



FOSS

Research Centre for
Sustainable Energy

Annual Activity Report 2016



University of Cyprus
Research Centre for
Sustainable Energy

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About the Centre

FOSS Research Centre for Sustainable Energy was created in order to play 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. In FOSS significant research expertise from the University of Cyprus as well as from industry has been assembled that spans a host of fields: Electrical, Mechanical, Civil, Environmental, Chemical Engineering, Physics, Chemistry, Economics, Finance, Computer Science as well as Architecture.



Thematic Areas

- Renewable energy sources (RES) with an emphasis on solar energy
- Distributed generation and microgrids
- Smart electricity networks
- Nearly Zero Energy Buildings (NZEB)
- Enabling technologies including energy storage and ICT

Application Areas and Research Projects

- Energy efficiency and energy saving
- Demand Side Management
- Energy in Smart cities
- Electric mobility
- Integrated services
- Energy Policy and Energy economics
- Education and awareness work on sustainable energy matters

Impact

FOSS aims to be established as a regional research and innovation (R&I) hub of excellence which will generate novel ideas, provide a strong stimulus for interdisciplinary co-operation and be an internationally respected, state-of-the-art training and education centre. The Centre of Excellence will generate an effective research and innovation culture in Cyprus and the surrounding region, promoting effective cooperation between academia, industry and business sectors, as well as contributing to the transfer of knowledge from advanced European clusters to the region. The Centre will create a test-bed and “living lab” in the areas of energy and sustainability and will be a major driver to facilitate commercialization of innovation in energy-related fields in Cyprus, Europe and the Middle East/North Africa (MENA) region.

Message from the Director

In the past year, the scientific and technical staff of FOSS have been fully engaged in the Centre's activities contributing to its academic achievements. 2016 has indeed been a very busy year for FOSS. During this time, the focus has been on efficiently and effectively running FOSS' current large research project portfolio as well as on enhancing the research and innovation (R&I) capabilities of FOSS and the quality of outputs generated towards stimulating excellence and innovation capacity. To this end, FOSS has focused on the project TwinPV ("Stimulating scientific excellence through twinning in the quest for sustainable energy"; Coordinator: FOSS), which is a leading coordination and support activity of Horizon 2020 (H2020). TwinPV aims to enhance the research conducted in FOSS in the field of PV and grid integration in smart grids through targeted twinning activities with two internationally-leading research institutions, namely the Austrian Institute of Technology (AIT) and the Technical University of Denmark (DTU).



A number of foreseen activities have already taken place between the 3 partners such as webinars for training of researchers at FOSS as well as week-long hands-on staff exchanges for training in topics such as PV module analysis reliability, battery use for storage in power systems, and power system simulations. All these activities contribute to building capacity at FOSS through crucial knowhow/best practice transfer from knowledge-intensive partners. As part of TwinPV, efforts have intensified in order to boost further output indicators for FOSS, which include publications, conference proceedings, proposals submitted, successful projects, but also joint projects with industry, and joining international networking fora. Overall, in 2016, FOSS has been very active in short- and long-term internships, networking, dissemination, awareness raising, as well as the development of academic and vocational courses in sustainable energy topics, and addressing industrial requests for testing services for PV components and systems from key companies and research institutions in the field.

Moreover, FOSS researchers have been working hard to attract a number of externally-funded research projects in the quest towards achieving sustainability for the Centre. There has been a large number of research proposals submitted by FOSS in national and European calls for attracting external funding for research. Overall, FOSS has been very successful in attracting competitive funding for research activities through initiatives such as H2020, ERANETMED, SOLAR ERA.NET, Interreg MED, LIFE+, to name a few. This has led to the growth of FOSS with a number of new people joining the team including new PhD students, post-docs, as well as technical and administrative staff. This motivation and hard work of the FOSS team is steadily driving the Centre forward to achieve its envisaged vision for R&I excellence and most importantly contributing to the creation of a critical mass of excellent researchers in a Cypriot university.

Dr. George E. Georghiou

Message from the Chairman

The University of Cyprus and FOSS in 2016 achieved notable results revealing maturity and stable growth paving the way for a bright future. Still though hard work is ahead of us to manage change capable of transforming research and innovation activities into real value for the Cyprus economy.



2016 has seen Europe trying to develop the vision and related policies to strengthen the energy transition process towards the low emission economy. The approval of the 2030 targets aiming for mandatory efficiency growth reaching the very aggressive figure of 30% combined with 40% reduction in the registered emissions give us hope and direction for building the future objectives of FOSS that aim to be responsive and supportive to the Cyprus community.

In line with the above objectives, the Commission put forward the very promising clean energy package and FOSS is more than welcoming the aggressive stance of EU in delivering the required policies that will make the difference in the quest of a bright sustainable future. FOSS is working to align with these objectives and offer its services to the wider community that can deliver actions that can:

1. Mitigate & adapt to climate change and build resilience at local level
2. Trigger the uptake of smart technologies to ensure the optimal management and use of local resources and infrastructures
3. Move away from fossil fuels by tapping the significant renewables and energy efficiency potential
4. Preserve the distinctive natural resources of Cyprus
5. Strengthen social inclusion, education and citizens' empowerment

It is true to say that the world has never experienced such dramatic calls for transition as with what we are currently experiencing. As can be seen from the results achieved by FOSS throughout 2016 our intervention is real and effective. We will continue these endeavours since we truly believe that Cyprus is in a pole position to respond effectively to the objectives of the clean energy package and build a dynamic economy that is resilient and flexible.

FOSS is working hard to keep pace with the fast-changing technology world that we live in and form a responsive group of professionals that adapts to the needs of change with realism and optimism. We have tried to present in this report the most important aspects of the work done in 2016 and we look forward to the future with eagerness and confidence to build on the experience gained that will allow us to positively capture the opportunities that are ahead of us!

Dr Venizelos Efthymiou

Committees

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Dr. Venizelos Efthymiou, University of Cyprus
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Prof. Costas Georghiades, Texas A&M University

Dr. George E. Georghiou, University of Cyprus
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Dr. Ioannis Krikides, University of Cyprus

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Academic Committee

Dr. Charalambos A. Charalambous, Department of Electrical and Computer Engineering

Prof. Charalambos D. Charalambous, Department of Electrical and Computer Engineering

Dr. George E. Georghiou, Department of Electrical and Computer Engineering

Dr. Demokratis Gregoriadis, Department of Mechanical and Manufacturing Engineering

Dr. Andreas Kyprianou, Department of Mechanical and Manufacturing Engineering

Dr. Marina Neophytou, Department of Civil and Environmental Engineering

Prof. Panos Papanastasiou, Department of Civil and Environmental Engineering

Dr. Marios C. Phocas, Department of Architecture

Dr. Panayiota Pyla, Department of Architecture

Members

Dr. Charalambos A. Charalambous, Department of Electrical and Computer Engineering

Prof. Charalambos D. Charalambous, Department of Electrical and Computer Engineering

