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Final Conference (M24)

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NBR.	DATE	NOTES AND COMMENTS
1	04/06/2018	Creation and first version
2	11/06/2018	Add presentations and final draft version
3	11/06/2018	Final version

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Executive Summary

The Final SUI Conference took part from May 9th to 11th, 2018 in Nicosia. It was part of a bigger event: “The Zero Energy Buildings and Smart Sustainable Cities Event”. The European “Smart Cities & Communities Initiative” of the Strategic Energy Technology Plan supports cities and regions to reduce by 40% their greenhouse gas emissions by 2020.

This event was organised by the Cyprus Institute and, it facilitated a seminar on Smart, Sustainable Cities under the JPI Urban-Europe project "Smart bioclimatic low-carbon urban areas as innovative energy isles in the sustainable city – Smart Urban Isles (SUI)".

Significant aspects of Smart Sustainable Cities and Zero Energy Buildings such as EC directives, National Policies, technologies and best practices, was presented and discussed. This 3-day event consisted of presentations by invited experts, interactive stakeholders’ panel and a visit to CyI’s Solar Research Facilities.

The Smart and Sustainable Cities Seminar took place on the second day of the Zero Energy Buildings & Smart Sustainable Cities event. Welcoming and opening of the event was performed by Prof. Despina Serghides, President ISES-Cyprus and representative of the Cyprus Institute within the SUI project. It also counted with the engagement of Prof. Georgia Butina Watson (Oxford Brookes University) and Mr. Joseph Karis (Ministry of Energy, Commerce, Industry and Tourism). They both highlighted the importance of sustainable cities nowadays and in a near future.

Prof. Despina Serghides continued the event with the presentation of an overview of the SUI project. First, Prof. Serghides identified two main urban problems: energy consumption and urban environmental problems such urban heat islands. This way, a common and progressive problem-solving approach is needed with adapted strategies and tools aimed at reducing energy consumption and improving the environment in cities. In this context, the SUI project claims to move forward with the urban energy savings and CO2 reduction. The ultimate goal is to design new urban planning that allows cities to grow in a sustainable way. SUI has a threefold approach: 1. Bioclimatic design of buildings and urban planning; 2. Mini networks, which include decentralised renewable energy generation, energy storage and distribution; and 3. An Energy Management System to control, manage, monitor the SUI and optimize energy flows.

Dr. Benedetto Nastasi, member of the TUDelft team involved in the SUI project, explained the developments carried out and the results achieved during the SUI project in the bioclimatic design field. Dr. Nastasi explained the importance of the development of interconnected fields from buildings design with bioclimatic strategies and district energy systems to cross-synergies with building energy systems and district microclimate design.

Mr. Calin Rugina remotely introduced him-self and the SUI energy management system. SUI HUB is a smart energy management system (SEMS) that gathers data from sensors located in different areas. All information collected from sensors (static / mobile, or other web services) are used to create trigger events / notifications.

Dr. Saleh Mohammadi, member of the TUDelft team involved in the SUI project, presented the SUI mini-network concept by explaining the ‘SUI Guidelines for developing SUI energy concepts’.

Dr. Mohammadi explained a step by step approach to develop a SUI mini network concept for a given urban area.

After lunch, a presentation of several case studies of Smart Urban Isles was done. First, Arch. Stella Dimitriou, member of the CyI team involved in the SUI project, made her presentation 'From investigation to implementation' related to the Cypriot case study. Prof. Soofia Tahira Elias-Özkan, representative of the METU, followed with her presentations of the Winterthur and Ankara case studies. Urban Level Simulations were carried out with ENVI-MET to determine the Thermal comfort conditions (PMV, PET) and wind direction and speed, diffused & direct solar radiation. Building Level Simulations were carried out with Design Builder to determine the comfort conditions: Lighting and Thermal and energy consumption and CO2 emissions. Afterwards, Dr. Manfred Hotwagner, member of the EEE team involved in the SUI project, presented the case study performed in Austria, entitled: 'The challenge of operating energy flows'. Last presentation was performed by Mr. Vicente Carabias-Hütter, representative of ZHAW. His presentation, 'Tools for the SUI handbook', included a brief explanation of the scope of the SUI mini-networks concept and an overview of the two swiss case study: Winterthur and Zürich.

