TILOS Newsletter 3

Technology Innovation *for the* Local Scale
Optimum Integration *of* Battery Energy Storage

TILOS marching to the beat of a different drum!!!

On May 13, 2016, the Production License for the first ever, Wind-PV-Battery power station in Greece, and among the first in Europe, was granted to TILOS project from the Greek Regulatory Authority for Energy. This decision is a major breakthrough for the further deployment of RES-battery systems and for the elimination of oil use in Greek and other European island regions.

Newsletter Contents

TILOS

Technology **I**nnovation for the **L**ocal Scale,
Optimum Integration of Battery Energy **S**torage

Tilos, the "S" shaped Greek island, located at the south-eastern part of the Aegean Sea.

TILOS is a European research project engaging 13 participating enterprises and institutes from 7 European countries (DE, FR, EL, UK, SE, IT, ES). The project's main goal is to demonstrate the potential of local / small-scale battery storage to serve a multi-purpose role within an island micro-grid that also interacts with a main electricity network. Among others, the project aims to achieve large-scale RES penetration and asset value maximization through the optimum integration of a hybrid RES (wind and PV) power station together with advanced battery storage, distributed, domestic heat storage, smart metering and DSM.

Project objectives will be accomplished through the development and operation of an integrated, smart micro-grid on the island of Tilos. Tilos belongs to the island complex of Dodecanese, on the south-eastern part of the Aegean Sea, and is interconnected to the host grid of Kos and Kalymnos islands via an undersea cable.

TILOS project started on the 1st of February 2015, under the call for Competitive Low-Carbon Energy, H2020-LCE-2014-3, and its duration is 48 months. The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 646529, with its total budget reaching 15M€.

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1. TILOS in general

Transforming the Greek Energy Market!

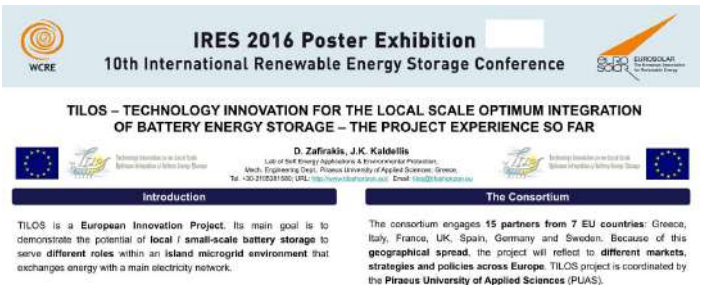
The production license for the first ever, battery-based, Wind-PV power station in Greece is already transforming the Greek energy market by creating a new paradigm for island regions. What is more, replicability of the TILOS system in other Greek island regions was recently raised by the Greek Ministry of Energy and German delegates during the visit of the German Vice Chancellor S. Gabriel in Athens, on June 30.

Welcoming the Swiss Indrivetec on Board!

INDRIVETEC
Innovative Drive Technologies AG

Following the completion of a project amendment, the TILOS team is now in collaboration with the Swiss inverter manufacturer Indrivetec (IDT). IDT will provide the necessary grid-forming battery inverters for TILOS project, enabling in this way the development of the prototype battery storage system and the stand-alone operation of the Tilos island grid, based exclusively on RES and battery storage.

TILOS presented in IRES2016!



A poster of the TILOS project was presented in the 10th "International Renewable Energy Storage" (IRES) that was held in Düsseldorf between the 15th and the 17th of March 2016. The poster was developed from TEIP and was presented in IRES 2016 from RWTH Aachen.

TILOS invited in S3P Energy Workshop!

Join the SMART SPECIALISATION PLATFORM

After receiving an invitation, TEIP participated in "S3P Energy: Smart Mediterraneo. Best practices, innovation and pilot projects in smart grid development in the Mediterranean region", a workshop organized by the European Commission Joint Research Centre Institute for Energy and Transport, in Bari-Italy between the 23rd and the 24th of June 2016, and presented the progress achieved so far in TILOS project.