Dr. George E. Georghiou, Department of Electrical and Computer Engineering

Dr. Demokritos Gregoriadis, Department of Mechanical and Manufacturing Engineering

Dr. Christos Hadjichristos, Department of Architecture

Dr. Stavros Kassinos, Department of Mechanical and Manufacturing Engineering

Dr. Andreas Kyprianou, Department of Mechanical and Manufacturing Engineering

Dr. Alexandros Arsalis, Department of Mechanical and Manufacturing Engineering

Dr. Aimilios Michael, Department of Architecture

Dr. Marina Neophytou, Department of Civil and Environmental Engineering

Prof. Panos Papanastasiou, Department of Civil and Environmental Engineering

Dr. Marios C. Phocas, Department of Architecture

Dr. Panayiota Pyla, Department of Architecture

Dr. Andreas Savvides, Department of Architecture

Memberships

European Distributed Energy Resources Laboratories (DERlab)

DERlab is the association of leading laboratories and research institutes in the field of distributed energy



resources equipment and systems. The association develops joint requirements and quality criteria for the connection and operation of distributed energy resources (DER) and strongly supports the consistent development of DER technologies. DERlab offers testing and consulting services for distributed generation (DG) to support the transition towards more decentralised power systems. The various activities in research, pre-standardisation can be found at: <http://der-lab.net/>

EERA AISBL

Since April 2014, the European Energy Research Alliance EERA AISBL, as an international not-for-profit association by Belgian law, is formally the organization that works on Energy Research at European level to deliver on the SET Plan. AISBL stands for Association internationale sans but lucratif (International Non-Profit Organization). EERA AISBL has been established to obtain legal capacity to operate. The purpose of the Association is to strengthen and to expand Europe's capabilities in sustainable energy research by connecting and joining European energy research activities. The coordinated and streamlined efforts of the Association, in particular the coordinated joining of different public research programmes at regional, member state and European level, shall enable all stakeholders of energy research to optimise their research efforts and to overcome fragmentation in order to accomplish a strategic and targeted development of next generations of energy technologies. The efforts of the Association take place in the context of and contribute to the targets formulated in the Strategic Energy Technology (SET) Plan. More details can be found at: <https://www.eera-set.eu/>



European Energy Research Alliance (EERA) Joint Programme for Smart Grids

The European Energy Research Alliance (EERA) contributes to coordinate a massive public research effort to develop more efficient and cheaper low carbon energy technologies. Wind turbines and solar panels, building a “smart” electricity grid, harnessing energy from the oceans and underground heat sources, as well as finding new ways to store and use energy instead of wasting it. EERA is the public research pillar of the EU Strategic Energy Technology Plan (SET-Plan). This tightly focused strategy aims at accelerating the development and market uptake of key low carbon technologies. The Joint Programme on Smart Grids was officially launched at the SET Plan Conference in Madrid (3-4 June 2010). The Joint Programme, coordinated by RSE and ENEA from Italy by means of an extended cross-disciplinary cooperation involving many Research and Development (R&D) participants with different and complementary expertise and facilities, aims at addressing in a medium- to long-term research perspective, one of the most critical areas directly relating to the effective acceleration of smart grid development and deployment. More details can be found at: <http://www.eera-set.eu/eera-joint-programmes-jps/smart-grids/>

The Association of European Renewable Energy Research Centres (EUREC)

EUREC, is the leading association representing research centres and university departments active in the area of renewable energy. EUREC was founded in 1991 as European Economic Interest Grouping (E.E.I.G.) with the goal of improving the quality and scope of European research and development in renewable energy technologies. The purpose of the association is to promote and support the development of innovative technologies and human resources to enable a prompt transition to a sustainable energy system. EUREC is the voice of renewable energy research in Europe, representing European Research Centres active in renewable energy. More details can be found at: <http://www.eurec.be/en/>



International Energy Agency

The International Energy Agency (IEA) Photovoltaic Power Systems Task 13 workgroup aims to improve the operation, reliability, electrical and economic outputs of photovoltaic (PV) systems. The workgroup focuses to provide reliable information to the PV industry with respect to the different PV applications



and system locations (e.g. different countries, regions, and climates), technical issues such as adapting test methods and lifetime assessments and optimization of PV systems economic and institutional issues such as the comparison of investment costs and energy costs. FOSS members have been invited to participate as observers contributing to the activities of this initiative.

Services to the Community

Education

Members of FOSS provide teaching to students of the University of Cyprus, at undergraduate and postgraduate level. Also, for masters projects, students receive guidance from the faculty of FOSS Research Centre for Sustainable Energy. FOSS also provides vocational training courses to professionals on energy issues.



Academic Courses

ECE447: Renewable Energy Sources: Photovoltaics

This course covers theoretical and practical aspects of photovoltaic technology and in particular introduces students to aspects of solar generation, technology characteristics, design principles and system types. The course covers the following: Introduction to renewable energy sources with main emphasis on photovoltaic (PV) energy conversion. Current state in Cyprus and potential. Types of photovoltaic systems. History of photovoltaic technology development. Current status: Technology, Policy, Markets, System Design and Sizing, Grid integration.

ECE687: BIPV - Towards nearly zero energy buildings (NZEB)

This course covers theoretical and practical aspects of building integrated photovoltaics (BIPV) in the realm of nearly zero energy buildings (NZEB). The objective of the course is to train students in NZEB strategies and technologies in order to accelerate the adaptation of the recast EU Energy Performance in Buildings Directive (EPBD), which includes the obligation for all public buildings constructed after the 31st December 2018 and all buildings constructed after the 31st December 2020 to meet the EPBD NZEB standard.

Vocational Training

PV System Designer and Installer

This course covers theoretical and practical aspects for trainees to develop skills and understanding on the design and installation of both stand-alone and grid-connected photovoltaic (PV) systems alongside



with innovative topics such as self-consumption, smart meters and storage. The main topics covered throughout the course include initial site assessments of the installation area using site-survey equipment, risk assessment analysis, system design, installation and basics of commissioning, maintaining and troubleshooting PV systems. Emphasis is also given to all the requirements of a grid-connected PV system according to all related international standards with main focus the design qualification and type approval requirements of terrestrial PV modules, as outlined in IEC 61215 and 61646. The general performance testing requirements according to IEC 62446 are also defined.

Grid connected PV System minimum requirements for system documentation, commissioning tests and inspection according to EN 62446

Ensuring the long-term quality and safety of a PV system is a necessary requirement in order to assure the best performance and to minimize risks of failure. In addition, the periodic verification of system performance is of utmost importance so as to check whether the system complies with warranty and equipment guarantees, minimizing in this way investment risks. This course covers theoretical and practical aspects for trainees to develop skills and understanding on the minimum requirements for documentation, commissioning and inspection of grid connected PV systems according to IEC 62446. Candidates have the opportunity to operate professional state-of-the-art equipment (located only in a few places globally) and to be trained by worldwide renowned personnel.

