

## Host Utilities



**BSES**  
BSES Rajdhani Power Limited

**BSES**  
BSES Yamuna Power Limited

## Co - Host Utilities



## ORGANIZER

**ISGF**  
India Smart Grid Forum



**India**  
**SMART UTILITY**  
**Week 2024**

## Supporting Ministries



MINISTRY OF POWER  
GOVERNMENT OF INDIA



MINISTRY OF NEW AND  
RENEWABLE ENERGY  
GOVERNMENT OF INDIA



नीति आयोग  
National Institution for Transforming India



MINISTRY OF JAL SHAKTI  
DEPARTMENT OF WATER RESOURCES,  
RIVER DEVELOPMENT & GANGA REJUVENATION,  
GOVERNMENT OF INDIA



MINISTRY OF HEAVY INDUSTRIES  
GOVERNMENT OF INDIA



MINISTRY OF POWER  
GOVERNMENT OF INDIA

## Session : Emerging Technologies for Utilities

**Renewable Energy EMPOWERing European and InDian  
communities (RE-EMPOWERED)**

*Presented By*

**Dr. Srinivas Bhaskar Karanki, IIT Bhubaneswar**



**RE-EMPOWERED**

Renewable Energy EMPOWERING  
European & InDian Communities

# INTRODUCTION

- The “RE-EMPOWERED” project aims to develop and demonstrate novel tools to provide a complete solution for all stages of a Microgrid / Energy Island and Multi-Microgrid applications.

## • Key Features:



DST, India &  
EU Horizon 2020



2 Continents



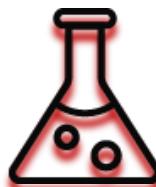
10 eco Tools  
10 WPs



7 Indian  
Partners



7 European  
Partners



4 Pilots



5 Countries



# Objectives

- RE-EMPOWERED objectives are organized in 3 pillars, each one comprising a set of objectives.

- Pillar-1: **Technical Objectives (TO)**
- Pillar-2: **Socio-economic Objectives (SO)**
- Pillar-3: **Coordination Objectives (CO)**

Pillar 1: Increased energy efficiency, RES utilization and reliability	Pillar 2: Fostering sustainable and economic community development	Pillar 3: Exchange, replicability and scalability in EU and India
<p><b>TO1: Optimal operation, high flexibility and efficiency</b></p> <p><b>TO2: Higher RES penetration and utilization</b></p> <p><b>TO3: Reliable and resilient operation</b></p> <p><b>TO4: Digitization and ICT deployment</b></p>	<p>SO1: New competitive business models and financing tools</p> <p>SO2: Community engagement, training and energy community development</p> <p>SO3: Improved energy access and environment quality</p>	<p>CO1: Knowledge exchange and training between EU and India</p> <p>CO2: Use case replicability across EU and India</p>

# Demo Sites Description

## Ghoramara Island (India):

- Not connected to main grid, few rooftop PVs, severe cyclonic storms every 5-10 years
- Microgrid will be built to electrify more than 1000 houses of the island

## Keonjhar (India):

- Isolated rural Villages
- Existing renewable facilities will be upgraded to improve the living standards of the community. Biomass and biogas will be integrated

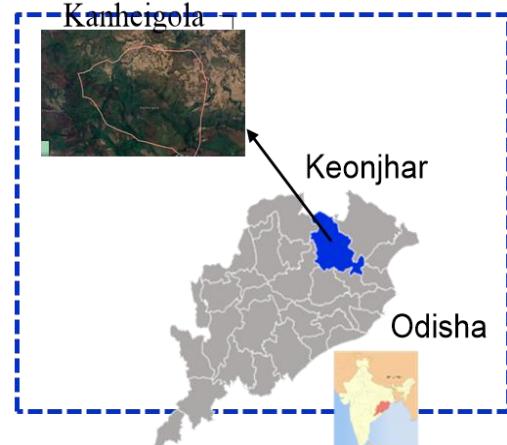
## Bornholm Island (Denmark):

