SUSTAINABLE PLACES 2020

October 27-30, 2020

DIGITAL EVENT

Horizon 2020
European Union funding
for Research & Innovation

Energy Transition on European Islands

Chaired by

New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

Robinson

SMILE

GIFT

insulae
Maximizing the impact of innovative energy approaches in the EU islands

REACT
Renewable Energy for Self-Sustainable Island Communities

13:10 SESSION 1. THE CLEAN ENERGY ISLANDS INITIATIVE

- A few words about the Clean Energy Islands initiative
- The EU Islands Facility - NESOI

Sophie Dourlens-Quaranta, R2M Solution

13:30 SESSION 2. SELECTED TOPICS ADDRESSED BY ONGOING RESEARCH & INNOVATION PROJECTS

- PV and BESS integration on islands – The **INSULAE** project

Stefano Barberis, RINA Consulting

- Storage concepts and interoperability – The **GIFT** project

Sašo Brus, INEA

- Utilisation of local renewable resources – The **ROBINSON** project

Ugo Simeoni, European Turbine Network

- Sustainable mobility on islands – The **SMILE** project

Stefano Barberis, RINA Consulting

- Citizen engagement – The **REACT** project

Thomas Messervey, R2M Solution and Andrew Barney, Uppsala University

14:30 SESSION 3. ROUNDTABLE DISCUSSION

- Theme 1: How to engage islanders in the energy transition?
- Theme 2: How to stimulate islands' long-term energy strategy?

insulae

Maximizing the impact of innovative energy approaches in the EU islands

PV and BESS integration on islands

The case of Unije

Stefano Barberis
RINA Consulting SpA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 824433

Project info

- ✓H2020-LC-SC3-2018-ES-SCC Call
- ✓ Innovation Action
- ✓ EU Funding 12.160.234,50 €
- ✓ Duration 48M
- ✓ Coordinator CIRCE
- ✓ 26 partners

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Objectives, concept and expected outcome

- ✓ The main goal of INSULAE is to foster the deployment of innovative solutions aiming to the EU islands decarbonization by developing and demonstrating at three Lighthouse Islands ***(Bornholm – DK, Madeira – PT, Unije – HR)*** a set of interventions linked to seven replicable use cases, whose results will validate an Investment Planning Tool that will be then demonstrated at four Follower Islands ***(Psara – GR, Nordeney – D, Menorca – ES, Marie Galante - FR)*** for the development of four associated Action Plans.

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UNIJE

- Surface: 16.83 km^2
- Coastline: 38.012 km
- the island peak: 138 m.a.s.l
- Unije, only settlement
- 85 inhabitants
- 47 households
- Underwater grid cable connected
- No cars on the island
- Small sea port and airport

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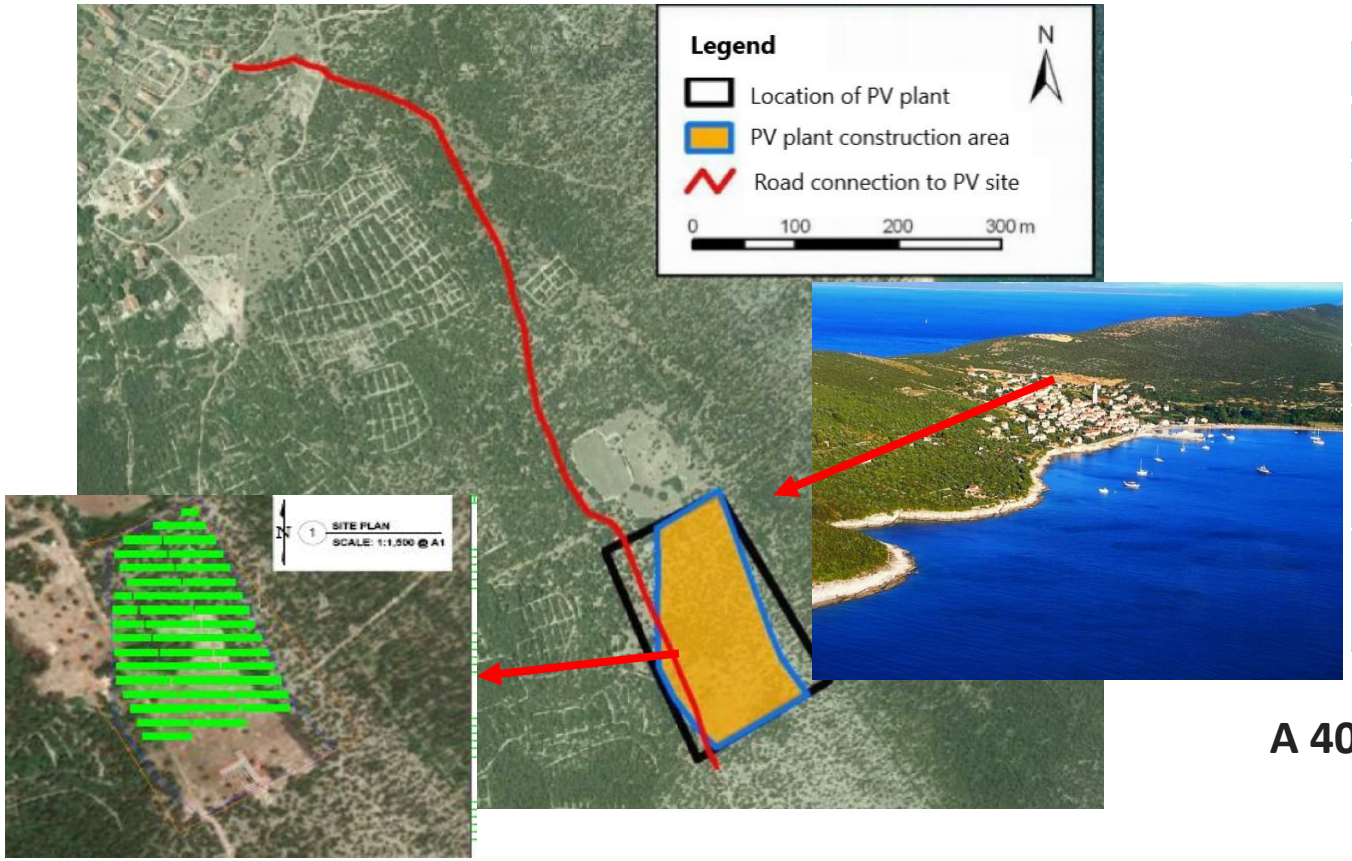
Unije PV Plant Purpose

The expected consumers of electricity produced are consumers on the Island of the Unije, but also nearby islands of Susak, Srakane and Lošinj, via undersea medium voltage cable (10 kV).



Installed power	1270 kW
Nominal voltage	3 x 230 / 400 V
Nominal frequency	50 Hz
Nominal power factor	≥ 0.95
Efficiency	97%
Operation type	In parallel with distribution grid
Purpose	For production in the distribution grid

A 400 kW/1,6 MWh BESS was initially foreseen

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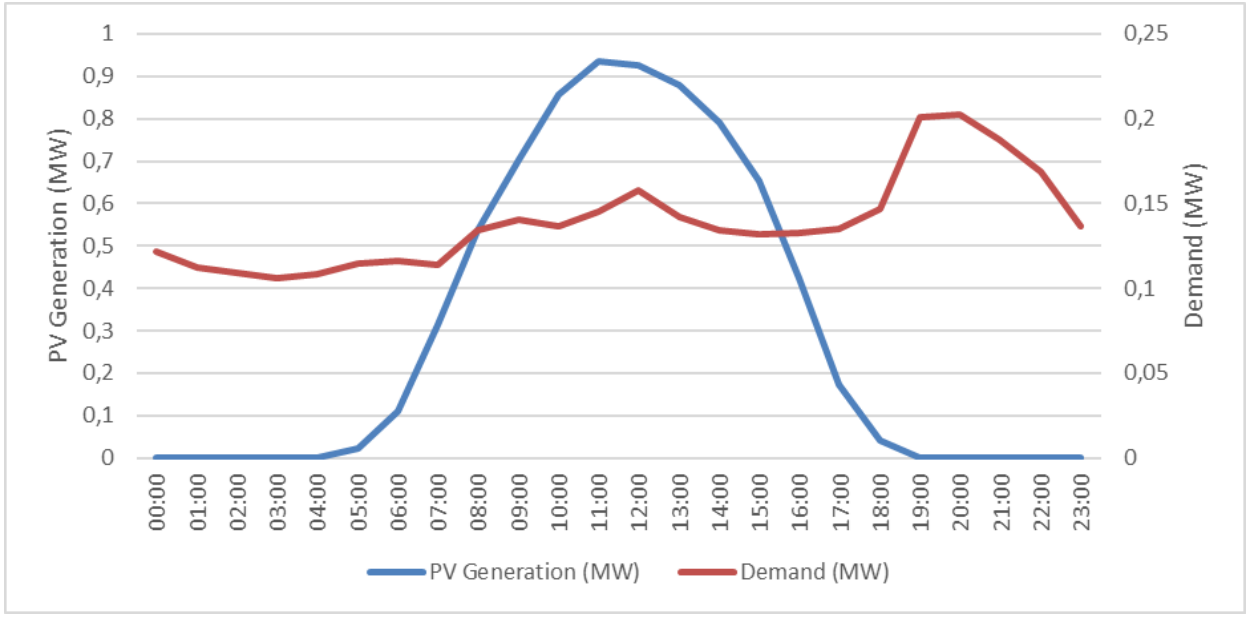
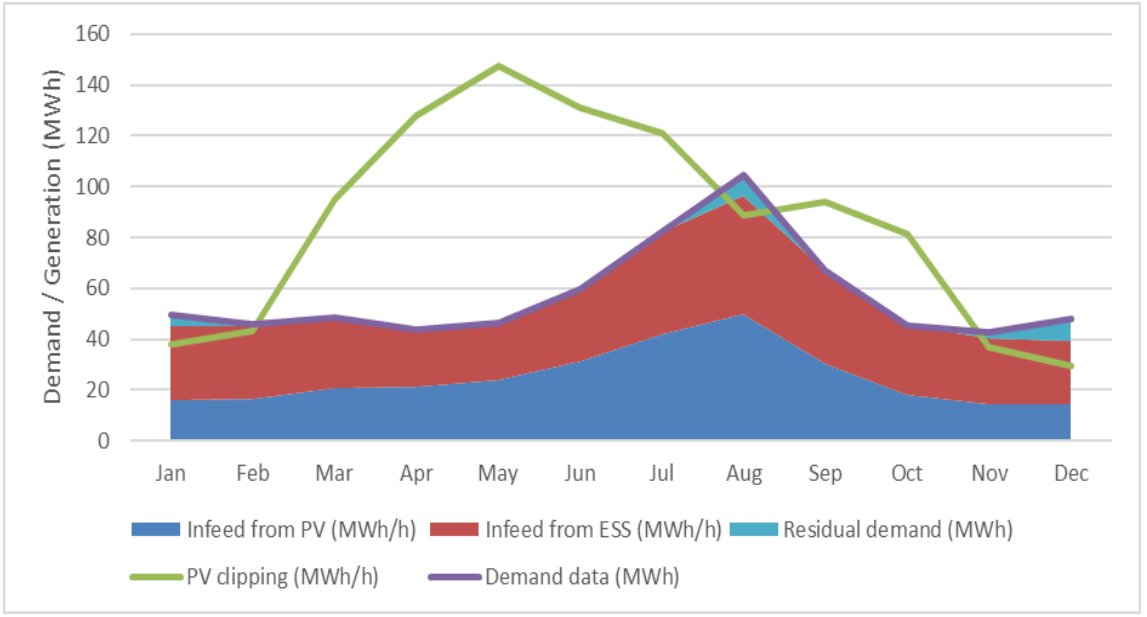
Sizing the BESS

RINA-C has undertaken a selection of modelling scenarios for a range of proposed BESS sizes. The simulations have been performed to assess the performance and utilisation of the BESS to meet the local energy demand while operating in conjunction with the solar PV asset ***(Budget constraints are considered too)***

SCENARIO 1: 1 MW/1MWh (initially foreseen) - **SCENARIO 2:** 0,4 MW/1,6 MWh





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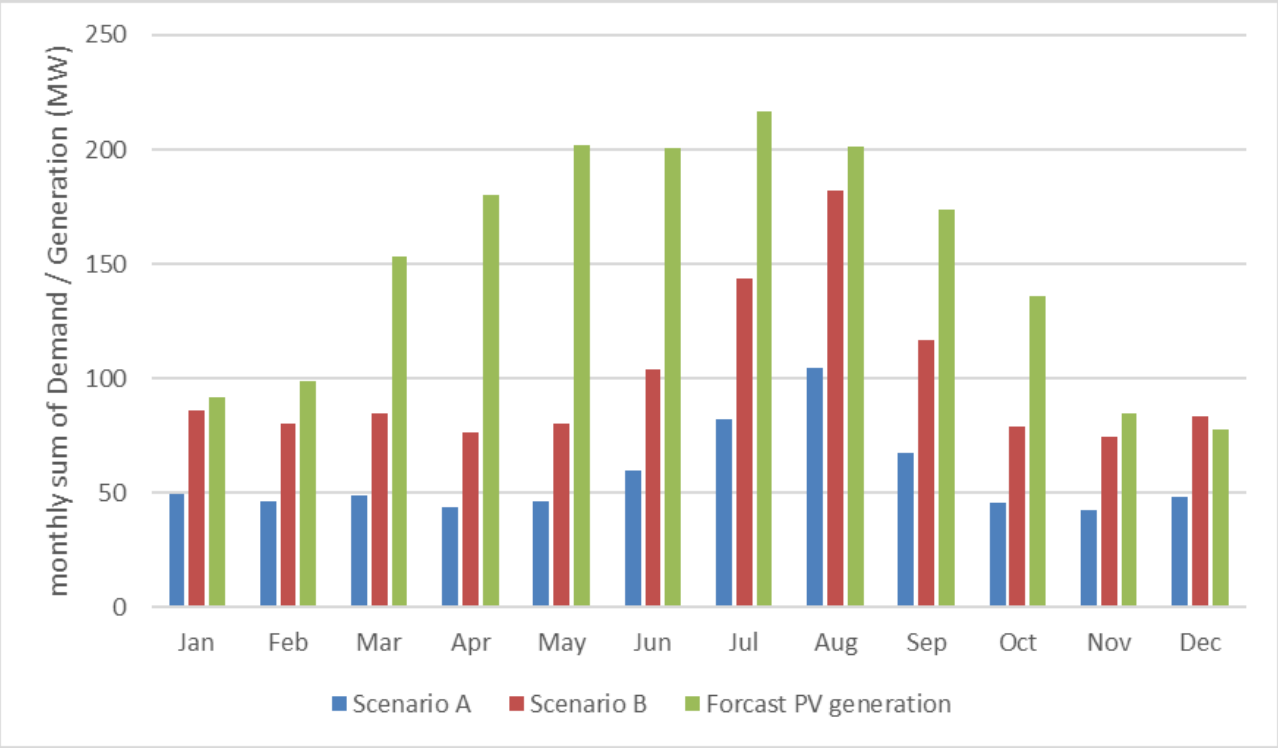
Sizing the BESS - the relevance of demand

Demand assessment based in the case of Unije 2009 monitored demand and “increased Unije demand”



Scenario A: is based on scaling the synthesised demand profile against the measured data.

Scenario B: is a conservative case where the Scenario A demand profile has been further increased in order to lift the annual maximum demand to equal the rated capacity of the 400kVA transformer installed on Unije. Given this transformer sizing it is expected that this would represent the highest demand on the island.