Course on Nearly Zero Energy Buildings (NZEB)

At the end of 2015, a series of free postgraduate level training courses in Nearly Zero Energy Buildings (NZEB) began around Europe as part of the European project MEnS (<http://www.mens-nzeb.eu>). In Cyprus the courses are offered by the University of Cyprus and specifically FOSS Research Centre for Sustainable Energy. These courses aim to empower building professionals through the development of skills in energy efficiency and integration of renewables in the retrofit of existing housing stock. The objective of the course is to train building professionals in NZEB strategies and technologies in order to accelerate the adaptation of the recast EU Energy Performance in Buildings Directive (EPBD), which includes the obligation for all public buildings constructed after the 31st December 2018 and all buildings constructed after the 31st December 2020 to meet the EPBD NZEB standard. The focus of the courses will be on the renovation of existing housing stock.

Educational and Testing Centre

FOSS Research Centre for Sustainable Energy has recently become an Educational and Testing Centre, certified by the Ministry of Energy, Commerce, Industry and Tourism. We will keep the public updated about these new educational goals. FOSS extends its offer to the society by conveying knowledge acquired through its research activities and provides training and education courses to professionals.

School visits

Over 250 schools have visited FOSS's PV Technology facilities to learn more about photovoltaic technology. Children have the opportunity to be exposed to the latest technologies through experiments. The presentation covers the outdoor and indoor infrastructure and tests carried out on a daily basis. At the outdoor facility the students understand the operation of both a grid-connected and stand-alone PV system. At the indoor infrastructure they see the equipment (climatic chamber and sun simulators) required for the indoor simulation of PV cells and modules.



Government, Local / Regional Authorities and Industrial Services

One of FOSS 's prime objectives is to provide constant support to the various government departments, municipalities / communities and the local industry. Attempts will be continuous for building trust and be in a position to positively intervene in the day to day issues that are worrying the government, local communities and the local industry to offer services for valued solutions whenever the need arises. As covered in other areas of this report, FOSS is already cooperating on these issues signing MoU wherever needed and responding to requests for support on specific issues. FOSS can be the catalyst for informed solutions to all energy related problems that the Cypriot community is facing and we will gladly take this role since we consider it to be one of the prime objectives for the establishment of universities and more specifically for the creation of the research centre FOSS and giving it the multi-discipline character and content that is currently enjoying.



Public Awareness

Workshop for the Cyprus PV Industry organised by FOSS Research Centre For Sustainable Energy (FOSS), Austrian Institute Of Technology (AIT) and Denmark Technology University (DTU)

A workshop on photovoltaics (PV), grid integration and funding of the next wave of PV expansion in Cyprus, took place on the 13th and 14th of December 2016 at the University of Cyprus. The intensive two-day workshop for the Cyprus PV industry was hosted by the PV lab and FOSS research Centre for Sustainable Energy of the University of Cyprus (UCY) and their close



collaborators Austrian Institute of Technology (AIT) and Denmark Technology University (DTU). The workshop was funded from the European Union's Horizon 2020 research and innovation programme through the project TwinPV under the agreement No. 692031. The project aims to enhance the research conducted at UCY and to improve the competitiveness of the Cypriot industry through targeted activities

with two internationally-leading research institutions, AIT and DTU. Furthermore, the project aims to develop and sustain the Cypriot Energy Community, which will play a leading role in future activities in the field of energy in Cyprus.



A total of 75 participants, most of them from the industry and Cypriot energy related agencies had the opportunity to interact and learn directly from DTU and AIT, Deloitte Cyprus, the Research Promotion Foundation, the Cyprus Association of Renewable Energy Enterprises, the Cyprus Federation of Employers & Industrialists, and the Electrical Authority of Cyprus. The workshop was also briefly attended by His Excellency Dr. Karl

Michael Mueller ambassador of Austria to Cyprus who views this as an opportunity for a wider technological cooperation between Austria and Cyprus. Topics at the workshop covered PV fundamentals, emerging technologies, smart grids, network integration, funding and investment opportunities. The

workshop focused on how all those developments impact and benefit the Cyprus PV industry. It was particularly inspiring to hear innovative crowdfunding schemes from our partners at AIT and to see the very high penetration of renewable energy achieved in Denmark. Cyprus can draw from those experiences to overcome the challenges that come with increased use of renewable energy.

Workshop on Islands or weakly linked grids with high potential for market mature Renewable Energy Sources (RES)

On the 11th-13th May 2016 the SmartPV consortium and the FOSS Research Centre for Sustainable Energy, hosted the 24th Steering Committee of the European Energy Research Alliance (EERA) Joint Programme (JP) on Smart Grids in Cyprus together with the progress meeting of the ELECTRA EU project. The meetings were further combined with a workshop addressing the very interesting theme of Islands and / or weakly linked grids with high potential of market mature RES. The events in Cyprus were well attended by members of the ELECTRA consortium coming from 16 countries and aiming to enrich the networking experience with Cypriot researchers and especially with the consortium members of the LIFE+ project SmartPV.



Through the support of FOSS Research Centre for Sustainable Energy, which is a full member of EERA JP on Smart Grids, the International Workshop was organized on the 11th May 2016 at the new



Campus of the University of Cyprus. The Vice Rector for International Affairs, Finance and Administration of the University of Cyprus, Professor Constantinou P. Constantinou, welcomed the participants and underlined the importance of promoting sustainable technologies in the energy mix of Cyprus. He concluded with the strong message that the University of Cyprus aims to be a fully green campus supported by locally generated PV energy and complemented with storage and smart grid systems for optimal energy use. All relevant stakeholders from Cyprus such as the Ministry of Energy, Commerce, Industry and Tourism, Cyprus

Energy Regulatory Authority, the Distribution System Operator and the Cyprus Transmission System Operator together with the private sector predominantly represented by Deloitte, actively contributed to the success of the event. The workshop participants also had the opportunity to be updated on the progress of the SmartPV project and in particular on the dynamic tariffs to be shortly applied to the electricity bills of the 300 prosumers participating in the project in an attempt to promote demand side management and energy efficiency.

Educational Workshop on Nearly Zero Energy Buildings (NZEB)

The University of Cyprus and FOSS Research Centre for Sustainable Energy organised an educational workshop on Nearly Zero Energy Buildings (NZEB). The event took place on Wednesday, 1st June 2016.

Distinguished speaker, Professor Andreas Athienitis, Director of the Centre for Zero Energy Building Studies at Concordia University in Montreal, Canada and Director of the Canadian Strategic Research Network on Smart NZEB delivered a speech on “Modeling and design of Smart Net Zero Energy Solar Buildings and communities”. The presentation first focused on modeling and design of such advanced solar buildings to capture solar energy through building-integrated solar systems for simultaneous production of electricity and useful heat, optimally designed windows for capturing passive solar heat gains and daylight and efficient techniques of building-integrated storage. Results from Canadian high performance demonstration buildings under two Canadian strategic research networks were presented with emphasis on modeling and design.



At the end of the workshop, the Graduation Ceremony for the first MEnS graduates took place. The participation certificates were presented to the 30 first MEnS graduates by Professor Andreas Athienitis.

Front Meeting of Skills in Cyprus. Training course on the effective design of Nearly Zero Energy Buildings (NZEB)

The second edition of the Front Meeting of Skills took place between 4th - 6th July 2016 in Nicosia, Cyprus. The venue for the first two days of the FMS was the new campus in University of Cyprus (Nicosia), while the third day the FMS activities comprised a meeting at the Senate building of the University of Cyprus following by technical visits to the chosen case studies.

The FMS is a core activity of the MEnS project and is considered to provide a unique multidisciplinary hands-on experience for participants. The main idea behind FMS is to gather a mix of professionals, unemployed, women and other engineers in disciplines related to buildings and offer them the chance to work upon a real case study of a building either requiring an NZEB retrofit or already having been retrofitted as an NZEB building. This multidisciplinary, and to some extent multinational group, is assisted by highly experience professionals, who interact with them at various stages. Initially, these professionals give specialized presentations on topics that are closely related with NZEB retrofit.



Then, they interact with the participants during the working group sessions, providing them with valuable suggestions and insights. At the end, the working groups present to the entire audience their strategies either prior or after visiting the actual case study. To find out more about MEnS, Meeting of Energy Professional Skills, please visit the project website www.mens-nzeb.eu.

Workshop for the stakeholders organized by the SmartPV project consortium



On the 26th October 2016, a workshop for all stakeholders was organized by FOSS Research Centre for Sustainable Energy, Electricity Authority of Cyprus, Cyprus Regulatory Authority of Cyprus, Ministry of Agriculture Natural Resources and Environment – Environment Department and Deloitte, under the project SmartPV “Smart net metering for promotion and cost-efficient grid-integration of PV technology in Cyprus which is co-financed by the EU through the LIFE Programme. The consortium of the project presented the project implementation framework, the smart meter installation pilot project, as well as the results of the research that contributes to measuring the impact of the project. Stakeholders have shown interest in dynamic tariff implementation and the ability to convert consumers from passive to active users of the electricity grid using smart meters. For more information about the workshop and the project, please visit the following website: <http://www.smartpvproject.eu>.

Awards & Honors

An international award by the Association of European Renewable Energy Research Centres (EUREC) was received by Spyros Theocharides, undergraduate student at the Department of Electrical and Computer Engineering of University of Cyprus until 2016 and now a research associate at FOSS Research Centre for Sustainable Energy. Spyros received the second award for 2016 EUREC Awards: Promoting excellence in Renewable Energy education. EUREC delivers three awards to the best undergraduate students' projects on Renewable Energy. The aim of these prestigious awards is to promote excellence in the study of Renewable Energy, to reward talent and to encourage Renewable Energy debate worldwide. EUREC would like to stimulate interest in research in Renewable Energy and encourage young students to pursue a career in the field. His



dissertation project was **entitled «PV Prediction and Live Monitoring Tool for PV Systems in Cyprus»**. The purpose of the dissertation was to implement a tool in cooperation with the Electricity Authority of Cyprus for anticipating the production of the photovoltaic systems in Cyprus for the next day and these data were delivered to the network operator in order to regulate the production of the electricity generators stations.



The ceremony took place in Brussels, on the 7th October 2016 and the three winners gave a presentation for the projects they developed, in a room full of students and professors of EUREC's Masters programmes.

Publications

Journals

A. Arsalis, A. N. Alexandrou, and G. E. Georghiou. "Thermoeconomic modeling and parametric study of a photovoltaic-assisted 1 MWe combined cooling, heating, and power system", *Energies*. Vol. 9(8), p. 663, DOI: 10.3390/en9080663 [Special issue: Simulation of Polygeneration Systems], 2016.

A. Kyriakidis, A. Michael, R. Illampas, "Parametric Numerical Assessment of the Thermal Performance and Environmental Impact of an Innovative Masonry Construction Component", *Journal of Sustainable Architecture and Civil Engineering*, Vol. 3/16, p. 6-19, SACE, ISSN: 2029-9990, DOI: 10.5755/j01.sace.16.3.16174, 2016.

A. G. Michael, K. C. Alexandrou, P. G. Konatzii, A. K. Kalli, "An Environmental Renovation Strategy based on Adaptive Control Optimisation of a Modular Light Regulating Façade System", *The Built Environment*, Vol. 161, p. 71-82, ISSN 1743-3509, WIT Press, DOI: 10.2495/ARC160071, 2016.

A. Nikolaidis, I. Koumparou, G. Makrides, V. Efthymiou, G. E. Georghiou and C. A. Charalambous, "Reliable integration of a concentrating solar power plant in a small isolated system through an appropriately-sized battery energy storage system", *IET Renewable Power Generation*, Vol. 10, p. 735 – 742, DOI: 10.1049/iet-rpg.2015.0337, 2016.

A. Savvides, A. Michael, E. Malaktou, M. Philokyrou, "Examination and assessment of insolation conditions of streetscapes of traditional settlements in the Eastern Mediterranean area", *Habitat International*, Vol. 53, p. 442-452, Elsevier, DOI: 10.1016/j.habitatint.2015.12.002, 2016.

C. A. Charalambous, P. Aylott, P. and D. Buxton, " Stray Current Calculation and Monitoring in DC Mass-Transit Systems: Interpreting Calculations for Real-Life Conditions and Determining Appropriate Safety Margins ", *IEEE Vehicular Technology Magazine*, Vol. 11, p. 24 – 31, DOI: 10.1109/MVT.2015.2477419, 2016.

C. Lazarou, T. Belmonte, A. S. Chipper and G. E. Georghiou, "Numerical modelling of the effect of dry air traces in a helium parallel plate dielectric barrier discharge", *Plasma Sources Sci. Technol.* 25 055023, doi:10.1088/0963-0252/25/5/055023, 2016.

E. Malaktou, M. Philokyrou, A. Michael, A. Savvides A., "Thermal Assessment of Traditional, Partially Subterranean Dwellings in Coastal and Mountainous Regions in the Mediterranean Climate, The Case of Cyprus", *Journal of Sustainable Architecture and Civil Engineering*, Vol. 3/16, p. 82-96, SACE, ISSN: 2029-9990, DOI: 10.5755/j01.sace.16.3.16155, 2016.

G. C. Christoforidis, I. Panapakidis, T. Papadopoulos, G. Papagiannis, I. Koumparou, M. Hadjipanayi, G. E. Georghiou, "A Model for the Assessment of Different Net-Metering Policies", *Energies*, Vol. 9, Issue 4, p. 262, 2016.

G. Konstantinou and K. Mouloupoulos, "Generators of dynamical symmetries and the correct gauge transformation in the Landau Level problem: use of Pseudomomentum and a Pseudo-angular momentum", *European Journal of Physics*, Vol. 37, Issue 6, Article Number: 065401, 2016.