- Received the 2019 RESponsible Island Prize by the EC
- Synergies of integrating energy vectors (power/heat) will be explored
- focus on unlocking the demand flexibility for higher RES utilization in grid-connected islands

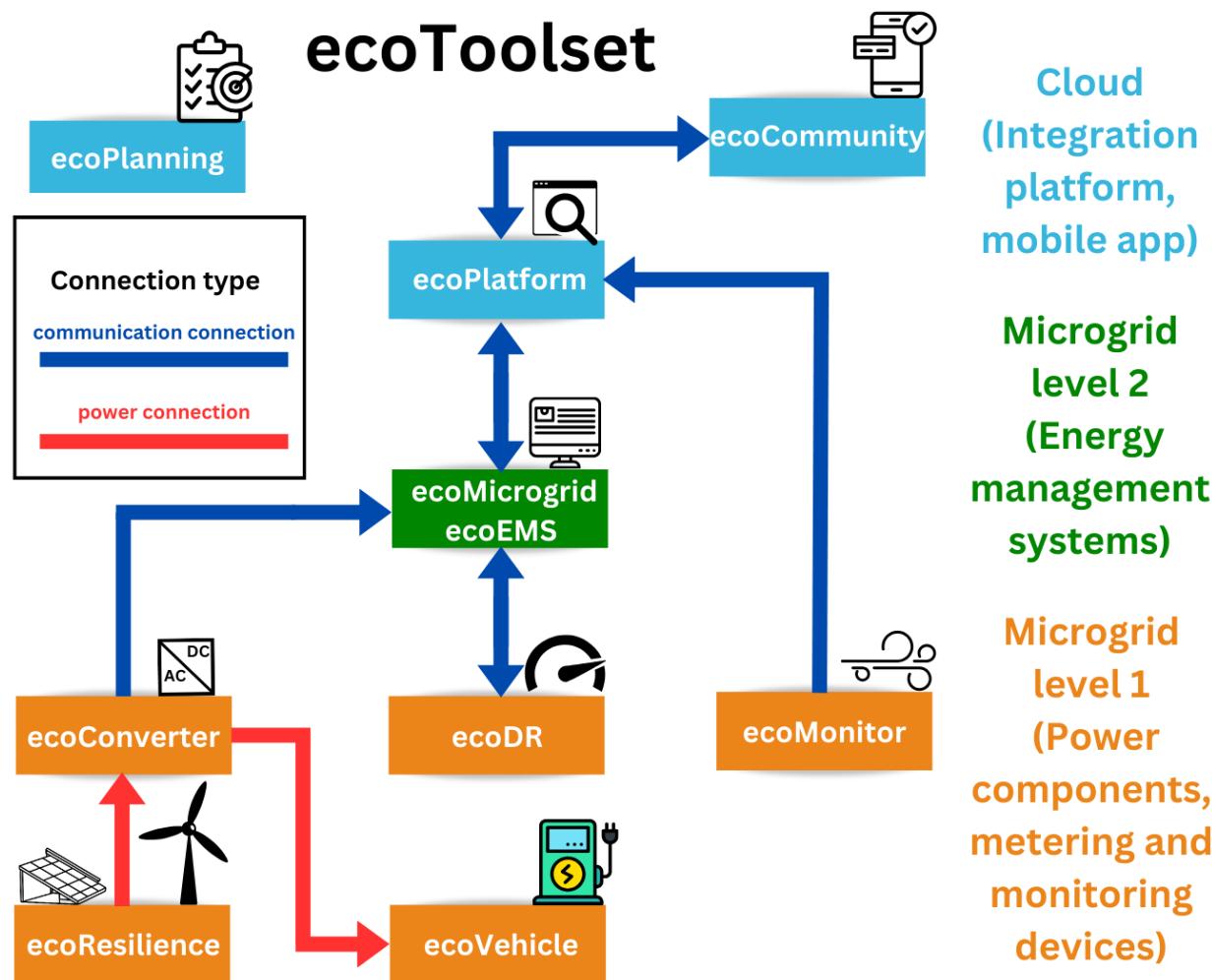
## Kythnos island (Greece):