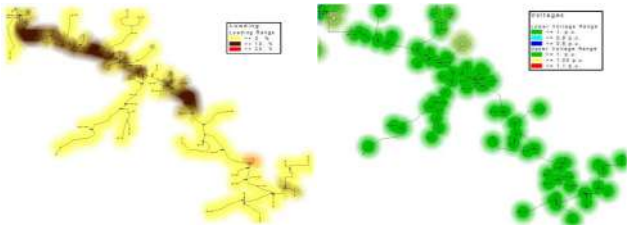
2. TILOS 12M Meeting, Gran Canaria, Feb 11-12, 2016

The 3rd TILOS meeting was held on the island of Gran Canaria, hosted by the beneficiary ITC. The meeting included also an optional day-visit to the island of El Hierro on the 10th of February, where a wind-pumped hydro installation is in operation. The members of TILOS team had the opportunity to exchange ideas with the technical personnel of the power station and draw information on the operational status and challenges of the El Hierro RES-storage scheme.

3. Project Progress

- **Final System Layout**

Following the issuance of the production license for the TILOS hybrid power station, the final layout of the TILOS system has been determined, with completion also of the respective preliminary energy and grid simulation studies.



The core system will comprise of an 800kW wind turbine, 160kW of PV power and $NaNiCl_2$ battery storage of 2.88MWh total storage capacity and 800kW nominal power output. Determination of the final system layout signals also the successful completion of the second TILOS project work package (WP2).

- **SCADA Development**

The structure and components of the SCADA control room have been finalized under WP3. Next steps concern the installation of the SCADA control room (container) on the island of Tilos, in mid-September 2016, and the testing of communications between the SCADA and the existing measuring devices, including the three weather stations and the two grid load meters.

- **Demand Side Management**

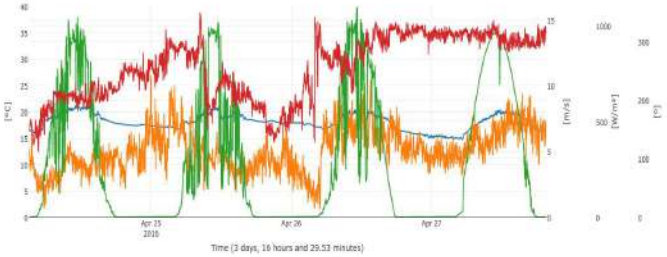
A smart meter-DSM device prototype has been developed from Eurosol in WP4, with the respective end-to-end testing being under completion. Next, early in September 2016, phase-A of the installation for smart meters and DSM devices will start, so as to test the functionality of the prototype in representative households of Tilos. Installation requirements of the prototype in the local households were assessed during a site-visit in April 2016.

- **Battery Storage System Development**

State-of-energy and multipack management algorithms along with an integrated battery system model have been developed. Meanwhile, assembly of the first FIAMM container is at its final stage, almost ready to be shipped to Younicos test center in Berlin. There, the FIAMM battery will be integrated with the IDT inverter and the integrated battery-inverter prototype will undergo several tests before it gets to the island of Tilos for commissioning.

- **Forecasting Models**

According to the current plan, the different forecasting models that have been developed under WP6 are set to be integrated in a single forecasting platform by the end of October 2016. At the same time, the architecture for the integration of the forecasting platform to the SCADA is also under development, while forecasting models are further elaborated in order to meet the needs of the different dispatch strategies that will apply for the TILOS system operation.



- **Training Seminars**

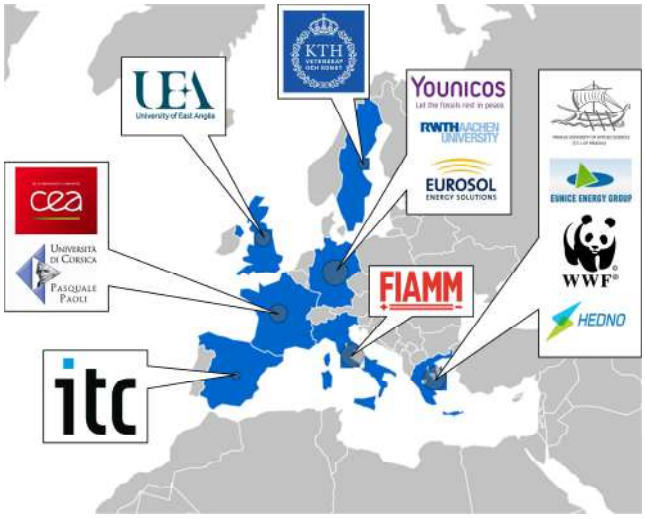
In mid-April 2016, WWF Greece conducted the final training seminar of the first round of seminars to the citizens of Tilos island. Aiming at mobilizing and educating all the people of the island, the seminar was divided in two separate sessions; one concerning the students of the island and another for the adults. Worth mentioning, all 23 students attended the seminar, expressing genuine interest in the TILOS project.

