## **StoRES**



Project co-financed by the Europear Regional Development Fund

Promotion of higher penetration of Distributed PV through storage for all



## Dear Readers,

It is our pleasure to welcome you to the third edition of the StoRES Newsletter! "StoRES — Promotion of higher penetration of Distributed PV through storage for all" is an ambitious Interreg MED modular project, implemented by a consortium of 18 highly capable and well established organisations (both private and public) spanning across the Mediterranean region.

Through this edition we would like to share with you news about the progress of the project.

If you would like to keep up to date with all the latest developments of our project follow us on Facebook & Twitter.

Kind Regards, The StoRES Consortium IN THIS ISSUE

#### **PILOT INSTALLATIONS**

#### **PROJECT MEETING**

#### **PROJECT NEWS**

#### **EVENTS PARTICIPATION**

## **About StoRES**









StoRES aims to increase the PV penetration in the energy mix of islands and rural areas in the MED by integrating PV and ESS under an optimal market policy by removing the constraints of grid reliability and RES intermittency.

The challenge is to achieve high PV penetration in their energy mix through solving all market/technical/grid/tariff issues without compromising grid stability and security of supply.

The project involves regions facing specific needs and challenges: islands with isolated networks, almost 100% fossil-fuel dependency and increasing energy demand; rural areas exhibiting weaker networks, possibly greater energy needs, and higher environmental impact. As a result, pilot installations areas include Cyprus, Italy, Spain, Greece and Portugal.

The objective of the pilots are to achieve a high PV penetration in the energy mix of each area, while solving all market/technical/grid/tariff issues without compromising grid stability or security of supply.

The demonstration sites with existing PV systems (3-5 kWp) and smart meters feature:

- Local weather forecasts for solar power generation prediction
- Control for all compliance household devices
- Maintain on-grid connectivity during system frequenct disturbance incidents
- Time of Use tarrifs





# Pilot Installations in MED regions

StoRES foresees the development of an optimal policy for the effective integration of photovoltaics (PV) and energy storage systems (ESS) via testing smart solutions in 5 MED islands and rural areas.

The objective is to boost PV self-consumption in the MED through an optimal storage solution. The approach is to test PV storage solutions for the consumer in different pilot sites taking into account local parameters for optimization and using efficiency measures.

In order to develop an optimal policy for the effective integration of photovoltaics (PV) and energy storage systems (ESS), the StoRES project tested the smart solutions in 6 islands and rural areas. Pilot installation areas include Cyprus, Greece, Italy, Portugal, Spain and Slovenia.

StoRES counts 33 pilot plants!









The StoRES Consortium met in Zaragoza, Spain on the 17-18th May 2018 in order to discuss the project progress to date. During day 1 of the meeting all the partners gave an overview of the status in their regions in relation to their pilot installations, the obstacles and challenges faced, as well as possible solutions. On the second day of the meeting on the 18th May, SARGA organised a visit to one of the StoRES pilot sites in Zaragoza, where the Partners had the opportunity to see the pilot installation and discuss with the prosumers their experience. Project meeting in Zaragoza 17-18 May 2018

#### **Events Participation**

Algarve Estratégia 2030 de Energia 2000 de Energia Administration partie à Administration Administration partie administration Administration partie à Administration Administration partie administration Administration Administration

#### "ALGARVE 2030 - REGIONAL ENERGY STRATEGY"

StoRES participated in the event organised by the Algarve Commission of Coordination and Regional Development and supported by the members of the Energy Working Group within the framework of the Algarve Regional Innovation Council.

#### "MADE IN MED - CRAFTING THE FUTURE MEDITERRANEAN"

Representatives of the StoRES team from Cyprus, France, Italy, Slovenia and Spain were actively present at the Interreg Med Programme's mid-term event "MADE in MED – Crafting the future Mediterranean" on the 18th and 19th April 2018, in Rome, Italy. The event, which was designed in accordance with the concept of Fablab: "Fabrication Laboratory", provided a unique opportunity for the presentation of the first results of 90 projects through a conference and an exhibition, experience the Mediterranean territorial cooperation and connecting with people sharing the same motivations.



#### 12TH IEEE CONFERENCE

Representatives of the StoRES team from Cyprus were invited to lecture at the "IEEE 12th International Conference on Compatibility, Power Electronics and Power Engineering" event on the 10-12 April 2018, in Doha, Qatar.



