

# Mastering Energy Supply focusing on Isolated Areas (MESfIA)

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*Erasmus + Capacity Building for Higher Education CBHE projects - 598716-EPP-1-2018-1-EL-EPPKA2-  
CBHE-JP*

*Minutes of the Workshop in Canary Islands*

*Hybrid in Zoom platform and Gran Canaria INFECAR exhibition centre*

*15th February 2022*

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## Background

On Tuesday 15 February 2022 the Canary Islands workshop of the MESfIA project took place as a replacement of the initially scheduled workshop in Gran Canaria in March 2020 which had already been planned.

It was organized by the local MESfIA project partner, the Canary Islands Institute of Technology (ITC), and held in Hybrid mode at both INFECAR exhibition centre at Las Palmas de Gran Canaria. A total of 77 participants, 21 attending physically in the conference room, and 56 remotely on-line from universities and other types of stakeholders in Vietnam, Indonesia, Thailand, France and Greece.

The workshop addressed a variety of relevant issues to maximizing renewable energy penetration in weak electrical grids of island and remote regions: Namely, Energy planning; Demand Side Management; wind and solar forecasting; Energy management Systems; island electrical power systems; impact of RES generation on electric grid parameters; strategies for maximizing RES penetration; electric mobility; energy storage; green hydrogen. It will also discuss positive energy districts and will look at a success experience of a spin-off company that promotes RES.

The **MESfIA project** (Mastering Energy Supply Focusing on Isolated Areas) is Co-funded by the Erasmus+ Programme of the European Union (under agreement No. 2018-2490/001-001). The project aims to provide high quality postgraduate education on energy supply for students and professionals willing to be employed in this sector. Specifically, it focuses on Southeast Asia that has multiple remote area, forest areas, mountainous areas and islands that will need to improve electrification conditions and other energy supplies. Additionally, this project partners with European Universities for knowledge and experience exchange among regions.

The MESfIA project brings together EU and South East Asian countries, namely Thailand, Vietnam and Indonesia, to develop education and training at Postgraduate level on various aspects of energy engineering, dedicated to isolated regions and mainly islands. The activities planned aim at strengthening curricula of master programs on renewable energies of the participating universities.

In line with Sustainable Development Goals 4, 7, 11 and 13, MESfIA emphasizes in providing, via existing or new MSc programs of the partner countries, the capability to apply specific skills to help in the more efficient energy supply of isolated areas. Despite the Covid-19 pandemic, the first students have already enrolled in the Universities and some of them will present their work in this Conference as a first attempt to enhance their academic skills.

## Agenda

The Agenda of the Workshops is as follows in Table 1. The poster of the workshop is as follows in

Table 1 The Agenda of the Workshop

HOUR	SPEAKER	POSITION	INSTITUTION	TITLE OF PRESENTATION
08:30 - 08:40	Antonios Tsikalakis	Project Coordinator	Hellenic Mediterranean University	Welcome to participants
08:40 - 09:30	Gonzalo Piernavieja	R&D Director	Canary Islands Institute of Technology	Energy planning on islands
09:30 - 09:40	<b>SHORT 10 MINUTE BREAK</b>			
09:40 - 10:30	Santiago Díaz	Head of section	Canary Islands Institute of Technology	PV, wind and demand forecasting
10:30 - 11:00	<b>COFFEE BREAK</b>			
11:00 - 11:30	Elías Medina	Engineer; Renewable Energy Department	Canary Islands Institute of Technology	Some Technical Aspects Related to Renewable Energy Integration into Power Systems
11:30 - 12:00	Salvador Suárez Garcia	Head of Renewable Energy Department	Canary Islands Institute of Technology	Energy storage and H <sub>2</sub> technologies
12:00 - 12:10	<b>SHORT 10 MINUTE BREAK</b>			
12:10 - 12:25	Axel Bruck	Engineer; Renewable Energy Department	Canary Islands Institute of Technology	Positive Energy Districts in rural and urban neighbourhoods – a comparison
12:25 - 12:40	Matej Stipeljković / Matija Sucic	Spin-off - Croatian RES company	University of Zagreb (YENESIS project)	Entrepreneurship in RES promotion
12:40 - 13:00	Antonios Tsikalakis	Project Coordinator	Hellenic Mediterranean University	General discussion
13:00 - 14:40	<b>LUNCH</b>			

