar forecasting based on whole sky imagery analysis consists of four components [2]: a) acquisition of a sky image in the vicinity of the forecast site using a device such as sky camera; b) analysis of sky image data to identify clouds; c) estimation of cloud motion vectors

using successive images; d) use of cloud location and motion vector data for short-term deterministic or probabilistic cloud cover, irradiance, and power forecasting.

Researchers at the University of California San Diego as well as at Reuniwatt have been publishing several pioneer studies in this field study, which involved using sky imagers specifically developed for solar forecasting applications and feature high resolution, high dynamic range, high stability imaging chips that enable cloud shadow mapping. (See [3] and [4] for their latest research publications)

R&D Nester has acquired a new generation All-sky camera with some unique features to make clear full hemispheric pictures of the sky even under full sun light conditions with particularly interesting features for photovoltaic evaluation applications. Since clouds and aerosols substantially contribute to the attenuation of solar irradiance at ground level, the sky imager provides quantitative data of the sky conditions on site. The cloud camera can also be used to monitor the solar position and detect potential shading obstacles at a PV site.

With these developments R&D Nester expects to contribute to an increasingly sustainable electrical network and system management, benefiting the whole electrical system.

References

1 Nitche N., Trombe P-J., Cros S., Using cloud fraction derived from all-sky camera to improve beam solar irradiance forecasting by time-series modelling, 14th European Meteorological Society (EMS) Annual Meeting & 10th European Conference on Applied Climatology (ECAC), October 6 -10 2014, Prague, Czech Republic.

2. International Energy Agency (IEA) (2013). Photovoltaic and Solar Forecasting: State of the Art. Photovoltaic Power Systems Programme. Report IEA PVPS T14-01:2013

3 http://solar.ucsd.edu/c/publications/

4 http://reuniwatt.com/en/publications/

TECHNICAL INFORMATION

Energy Storage for grid reliability and frequency regulation

Renewable Energy Systems Americas Inc. (RES), one of the top renewable energy companies in North America, is currently developing two storage systems which together will comprise one of the largest energy storage deployments in North America. It is anticipated that this battery storage technology, when combined with proven PV solar technology, can provide significant benefits to power grids.

The projects, intended to provide energy storage over the course of a decade, will provide frequency regulation service to support grid efficiency.

"As the value of energy storage for grid reliability gains recognition nationwide, projects like the two being developed by RES are playing a growing role by better leveraging existing utility assets," says the Project Manager. "The ability of energy storage to support grid efficiency through frequency regulation is another important benefit because storage is capable of ramping up and down generation assets within milliseconds.

RES is constructing the two 19.8 megawatt (MW) energy storage systems, each able to store 7.8 megawatt-hours (MWh) of energy. RES anticipates completing construction on the Jake Energy Storage Center in Joliet, IL, and the Elwood Energy Storage Center in West Chicago, IL, in the third quarter of 2015.

IEC White Paper on Wireless Sensor Networks

A new white paper by an international team surveys the role of wireless sensor networks in the evolution of the Internet of Things (IoT). The report catalogs current needs for underlying standards and infrastructure that must be met before wireless devices can become, as some envision, nearly as plentiful as dust.

Published by the International Electrotechnical Commission (IEC), Internet of Things: Wireless Sensor Networks* was prepared by a team led by Shu Yinbiao, of the State Grid Corporation of China, and Kang Lee, an engineer at the National Institute of Standards and Technology (NIST).

Wireless sensor networks have been called a digital skin. They are self-organizing networks of distributed devices - or nodes - that work cooperatively to gather and transmit information from the surrounding environment, be it a factory, electric grid, field-monitoring site, intelligent transportation system, or virtually any other setting. In addition to sensing the environment, these networks also may handle some control functions, such as adjusting building thermostats, redirecting traffic flows in a city, or optimizing manufacturing processes in a factory.

The IoT is a broader technological concept that embodies wireless sensor networks. As envisioned, the IoT would embed miniature computers in all manner of objects, from the most sophisticated, such as aircraft, to the mundane, such as clothing and appliances. Each object would be uniquely identifiable and linked through an Internet-like structure.

Cisco Systems estimates that the numbers of devices connected to the Internet will double to 50 billion by 2020.