#### EUROPEAN MOBILITY WEEK

Project partner AREAL participated in the European Mobility Week, which took place from 16 to 22 September, focusing on the recent developments of the StoRES project. AREAL took advantage of the presence of the group of stakeholders to present StoRES.

#### NOVEMBER, 2018

#### **Events Participation**

#### 6TH INTERNATIONAL CONFERENCE ON RENEWABLE ENERGY SOURCES AND ENERGY EFFICIENCY (RESEE2018)

The 6th International Conference on Renewable Energy Sources and Energy Efficiency (RESEE2018) followed the five successful editions held in Nicosia. The aim of the conference was to bring together all the key stakeholders interested in renewable energy sources and energy efficiency to share and discuss advances and developments in this field. Researchers, scientists, manufacturers, companies, communities and agencies, attended the conference. The thematic areas of the conference covered all topics of renewable energy as well as energy efficiency in all sectors. StoRES participated with a poster presenting some early results from the CY pilots.







#### NOVEMBER, 2018

#### **Events Participation**

#### EFFICIENT BUILDINGS AND RENEWABLE ENERGY MED COMMUNITY CONFERENCE



On the 18th and 19th of October, StoRES participated at the Efficient Buildings & Renewable Energy MED Community Conference, which was organized in the framework of the Interreg MED programme in Ljubljana (Slovenia). During the Conference, StoRES showcased its energy storage solution with the battery.

The conference was attended by partners of all Interreg MED Modular Projects from the two Thematic Communities: Efficient Buildings Community and Renewable Energy Community. The conference was organized with the support and in the presence of the EU Director General for Energy.



The conference objectives were to:

- Showcase solutions for an efficient, inclusive and renewable energy model in the Mediterranean area.
- Gather experts from the energy/environmental sector to explore new synergies and share best practices and innovative ideas.
- Understand the current state, the challenges and the assets of the energy sector in the Mediterranean area.
  Formulate recommendations for the improvement of the energy sector in the Mediterranean area.



#### 53RD INTERNATIONAL UNIVERSITIES POWER ENGINEERING CONFERENCE (UPEC 2018)

Project partner Prof. Grigoris Papagiannis from AUTH represented StoRES at the 53rd International Universities Power Engineering Conference that took place on the 4th-7th of September 2018 in Glasgow (Scotland). UPEC 2018 is the 53rd session of a successful series of International Power Engineering Conferences, and targets mainly young researchers and engineers of power technology. With a participation of more than 300 papers and 400 delegates, the UPEC Conference offers a very good opportunity for a wider dissemination of research and experimental results.

Given the major challenges now facing the electrical power industry, and the energy sector in general, the conference provided an ideal opportunity to address some of these challenges. It also provided the opportunity to network and to meet the experts in these areas. The Conference subject areas included topics related to the StoRES project, such as Distributed Generation, Renewable Energy Systems, Smart Grids, Energy Storage.

StoRES partners submitted a scientific paper related to project results titled "A Sizing Method for Decentralized Energy Storage Systems Operating Under a Peak Shaving Control Strategy" and delivered a presentation to more than 50 delegates.



#### EARLY RESULTS FROM THE RESIDENTIAL PILOTS

Charge/discharge process on a typical day with frequent battery usage



This figure presents the charging and discharging (positive and negative values in the graph respectively) power (Watts) of the battery unit, during a day that required frequent use of the battery (in simple words a lot of charging and discharging during the course of the day). As the pilots are located nearby, the PV production is similar, so the pilot's consumption is the parameter mainly affecting the behaviour of the battery.

As the rated power of the battery system is 2.5 KW (2500 W, the max/min values seen in the graph), it can be observed that the power sizing of the battery (those 2.5 KW) was done correctly and that this power ability can cover both the power needs of the households and is also enough to charge the battery with surplus PV generation.

#### Average Self-consumption Ratio with and without storage during the summer months



Average value from the pilots for the three months of summer. The case of storage and a no-storage scenario are presented.

The self-consumption shows how the PV energy is consumed (via the household - direct consumption or via battery charging).

The equation used is:

SCR = (Direct PV Consumption + Battery Charge) / (Total PV Production)



Average value from the pilots for the three months of summer. The case of storage and a no-storage scenario are presented.

The self-sufficiency shows the amount of PV energy consumed (via the household - direct consumption or via battery discharging) over the total energy consumption of the household.