08:30 - 08:40	<b>Antonios Tsikalakis</b> , MESfIA project coordinator Hellenic Mediterranean University, Greece	WELCOME
08:40 - 09:30	<b>Gonzalo Pierraviteja Izquierdo</b> , R&D&I Director Canary Islands Institute of Technology (ITCI), Spain	Energy planning on islands
09:30 - 09:40	10 MINUTE BREAK	
09:40 - 10:30	<b>Santiago Diaz Ruano</b> , Renewable Energy Dept. Canary Islands Institute of Technology (ITCI), Spain	PV, wind and demand forecasting
10:30 - 11:00	COFFEE BREAK	
11:00 - 11:30	<b>Elias Medina Dominguez</b> , Renewable Energy Dept. Canary Islands Institute of Technology (ITCI), Spain	Some Technical Aspects Related to Renewable Energy Integration into Power Systems
11:30 - 12:00	<b>Salvador Suárez Garcia</b> , Head of the Renewable Energy Dept. Canary Islands Institute of Technology (ITCI), Spain	Energy storage and H <sub>2</sub> technologies
12:00 - 12:10	10 MINUTE BREAK	
12:10 - 12:25	<b>Axel Bruck</b> , Renewable Energy Dept. Canary Islands Institute of Technology (ITCI), Spain	Positive Energy Districts in rural and urban neighbourhoods Comparison
12:25 - 12:40	<b>Matej Stipijaković / Matija Sudić</b> , Spin-off RES company University of Zagreb (YENERIS project), Croatia	Entrepreneurship in RES promotion
12:40 - 13:00	<b>Antonios Tsikalakis</b> , MESfIA project coordinator Hellenic Mediterranean University, Greece	GENERAL DISCUSSION

\*Canary Islands time (GMT)

Figure 1 The Poster of the Workshop.

## Participants

### On-Site participants

The physical participation in the conference room was limited to about 20 people because of the COVID 19 pandemic restrictions in Spain.

Participants locally in the Conference Room were 21. 12 from Energia Gran Canaria, 5 from the Host, 2 from MS2Ergo, Croatia and other 2 from Spanish consultant companies.



Figure 2 Photo of the participants and the Conference Room.



Figure 3 Another view of the Conference Room.

### On-line participants

A google drive link was prepared in order to list the online participants.

Participants from the following 9 countries were registered to attend the workshop as follows:

Table 2 Number of participants per country

Indonesia	15
Thailand	21
Greece	5
Philippines	1
Cambodia	1
Vietnam	4
Myanmar	1
Bangladesh	3
Spain	4

Despite the time-difference, 46 participants from South East Asia participated. The Vast majority of online participants were from Universities (48) while we had one (1) participation from a Utility and six (6) from consulting Companies across the world.



Figure 4 Room and Hybrid Mode of the Workshop

## Summary of presentations

**Dr. Antonis Tsikalakis**, the Co-ordinator of the project, made a short presentation regarding MESFIA project, its scope and the participants. One person from each Partners organization saluted the rest of the participants via the On-line Zoom platform.

**Mr. Gonzalo Piernavieja**, who coordinates ITC R&D activities, in his presentation discussed the elements that have to be considered when doing a proper energy planning that aims at contributing to a fast transition to a low carbon economy. He used the Canary Islands energy planning explaining the thorough diagnosis work that was carried-out and the methodology of the work elaborating sector strategies that support and the approach followed for the elaboration of the Action Plan.

He highlighted trends towards total electrification of lighting, cooking, DHW, EV, heat, desalination, mobility, and rest of energy consumption in island energy systems, and that this trend gives and



excellent opportunity to apply Demand Side management, as a tool for contributing to maximizing RES penetration and for moving forward to a total decarbonized energy system and energy independence of islands energy systems.

