Autonome Provinz Bozen
Provincia autonoma di Bolzano
Provinzia autonoma de Bulsan
SÜDTIROL · ALTO ADIGE

unibz

ReNoN Workshop

Optimization, Energy Planning and Integration of Multi-Energy Systems for Decarbonization Pathways

Book of Abstracts

Editors

Massimiliano Renzi

Jacopo C. Alberizzi

Marko Keber

Title ReNoN Workshop
Optimization, Energy Planning and Integration of Multi-Energy Systems for Decarbonization Pathways

Editors Prof Massimiliano Renzi
(Faculty of Engineering, Free University of Bozen-Bolzano)

Dr Jacopo C. Alberizzi
(Faculty of Engineering, Free University of Bozen-Bolzano)

Dr Marko Keber
(Faculty of Engineering, Free University of Bozen-Bolzano)

Conference ReNoN Workshop 2026

Date 10 July 2026

Location Faculty of Engineering, Free University of Bozen-Bolzano
NOI Techpark, Building B1, via Bruno Buozzi,
Bozen-Bolzano (BZ), Italy

Organising committee Prof Massimiliano Renzi

Dr Jacopo C. Alberizzi

Dr Marko Keber

Scientific committee Prof Massimiliano Renzi

Dr Jacopo C. Alberizzi

Dr Marko Keber

Published by Faculty of Engineering, Free University of Bozen-Bolzano
NOI Techpark – via Bruno Buozzi, 1
39100 Bozen-Bolzano (BZ), Italy

Publication date 10 July 2026

DOI https://doi.org/10.5281/zenodo.21257371

Cite as Renzi, M., Alberizzi, J. C., Keber, M. (Eds.). (2026) *Book of Abstracts of the ReNoN Workshop: Optimization, Energy Planning and Integration of Multi-Energy Systems for Decarbonization Pathways* (Bozen-Bolzano, Italy, 10 July 2026) Free University of Bozen-Bolzano. DOI: 10.5281/zenodo.21257371

Table of Contents

Foreword

ReNoN Workshop

Optimization, Energy Planning and Integration of Multi-Energy Systems for Decarbonization Pathways

The ReNoN Workshop 2026 aims to explore advanced methodologies, planning strategies and optimization tools supporting the transition towards decarbonized and resilient energy systems.

Achieving the European carbon neutrality targets by 2050 requires a profound transformation of traditionally independent infrastructures such as electricity grids, hydrogen technologies integration and safety, district heating networks, water systems, transportation and energy storage. In this context, the ReNoN project introduces the “Network of Networks” paradigm, promoting the coordinated integration of multi-energy systems and the active involvement of prosumers and energy communities.

Project description

The path towards a green and sustainable transition, able to cope with the European carbon neutrality goals by 2050 will require a strong integration of essential energy-intensive services that have so far been designed and operated without an integrated approach. This project will investigate the energy integration of some key services (e.g. renewable generation and energy recovery systems, major electricity storage and distribution systems, hydrogen, water grid, district heating, electric mobility) within an interconnected multi-vector energy network – namely, Renewable-based Network of Networks (ReNoN). Such integration will reach the dual outcome of increasing energy production from renewable sources and increasing efficiency/reducing waste in resource use in the perspective of a circular economy approach. The goal can be achieved by exploiting synergies between different energy carriers (e.g. hydrogen, heat) and other energy-intensive Utility Networks (UN), storage systems, and by further engaging prosumers to help provide the flexibility needed to manage system constraints and ensure quality of service.

The goal of the project is to produce management algorithms for the ReNoN, building upon numerical optimization techniques, with a novel two-level architecture. The first level will be in charge of skimming the available local distributed resources that can provide a service given

the specific environmental, technical and economic boundary conditions; this part of the algorithm will also identify the most critical performance parameters (KPIs) and optimization goals of the ReNoN, given the technical, economic and environmental boundary conditions. Using the outcomes coming from the first level optimization, a lower level computes the optimal management solution of the ReNoN (e.g., minimization of emissions, keeping system efficiency above a threshold, ensuring continuity of service according to a certain order of merit, stability of the grid, overall energy cost minimization, etc.) by considering the specific digital-twin models of the technologies involved. This lower-level algorithm can be also updated on-line with data coming from energy flow sensors, actual environmental conditions, resources availability to manage future interconnected smart-cities.

The proposed ReNoN energy management tool is intended to be an instrument for local energy policy makers, for energy companies and utilities to support the transition to a sustainable, distributed and integrated energy system, also by involving the local communities, with a positive social and economic fallout. The ReNoN concept will be applied to specific case studies that maximize the impact on the territories of South Tyrol and Trentino, but the scalability of the adopted approaches will be discussed to allow their extension to different and potentially larger systems in the future.

Project sponsor

The ReNoN project is funded by the Autonomous Province of Bozen-Bolzano under the research call Research Südtirol / Alto Adige 2022 (CUP: I53C23002490003).

Funded research partners are the Free University of Bozen-Bolzano and the University of Trento.

Program

08:00 – 08:30	Registration
08:30 – 09:00	Welcome & opening remarks
09:00 – 10:30	Keynote presentations
10:30 – 11:00	Networking activity
11:00 – 12:30	Presentations – session 1: Hydrogen Technologies
12:30 – 13:30	Long coffee break
13:30 – 14:30	Presentations – session 2: Energy System Modeling
14:30 – 15:00	Networking activity
14:30 – 15:30	Presentations – session 3: Applications
16:00 – 17:00	Laboratory visit
17:00 – 17:30	Closing discussion

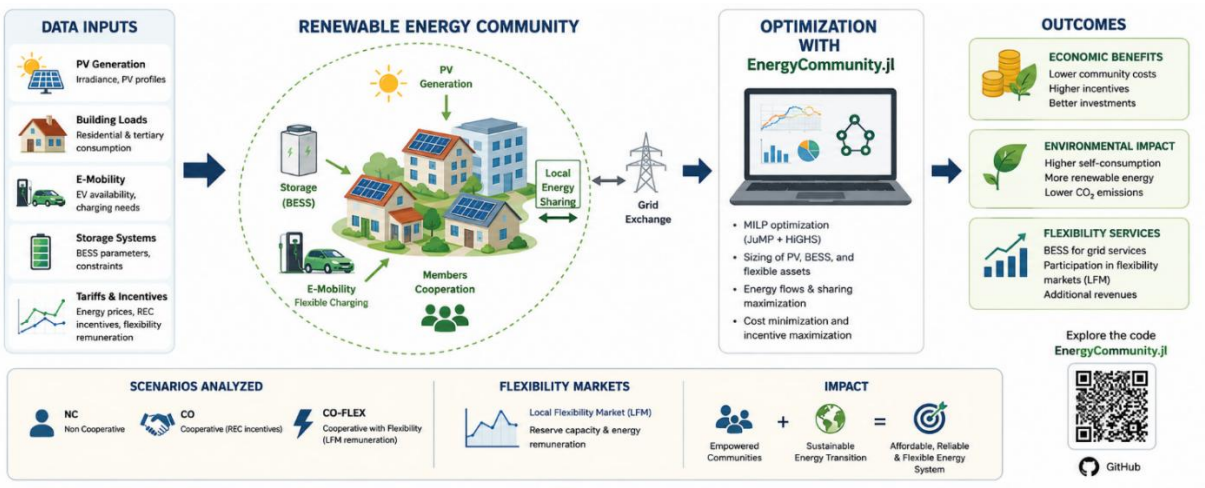
Graphical Abstracts

Optimization and Flexibility of Renewable Energy Communities

Tommaso Ferrucci, Davide Poli, Davide Fioritiv

DESTEC, University of Pisa, Pisa, Italy

ABSTRACT



KEY TAKEAWAYS

- Open-source optimization supports transparent planning of renewable energy communities.
- Coordinated PV, storage and EV charging can increase shared energy and flexibility.
- Fair reward allocation helps turn technical potential into durable participation.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Open-source techno-economic modelling of renewable energy communities under dynamic market conditions.
- Demand-side flexibility from batteries, electric vehicles and controllable building loads.
- Fair reward allocation and business models for community-based flexibility services.

AUTHORS' CONTACTS AND INFORMATION

- Corresponding author: Tommaso Ferrucci, DESTEC, University of Pisa tommaso.ferrucci@phd.unipi.it
- ORCID: 0000-0002-1178-6681 - LinkedIn: linkedin.com/in/tommaso-ferrucci/
- Department website: destec.unipi.it/en

Open-source model: EnergyCommunity.jl

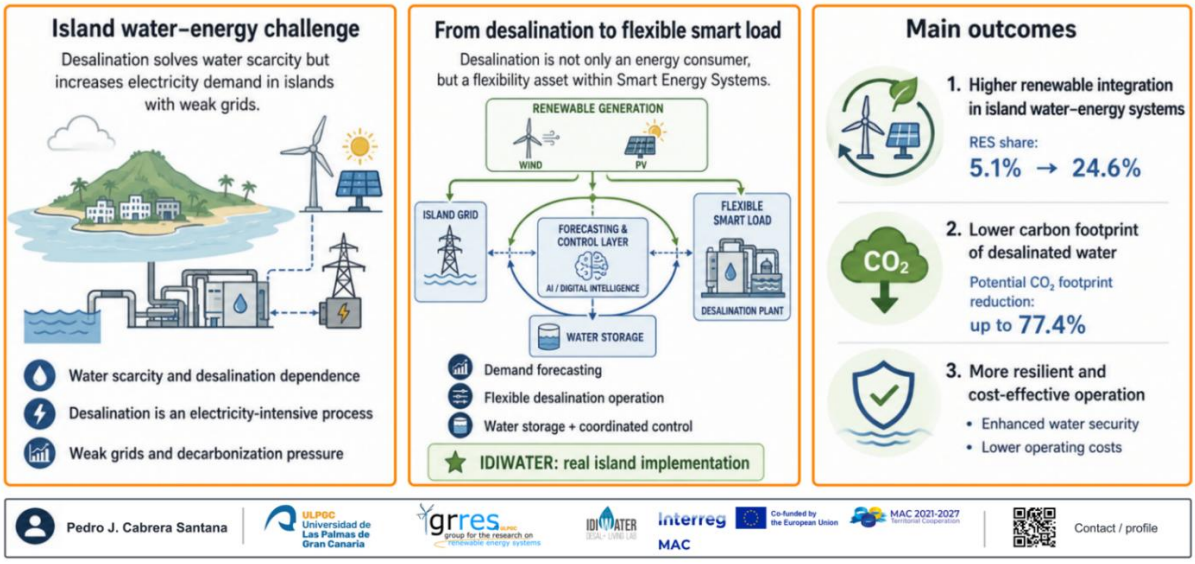
https://github.com/SPSUnipi/EnergyCommunity.jl

Smart Energy Systems in Desalination: The IDIWATER Project as Case Study

Pedro J. Cabrera Santana

Group for the Research on Renewable Energy Systems (GRRES),
Department of Mechanical Engineering, University of Las Palmas de Gran Canaria,
Las Palmas de Gran Canaria, Spain

ABSTRACT



KEY TAKEAWAYS

- Desalination should not be viewed only as an electricity-intensive process, but also as a potential flexibility asset within Smart Energy Systems.
- In island systems, the coordinated management of renewable generation, desalination capacity and water storage can increase renewable energy integration while reducing fossil fuel dependence.
- The IDIWATER project provides a real island case study for moving from planning-oriented smart water–energy models to AI-supported operational decision-making.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Integrated modelling of water–energy interactions in Smart Energy Systems and multi-energy planning frameworks.
- Flexibility assessment of water infrastructures as demand-side resources for renewable energy integration.
- AI, digital twins and decision-support tools for resilient and low-carbon planning of island and weak-grid energy systems.

AUTHORS' CONTACTS AND INFORMATION

- **Pedro J. Cabrera Santana**
  Associate Professor, Department of Mechanical Engineering

  University of Las Palmas de Gran Canaria (ULPGC), Spain

  Coordinator of the Group for the Research on Renewable Energy Systems (GRRES)

- Email: pedro.cabrerasantana@ulpgc.es

  ORCID: https://orcid.org/0000-0001-9707-6375

  Research profile: https://accedacris.ulpgc.es/cris/rp/rp00649/

  LinkedIn: https://www.linkedin.com/in/pedro-j-cabrera-santana-4ab62817/

- Department website: https://www.ulpgc.es/departamentos/dim

  Institutional website: https://www.ulpgc.es

  QR code: linked to the ULPGC profile

Hydrogen: A Green and Safe Molecule Ready for the Decarbonization

Marco Belloni

IIT Hydrogen Ltd, Bolzano, Italy

ABSTRACT

KEY TAKEAWAYS

- Hydrogen: Applications in Mobility, Industry;
- European Regulations Defining Sustainable Hydrogen
- Hydrogen Technologies and Safety

AUTHORS' CONTACTS AND INFORMATION

- Marco Belloni, Mechatronics Engineer - CTO of IIT Hydrogen
- https://iithydrogen.it/
- marco.belloni@iithydrogen.it
- www.linkedin.com/in/marco-belloni-3648a742

Safety in H2 Plants: Challenges and Solutions

Nelson Righetti

GAe Engineering Nord, Bolzano, Italy

ABSTRACT

Hydrogen is increasingly recognised as a key energy carrier for decarbonisation, but its safe use requires a specific understanding of its physical and combustion properties. Its low density, high diffusivity, wide flammability range, very low ignition energy and almost invisible flame behaviour make hydrogen safety fundamentally different from conventional fuels. These characteristics directly influence plant layout, ventilation strategy, hazardous area classification, detection philosophy, emergency shutdown logic and fire protection design.

This presentation introduces the main safety challenges in hydrogen production, storage and dispensing facilities, with particular focus on accidental releases, jet fires, delayed ignition, flash fires, overpressure scenarios and potential domino effects. It outlines how structured engineering methods such as HAZID, HAZOP and quantitative risk assessment tools like HyRAM can support the identification of credible scenarios and the definition of appropriate mitigation measures.

The lecture also presents the typical layers of protection adopted in hydrogen plants, including leak prevention, gas and flame detection, automatic isolation, emergency shutdown systems, ventilation, separation distances, blast walls, deluge systems and operational procedures. The objective is to show how fire safety engineering can translate hydrogen-specific hazards into robust design choices, combining regulatory compliance, consequence modelling and practical risk reduction strategies.

KEY TAKEAWAYS

- Hydrogen: physical/combustion properties;
- Safety Design and techniques
- Risk Mitigation and applied solutions

AUTHORS' CONTACTS AND INFORMATION

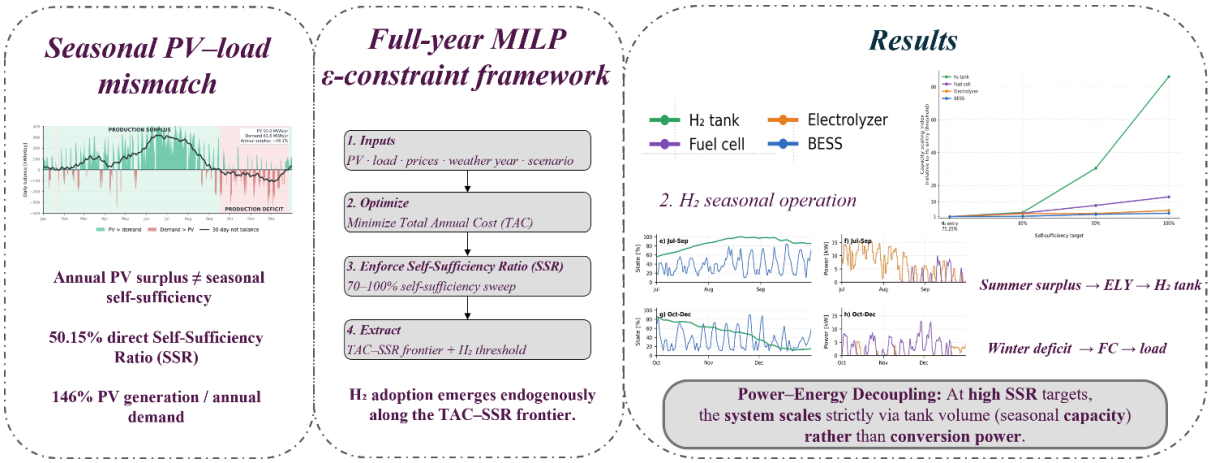
- Nelson Righetti – Industrial Engineer, CEO – GAe Engineering Nord Srl
- https://www.gae-engineering.com/
- n.righetti@gae-engineering.com
- https://www.linkedin.com/in/nelson-righetti-82950254/

When Does Hydrogen Become Cost-Effective for Seasonal-Load Prosumers in South Tyrol?

Lorenzo Gambadori, Jacopo Carlo Alberizzi, Marko Keber, Massimiliano Renzi

Faculty of Engineering, Free University of Bolzano/Bozen, Bolzano/Bozen, Italy

ABSTRACT



KEY TAKEAWAYS

- Annual PV surplus does not guarantee autonomy: the limiting factor is the seasonal mismatch between PV generation and electricity demand.
- Hydrogen enters the least-cost design only at high self-sufficiency targets, after the battery-only region has been exhausted.
- The value of hydrogen lies in power–energy decoupling: electrolyzer and fuel cell capacity scale with power needs, while the tank provides seasonal energy capacity.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Community-scale optimization of shared BESS–H_2 flexibility for Alpine prosumers connected to constrained rural feeders.
- Modelling feeder-level constraints, synchronized PV exports and winter imports to assess whether local flexibility can defer grid reinforcement.
- Multi-energy extension of the framework, including heat demand, refrigeration, heat pumps, thermal storage and fuel-cell heat recovery.

AUTHORS' CONTACTS AND INFORMATION

Lorenzo Gambadori

Department of Engineering, Free University of Bolzano/Bozen

e-mail: lorenzo.gambadori@student.unibz.it

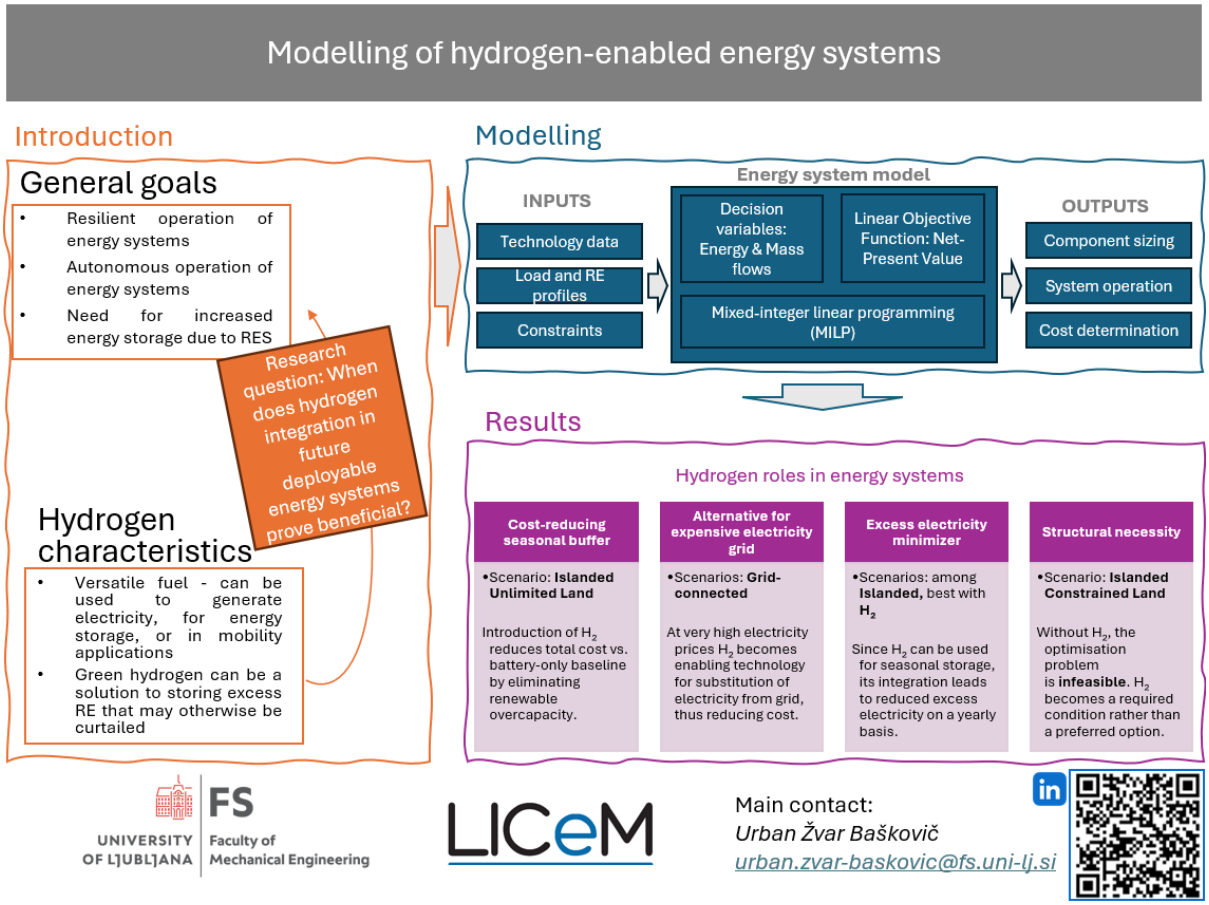
LinkedIn profile: linkedin.com/in/lorenzo-gambadori

Modelling of Hydrogen-Enabled Energy Systems

Urban Žvar Baškovič, Žiga Rosec, Tomaž Katrašnik

Laboratory for Internal Combustion Engines and Electromobility,
Faculty of Mechanical Engineering, University of Ljubljana, Ljubljana, Slovenia

ABSTRACT



KEY TAKEAWAYS

- In islanded configurations hydrogen acts as a cost-reducing seasonal buffer and under land restrictions hydrogen becomes a structural enabler without which operation of the energy system is not feasible.
- For temporary deployment periods, imported electricity is generally the least costly option, followed by imported hydrogen and then locally produced hydrogen.
- Complex systems with high share of renewable energy production and storage can have huge implications on the logistics of the energy system deployment.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Determining the role of hydrogen storage in energy systems to achieve resilient operation while considering intermittency of renewable energy sources and flexibility of hydrogen/electricity pricing.
- Determining the role of e-fuels in energy systems through production and utilization in internal combustion engine (piston ICEs, gas turbines) along with combustion characteristics and engine emission response.
- Evaluating influence of energy system components (fuel cell, electrolyser, battery) degradation on energy system design and operation.

AUTHORS' CONTACTS AND INFORMATION

- Main authors:
    - Assist. Prof. dr. Urban Žvar Baškovič,
        - Email: urban.zvar-baskovic@fs.uni-lj.si
        - ORCID: https://orcid.org/0000-0001-9044-5617
        - LinkedIn: www.linkedin.com/in/urban-žvar-baškovič-18345360
        - LinkedIn QR code

    - Prof. dr. Tomaž Katrašnik
        - Email: tomaz.katrasnik@fs.uni-lj.si
        - ORCID: https://orcid.org/0000-0001-6954-4936
        - LinkedIn:

          https://www.linkedin.com/in/tomaž-katrašnik-681906251/

- Institution:
    - University of Ljubljana: https://www.uni-lj.si/en
    - Facult of Mechanical Engineering: https://www.fs.uni-lj.si/
    - Laboratory for Internal Combustion Engines and Electromobility: https://www.licem.si/

Optimization-Based Prosumer Control for Integrating Flexibility with *pandaprosumer*

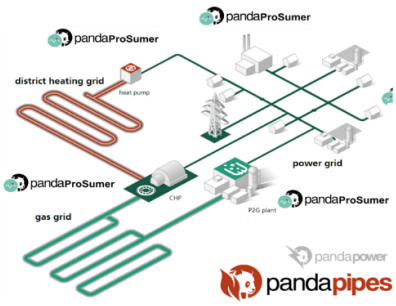
Carl Ritzenhoff [1], Pratikshya Mohanty [1,2], Ruben Schauer [1,2]

[1] Department of Sustainable Electrical Energy Systems, University of Kassel, Kassel, Germany

[2] Fraunhofer-Institut für Energiewirtschaft und Energiesystemtechnik, Kassel, Germany

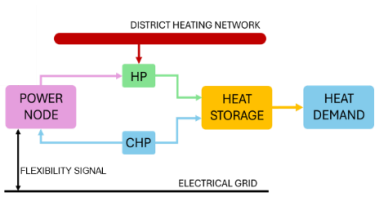
ABSTRACT

pandaprosumer:



- **Tool:** Open-source Python tool for simulating flexibilities in multi-energy grids
- **Core:** Time-synchronous prosumer–grid coupling
- **Purpose:** Analyzing flexibility potential and its real-time interaction with the power grid (e.g. voltage, line and transformer loading)
- **Grid planning application:** Avoid conventional grid reinforcement

Demonstration of flexibility provision



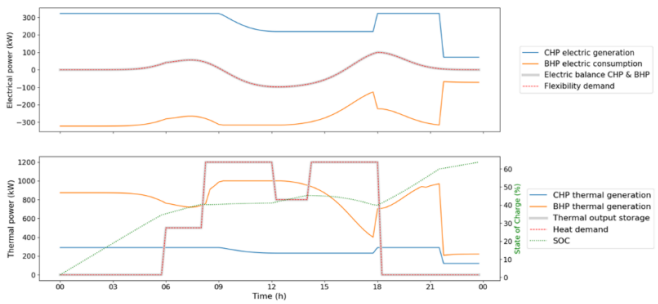
Goal

- Flexibility provision
- Thermal demand satisfaction

Method

Optimizing HP and CHP electrical loads to minimize deviations from requested flexibility signal

Results



KEY TAKEAWAYS

- *pandaprosumer* framework can be used as a decision-making tool to coordinate operation of flexible assets by tracking grid-side flexibility request while satisfying thermal comfort of consumers.
- The methodology enables calculation of feasible setpoints for the operation of assets considering their operating constraints.
- The tool allows the interaction between heating, gas and power grid and storage, thereby representing sector-coupling at the prosumer level.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Flexibility Integration for automatic grid planning considering increasing renewable generation and new types of loads as an alternative to grid reinforcement
- Automatic Grid Planning with a capacity-based optimization framework for sector couple distribution grids across electricity, heat and gas sectors.
- Timeseries based grid planning as an optimization problem, considering flexibility integration from loads, generators or prosumers and grid expansion

AUTHORS' CONTACTS AND INFORMATION

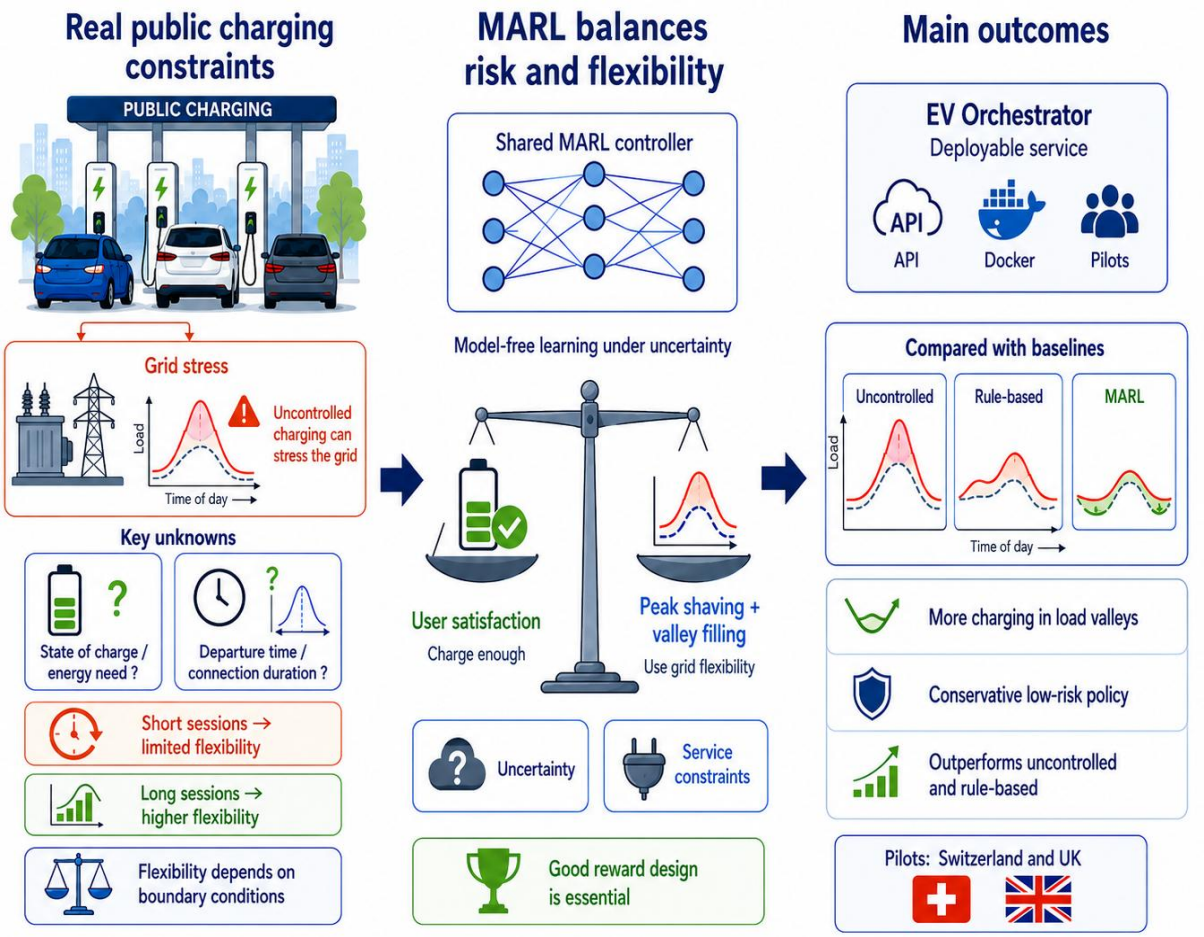
- Carl Ritzenhoff: carl.ritzenhoff @uni-kassel.de
- Pratikshya Mohanty: pratikshya.mohanty@iee.fraunhofer.de
- Dr Ruben Schauer: ruben.schauer@iee.fraunhofer.de
- Fraunhofer-Institut für Energiewirtschaft und Energiesystemtechnik: https://www.iee.fraunhofer.de/de/forschungsschwerpunkte/netzplanung_netzbetrieb.html
- University of Kassel: https://www.uni-kassel.de/eecs/e2n/startseite.html

From Algorithm to Deployment: A Multi-Agent EV Orchestrator for Public Charging Flexibility

Manuel Antonio Perez Estevez, Lorenzo Nespoli, Vasco Medici, Roberto Rocchetta

Dipartimento ambiente costruzioni e design (DACD),
Scuola Professionale della Svizzera Italiana, Mendrisio, Switzerland

ABSTRACT



KEY TAKEAWAYS

- Public charging operates under genuine uncertainty (unknown energy need, departure time and grid load), so flexibility potential depends heavily on operational constraints and the acceptable risk of undercharging, contrary to idealized academic assumptions.
- MARL with careful reward engineering can learn to balance grid flexibility and user satisfaction, effectively shifting energy during long sessions while strictly avoiding critical service failures.
- The outcome of this research is a containerized, easily deployable platform that outperforms uncontrolled and rule-based baselines in simulation conditions, with real-world pilots now essential for quantifying true flexibility gains under real conditions.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Design of energy demand flexibility controllers capable of operating under real-world uncertainty, considering data-sharing frameworks from live deployments that rigorously respect privacy and data-protection constraints.
- User acceptance and the corresponding design of tariff systems to effectively incentivize flexible charging behaviour without compromising user experience.
- Development of tools and approaches to promote citizens' energy literacy, particularly on topics such as demand response, to foster informed participation in flexibility programmes.

AUTHORS' CONTACTS AND INFORMATION

- Manuel Perez: manuel.perez@supsi.ch
- Vasco Medici: vasco.medici@supsi.ch
- Lorenzo Nespoli: lorenzo.nespoli@supsi.ch
- Roberto Rocchetta: roberto.rocchetta@supsi.ch

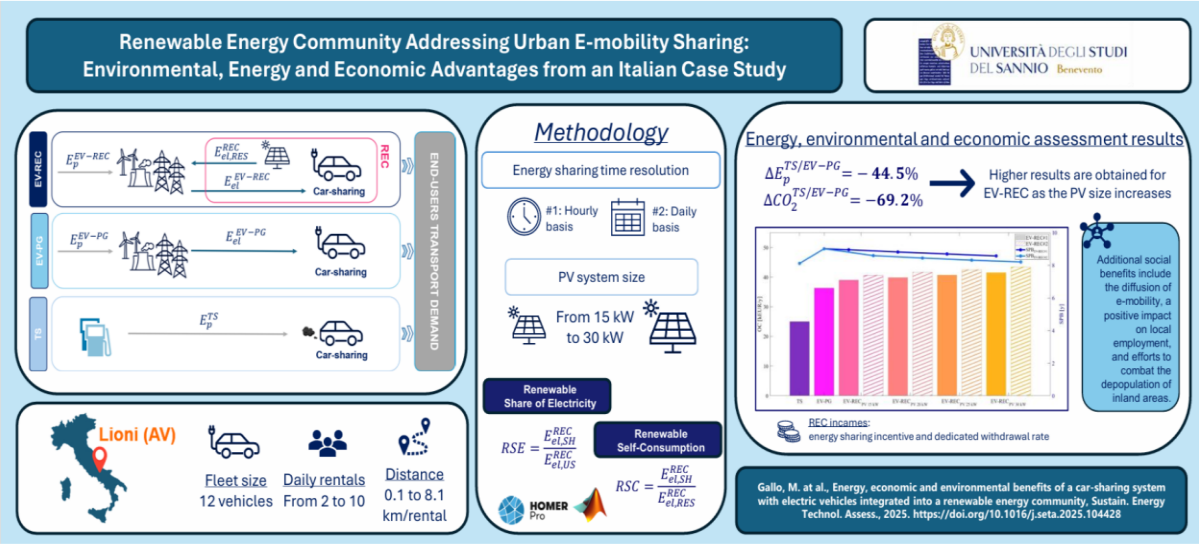
Group website: https://www.isaac.supsi.ch/en/energy-systems

Renewable Energy Community Addressing Urban E-Mobility Sharing: Environmental, Energy and Economic Advantages from an Italian Case Study

Mariano Gallo, Elisa Marrasso, Chiara Martone, Giovanna Pallotta, Carlo Roselli, Maurizio Sasso

Department of Engineering, University of Sannio, Benevento, Italy

ABSTRACT



KEY TAKEAWAYS

- The environmental impact reduction of the transport sector and the affordability of e-mobility are promoted through a car-sharing system integrated into a PV-based Renewable Energy Community.
- Energy, environmental and economic outcomes are assessed across different scenarios by comparing conventional and electric vehicles, various PV system sizes, and hourly and daily energy sharing time resolutions.
- Shared energy increases with PV size and sharing time resolution, resulting in greater primary energy savings and CO_2 equivalent emissions, while the traditional system shows the lowest operating costs.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Sector coupling, solidarity-oriented approaches and regulatory framework assessment of Renewable Energy Communities.
- Methodologies and user-friendly tools to support the transition toward Positive Energy Districts.
- Load-shifting methodology based on time-dependent power grid CO_2 emission factor for environmental impact reduction of residential energy consumption.

AUTHORS' CONTACTS AND INFORMATION

- Mariano Gallo:
  e-mail: gallo@unisannio.it
  ORCID 0000-0001-7375-7117
- Giovanna Pallotta:
  e-mail: giopallotta@unisannio.it
  ORCID 0000-0002-5365-5903
- Elisa Marrasso:
  e-mail: marrasso@unisannio.it
  ORCID 0000-0002-9534-4468
- Carlo Roselli:
  e-mail: croselli@unisannio.it
  ORCID 0000-0002-4423-8147
- Chiara Martone:
  e-mail: cmartone@unisannio.it
  ORCID 0009-0008-2274-1316
- Maurizio Sasso:
  e-mail: sasso@unisannio.it
  ORCID 0000-0002-8318-8621

- Department of Engineering, University of Sannio
  Link University of Sannio: https://www.unisannio.it/it
  Link department of Engineering:
  https://www.unisannio.it/it/sitodipartimentale/dipartimento-ding

University of Sannio

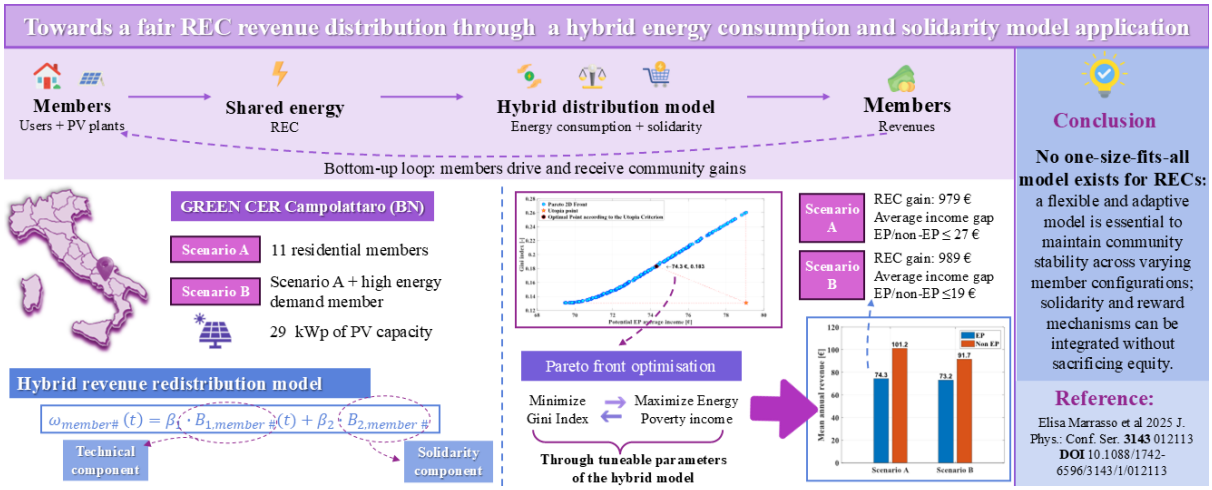
Department of Engineering

Towards a Fair REC Revenue Distribution Through a Hybrid Energy Consumption and Solidarity Model Application

Elisa Marrasso, Chiara Martone, Ilenia Perugini, Carlo Roselli

Department of Engineering, University of Sannio, Benevento, Italy

ABSTRACT



KEY TAKEAWAYS

- A hybrid model application combining meritocratic and solidarity criteria enables fair revenue distribution in RECs.
- REC membership is open and dynamic; a distribution model must therefore embed tuneable parameters to adapt to changing configurations and preserve community stability.
- In socially oriented RECs, identifying energy-poverty members is essential but challenging: sensitive data (e.g. ISEE) may be unavailable, making bill-derived proxies, such as the unit electricity cost, a practical and privacy-respecting alternative.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Industrial Renewable Energy Communities: applications, modelling, and integration with urban energy systems
- Integration of sustainable mobility into Renewable Energy Communities, such as electric vehicle charging coordination within REC frameworks
- Solidarity-oriented RECs: energy poverty indicators, assessment methods, and real-case applications

AUTHORS' CONTACTS AND INFORMATION

- Elisa Marrasso:
  e-mail: marrasso@unisannio.it
  ORCID 0000-0002-9534-4468
- Ilenia Perugini:
  e-mail: i.perugini@studenti.unisannio.it
  ORCID 0009-0008-7670-0173
- Chiara Martone:
  e-mail: cmartone@unisannio.it
  ORCID 0009-0008-2274-1316
- Carlo Roselli:
  e-mail: croselli@unisannio.it
  ORCID 0000-0002-4423-8147

Department of Engineering, University of Sannio

Link University of Sannio: https://www.unisannio.it/it

Link department of Engineering:
https://www.unisannio.it/it/sitodipartimentale/dipartimento-ding

University of Sannio

Department of Engineering

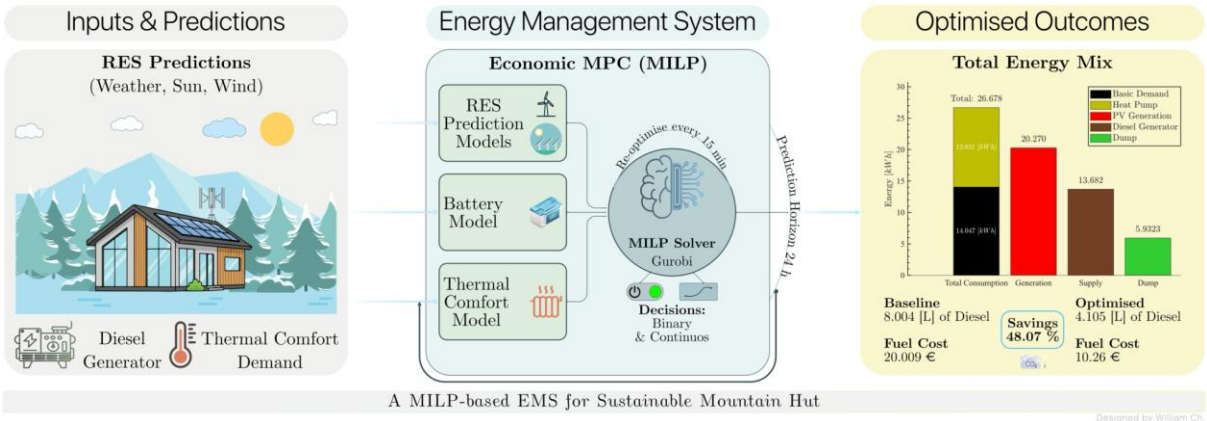
Economic MPC for Multi-Vector Energy Systems in Carbon-Neutral Mountain Huts: A Methodological Framework

William D. Chicaiza [1], Elisabetta Tedeschi [1,2]

[1] Department of Industrial Engineering, University of Trento, Trento, Italy

[2] Department of Electric Energy, Norwegian University of Science and Technology, Trondheim, Norway

ABSTRACT



- **Metrics from a 48-hour simulation**
- **Operational impact:**
  - ✓ Reduce diesel dependence and increased renewable utilization via coordinated predictive management.