The equation used is:

SSQ = (Direct PV Consumption + Battery Discharge) / (Total Household Consumption)

Average Grid feed-in power to PV Production with and without storage during the summer months



**Average Grid Feed-in Power to PV Production** 

Average value from the pilots for the three months of summer. The case of storage and a no-storage scenario are presented. A ratio of surplus power that is injected to the grid from the household over the total PV generation.



#### INTERNATIONAL WORKSHOP ABOUT ENERGY CONSUMPTION, BEHAVIOUR CONSUMPTION PRACTICES AND REBOUND EFFECT

The workshop took place in Maribor, Slovenia on the 10th of May 2018 and was organized within the framework of the TOGETHER project by the University of Maribor. The workshop focused on how to modify consumers' behaviour and their energy demand through various methods with concrete cases and practical experiences and with the support of field experts and ambassadors of other EU funded projects! The aim of the workshop was therefore to let participants think outside the box and make them aware of different integrated perspectives that may trigger energy efficiency. The workshop was attended by approximately 40 academics, public authority officials, decision-makers and other stakeholders.



#### ETIP SNET SOUTH-EASTERN REGION WORKSHOP

The ETIP SNET Workshop on Smart Grids was organized in Croatia on September 19th-20th, 2018 and its objective was to discuss the priorities related to Smart Grids set out in the European Commission proposal for a new electricity market design, exchange experience on the role of the Smart Specialization Platform on Energy (S3PEnergy) and on the regional innovation policy activities.



5th StoRES project partner meeting (Lyon, France)

#### FORTHCOMING EVENTS



#### Nov 18

POLLUTEC 28th international trade show for environmental equipment, technologies & services (Lyon, France)



SynERGYMED2019 1st Conference on Energy Transition in the Mediterranean Area (Cagliari, Sardinia)



May 19

6th StoRES project partner meeting

### University of Cyprus

### University of Cyprus (UCY)

UCY, through its Research Centre for Sustainable Energy (FOSS), plays a key role in research and technological development activities in the field of sustainable energy within Cyprus and at international level with the aim of contributing to the achievement of the relevant energy and environment objectives set out by Europe. In particular, FOSS strives to become a centre of excellence in energy that will act as a structure where world-standard R&D work can be performed, in terms of measurable scientific production (including training) and/or technological innovation.

George E. Georghiou geg@ucy.ac.cy

#### Aristotle University of Thessaloniki

The project will be executed by the Power Systems Laboratory (PSL) which is running since 1980 and has been involved in 140+ European, bi-lateral and national projects, related to research and development of power systems, renewable energy sources, electric power and consumption control, environmental impacts from power generation, applications of Information Technologies and energy efficiency (http://power.ee.auth.gr/). The PSL and the team members involved in this project have significant experience in all topics related to power systems analysis, operation and control, modelling, power line, communications, distributed generation and smart grids, power electronics, harmonics, power quality, electrical drive systems and renewable energy sources.

Grigoris Papagiannis grigoris@eng.auth.gr Giorgos Christoforidis gchristo@teiwm.gr

## AREAL – Regional Energy and Environment Agency of Algarve

AREAL is a non-profit private Association, whose main goal is to work for the implementation of Regional Energy Politics as a way to contribute for the Algarve Sustainable Development. With international cooperation, AREAL will look for a More Efficient Use of Energy aiming to improve the actual usage of Algarve great potential of renewable Energy Sources. AREAL will benefit from this project by internalizing and disseminate the knowledge that will be acquired from the cooperation between all the partners involved.

Cláudio Casimiro ccasimiro@areal-energia.pt



ARISTOTLE UNIVERSITY OF THESSALONIKI





#### SARGA - Government of Aragon

SARGA executes and provides assistance and advice to the Government in the passing of regulations and strategy definition. Through the Aragon Strategy for Climate Change and Clean Energies & Energy Plan for Aragon, it has developed & implemented an energy policy that aims to contribute to the maintenance of energy supply quality and the improvement of energy efficiency. This is in consonance with the priority 4C of Aragon ERDF Operational Plan: 0.4.3.1 "Improvement of energy efficiency and emissions reduction in public buildings" & OE.4.3.2 "increase the use of renewable energies for the production of electricity and use of thermal solutions in public buildings and infrastructures, placing specific interest in micro-generation".