Introduction

The Final SUI Conference took part from May 9th to 11th, 2018 in Nicosia. It was part of a bigger event: "The Zero Energy Buildings and Smart Sustainable Cities Event". The European "Smart Cities & Communities Initiative" of the Strategic Energy Technology Plan supports cities and regions to reduce by 40% their greenhouse gas emissions by 2020. The Energy Performance of Buildings Directive, requiring all new buildings to be nearly zero-energy by 2020 is a stepping-stone to this goal.

In the event, significant aspects of Smart Sustainable Cities and Zero Energy Buildings such as, EC directives, National Policies, technologies and best practices, was presented and discussed.

The Smart Sustainable Cities and Zero Energy Buildings Event was organised by the Cyprus Institute.

The project

The SUI project investigates, implements and validates energy neutral 'Smart Urban Isles' (SUI), defined as 'areas around a public building, which make use of the synergies between different (building) functions and of the scale advantages for energy (storage) solutions'. The aim is to locally balance the energy system as much as possible. These areas can consist of 10 – 1000 buildings. We test Smart Urban Isle as innovative basic energy unit in the Smart City.

The project is formed by three complementary and integrated blocks: mini networks, bioclimatic and responsive building design and management platform. The mini networks include decentralised renewable energy generation, energy storage and distribution, and consider integration of (electrical) mobility.

Bioclimatic design is formed by an architectural design to achieve the maximum comfort inside the building with the minimum energetic cost. But having a bioclimatic public building as an example is not enough, we make a step forward by developing bioclimatic designs in urban wide-open areas (bioclimatic urban planning). On the other hand, not all bioclimatic design aspects are highly visible or recognisable for the general public. New bioclimatic areas should be developed and designed in such a way that the bioclimatic strategies are visible in the architecture.

Management platform deals with the automatic active measures that can be taken up in the SUI. We develop a software application to control, manage and monitor the building (as SUI's core) in order to improve the energy efficiency, as well as the energy flow throughout the SMART URBAN ISLE (all components). Moreover, several ICT systems (sensors, actuators...) placed all over the SUI area, will offer advanced automatized control, monitoring, management and maintenance to systems and services, in an optimal and integrated manner both locally or remotely.

Urban Isle mini-networks will cope with how we facilitate the generation, storage and supply of energy in the SUI. On this stage, we face typical problems as generation, storage and distribution of energy. We pursue the concept of energetic island by implementing renewable energy systems that allow us to be (completely or partly) autonomous and to decrease or erase any CO2 emission. The mini networks can be adapted to the needs of an urban isle and can also include for example heat networks or DC networks between some buildings.

Seminar: "Smart, Sustainable Cities"

The event

The European "Smart Cities & Communities Initiative" of the Strategic Energy Technology Plan supports cities and regions to reduce by 40% their greenhouse gas emissions by 2020. The Energy Performance of Buildings Directive, requiring all new buildings to be nearly zero-energy, is a stepping-stone to this goal.

This event was organised by the Cyprus Institute and, it facilitated a workshop on Zero Energy Buildings under the Interreg Balkan-Med project "Towards Zero Energy Hospitals in the Balkan Region" and a seminar on Smart, Sustainable Cities under the JPI Urban-Europe project "Smart bioclimatic low-carbon urban areas as innovative energy isles in the sustainable city – Smart

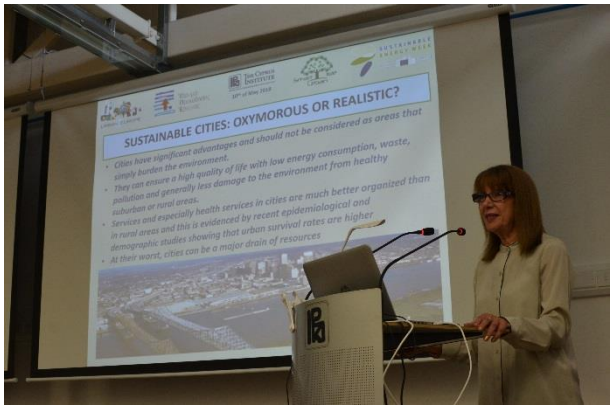
Urban Isles (SUI)". Significant aspects of Smart Sustainable Cities and Zero Energy Buildings such as EC directives, National Policies, technologies and best practices, was presented and discussed. This 3-day event consisted of presentations by invited experts, interactive stakeholders' panel and a visit to CyI's Solar Research Facilities.