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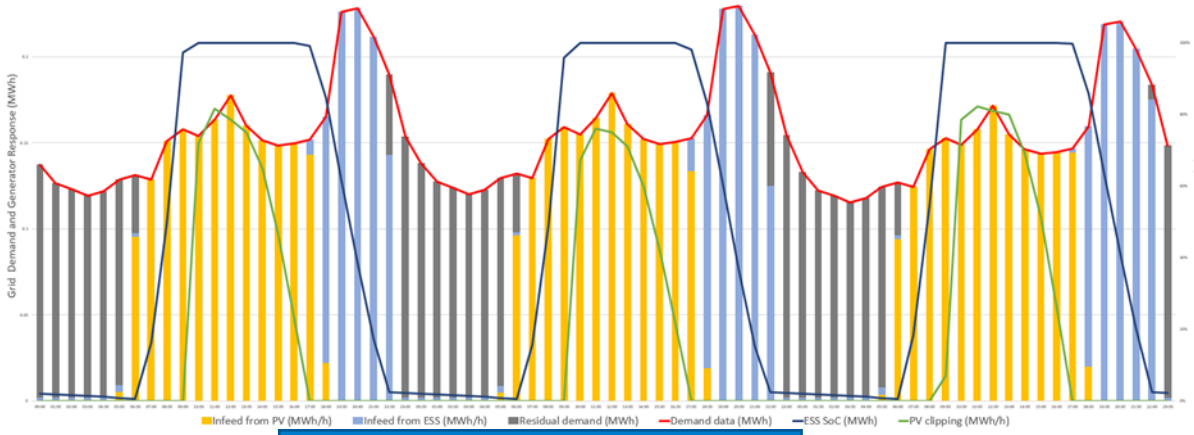
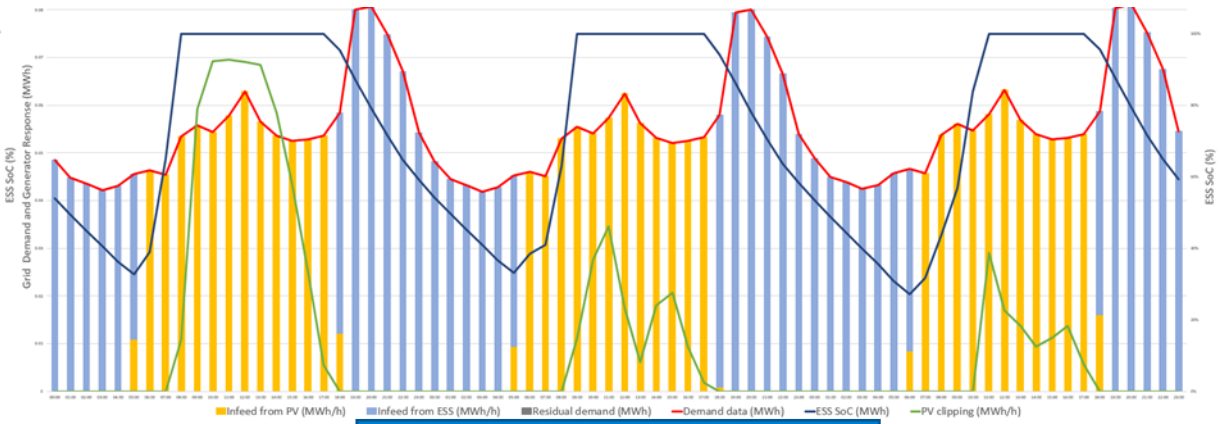
Sizing the BESS - SCENARIO 1

- Grid inputs used for day-night in peak period.(grey columns) while BESS covers winter days fully
- In miminmum demand period BESS cannot be charged and PV production has to be injected in the grid.
- Given the peak demand of the island being considered less than 400kW (based on the island transformer capacity) it was deemed unnecessary to specify the BESS with a 1MW power rating.

75.46 MWh of annual residual demand in demand scenario A
(more or less similar if we move to 0,4MW/1,6 MWh with 76.74 MWh of annual residual demand)



PEAK DEMAND



MINIMUM DEMAND

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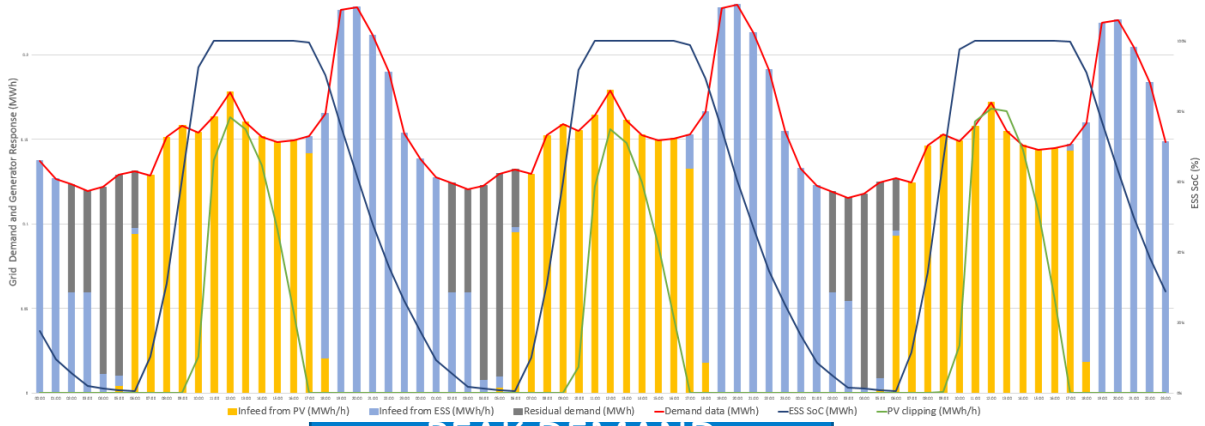
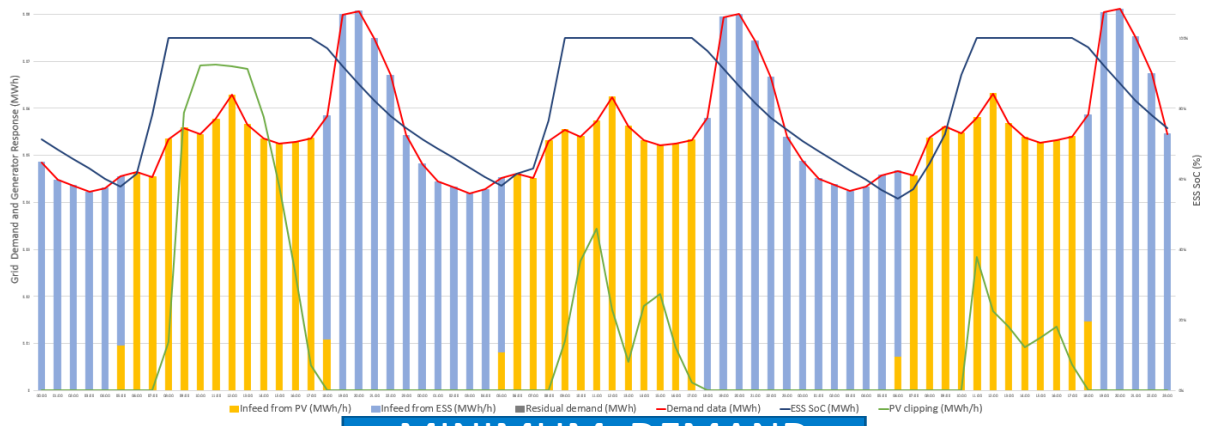
Sizing the BESS - SCENARIO 2

- Reduction of grid inputs
- By increasing the usable energy capacity of the BESS from 1MWh to 1.6MWh the annual residual demand for Unije which required generation capacity from the island interconnector has been reduced to **25.53MWh in demand scenario A**
- In demand scenario B assessment, discrepancy between BESS Scenario 1 and 2 is lower in terms of residual demand (1: 372 MWh - 2: 223 MWh) but still more favourable to scenario 2.



PEAK DEMAND



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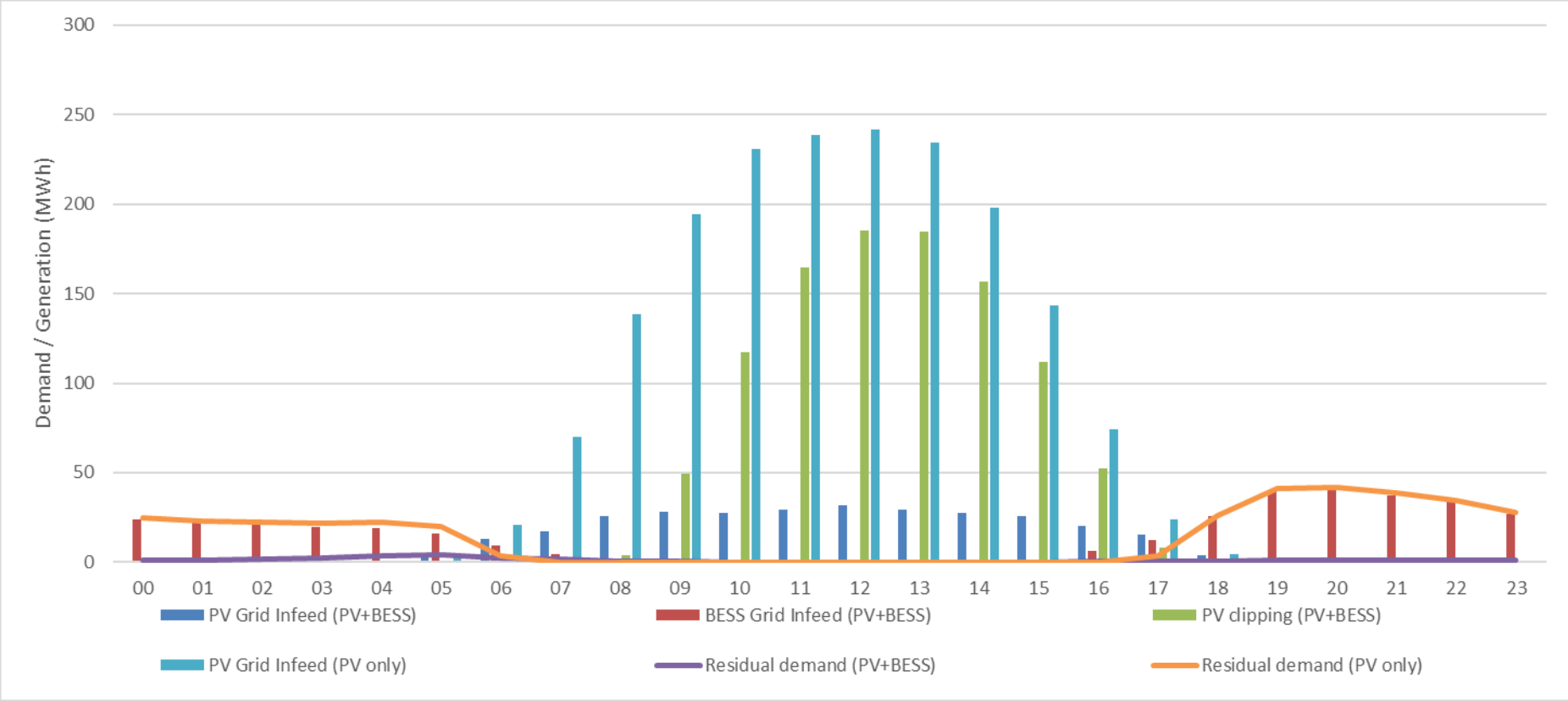
Key findings



The PV only residual demand (red line) is pronounced throughout the evening peaks and night-time loads: reduced!
Morning hours still require some inputs from the grid.
PV+BESS enables to offer increased flexibility (particularly in winter periods) in addition to realising potential financial benefits through the time value of energy delivery, i.e. increased tariffs during daily peak demand periods

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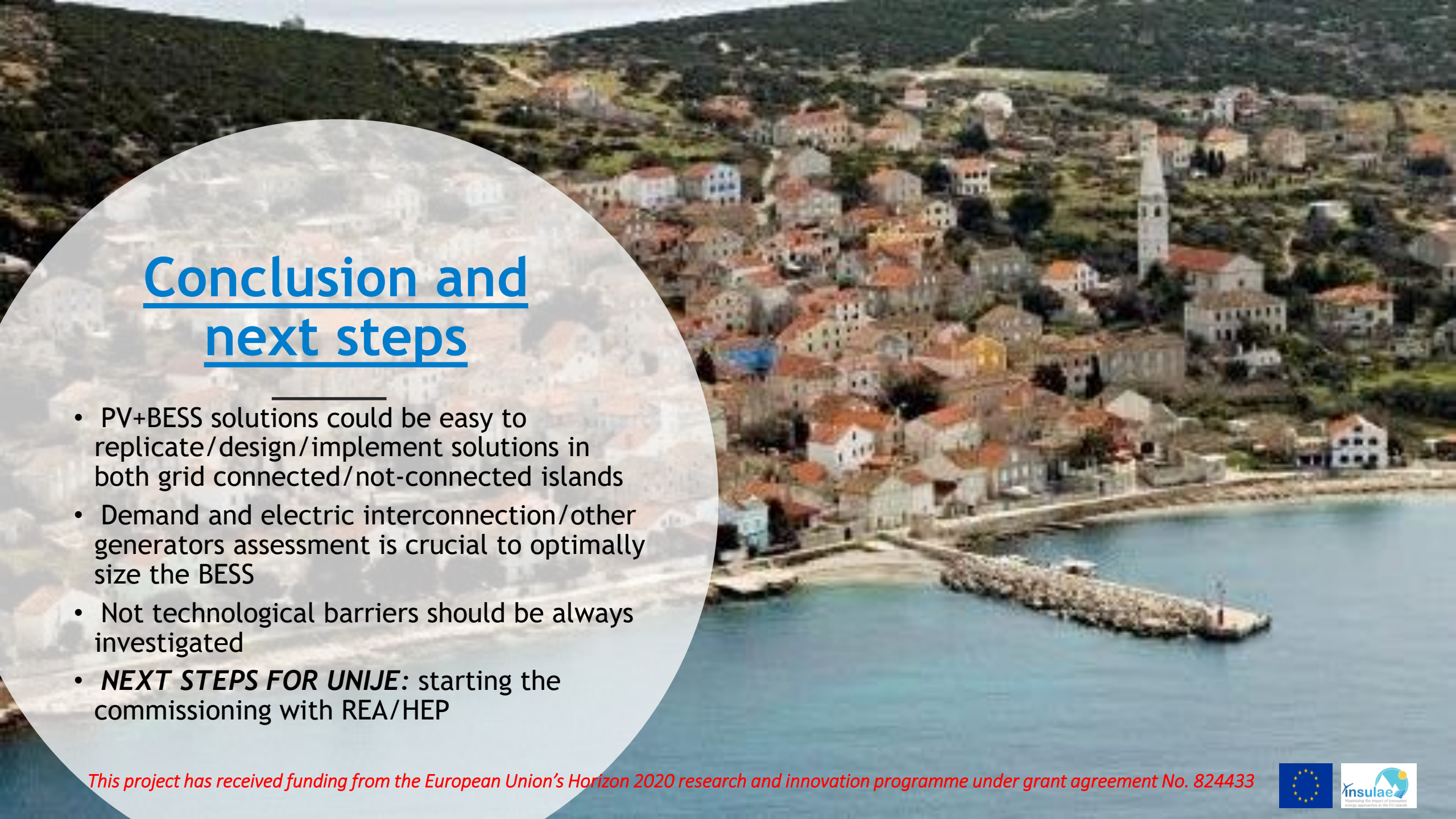

Conclusion and next steps

- PV+BESS solutions could be easy to replicate/design/implement solutions in both grid connected/not-connected islands
- Demand and electric interconnection/other generators assessment is crucial to optimally size the BESS
- Not technological barriers should be always investigated
- ***NEXT STEPS FOR UNIJE:*** starting the commissioning with REA/HEP

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Thanks for your time!

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