KEY TAKEAWAYS

- PV generation covered a significant share of demand (20.27 kWh vs 26.68 kWh total) but was insufficient due to temporal mismatch.
- Diesel generation is still required in off-grid systems, providing over 50 % of the electrical supply.
- EMPC achieved a 48.7 % reduction in diesel use compared to a diesel-only case.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Lumped parameter models for thermal prediction in isolated buildings.
- Artificial Intelligent techniques for renewable energy and thermal demand forecasting.

AUTHORS' CONTACTS AND INFORMATION

- **William D. Chicaiza** – University of Trento – wd.chicaizasalazar@unitn.it – ORCID: 0000-0001-5473-9538.
- **Elisabetta Tedeschi** – University of Trento – elisabetta.tedeschi@unitn.it – ORCID: 0000-0002-6185-4910.

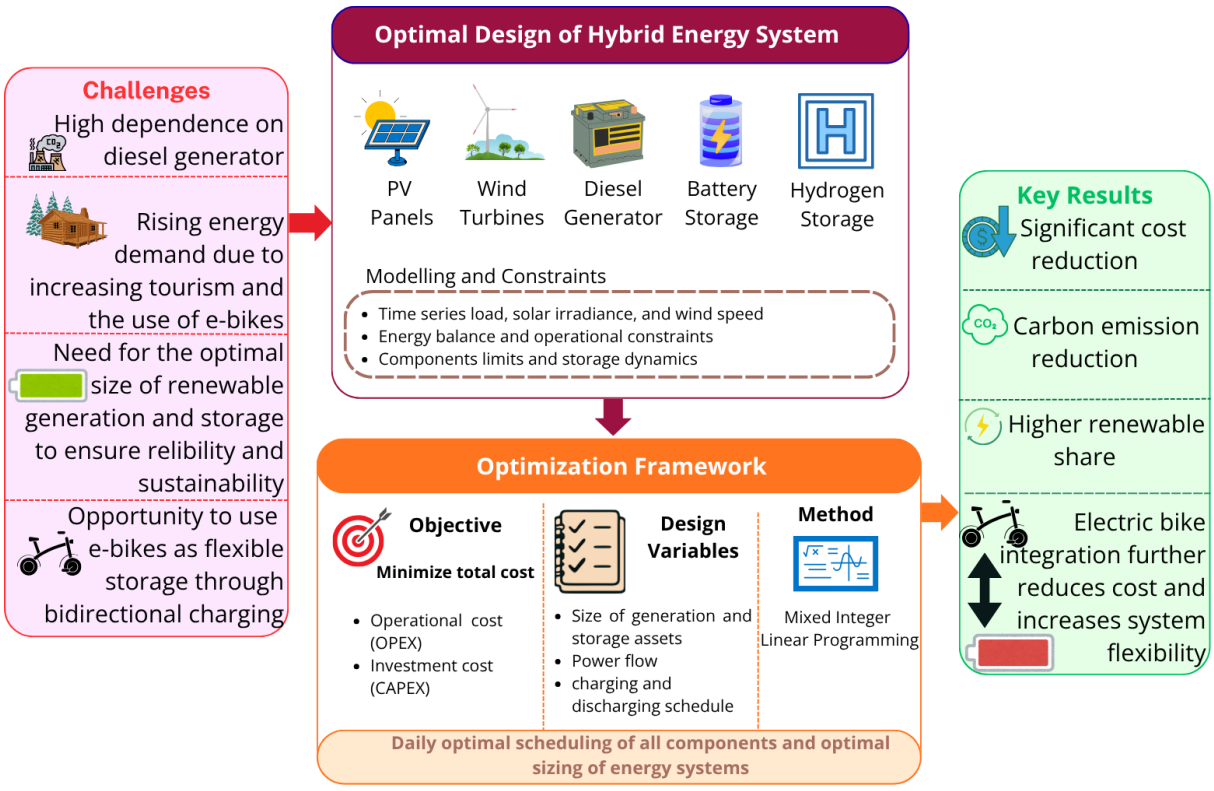
Decarbonization of an Alpine Hut in the Trentino Region

Niccolò Andreetta [1], Malik Ali Judge [2], Elisabetta Tedeschi [1,2]

[1] Department of Electric Energy, Norwegian University of Science and Technology, Trondheim, Norway

[2] Department of Industrial Engineering, University of Trento, Trento, Italy

ABSTRACT



KEY TAKEAWAYS

- An integrated modelling of renewable energy resources, storage technologies, loads, and energy networks.
- Optimization-driven platform for optimal sizing and operation of multi-energy systems.
- Support the transition toward sustainable, resilient, and decarbonized energy infrastructures.

TOPICS OF INTEREST FOR RESEARCH COLLABORATION

- Optimal sizing and operational scheduling.
- Integrated electricity–hydrogen energy networks.
- Energy management of renewable communities and isolated microgrids.

AUTHORS' CONTACTS AND INFORMATION

Malik Ali Judge:

- Contact details: https://orcid.org/0000-0003-3345-9603, https://www.linkedin.com/in/malik-ali-judge/
- https://www.dii.unitn.it/

Prof. Elisabetta Tedeschi:

- Contact details: https://orcid.org/0000-0002-6185-4910, https://www.linkedin.com/in/elisabettatedeschi/
- https://www.dii.unitn.it/
- https://www.ntnu.edu/iel