- **Microgrid Simulator**

To validate the energy management algorithms of the TILOS system operation, a dedicated microgrid simulator is developed by the TILOS team. In a parallel work stream, the TILOS team also looks at the development of the Extended Microgrid Simulator, suitable for the conduction of feasibility studies and able to simulate different kinds of RES-storage configurations, for both stand-alone and market-based applications. Design features of the latter are currently under elaboration by the TILOS team, with the main goal being to produce a user-friendly tool that can enable local communities to evaluate the potential for the establishment of energy schemes similar to the one of TILOS.

4. Project Partners - Consortium

The consortium involves 13 partners from 7 countries in Europe: Greece, Italy, France, UK, Spain, Germany and Sweden. Because of this geographical spread, the project reflects to different markets, strategies and policies across Europe.



Note: SMA and SHNG (along with third party E.ON) do not belong to the TILOS team anymore. TILOS partners are grateful for their contribution and support up to the point that their participation was terminated.

Coordinator

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Project Partners

Piraeus University of Applied Sciences - Former Technological Educational Institute of Piraeus **(TEIP)** http://teipir.gr/; http://sealab.gr/
RWTH Aachen University **(RWTH)** https://www2.isea.rwth-aachen.de/de
Commissariat à l'énergie atomique et aux énergies alternatives **(CEA)** http://www.cea.fr/
Eunice Energy Group (**EUNICE**) http://www.eunice-group.com/
Eurosol P&M GmbH (**EUROSOL**) http:// http://www.eurosol.eu/
FIAMM Energy Storage (**FIAMM**) http://www.fiamm.com/
Hellenic Electricity Distribution Network Operator S.A. **(HEDNO)** http://www.deddie.gr/
Instituto Tecnológico de Canarias SA **(ITC)** http://www.itccanarias.org/
Kungliga Tekniska Högskolan (**KTH**) https://www.kth.se/
University of Corsica Pascal Paoli **(UCPP)** http://spe.univ-corse.fr/
University of East Anglia **(UEA)** https://www.uea.ac.uk/
World Wide Fund for Nature **(WWF)** http://www.wwf.gr/
Younicos **(YOUNICOS)** http://www.younicos.com/

Related news and conferences:

COMECAP 2016

The 13th International Conference on Meteorology, Climatology and Atmospheric Physics will be held at Thessaloniki, between the 19th and the 21st of September, 2016, and will be hosted at the Aristotle University Research Dissemination Center.

The Conference aims to present state of the art methodologies, modeling tools, theoretical approaches, measurements, modeling results and to provide a forum for discussion and debate on disciplines that attract the interest of the international scientific community.
http://comecap2016.geo.auth.gr/

Solar Technologies and Hybrid Mini Grids

This new international conference, held in Frankfurt between September 21-23, 2016, aims to consolidate the knowledge around solar-based hybrid mini grid solutions, proven to work, and on enabling factors.
http://www.energy-access.eu/

ICAE2016

The 8th International Conference on Applied Energy is held between October 8-11, 2016, in Beijing, China. Its theme is "Transformative Innovations for a Sustainable Future" and includes topics such as: Renewable Energy, Energy Storage, Intelligent Energy Systems, etc.
http://www.applied-energy.org/icae2016/

MedPower2016

The Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion (MedPower) will be held between 6-9 November, 2016, in Belgrade, Serbia. It will focus on topics of interest to the Electric Power Industry, intending to address the significant technological changes in all areas of the electrical energy domain, including business, products and methods.
http://www.medpower2016.com/