The new IEC white paper discusses evolution of wireless sensor networks within the wider context of the IoT, describes the characteristics of wireless sensor networks and current applications and trends, and surveys future applications and the obstacles that stand in the way. It also assesses needs for standards to achieve interoperability among wireless sensor networks from different vendors and across varied applications.

Given the growing number of uses of wireless sensor networks, it's not surprising that many different standards organizations address various aspects of the technology, often in isolation. The white paper calls on standards organizations to improve communication and coordination, make unified plans, optimize resource allocation, and reduce duplicative efforts.

It also recommends increasing research devoted to improving network performance and quality of service, developing a systems architecture and integration technologies to accommodate diverse networks, developing a common model for ensuring security, and improving access technologies to conserve wireless spectrum and to support larger networks.

"We hope this paper will be a useful resource for a large and diverse community of stakeholders," says Lee. "It provides a much-needed, high-level perspective on the technology's vast potential and on the standards-related tasks that must be accomplished so that we can realize it."

Source:http://www.nist.gov/el/isd/iec-white-paper.cfm

LEGISLATION AND CURIOSITIES

LEGISLATION

Despacho Nº 7/2015
Quarterly update of the reference rate of cogeneration (2nd quarter 2015).
Read Document
Decreto-Lei Nº 68-A/2015, de 30 de Abril
Establish provisions on energy efficiency and cogeneration production, transposing Directive Nº 2012/27 / of the European Parliament and the Council of 25 October 2012, on energy efficiency.
Read Document
Resolução do Conselho de Ministros Nº 28/2015, de 30 de Abril
Approves the Commitment to Green Growth.
Read Document

EVENTS

24 -25 Nov 2016
BIRMINGHAM, UK
EERA FIRST ANNUAL CONFERENCE

14 -16 Nov 2016
MEXICO CITY, MEXICO
INTERNATIONAL COLLOQUIUM CIGRE MEXICO 2016 “BUILDING SMARTER SUBSTATIONS”

12 -14 Oct 2016
BARCELONA, SPAIN
EUROPEAN UTILITY WEEK

12 -14 Oct 2016
OTTAWA, CANADÁ
2016 IEEE ELECTRICAL POWER AND ENERGY CONFERENCE “SMART GRID AND BEYOND: FUTURE OF THE INTEGRATED POWER SYSTEM"

24 -25 Nov 2016
BIRMINGHAM, UK
EERA FIRST ANNUAL CONFERENCE

9 -12 Oct 2016
LJUBLJANA, SLOVENIA
IEEE POWER & ENERGY SOCIETY INNOVATIVE SMART GRID TECHNOLOGIES EUROPE 2016 CONFERENCE

24 -25 Nov 2016
BIRMINGHAM, UK
EERA FIRST ANNUAL CONFERENCE

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LINKS

QUIZ

1) IN MAY 2016 PORTUGAL ENERGY CONSUMPTION WAS SATISFIED 100% BY RENEWABLES ENERGY SOURCES FOR HOW MANY DAYS?

- 3 days
- 0 days, that is impossible!
- d) 4 days
- 1 day

2) WHICH COUNTRY HAS THE HIGHEST INSTALLED POWER CAPACITY?

- China
- United States of America
- Japan
- Australia

3) THE BIGGEST PHOTOVOLTAIC POWER PLANT IN THE WORLD IS LOCATED IN ROSAMOND, CALIFORNIA USA. CAN YOU GUESS THE TOTAL INSTALLED CAPACITY?

- 525 MW
- 598 MW
- 579 MW
- 625 MW

Correct answers will be provided to you soon.
If you have problems answering this quiz, click here to answer this via browser.

Answers of the 7th edition Quiz

1) IN MAY 2016 PORTUGAL ENERGY CONSUMPTION WAS SATISFIED 100% BY RENEWABLES ENERGY SOURCES FOR HOW MANY DAYS?

Answer: d) 4 days

2) WHICH COUNTRY HAS THE HIGHEST INSTALLED POWER CAPACITY?

Answer: China

3) THE BIGGEST PHOTOVOLTAIC POWER PLANT IN THE WORLD IS LOCATED IN ROSAMOND, CALIFORNIA USA. CAN YOU GUESS THE TOTAL INSTALLED CAPACITY?

Answer: 598 MW

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