Smart, sustainable Cities

The Smart and Sustainable Cities Seminar took place on the second day of the Zero Energy Buildings & Smart Sustainable Cities event. Welcoming and opening of the event was performed by Prof. Despina Serghides, President ISES-Cyprus and representative of the Cyprus Institute within the SUI project. It also counted with the engagement of Prof. Georgia Butina Watson (Oxford Brookes University) and Mr. Joseph Karis (Ministry of Energy, Commerce, Industry and Tourism). They both highlighted the importance of sustainable cities nowadays and in a near future. Prof. Butina explained and described the prospects and challenges towards sustainable and healthy cities, whilst Mr. Karis deepened into the standards for sustainable cities.


On the left, it is shown Prof. Butina during her presentation. On the right, Mr. Karis performed his presentation.

Prof. Despina Serghides continued the event with the presentation of an overview of the SUI project. First, Prof. Serghides identified two main urban problems: energy consumption and urban environmental problems such urban heat islands. This way, a common and progressive problem-solving approach is needed with adapted strategies and tools aimed at reducing energy consumption and improving the environment in cities. Sustainability in cities offers all this strategies and tools with sustainable (des-centralised) energy supply systems, by improving the microclimate. Ultimately, the optimal design of the buildings to harness the beneficial elements of the climate and the environment for cooling, heating and natural lighting.



Prof. Despina Serghides explaining the concept of sustainable cities

In this context, the SUI project claims to move forward with the urban energy savings and CO2 reduction. The ultimate goal is to design new urban planning that allows cities to grow in a sustainable way. To do this, the SUI project investigated, implemented and validated energy

neutral 'Smart Urban Isles' (SUI). SUI has a threefold approach: 1. Bioclimatic design of buildings and urban planning; 2. Mini networks, which include decentralised renewable energy generation, energy storage and distribution; and 3. An Energy Management System to control, manage, monitor the SUI and optimize energy flows.

The bioclimatic design determined the energy consumption and human comfort conditions within the new/existing building as well as the surrounding area, enhanced the energy performance and improved comfort conditions both indoors and outdoors. It reduced the conventional energy use with energy efficient design, as well.

The mini-networks concept relies in a combination of energy generation, with RES - storage and distribution to supply the energy demand, to generate, distribute, exchange and store as much as possible locally.

The Energy Management System provides a bidirectional energy management interface that implements the gateway between the electrical utility and the customer, and their electricity consuming/generating devices.

The implementation stage validated the SUI concept, and it was based on two parts: evaluation of scenarios/measures and implementation study. The implementation was done in seven municipalities: Santa Cruz de Tenerife (ES), Amsterdam (NL), Iasi (RO), Winterthur (CH), Zurich (CH), Limassol (CY) and ecoEnergyLand in Güssing (AT).

Dr. Benedetto Nastasi, member of the TUDelft team involved in the SUI project, explained the developments carried out and the results achieved during the SUI project in the bioclimatic design field. Dr. Nastasi explained the importance of the development of interconnected fields from buildings design with bioclimatic strategies and district energy systems to cross-synergies with building energy systems and district microclimate design. Consequently, the two scales could not be taken into account individually anymore, to answer the rising demand for Sustainable Cities.

Dr. Nastasi starting his presentation of SUI bioclimatic design and mobility

Mr. Calin Rugina remotely introduced him-self and the SUI energy management system. SUI HUB is a smart energy management system (SEMS) that gathers data from sensors located in different areas. All information collected from sensors (static / mobile, or other web services) are used to create trigger events / notifications. SUI HUB is a software platform that connects devices in a network of smart entities. It is capable to enable control and send data among them. Based on complex condition builder, the platform can monitor data and can control how and when is necessary to forward information.