He pointed-out the need to guarantee quality and security of supply (avoid outages in island electrical systems) in scenarios of high RES penetration, at the same time that the objective should be supplying electricity at a minimum cost, minimizing curtailment of RES and guaranteeing high capacity factors of energy storage devices.

He Also expressed the concerns about faire energy transition, energy poverty and other social and environmental issues of the Canary Islands Regional Government when addressing the energy planning in the Canary Islands.

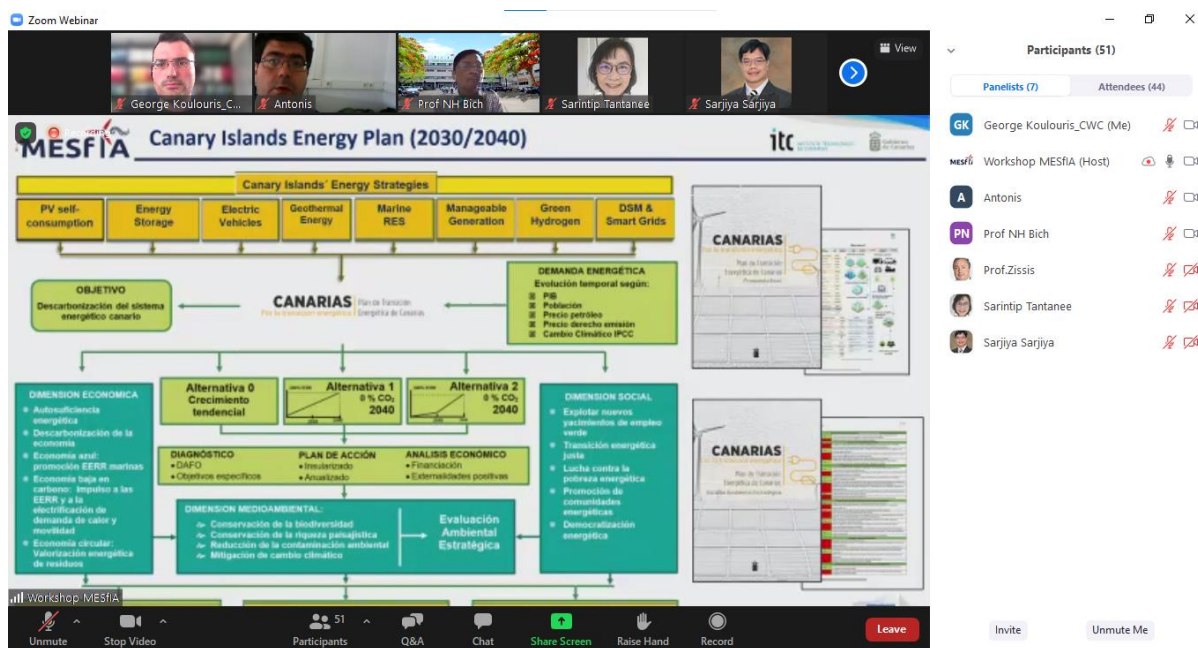


Figure 5 On-line view of ITC introductory Presentation

**Dr Santiago Díaz** from ITC’s Renewable Energy Department discussed forecasting numerical models that are currently used by ITC. And how complementing WRF climate models, with statistical models and the application of big data + machine learning, allows for reliable wind-solar forecasting.

He commented on the importance of forecasting for optimizing and size of energy storage, and that wind-solar-energy demand forecasting is the cheapest cost-effective of the elements of a strategy for maximizing RES. He also commented on the experience of ITC integrating forecasting tools into the EMS of the Tilos island microgrid (Work done under the European Commission financed project, TILOS).

**Dr Elías Medina** From ITC’s Renewable Energies Department discussed technical issues related to the integration of renewable energies in small and weak electrical grids. He highlighted the voltage dip and problems with disconnection of wind turbine, and how modern wind turbines support the voltage grid and remain connected. He discussed inertia response of disturbance, and pointed-out the importance of active power regulation provide ancillary services, and introduce the concept of synthetic or artificial inertia, as a replacement to inertia provided by conventional rotating synchronous machines, necessary to maintain stability of the grid.

**Dr Salvador Suárez** Head of ITC's Renewable Energies Department made a presentation focusing on the possibilities that energy storage offer in grid balancing of island electrical systems in scenarios of high RES penetration. He began by reviewing some basic concepts of RES affections to grid parameters, and economy aspects of energy storage. He also introduced some basics of hydrogen technologies and its integration with RES. He walked the audience through experiences in the Canary Islands with reverse pumped-hydro and with hydrogen for energy storage. Energy storage and H2 technologies.

He finalized his presentation by introducing possibilities of new fuels derived from green hydrogen. He discussed the different synthesis processes for obtaining fuels from hydrogen, and how Power to Gas and Power to liquid technologies will allow for the substitution of fossil fuels in the transport sector (road, marine and air transport), and in power generation.



Figure 6 View of the Conference Room for the presentation by Dr Salvador Suárez –Member of the Steering Committee from ITC.

The last presentation was from **Mr Matej Stipeljković** and **Mr Matija Sucic**, young engineers entrepreneurs that have created in Croatia a company called company **MS2 ENERGO**. This is a spin-off of the University of Zagreb, created in the framework of the YENESIS project. They are both spending a month at the Canary Islands Institute of Technology in an exchange activity as part of the YENESIS project.

They presented their experience creating the company that is doing installation of roof top PV systems, and some key issues to their success in the hope that it could inspire university graduates from participating Southeast Asian universities in the MESFIA project, to create their own companies.

Finally, a summary of the presentations by the co-ordinator was made.



Figure 7 End of the Conference.

## Key Findings

“Geographical islands” share common problems with remote continental rural communities that could be considered “energy islands”. In many cases they are totally dependent on outside energy resources (i.e. fossil fuels), even when the dispose of enough autochthonous clean renewable energies that could be harnessed to cover their energy needs. But managing high levels of renewable energy penetration in small and non-interconnected grids require balancing electricity supply and demand instantaneously in order to avoid problems with grid parameters, specially frequency and voltage.

A comprehensive strategy for maximizing RES penetration in small and weak electrical island grids, and those of remote continental non-interconnected rural communities, require the combination of several elements. Among them are the need for reliable wind and solar forecasting for optimum dispatching and unit commitment giving priority to RES generation; grid stability analysis to determine maximum level RES penetration and solutions for reinforcing the grids; Distributed Generation; Demand Side Management of non-critical deferrable loads; Energy storage as the last element given the high cost of these solutions.

The deep understanding of electrical grids in the context of islands and small rural communities, is a key issue when addressing solutions for maximizing RES penetration. Participating Asian universities in the MESfIA project should take note, and make efforts to reinforce training on modelling of electrical grids, to increase competence of their graduate engineering students.

At the Canary Islands workshop, interesting experiences that have been developed in archipelago were analysed. They include the wind-pumped-hydro system of El Hierro that is currently allowing for more than 60 % RES penetration on the yearly balance. Also it was discussed the general work that has been developed in the archipelago on energy planning for fast decarbonisation of the archipelago energy system. These experiences are excellent case studies that could be discussed as part of the Renewable Energy Master programs of the Asian universities participating in the MESfIA project, to reinforce their curricula.

Of interest is also the experience presented by two young university engineering graduate students from Croatia, in getting support from their university in the promotion of their small private company. It shows how important is to include as part of the Master curricula, training activities that could inspire entrepreneurship among engineering master graduates. This is a fundamental issue that has to be addressed by the participating Asian universities that will give practical added value to their Master's program. The energy policies for energy transition to RES is an opportunity to develop industrial policy that promotes creation of local companies, and employment policy for new green jobs.

The key findings are that common problems require common solutions. And that islands, due to existing technical barriers for maximizing RES penetration, are perfect natural living lab to develop solutions that can be eventually extrapolated also to remote continental regions, to allow for the supply of modern energy services to rural communities that will contribute to their economic, social and environmental sustainable development.