- Kythnos power system and Gaidouromantra microgrid (first microgrid in Europe)
- Optimal operation and higher penetration of RES

4 demo sites, in EU and India. Demos range in size and technical maturity



# Description of the Tools

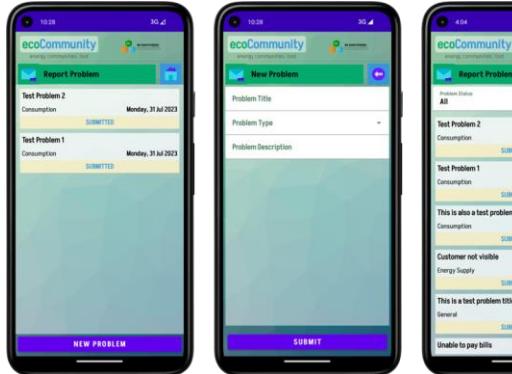
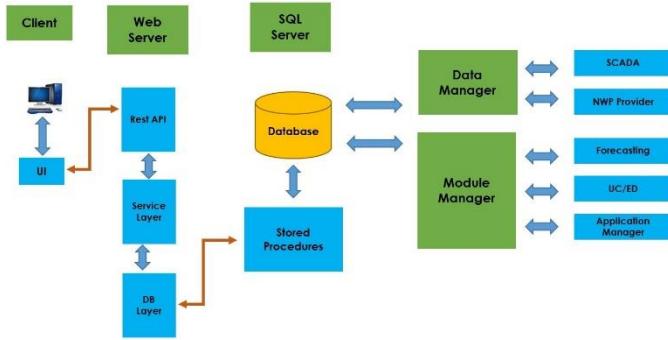


- **ecoPlanning**: Energy planning tool
- **ecoPlatform**: Cloud-based interoperable platform
- **ecoCommunity**: Citizen engagement digital platform
- **ecoEMS**: Energy Management System for isolated and weakly interconnected systems
- **ecoMicrogrid**: Energy Management System for smaller off-grid systems
- **ecoConverter**: Power electronic converters for dc/ac microgrids
- **ecoDR**: Smart Meter - Load controller
- **ecoMonitor**: Air quality monitoring
- **ecoResilience**: Cyclone Resilient infrastructure for wind turbines and PV
- **ecoVehicle**: Electric vehicle charger