G. Konstantinou, K. Kyriakou, K. Mouloupoulos, "Emergent non-Hermitian contributions to the Ehrenfest and Hellmann-Feynman theorems", *International Journal of Engineering Innovation & Research*, Vol. 5, Issue 4, p. 248-252, 2016.

M. Hadjipanayi, I. Koumparou, N. Philippou, V. Paraskeva, A. Phinikarides, G. Makrides, V. Efthymiou, G. E. Georghiou, "Prospects of Photovoltaics in Southern European regions", *Renewable Energy*, vol. 92, p. 58-74, July, 2016.

M. Norton, P. Vasiliki, K.P. Robert, and G. E. Georghiou. "Field investigation of the effect of spectral response upon photovoltaic energy yields", *IEEE Journal of Photovoltaics* 6, vol. 3, p.739-745, DOI: 10.1109/JPHOTOV.2016.2523118, 2016.

M. Patsalides, V. Efthymiou, A. Stavrou, and G.E. Georghiou, "A generic transient PV system model for power quality studies", *Renewable Energy*, vol. 89, p. 526-542, DOI: /10.1016/j.renene.2015.12.003, 2016.

M. Theristis, E. F. Fernández, F. Almonacid, P. Pérez-Higueras, "Spectral Corrections Based on Air Mass, Aerosol Optical Depth, and Precipitable Water for CPV Performance Modeling", in *IEEE Journal of Photovoltaics*, vol. 6, no. 6, p. 1598-1604, doi: 10.1109/JPHOTOV.2016.2606702, November, 2016.

Conference Papers

A. Armenakis, C. Stasopoulos, T. Kaskiris, M. Patsalides, V. Efthymiou and G. E. Georghiou, "The impact of simulation studies on the distribution grid operation and planning in Cyprus", 18th Mediterranean Electrotechnical Conference, MELECON 16, Limassol, Cyprus, 18-20 April, 2016.

A. Armenakis, M. Patsalides, V. Efthymiou and G. E. Georghiou, "Power quality analysis of a 2.4 MW wind farm in Cyprus", 5th International Conference on Renewable Energy Sources and Energy Efficiency, Nicosia, Cyprus, 5-6 May, 2016.

A. Arsalis, G. E. Georghiou, A. N. Alexandrou, "Development of a small-scale combined-cooling-heating-and-power system for distributed generation", 5th International Conference on Renewable Energy Sources & Energy Efficiency: New Challenges, Nicosia, Cyprus, 5-6 May, 2016.

A. Arsalis, and A. N. Alexandrou, "Modeling and optimization of a small-scale photovoltaic – electrolyzer – fuel cell system", 5th International Conference on Renewable Energy Sources & Energy Efficiency: New Challenges, Nicosia, Cyprus, 5-6 May, 2016.

A. Arsalis, A. N. Alexandrou, G. E. Georghiou, C. Anastassiou, "Integration of a PV subsystem to a decentralized LNG-fuelled CCHP system", Qatar Foundation Annual Research Conference (ARC'16), Doha, Qatar, 22-24 March, 2016.

A. Arsalis, and A. N. Alexandrou, "Integration of Photovoltaic Technology to Decentralized Liquefied Natural Gas-fueled Combined-Cooling-Heating-and-Power Plants", Qatar Foundation Annual Research Conference Proceedings 2016: EEP1491, 2016.

A. Kyprianou, A. Phinikarides, G. Makrides and G. E. Georghiou, "Forecasting the degradation rate of different photovoltaic systems using robust principal component analysis and ARIMA", 32nd European PV Solar Energy Conference, EUPVSEC 2016, Munich, Germany, 20-24 June, 2016.

A. Kyriakidis, A. Michael, R. Illampas, "Parametric Numerical Assessment of the Energy Efficiency and the Environmental Impact of an Innovative Masonry Construction Component", Proc. of the 5th International Conference On Renewable Energy Sources and Energy Efficiency – New Challenges, Nicosia, Cyprus, Proceedings paper no. 1602, p. 23-33, 05-06 May, 2016.

A. G. Michael, K. C. Alexandrou, P. G. Konatzii, A. K. Kalli, "An environmental renovation strategy based on adaptive control optimisation of a modular light regulating façade system", Proc. of the 6th Int. Conf. On Harmonisation between Architecture and Nature, Eco-Architecture 2016, Alicante, Spain, p. 142-153, 13-15 July, 2016.

A. Michael, M. Philokyprou, S. Thravalou, I. Ioannou, "The Role of the Thermal Mass of Adobe Walls in the Thermal Performance of Vernacular Dwellings", Proc. of the XIIth World Congress of Eastern Architectures, Terra 2016, Lyon, France, 11-14 July, 2016.

A. Michael, O. Kontovourkis, M. C. Phocas, "Architectural Synergies: Participatory Design and Construction of a Pavilion Prototype", Proc. of the 10th International Conference on Architectural Research Addressing Societal Challenges, Couceiro da Costa et.al. (eds), EAAE/ARCC 2016, Lisbon, Portugal, Emerging Fields of Architectural Practice - Research on Architectural Education, Volume 2, ISBN 978-1-138-02966-8, Taylor & Francis Group, CRC Press 2017, p. 1031–1038, DOI: 10.1201/9781315226255-160, 15-18 June, 2016.

A. Phinikarides, G. Makrides and G. E. Georghiou, "Estimation of the degradation rate of fielded photovoltaic arrays in the presence of measurement outages", 32nd European PV Solar Energy Conference, EUPVSEC 2016, Munich, Germany, 20-24 June, 2016.

A. Phinikarides, G. Makrides, G. E. Georghiou, "Analysis of the field performance of a double junction amorphous silicon photovoltaic module and its correlation to standardized testing", in 32nd European Photovoltaic Solar Energy Conference, p. 1992 - 1996, 2016.

C. Lazarou, C. Anastassiou, G. E. Georghiou, "Numerical investigation of the electric field produced by the interaction of helium plasma jet with normal and cancer cells", 6th International Conference on Plasma Medicine (ICPM-6), Bratislava, Slovakia, September 4-9, 2016.

C. Lazarou, G. E. Georghiou, "Investigation of the influence of electron impact cross section from different databases on the simulation results of helium barrier discharge with dry air impurities", ESCAMPIG XXIII, Bratislava, Slovakia, July 12-16, 2016.

G. Charalambous, A. Michael, "Architectural Integration of Technological Breakwaters for Wave Energy Generation and for the Improvement of Marine Corrosion Resistance", Proc. of the 5th International Conference On Renewable Energy Sources and Energy Efficiency – New Challenges, Nicosia, Cyprus, Proceedings paper no. 1608, p. 65-75, 05-06 May, 2016.

G. Makrides, A. Phinikarides, J. Sutterluetti, S. Ransome and G. E. Georghiou, "Advanced performance monitoring system for improved reliability and optimized cost of electricity", 32nd European PV Solar Energy Conference, EUPVSEC 2016, Munich, Germany, 20-24 June, 2016.