Javier Sancho jsancho@sarga.es

#### OBČINA SLOVENSKA BISTRICA



#### Municipality of Slovenska Bistrica

The Municipality of Slovenska Bistrica is organized under the Local Self-Government Act (Official Gazette of RS, no. 94/07) and is the basic local self-governing community of settlements, which are associated with common needs and interests of their citizens. Municipality is managing 45 public buildings and want to (in the frame of energy management) implement some of the actions from the Local energy concept. For example: extended energetic examination of public buildings, case studies about possibilities for Hydro, Wind, Solar, biomass and Bio gas usage/exploitation, new PV installations on public buildings etc.

Tomaž Pristovnik tomaz.pristovnik@ric-sb.si



#### Regional Energy and Environment Agency in Rhône-Alpes

The Regional Energy and Environment Agency in Rhône-Alpes is in charge for the development of sustainable energy projects and programs both at regional, but also local levels. The objective of the Regional Energy and Environment Agency in Rhône-Alpes is to mobilize public authorities and other key stakeholders at regional and local levels in order to develop new policies and introduce new instruments having a significant impact on the development of sustainable energy projects within the region.

Noemie Poize noemie.poize@raee.org



#### Ministry of Energy, Commerce, Industry and Tourism

The Energy Service has the overall responsibility of Energy in Cyprus, including the promotion and utilization of RES & the formation of the national energy policy for Cyprus. In this capacity the Energy Service is keenly interested in the further development of PV in Cyprus through the adoption of appropriate policy, market rules and supporting technologies. To this effect the proposed project StoRES is aligned with the objectives of the Energy Service and thus the Energy Service is interested to play an active role in completing the planned installations and identifying the benefits of using distributed storage facilities in support of PV sources of energy.

George Partasides gpartasides@mcit.gov.cy



#### Municipality of Ussaramanna

The members of municipality of Ussaramanna can share important skills and experiences in European project design as well as in the Sustainable Energy field. They have in particular a good know-how in electrical engineering such as electrical power system, and good knowledge of electrical distribution networks and smart grids. In addition, administrators have several experience and skills in managing European projects. The Municipality of Ussaramanna is already signatory of the Covenant of Mayors and the relevant SEAP implementation is already started and in progress. This SEAP involves local integrating actions of 18 Municipalities, as well as global actions for the whole territory of the "Municipalities Union of Marmilla".

Marco Sideri sindaco@comune.ussaramanna.vs.it



Αρχή Ηπεκτρισμού Κύπρου Electricity Authority of Cyprus

#### Electricity Authority of Cyprus/Distribution System Operator

The DSO is the organisation responsible for the efficient, reliable and secure operation, maintenance & expansion of the electricity distribution system. The DSO is responsible for the integration of distributed RES in the distribution network of Cyprus. The technical staff have great experience regarding the integration of PVs into the energy mix, identifying possible problems and troubleshooting. Also, it has great experience in designing technical solutions for the integration of domestic PV systems to the electricity grid. The involvement of the DSO of Cyprus in this project is of vital importance.

Tasos Gregoriou TGregori@eac.com.cy

#### **Associated Partners**

Mediterranean Technology Platform for Smart Grids Venizelos Efthymiou vefthymiou@hotmail.com

University of Cagliari Susanna Mocci susanna.mocci@diee.unica.it

Cyprus Energy Regulatory Authority Andreas Poullikkas andreas.poullikkas@cut.ac.cy

Autonomous Region of Sardinia – Regional Planning Centre Massimo Carboni mascarboni@regione.sardegna.it

Federacion Aragonesa De Municipios Comarcas Y Provincias Romina Magni De Antonio rmagni@famcp.org

Ministry of Environment and Energy/General Secretariat of Energy and Mineral Raw Materials/General Directorate of Energy/Directorate of Renewable Energy Sources and Electricity Papadogianni Aikaterini papadogiannia@prv.ypeka.gr

Municipality of Kozani Despotidis Konstantinos Programmatismos@kozanh.gr

HEDNO S.A. (Hellenic Electricity Distribution Network Operator S.A.) Dimitrios K. Lianas D.Lianas@deddie.gr Dimitra Telaki D. Telaki@deddie.gr

EDP Distribuicao Energia S.A. Antonio Aires Messias aires.messias@edp.pt

SODO electricity distribution system operator, d. o. o. Matjaž Vodušek matjaz.vodusek@sodo.si

#### **Project Manager**

For more information please contact the project coordinator Dr. George E. Georghiou, Director of FOSS Research Centre for Sustainable Energy, University of Cyprus, Tel. +357 22892272 email: geg@ucy.ac.cy