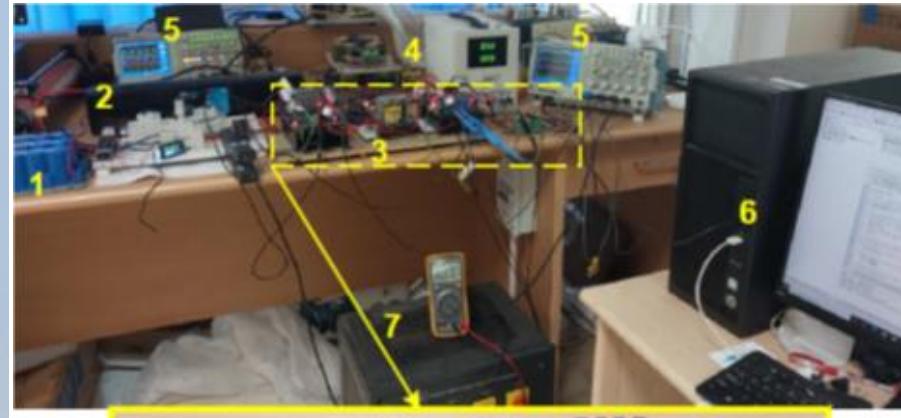
# Summary of Achievements

- Tools development has been almost completed

ecoEMS

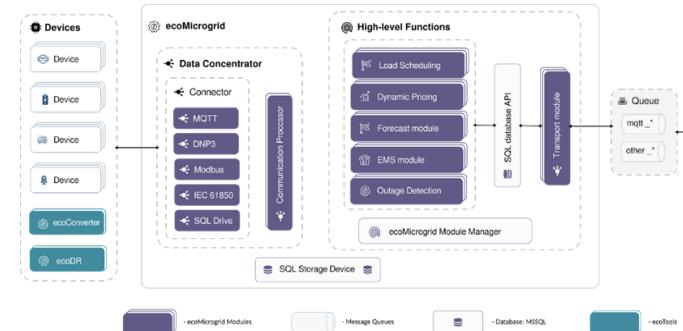


eco

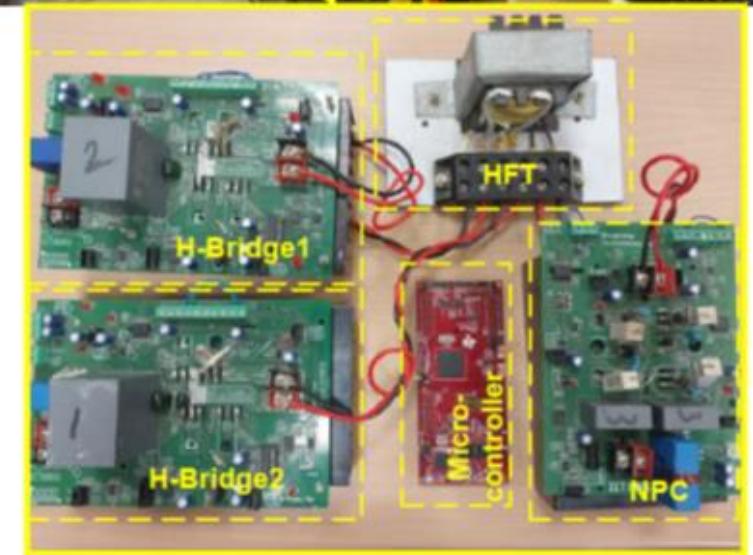


ecoConverter

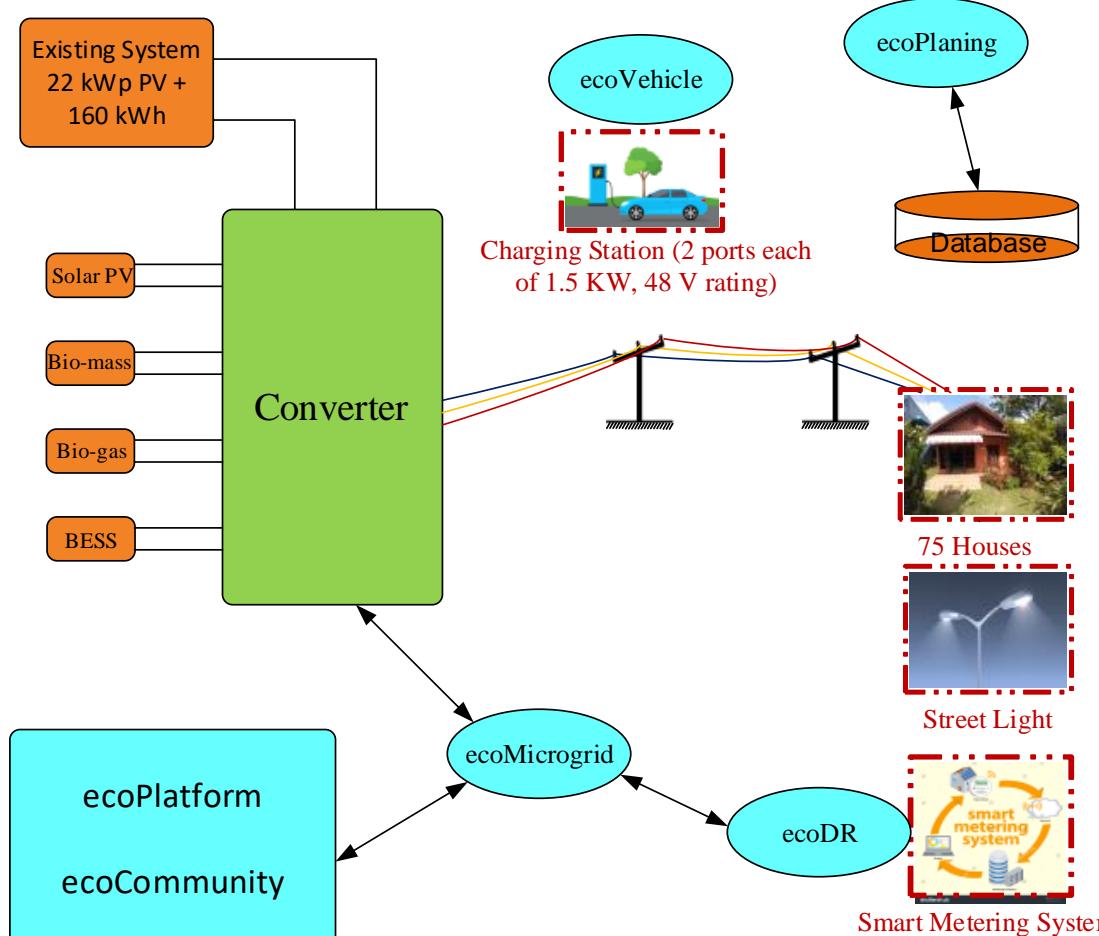
ecoMicrogrid



ecoResilience



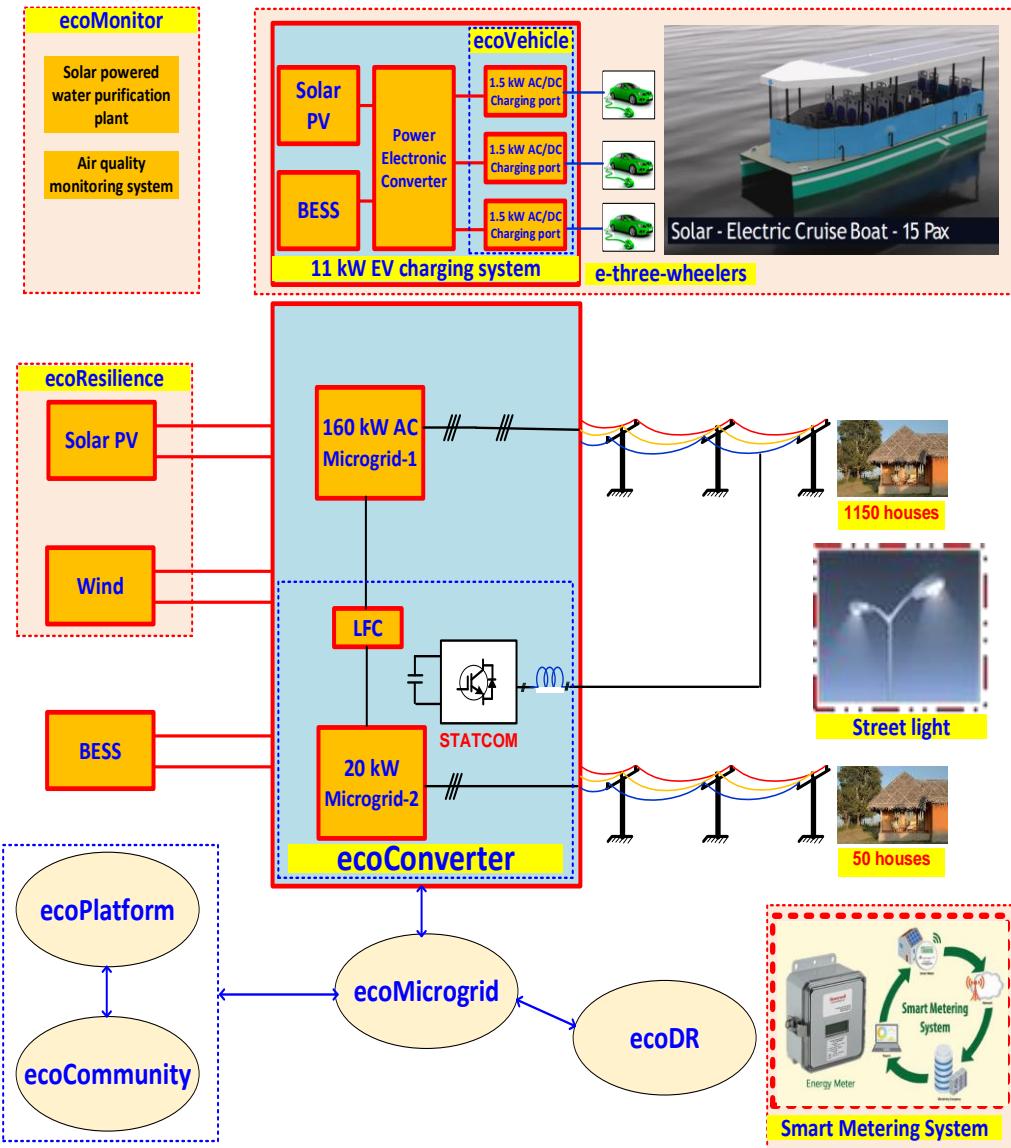
# Keonjhor Demo Site



50 KW Commercially available hybrid system  
(30 kWp PV + 10 kWp Bio-mass + 10 kWp Bio-gas  
+ 180 KWh BESS)



# Ghoramara Demo Site



**Impact 1.** Validate solutions for decarbonisation of the local energy system while ensuring a positive impact on the wider energy infrastructure on the local economy and local social aspects, and local air quality

**Impact 2.** Enhance the involvement of local energy consumers and producers, preferably by creating energy communities in the development and the operation of local energy systems and test new business models

**Impact 3.