G. Makrides, I. Koumparou, J. Bratcher, J. Pratt and G. E. Georghiou, "Thermal classification modelling and energy yield performance of different crystalline silicon photovoltaic modules with innovative packaging components", 32nd European PV Solar Energy Conference, EUPVSEC 2016, Munich, Germany, 20-24 June, 2016.

G. Makrides, A. Phinikarides, E. Herzog, M. Strobel and G. E. Georghiou, "Outdoor performance and modelling study of innovative crystalline silicon photovoltaic modules under warm outdoor conditions", 32nd European PV Solar Energy Conference, EUPVSEC 2016, Munich, Germany, 20-24 June, 2016.

I. Koumparou, G. Makrides, C. Anastassiou, V. Efthymiou and G. E. Georghiou, "Characterisation and classification of daily sky conditions between the 23rd and 27th parallel north for improved energy security", ARC'16, Doha, Qatar, 22 – 24 March 2016.

I. Koumparou, G. Makrides, G. E. Georghiou, "Characterization and mapping of daily sky conditions based on ground measurements of solar irradiance in mainland USA", in 43rd IEEE Photovoltaic Specialists Conference, p. 1 - 6, 2016.

I. Koumparou, G. Makrides, M. Hadjipanayi, V. Efthymiou and G. E. Georghiou, "Characterization and classification of daily sky conditions based on ground measurements of solar irradiance for improved energy forecasting", 5th International Conference on Renewable Energy Sources and Energy Efficiency, Nicosia, Cyprus, 5-6 May, 2016.

M. Patsalides, G. Makrides, A. Stavrou, V. Efthymiou and G. E. Georghiou, "Assessing the Photovoltaic (PV) hosting capacity of distribution grids", The 10th International Conference on Power Generation, Transmission, Distribution and Energy Conversion, MedPower 2016, Belgrade, Serbia, 6-9 November, 2016.

M. Patsalides, V. Efthymiou, C. Anastassiou, and G. E. Georghiou, "Transient PV system models for power Quality Studies", ARC'16, Doha, Qatar, 22– 24 March, 2016.

M. Philokyprou, A. Michael, A. Savvides, E. Malaktou, "Thermal Assessment of Traditional Partially Subterranean Dwellings in Coastal and Mountainous Regions. The Case of Cyprus", Proc. of the 5th International Conference On Renewable Energy Sources and Energy Efficiency – New Challenges, Nicosia, Cyprus, Proceedings paper no. 1606, p. 40-52, 05-06 May, 2016.

M. Theristis, E. F. Fernandez, F. Almonacid, P. Perez-Higueras, G. E. Georghiou, "Analytical solutions for the spectral correction of photovoltaic devices", 6th PV Performance and Monitoring Workshop, Germany, 24-25 November, 2016.

N. Philippou, G. Makrides, C. Anastassiou, V. Efthymiou and G. E. Georghiou, "Dynamic tariff development for effective demand side management (DSM) in the presence of increased penetration of photovoltaics (PV)", ARC'16, Doha, Qatar, 22-24 March, 2016.

N. Philippou, G. Makrides, V. Efthymiou and G. E. Georghiou, "PV integration and demand side management: First results from Cyprus", 5th International Conference on Renewable Energy Sources and Energy Efficiency, Nicosia, Cyprus, 5-6 May, 2016.

N. Philippou, V. Venizelou, G. Makrides, M. Hadjipanayi, V. Efthymiou, G. E. Georghiou, "PV Integration and Price-Based Demand Side Management: Optimum Time-of-Use Tariffs", in 32nd European Photovoltaic Solar Energy Conference, p. 2664 - 2669, Munich, 20-24 June, 2016.

P. Norgaard, H. Binder, A. Thavlov, M. Florides, V. Venizelou, M. Patsalides, C. Anastassiou, G. Makrides, V. Efthymiou, G. E. Georghiou, "Optimised Control of 10MW Photovoltaic (PV) Plant with 1MW / 1MWh Battery", 6th Solar Integration Workshop, Vienna, Austria, 12-14 November, 2016.

R. Illampas, A. Kyriakidis, A. Michael, "Computational Evaluation of the Thermal, Environmental and Structural Performance of an Innovative Masonry System", Proc. of the International Conference on Sustainable Synergies from Buildings to the Urban Scale", SBE16, Thessaloniki, Greece, Proceedings, p. 1-8, 17-19 October, 2016.

S. Thravalou, M. Philokyprou, A. Michael, "The impact of architectural design interventions and occupant interactions on thermal comfort in built vernacular heritage", Proc. of the 2nd International Conference On Energy Efficiency and Comfort in Historical Buildings, EECHB 2016, Brussels, Belgium, p. 102-109, 19-21 October, 2016.

S. Thravalou, M. Philokyprou, A. Michael, "Natural Ventilation Performance of Heritage Buildings in the Mediterranean Climate. The Case of a Two-Storey Urban Traditional Dwelling in Nicosia, Cyprus", Proc. of the 9th International Conference on Making Comfort Relevant, ISBN 978-0-9928957-3-0, Windsor 2016, p. 328-339, 07-10 April, 2016.

S. Gregoriou and A. Michael, "Innovative Renovation Method for the Improvement of Indoor Visual Comfort of Existing Buildings", Proc. of the 4th International Conference on Transparency and Architecture - Emerging Complexities, ICTA2016, Thessaloniki, Greece, 02-04 November, 2016.

W. van Sark, A. Louwen, G. E. Georghiou, G. Makrides, E. Loucaidou, M. Ioannidou, H. Fechner, M. Tabakovic, I. Weiss and S. Arancon, "Development of innovative educational material for building-integrated photovoltaics-Dem4BiPV", 32nd European PV Solar Energy Conference, EUPVSEC 2016, Munich, Germany, 20-24 June, 2016.

Refereed International Scientific Journal Articles after Presentation in International Conferences

D. Demosthenous, A. Michael, M. Philokyprou, "Natural ventilation strategies for cooling purposes in the rural vernacular architecture of Cyprus", Renewable Energy & Power Quality Journal, vol. 14, p. 526-530, ISSN 2172-038X, 2016.

E. Malaktou, M. Philokyprou, A. Michael, A. Savvides, "Environmental Behavior of Semi-Open Spaces in Mediterranean Vernacular Architecture. The Case of Rural Traditional Dwellings of Cyprus", Renewable Energy & Power Quality Journal, vol. 14, p. 599-604, ISSN 2172-038X, 2016.

Projects

Stimulating scientific excellence through twinning in the quest for sustainable Energy

(Twin PV)

Twinning is a European Union instrument that aims at excellence through collaboration with world-renowned research institutions in Europe. The main aim of the project is to enhance the research conducted at the University of Cyprus (UCY) through targeted twinning activities with two internationally-leading research institutions, namely the Austrian Institute of Technology (AIT) and the Technical University of Denmark (DTU). In particular, the aim will be to stimulate excellence and innovation capacity at UCY primarily in the field of photovoltaics (PV) and grid integration in smart grids. Twinning activities will include knowledge transfer and exchange of best practice between AIT/ DTU and UCY. This project will entail significant benefits for all institutions involved in terms of enhancement of their Research and Innovation (R&I) capacity in science and technology and raising their staff's research profile. It is envisaged that by twinning with AIT and DTU, FOSS Research Centre for Sustainable Energy will reach a high international calibre and will put Cyprus on the map as regards research excellence and technological development in which the country is currently underperforming. Moreover, it is anticipated that the project will form the knowledge basis for setting the appropriate mechanisms for boosting innovation practices at UCY and in Cypriot academia in general as well as transferring knowhow regarding building spin-off companies in Cyprus.

Funding programme: Horizon 2020

Budget: € 1,012,173.75

UCY: € 388000.00

Dates: January 2016-December 2018

Partners: University of Cyprus (Cyprus), AIT Austrian Institute of Technology (Austria), Danmarks Tekniske Universitet (Denmark).

Energy and water systems integration and management (EdGeWise)

The EdGeWise project aims to develop a smart and innovative integration of water and energy networks into a common framework to improve efficiency and reduce losses. This integration will play an important role in future Nexus scenarios of water and energy production, use, and wise interoperation, and as it is understood, the efficient use and availability of these two resources will be fundamental for earth's global sustainability, as a whole, and in the Mediterranean region, in particular. The introduction of new management strategies and concepts, with consequent experimental validation in prototypes built to this effect, will decisively contribute to the promotion of the project main goal: water and energy systems integration. The outcome of this project work will provide the new tools that are needed to manage water and energy resources simultaneously. This will contribute to optimize the availability of these resources, since losses will be reduced. Both rural and urban environments will be considered, contributing in this way to increase the global impact of the project outputs in the Euro-Mediterranean Region. The test pilot stations will be an excellent vehicle to promote the concepts. Further, they will be allowed to observe in loco how the concepts are applied and, at the same time, verify the advantages achieved.

Funding programme: Era Net Med

Budget: € 1.472.111, 58

UCY: € 99,992.00

Dates: June 2016- May 2019

Partners: University of Beira Interior (Portugal), Universite de Poitiers (France), Universite de Tunis (Tunisia), National Technical University of Athens (Greece), University of Cyprus (Cyprus), Malta College of Arts, Science and Technology (Malta), Alexandria University (Egypt), ICOVI (Portugal), GB Solar (France), Green Energy Solutions Company (Egypt).

Innovative Performance Monitoring System for Improved Reliability and Optimized Levelized Cost of Electricity (IPERMON)

The main objective is to develop an innovative performance monitoring system that will significantly improve and ensure quality of operation of grid-connected PV systems in order to fulfill and guarantee owner/investor expectations. The system which will provide the first independent complete baseline solution to ensure operational quality and optimise energy production will comprise of a complete structural sensor and data acquisition platform with high sampling capabilities, large storage databases and an advanced web-portal to incorporate the research originating performance loss, failure routines and degradation quantification algorithms for real-time analysis. In this sense, the algorithms and tools will provide the baseline to ensure PV plant performance quality assurance, energy yield optimisation, reflect financial parameters and provide accurate day-ahead production forecasts. The aims of the project will be to: (1) assess performance losses, failures and degradation mechanisms, (2) formulate a procedural protocol and guidelines for the identification and quantification of losses, failures and degradation of PV systems, (3) develop capacity rating, performance loss and degradation algorithms that will be incorporated as software modules to the advanced monitoring system, (4) optimise energy yield prediction for accurate production forecasts and (5) demonstrate O&M support including triggers and preventive maintenance.

Funding programme: SOLAR ERA NET

Budget: € 400.000

UCY: € 100.000

Dates: April 2016 – March 2019

Partners: Gantner Instruments Test & Measurement GmbH (GI) (Germany), University of Cyprus (Cyprus).

High voltage IBC photovoltaic i-Cells and modules (Hvolt-PV)

In this project the following parameters will be investigated by means of industrial production tools to develop a high efficiency n-type monocrystalline silicon IBC i Cell module (> 21%) at lower cost: 1. Reduction of the quantity of pure monocrystalline n-type silicon, 2. Reduction of Cell to Module losses using the high voltage i-Cell configuration, 3. Use of a low cost Interdigitated Back Contacts cell technology: in the last few years screen-printing processes were adapted for IBC cell structure for cost reduction purposes. Silver paste is used in this approach. This project proposes to make an optimisation of this process based on thin silicon foils wafers and i-Cell configuration. Under the previous considerations, 8 standard-size x60 IBC i-Cells (156x156 mm²) photovoltaic modules will be produced and tested under real outdoor operating conditions and standard indoor certification test conditions to validate each kind of module prototype. The study will be conducted iteratively, starting by a full module validation using 160 µm thick IBC cells, and pursuing the thickness reduction down to 100 µm and finally 60 µm. The aim of this project is to develop a standard-size solar photovoltaic module with efficiency higher than 21% by tackling two of the highest cost issues. The high efficiency aspect will be reached using both the IBC cell structure on n-type monocrystalline silicon and the use of i-Cell concept. S'Tile must be able to produce those panels at the end of the project, integrating internally: the cutting, quarter cells assembly into i-Cells and i-Cells interconnection steps.

Funding programme: SOLAR ERA NET

Budget: € 600,000.00

UCY: € 100,000.00

Dates: June 2016 - May 2018

Partners: S'Tile SA (France), International Solar Energy Research Center Konstanz e.V. (Germany)

Promotion of higher penetration of distributed PV through storage for all (StoRES)

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 challenge is to achieve high PV penetration in their energy mix through solving all market/technical/grid/tariff issues without compromising grid stability or security of supply. 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. StoRES is expected to change the current situation concerning grid reliability with higher RES deployment in islands/rural areas giving a cost-effective option to the public on more affordable and sustainable energy supply. Public authorities will be mobilized leading to their engagement in sustainable energy strategy implementation in their jurisdictions with a truly long-term vision in mind. The MED, as the natural place for PV and where grid parity is a reality, has the opportunity to pioneer in testing such technologies in real time with authorities ready to contribute. This endeavour will increase socio-economic competitiveness of regions involved; most importantly will have an international impact as new knowledge for optimum PV-ESS interoperability is transferred to a broader geographical context where grid parity has not reached yet.

Funding programme: MED

Budget: € 1,991,077.25

UCY: € 591,868.75

Dates: September 2016 - March 2019

Partners: University of Cyprus (Cyprus), Aristotle University of Thessaloniki (Greece), AREAL – Regional Energy and Environment Agency of Algarve (Portugal), SARGA. - Government of Aragon (Spain), Municipality Of Slovenska Bistrica (Slovenia), Regional energy and environment agency in Rhône-Alpes (France), Ministry of Energy, Commerce, Industry And Tourism (Cyprus), Electricity Authority Of Cyprus/Distribution System Operator (Cyprus), Municipality of Ussaramanna (Italy).

Generalized Operational FLEXibility for Integrating Renewables in the Distribution Grid (GOFLEX)

The GOFLEX project will innovate, integrate, further develop and demonstrate a group of electricity smart-grid technologies, enabling the cost effective use of demand response in distribution grids, increasing the grids' available adaptation capacity and safely supporting an increasing share of renewable electricity generation. The GOFLEX smart grid solution will deliver flexibility that is both general (across different loads and devices) and operational (solving specific local grid problems). GOFLEX enables active use of distributed sources of load flexibility to provide services for grid operators, balance electricity demand and supply, and optimize energy consumption and production at the local level of electricity trading and distribution systems. Building on top of existing, validated technologies for capturing and exploiting distributed energy consumption and production flexibility, GOFLEX enables flexibility in automatic trading of general, localized, device-specific energy as well as flexibility in trading aggregated prosumer energy. Generalized demand-response services are based on transparent aggregation of distributed, heterogeneous resources to offer virtual-power-plant and virtual-storage capabilities. The sources of load flexibility include thermal (heating/cooling) and electric storage (electric vehicles charging/discharging). A backbone data-services platform offers localised estimation and short-term predictions of market and energy demand/generation, and flexibility in order to support effective data-driven decisions for the various stakeholders. Smart-grid technologies, such as increased observability and congestion management, contribute to the platform. Over 36 months, GOFLEX will demonstrate the benefits of the integrated GOFLEX solution in three use-cases, covering a diverse range of structural and operational distribution grid conditions in three European countries.

Funding programme: Horizon 2020

Budget: € 11.234.125

UCY: € 440.750

Dates: November 2016 - October 2019

Partners: IBM Ireland limited (Ireland), Inea Informatizacija Energetika Avtomatizacijadoo (Slovenia), Aalborg Universitet (Denmark), Technische Universitaet Dresden (Germany), Erel Svetovanje In Druge Storitve Doo (Slovenia), Robotina D.O.O. Podjetje Za Inz Eniring Marketing, Trgovino In Proizvodnjo (Slovenia), B.A.U.M. Consult Gmbh (Germany), University Of Cyprus (Cyprus), Electricity Authority Of Cyprus (Cyprus), Haute Ecole Specialisee De Suisse Occidentale (Switzerland), L'energie De Sion-Région Sa (Switzerland), SWW Wunsiedel (Germany).

Novel concentrating PV/T & T solar collector and automated production methods (Solar CPC PVT Production)

Solarus today has a unique patented design of a concentrating Photovoltaic/Thermal solar collector (producing heat & electricity from 1box). This design has been tested successfully and, if produced in large scale, is expected to out-compete other collectors in €/total kWh produced. The main goals are to finalize the product design so it can be produced in an automated manner and to create the automated manufacturing methods. These are the final steps to reach cost competitiveness. The designs needs to be finalized (through the research described ahead) and certified in order to gain market credibility. New automation methods are essential because: A person can never be as reliable as a robot while doing repetitive/delicate processes: the automated line will have a much higher quality and unique automation is a necessary step to cost effectiveness. The main goal of this project is to develop an automated manufacturing line solution for the CPC-PVT solar collector in order to increase the quality while lowering product cost. The main goals of the Eureka-project are to finalize the product design, so that it can be produced in an automated manner and to create the automated manufacturing methods. Robotized production safeguards consistent quality while producing high volumes. These are crucial steps to consolidate cost competitiveness. After finalization of the project, the production costs of the collector are estimated to be a factor 3 lower than the current level. The Cypriot consortium will undertake the performance evaluation, standardized testing and pre-certification.

Funding programme: EUROSTARS

Budget: € 2.68M

UCY: € 92.800

Dates: September 2016 - August 2019

Partners: Solarus Sunpower AB (Sweden), University of Gavle (Sweden), Blue Engineering B.V. (The Netherlands,) FOSS Research Centre for Sustainable Energy, University of Cyprus (Cyprus), TUV Cyprus Ltd (Cyprus), Johnsun Engineering (Cyprus), Instituto Superior Tecnico (Portugal).

Cold atmospheric plasma treatment for effective cancer cell apoptosis (CAP-CANCER)

The project aims to investigate a new medical therapy based on cold atmospheric plasma energy (CAP). This new type of energy has many potential medical applications ranging from chronic wound healing, drug delivery, immune system activation to fight a range of diseases, to cancer treatment. An important property of CAP in the treatment of cancer is that CAP can selectively treat diseased tissue while leaving the healthy tissue intact. This selectivity, which is the focus of this project, would have significant implications in the surgical treatment of cancer. It would result in less pain and faster recovery times for the patient and also in the ability to cure forms of inoperable cancer which has spread too much or that it is so intermingled that any operation will damage too much critical tissue. To investigate and ultimately optimize this selectivity, a series of experiments is planned to explore how the electric field and the reactive oxygen species (ROS) produced by CAP interact with cancerous and healthy cells. The goal will be to determine the optimal conditions under which cancer cells die while healthy cells are not harmed. The process by which CAP can cause cell apoptosis (controlled death) is by opening up the membrane and allowing ROS to enter. For the optimal conditions this process occurs for cancerous cells but not healthy ones.

Funding programme: Marie-Curie

Budget: € 163.649

UCY: € 163.649

Dates: September 2016 - March 2019

Partners: Individual Fellowships (Dr. Charalambos Anastassiou)

Best practices and implementation of innovative business models for renewable energy aggregators (BestRES)

The BestRES project aims to develop innovative business models for the integration of renewable energy sources (RES) by aggregating distributed generation such as wind, PV, biogas, biomass, hydro, Combined Heat and Power (CHP) and combining this with demand side management and energy storage. New renewable energy business models that allow aggregators to successfully participate in the market by combining different RES technologies, energy storage, flexible demand and other technologies into a commercially viable product will be assessed and improved. It is within the scope of the project to validate the developed models by implementing them on selected mature markets to test their effectiveness by using to the highest degree possible real data. The BestRES project is coordinated by WIP – Renewable Energies. The consortium is represented by 11 partners operating in 9 European Countries giving it the required broadness for convincing results. The countries involved are the following: United Kingdom, Austria, Italy, Cyprus, Spain, Portugal, Belgium, Germany and France. FOSS Research Centre for Sustainable Energy represents Cyprus in the consortium.

Funding programme: Horizon 2020

Budget: € 1.994.812, 5

UCY: € 46.000

Dates: March 2016 - March 2019

Partners: Wirtschaft und Infrastruktur GMBH & CO (Germany), 3E NV (Belgium), Technische Universitaet Wien (Austria), Stiftung Umweltenergiebrecht (Germany), Good Energy Limited (UK), Next Kraftwerke Belgium (Belgium), Next Kraftwerke GMBH (Germany), Oekostrom GMBH fur Vertrieb Planung Energiedienstleistungen (Austria), FOSS Research Centre for Sustainable Energy of University of Cyprus (Cyprus), EDP Centre for New Energy Technologies (Portugal), Youris.com (Belgium).