Dr. Saleh Mohammadi, member of the TUDelft team involved in the SUI project, presented the SUI mini-network concept by explaining the 'SUI Guidelines for developing SUI energy concepts'. Dr. Mohammadi explained a step by step approach to develop a SUI mini network concept for a given urban area, which includes an energy concept that makes optimal use of the bioclimatic improvement potential of buildings, the energy exchange potentials between different buildings and the local renewable energy potentials and aims at a local energy balance from renewable resources, meaning: the energy is generated and used in the area, minimizing the import and export of energy from outside the SUI area.

Dr. Mohammadi explaining the meaning of the SUI energy concept.

After lunch, a presentation of several case studies of Smart Urban Isles was done. First, Arch. Stella Dimitriou, member of the CyI team involved in the SUI project, made her presentation 'From investigation to implementation' related to the Cypriot case study. The implementation stage followed a three steps strategy: 1. Analyse the existing situation: building/area/mobility and renewable energy potential; 2. Propose and evaluate a set of scenarios: bioclimatic measures, RES systems and Management platform; and 3. Implement and validate the concept.

Arch. Dimitriou gives explanations about the three steps strategy followed in the Cypriot case study

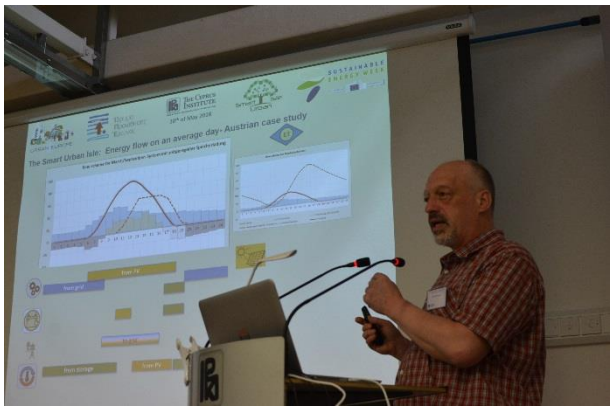
The case study area is located in the old town centre of Limassol. The building has uses of retail stores and education, cafeterias and wine and cocktails bars and it is part of the University Administration Building. This building was constructed on 1979 and has been renovated in 2011 and 2015. The building is a 3-storey building and it is equipped with all kind of services. It includes approximately 60 workplaces, a lecture room for 30 people and 2 meeting rooms.

Prof. Soofia Tahira Elias-Özkan, representative of the METU, followed with her presentations of the Winterthur and Ankara case studies. Urban Level Simulations were carried out with ENVI-MET to determine the Thermal comfort conditions (PMV, PET) and wind direction and speed,

diffused & direct solar radiation. Building Level Simulations were carried out with Design Builder to determine the comfort conditions: Lighting and Thermal and energy consumption and CO2 emissions.

Prof. Tahira explaining the tools used for the implementation of the case studies: Winterthur & Ankara.

Regarding the Winterthur case study, the existing environment was compared with the proposed urban renewal project in order to point out the improvements as a result of the case study. For the Ankara case study, Prof. Tahira explained the current conditions of the campus in terms of air temperature and CO2 emission, and showed the results obtained through the use of data logging devices for temperature and humidity. As a result, for both case studies a list of actions to be done (or taken into consideration in the Winterthur case) was given.



Dr. Hotwagner explaining the results obtained in the simulated scenario for the Austrian case study

Afterwards, Dr. Manfred Hotwagner, member of the EEE team involved in the SUI project, presented the case study performed in Austria, entitled: 'The challenge of operating energy flows'. First, Dr. Hotwagner started giving some key parameters regarding the motivation for the area selection. Then, he described the current situation of the area, paying details to electrical and heat grid, both. Dr. Hotwagner continued explaining the different supply systems used nowadays, from the traditional supply systems with one main generation plant and long lines of energy distribution, to the emerging multidirectional flow systems. The SUI energy concept closes that loop with energy flow management, storage and conversion. This structure was applied to the Austrian case study and results were shown for several weather conditions.

Last presentation was performed by Mr. Vicente Carabias-Hütter, representative of ZHAW. His presentation, 'Tools for the SUI handbook', included a brief explanation of the scope of the SUI mini-networks concept and an overview of the two swiss case study: Winterthur and Zürich.

Dr. Carabias-Hütter presenting the two swiss case studies: Winterthur and Zürich

Both case studies are based on local swiss 2000W-areas. In Winterthur the building constructer Implenia Lokstadt is interested in applied research for its relevant project Werk1 and Losinger-Marazzi (cf. LoI) invites us in Zurich to contribute with the analysis of its Greencity implementation.

Agenda

This project is funded by the European Union

Ίδρυμα Προώθησης Έρευνας

SUSTAINABLE ENERGY WEEK

An initiative of the European Commission

Seminar "Smart, Sustainable Cities"

10th May 2018

9:30 – 10:00	Registration
10:00 – 10:10	Welcome address (Prof. Despina Serghides, Cyl, President ISES-Cyprus)
10:10 – 10:40	The Prospects and Challenges Towards Sustainable and Healthy Cities (Keynote Speaker - Prof. Georgia Butina Watson, Oxford Brookes University)
10:40 – 11:00	Standards for Sustainable Cities (Mr. Joseph Karis, Cyprus Organisation for Standardization, Ministry of Energy, Commerce, Industry and Tourism)
11:00 – 11:30	Coffee break
11:30 – 12:00	Introduction to the Concept of Smart Sustainable Cities and overview of the Smart Urban Isle Project (Prof. Despina Serghides, Cyl)
	The Smart and Sustainable Urban Isle (SUI) threefold approach
12:00 – 12:20	SUI bioclimatic design and mobility (Dr. Benedetto Nastasi, TUDelft)
12:20 – 12:40	The management platform system (Arch. Stella Dimitriou, Cyl)
12:40 – 13:00	Approach of developing the SUI mini - network (Dr. Saleh Mohammadi, TUDelft)
13:00 – 14:00	Lunch
	Case Studies of Smart Urban Isles
14:00 – 14:20	The Cyprus Case Study – From investigation to implementation (Arch. Stella Dimitriou, Cyl)
14:20 – 14:40	The Winterthur Case Study (Prof. Soofia Tahira Elias-Özkan, METU)
14:40 – 15:00	Case study Austria- the challenge of operating energy flows (Dr. Manfred Hotwagner, Europäisches Zentrum für Erneuerbare Energie Güssing - EEE)
15:00 – 15:30	Tools for the SUI handbook (Dr. Vicente Carabias-Hütter, ZHAW)
15:30 – 16:00	Round Table Discussion

Thanks to the EU and the Research Promotion Foundation for funding, in the frame of the collaborative international Consortium (SUI) financed under the ERA-NET Cofund Smart Cities and Communities Cofunded Call. This ERA-NET is an integral part of the 2014 Joint Activities developed by the JPI Urban Europe

CARSA · zhaw · TU Delft · The Cyprus Institute · ANERDGY · ODTÜ METU

Speakers

Despina Serghides
(CyI)

Stella Demetriou
(CyI)

Benedetto Nastasi
(TUDelft)

Manfred Hotwagner
(EEE)

Saleh Mohammadi
(TUDelft)

Soofia Tahira Ozkan
(METU)

Vicente Carabias-Hütter
(ZHAW)

Target audience

The Zero Energy Buildings & Smart Sustainable Cities event was a free event. Target audience was focus on students, researchers and R&D stakeholders. But it was also open to general public. Registration was mandatory. To register, the attendings had to visit this link:

https://goo.gl/forms/boTar4KAr4kLywUM2

Dissemination

The Cyprus Institute was in charge of the global dissemination of the event. All SUI project partners were invited to take part in the event and also, they were asked to disseminate the event to their contacts through e-mailing. The Cyprus Institute published all the information related to the Zero Energy Building & Smart Sustainable Cities event on their website:

https://www.cyi.ac.cy/index.php/component/k2/zero-energy-buildings-and-smart-sustainable-cities-event