** Validate approaches, strategies and tools to safely and securely operate an integrated local energy system across energy vectors (electricity, heating, cooling, water, wastes, etc.) so that it is able to integrate higher shares of renewables (than it would in case of separate operation of infrastructures)

**Impact 4:** Benchmarking of technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens which will promote the ***Make-in-India and Atmanirbhar Bharat*** initiatives.

**Impact 5:** Increase of population awareness and customer engagement, such that rural to urban migration can be minimized.

Moreover, economic growth in the local communities is projected to be:

- 80% for Ghoramara, 70% for Keonjhar
- 4% for Bornholm island , 5% for Kythnos island

## RE-EMPOWERED outcomes/ Next steps

- ecoToolset has been **developed** and the project is now **heading towards demonstration**
- **Lab validation has been performed** ensuring
  - desired **performance and effectiveness** of the tools
  - successful **interconnection** of the tools
- Majority of the **commercial equipment has been installed** in the 4 demo sites (PV plants, biogas, biomass, batteries, control room etc)
- A **co-operative society has been formed** in Keonjhar demo site (India)

## Recommendations and lessons learned

- The **engagement of the local community** in the activities to start **as early as possible**
- Comprehensive **planning for the sustainability** is important including the **transfer of knowledge** to the local community and the **financial sustainability**
- Recognizing the **complementarity of expertise** of the INDIA and EU research groups and combine it for the success of the project
- **Frequent meetings** of all partners; facilitating fruitful discussion between India and Europe , **encouraging the flow of information** from both sides, overcoming unexpected difficulties through **effective communication**
- Emphasis on the **versatility/flexibility on the features** of the ecoTools in order to **maximise their compatibility and replicability - Avoid rigidity**

# THANK YOU

For discussions/suggestions/queries email: **isuw@isuw.in**  
visit: [www.isuw.in](http://www.isuw.in)

<https://reempowered-h2020.com/>



## RE-EMPOWERED

Renewable Energy EMPOWERing  
European & InDian Communities

### Project Partners:

