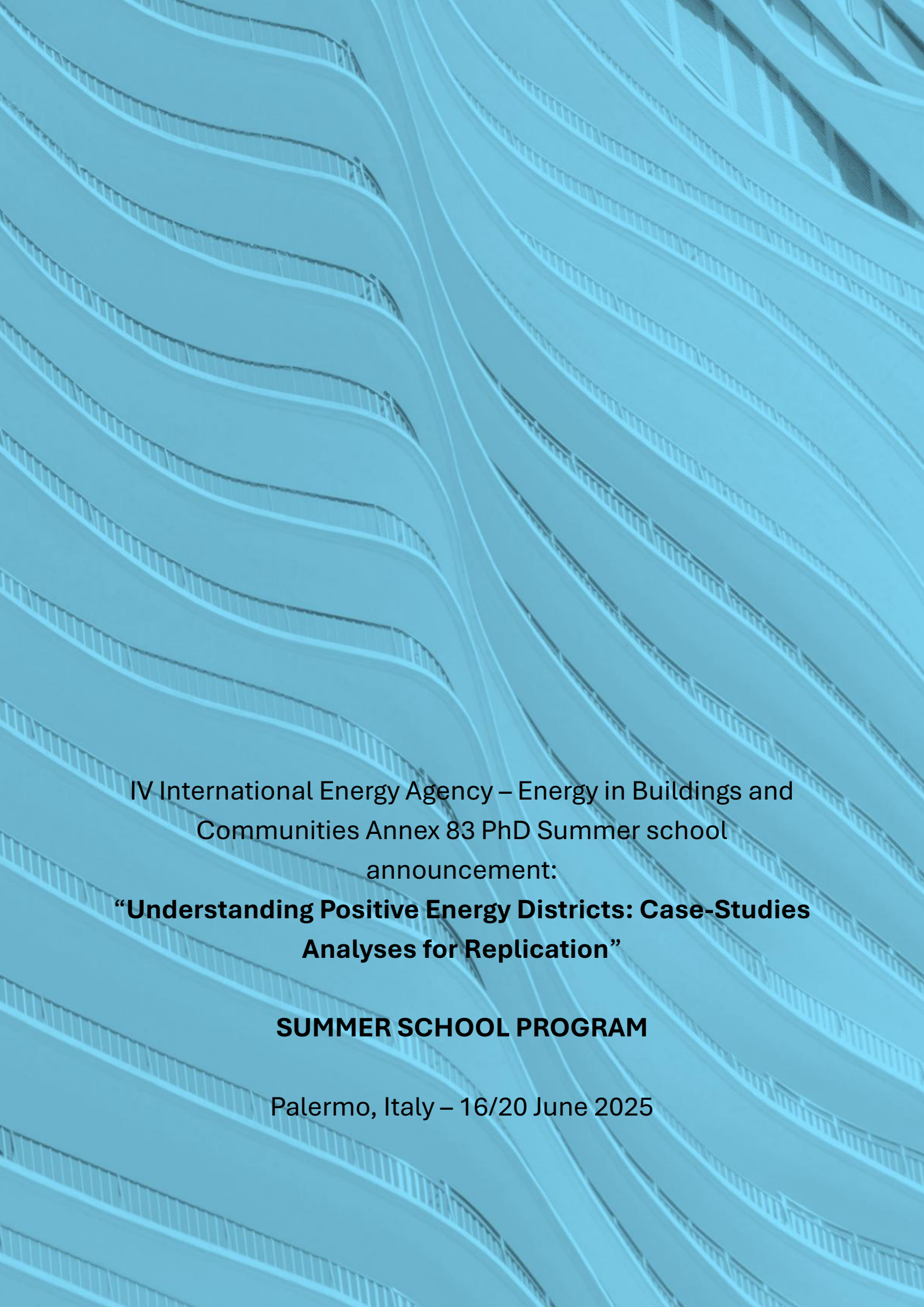


IV International Energy Agency – Energy in Buildings and Communities Annex 83 PhD Summer school announcement:

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

SUMMER SCHOOL PROGRAM

Palermo, Italy – 16/20 June 2025

Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA
ROME TECHNOPOLE INNOVATION ECOSYSTEM

UNIVERSITÀ DEGLI STUDI DI PALERMO
dipartimento di ingegneria unipa
Centro di Sostenibilità e Transizione Ecologica
EBC
Energy in Building and Communities Programme

IV IEA EBC Annex 83 PhD Summer School Introduction

Dear students and participants,

This **fourth edition** of the PhD Summer School, a dedicated initiative of the IEA EBC Annex 83, centers on the critical concept of Positive Energy Districts (PEDs) as a cornerstone of future sustainable urban development. Recognizing the urgent need for transformative solutions in our cities, this program is designed to provide a comprehensive understanding of the principles, challenges, and opportunities associated with Positive Energy Districts.

A **founding principle** within Annex 83 is to foster a strong **network** among our students, facilitating ongoing collaboration and knowledge exchange, being fully committed to exposing our students to **cultural contamination** and to an **international learning environment** as core values of this school.

Over the coming days, we will delve into the core tenets of PEDs, exploring their role in the broader energy transition and the essential frameworks for their successful realization. Our discussions will navigate the complexities of integrated design approaches, the strategic deployment of renewable energy technologies at the district scale, and the imperative of minimizing the environmental impact of our built environments. This inherently **multidisciplinary** endeavor will draw upon expertise from several domains, including **engineering (energy, building, environmental), architecture, urban planning, social sciences, economics, and environmental science**. We will examine the vital importance of stakeholder engagement, collaborative planning processes, and the development of holistic urban strategies that consider not only energy but also the broader social, economic, and environmental dimensions of sustainability.

By bringing together leading researchers in this international setting, this Summer School fosters a dynamic environment for knowledge exchange, the development of innovative ideas, and the creation of lasting connections. Our collective aim is to advance the understanding of Positive Energy Districts and to equip the next generation of researchers with the insights and tools necessary to drive their widespread adoption, ultimately contributing to the creation of more resilient and sustainable urban futures.

We wish you a great experience in Palermo and the very best of luck in your careers.

Sincerely,

Francesco Guarino & **Francesco Reda**

Operating Agents of IEA EBC Annex 83

IV IEA EBC Annex 83 PhD Summer School

"Understanding Positive Energy Districts: Case-Studies Analyses for Replication"

June 16-20, 2025 - University of Palermo (UNIPA), Palermo, Italy (Sala Lanza, Orto Botanico)

Monday, June 16th

- 08:30–09:00 | Registration
- 09:00-09:30 | Welcome
- 09:30–10:30 | Introduction to the school and to Annex 83 – **FRANCESCO GUARINO (UNIVERSITY OF PALERMO)**
- 10:30–11:00 | Coffee break
- 11:00–12:00 | The Ideal City – **FEDERICO BUTERA (POLYTECHNIC UNIVERSITY MILAN)**
- 12:00–13:30 | The role of Positive Energy District (PED) in the transition of urban energy system – **XINGXING ZHANG (DALARNA UNIVERSITY)**
- 13:30–14:30 | Lunch
- 14:30–15:30 | Calculating the Carbon Footprint of universities: the case study of the UNIPA Campus – **SONIA LONGO (UNIVERSITY OF PALERMO)**
- 15:30–16:00 | Coffee break
- 16:00–17:30 | Participants' Presentations and Poster Session

Tuesday, June 17th

- 09:30–11:00 | Holistic approach to designing energy positive, resilient communities: theories, and case studies – **CAROLINE HACHEM-VERMETTE (CONCORDIA UNIVERSITY)**
- 11:00–11:30 | Coffee break
- 11:30–13:00 | Renewable energy decentralization system and the urban space – **PAOLA MARRONE & ILARIA MONTELLA (ROMA TRE UNIVERSITY)**
- 13:00–14:00 | Lunch
- 14:00–15:30 | Theory and practice for Positive Energy Districts: implications from the agenda 2030 – **ROSARIA VOLPE (UNIVERSITY OF CATANIA)**
- 15:30–16:00 | Coffee break
- 16:00–17:30 | Poster Session
- 18:00–20:00 | Social activity: Visit of the Botanical Garden

Wednesday, June 18th

- 09:30–11:00 | Another side of the Positive Energy Districts: Industrial-Urban Innovation symbiosis - **FRANCESCO REDA (VTT TECHNICAL RESEARCH CENTER OF FINLAND)**
- 11:00–11:30 | Coffee break
- 11:30–13:00 | Planning for PED – Stakeholders perspectives and involvement – **ADRIANO**

BISELLO (EURAC RESEARCH)

- 13:00–14:00 | Lunch
- 14:00–15:30 | Urban Strategy Roadmaps for PEDs: Integrating Co-Creation at Every Step – **CODRUT PAPINA (URBASOFIA)**
- 15:30–16:00 | Coffee break
- 16:00–17:30 | On the relation between the urban heat mitigation and the performance of the built environment: solutions, strategies and impacts – **MICHELE ZINZI (ENEA)**
- 18:00–20:00 | Social activity: city tour

Thursday, June 19th

- 09:30–11:00 | Modelling costs and emissions for community energy solutions – **URSULA EICKER (CONCORDIA UNIVERSITY)**
- 11:00–11:30 | Coffee break
- 11:30–13:00 | Geospatial database tools for the design and implementation of Positive Clean Energy Districts (PCED) scenarios – **PAOLO CIVIERO (ROMA TRE UNIVERSITY)**
- 13:00–14:00 | Lunch
- 14:00–15:30 | Life cycle environmental impacts of building integrated photovoltaics - **MAURIZIO CELLURA & QUYEN LEE LU (UNIVERSITY OF PALERMO)**
- **20:00 Social Dinner**

Friday, June 20th

- 09:00–09:30 | **Introduction and Welcome**
- 09:30–11:15 | **Panel 1: Positive energy districts and ecological transition: towards (not-only) a low-carbon future - Chair Maurizio Cellura**
  - Ursula Eicker – De-risking the retrofit investment
  - Sergio Diaz de Garayo – Recipes for urban decarbonization
  - Giulia Turci - PEDs drivers and barriers. The case of Cesena, Italy
  - Caroline Hachem – Vermette - Beyond Energy: Designing Ecological Neighborhoods
- 11:15–11:45 | Coffee break
- 11:45–13:00 | **Panel 2: Research at UNIPA: experiences and projects - Chair Francesco Guarino**
  - Maurizio Cellura – Implementation working group 5: activities and synergies
  - Daniele Ronsivalle – The consistent project of urban space, mobility and energy
  - Marco Beccali – Innovative systems and materials for building applications: the NEST project
- 13:00–14:00 | Lunch
- 14:00–15:30 | **Students presentations**
- 15:30–16:00 | **Conclusions**

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

FRANCESCO GUARINO
Università degli Studi di Palermo - Italy

Francesco Guarino is currently an associate professor at the University of Palermo in Italy, at the Department of Engineering. He performs research and teaches in the field of Energy in Buildings, more in detail within innovative building energy simulation, co-simulation, environmental sustainability of districts and buildings, life cycle assessment of energy systems and buildings. Author of more than 140 among papers in national and international journals and conferences, book chapters or technical reports, he is reviewer consulted among several international energy and environmental journals and research agencies. Visiting professor and lecturer in several universities and research centers outside Italy.
He has participated to several international projects and research groups from the international energy agency on the topics of Positive Energy Districts, energy in buildings and sustainability of neighborhoods and is currently Operating agent of the International Energy Agency Energy in Buildings and Communities Annex 83 – Positive Energy Districts. Principle investigator of multiple EU and national projects and co-chair of the IWG5 workgroup within the EU SETPLAN. Chair of the Building Modeling & Design LAB (BMD LAB) at the University of Palermo.

Introduction to Annex 83

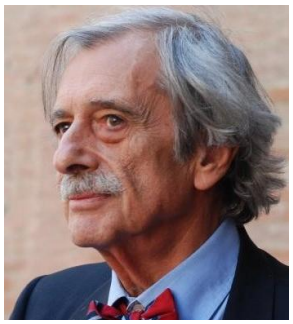
The presentation introduces the PED-SEA Annex 83 Summer School, held within the framework of the IEA EBC Annex 83 on Positive Energy Districts (PEDs). The talk outlines the overall structure and goals of the school, which brings together case studies, methodologies, and international experiences aimed at advancing knowledge and implementation of PEDs. It presents the main outcomes of Annex 83, including strategies for PED design and evaluation, as well as critical reflections from the collaboration among research, institutional, and technical actors. Key takeaways include the importance of local context, integrated approaches, and robust assessment frameworks. The presentation concludes with future directions for research and application in the PED domain.

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

FEDERICO BUTERA
Politecnico di Milano – Italy



Federico M. Butera is Professor Emeritus, chair of Environmental Physics, at the Politecnico di Milano, and PhD honoris causa in Architecture. Among the pioneers of scientific environmentalism, he has been engaged in research in the field of energy efficiency and renewable energy sources in the built environment since the 1970s.
He has been involved in the activities of the International Energy Agency on energy use at the building and urban scale and has coordinated European projects on the same topics; he has working with the UN Habitat agency on issues related to sustainable development and minimization of CO2 emissions at the building and community scale in developing countries.
His scientific experience has also led to projects, in Italy and abroad, of buildings and settlements powered exclusively by renewable sources. He has been and is involved in scientific dissemination and awareness-raising on environmental issues, through books, articles in magazines and newspapers, and conferences. He has received international awards, including the Eurosolar Prize for his commitment to solar energy and sustainable architecture in 2004, the PLEA (Passive and Low Energy Architecture) Pioneer Award in 2015, the Demetra Prize for environmental non-fiction, and the L'Europa che vogliamo ‘Robert Schuman’ Prize, awarded by the Academy of Sciences of the Bologna Institute, in 2021.

The ideal city

We are in the midst of an environmental crisis, witnessed by climate change and biodiversity loss, and we must overcome it. An inescapable starting point are the settlements, from mega-cities to villages. Settlements, in fact, while housing slightly more (55%) of the world's population, consume 79% of the globally produced food, 75% of all extracted natural resources and are responsible for 60-80% of all greenhouse gas emissions. In order to reduce their contribution to the environmental crisis, it is not enough to transform their energy system by reducing consumption and using only renewable sources, as large part of their contribution to the global environmental crisis stems from their metabolism, which is not only fuelled by energy, but also by materials, good, food and water. Thus, to reduce settlements’ impact on global environment it is necessary to examine their metabolism, seeking the necessary corrective actions.

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

XINGXING ZHANG
Dalarna University - Sweden

Xingxing Zhang is working as a full Professor in energy technology at Dalarna University, Sweden. He is the head of subject in energy technology, and the director of doctoral programme - Energy Systems in the Built Environment. He has multidisciplinary research in buildings, energy systems, and data analytics. He is active in EU research networks, by working in national projects, Nordic energy research projects, JPI Urban Europe and DUT projects, H2020 projects, EU cost action and IEA tasks.
He is the EU expert of ‘Scalable Cities’ programme about digitalization of urban energy system and application of AI on smart cities. He ranks as one of the top 2% scientists since 2021. He has published 4 books, 10 chapters and over 160 peer-reviewed papers as well as 10 patents. He serves as subject editor of ‘Building Simulation’ and editorial board member of several journals. He is the reviewer for EU research council Consolidator Grant, Industrial Research Fund Antwerp University Association, Belgium, Dutch Research Council in Domain Applied and Engineering Sciences, Swiss National Science Foundation, Research Grants Council of Hong Kong and the Austrian Academy of Sciences.

The role of Positive Energy District (PED) in the transition of urban energy system

This presentation firstly defines the urban energy system, and it further gives an overview of PED’s new definition framework 3.0. The binding contract – Climate City Contract (CCC) is then introduced in the Swedish context for municipalities to achieve PEDs and carbon-neutral cities. After then, the presentation also covers the most recent research activities of PEDs, such as visualization and benchmarking of PED database, evaluation matrix of PED. The practical development of PED in Sweden is finally summarized.

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

SONIA LONGO
Università degli Studi di Palermo - Italy

Sonia Longo is assistant professor at the University of Palermo. Teacher of the courses “LCA of energy systems” and “Fundamentals of circular economy” at the University of Palermo. Her main research interests: eco-design and life cycle assessment, circular economy, sustainable production and consumption, energy and environmentally extended input-output models; energy planning; sustainable building and Net Zero Energy Buildings.
She participated to national and international research projects and to the research activities of IEA: Task 38 Solar Conditioning and Refrigeration subtask D3 Life Cycle Analysis of Solar Cooling; Task 48 Quality Assurance and Support Measures for Solar Cooling; Task 53 New generation solar cooling & heating systems; Annex 62 IEA EBC, Ventilative Cooling. She was co-subtask leader of the Annex 72 IEA EBC “Assessing life cycle related environmental impacts caused by buildings”.
She is author of more than 220 papers for conferences, national and international journals. She is coordinator of the working group Energy and sustainable technologies - Association Italian LCA Network, member of the editorial board of AIMS Energy journal and of the buildings journal and referee of several international journals.

Calculating the Carbon Footprint of universities: the case study of the UNIPA Campus

Universities can support the decarbonization process of our economy through the assessment and reduction of their environmental impact. This lecture focuses on the calculation of the carbon footprint of university campuses, using the University of Palermo (UNIPA) as a case study. The methodology for quantifying greenhouse gas emissions is described, with a focus on Scope 1, 2, and 3 emissions categories, including energy consumption, transportation, waste management, and other campus activities. The lecture also presents the results of the analysis for UNIPA, highlighting challenges related to the data collection and carbon footprint calculation".

IV IEA EBC Annex 83 PhD Summer School

"Understanding Positive Energy Districts: Case-Studies Analyses for Replication"

PROFILE

CAROLINA H-VERMETTE
Concordia University - Canada

Dr. Caroline Hachem-Vermette, Associate Professor at Concordia University, specializes in integrative design for sustainable communities, combining architecture, urban planning, and engineering. Her research focuses on energy-efficient urban design, high-performance buildings, and renewable energy integration. She leads IEA Task 63 on Solar Neighbourhoods and contributes to various solar energy projects. In the DUT 2023 project, she explores 15-minute cities, urban agriculture, and transit-oriented development. She has pioneered net-zero communities like West 5 and EVE Park, now part of a Living Lab under Voltage SEED. A prolific author with 100+ articles and a book, she has received multiple honors, including the Peak Scholar Award and IBPSA Innovation Award. Her work bridges academia, policy, and industry to promote climate-resilient urban environments.

Holistic approach to designing energy positive, resilient communities: theories, and case-studies

ABSTRACT

This session will focus on the critical role of holistic planning in the design and development of solar neighborhoods, emphasizing the integration of building-scale and neighborhood-scale strategies to achieve energy-efficient, sustainable, and resilient communities. Participants will explore the principles of resilient, energy positive neighborhood design, including the optimization of building design, renewable energy integration, and urban layout to maximize energy performance and improve resilience. The lesson will also address the interconnected aspects of energy systems, urban morphology, and community engagement.

The session will include a detailed case study of a state-of-the-art Canadian community that exemplifies these principles in practice. This real-world example will illustrate how a holistic approach can harmonize environmental, social, and economic dimensions to create innovative and functional solar neighborhoods. Key topics such as passive design strategies, renewable energy technologies, and the role of green infrastructure in enhancing urban performance will be covered. This lesson will combine theoretical foundations with practical insights, providing students with a comprehensive understanding of how to plan and implement solar, energy positive, resilient neighborhoods. Through discussions, visual examples, and lessons learned from the Canadian case study, attendees will gain actionable knowledge and tools applicable to sustainable urban design projects.

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

PAOLA MARRONE

Roma Tre University - Italy

Paola Marrone, architect and PhD in Architectural Technologies, is Full Professor of Architectural Technology at the Roma Tre University, Department of Architecture.
She held the positions of Deputy Director of the Department of Architectural Design and Study (2006-10) and Delegate of the Rector for Environmental Sustainability (2014-17) at the University of Roma Tre. Since 2022, she has again been the Delegate of the Rector for policies relating to environmental sustainability. She currently coordinates for Roma Tre University the Flagship Project 2 “Energy transition and digital transition in urban regeneration and construction” of the Rome Technopole Foundation.
Since 1997 she has been working on innovation technologies with particular attention to the evolution of technological knowledge in architectural design, durability and reliability of buildings, buildings energy efficiency and regeneration of open spaces for climate mitigation and adaptation.
To date she has directed and participated in numerous research activities, as coordinator and/or manager of Research Units, documented by publications and participation in national and international conferences.

PRESENTATION TOPIC

ABSTRACT

Renewable energy decentralization system and the urban space

'Transition' commonly refers to changes during the time of a specific geographical unit but rarely considers changes in the spatial organization of the power energy system and how urban space, place and scale can shape it. Considering the geographies of a low-carbon energy transition means not only understanding and mapping the consequences of the policies implemented in a place, but also assuming some implications as significant as the spatial differences of places and the interactions that take place within them at different scales. The lecture analyzes how the structure and the spatial organization of five urban landscape in Rome can affect configuration and sizing of a decentralized renewable energy production system.

IV IEA EBC Annex 83 PhD Summer School

"Understanding Positive Energy Districts: Case-Studies Analyses for Replication"

PROFILE

ILARIA MONTELLA
Roma Tre University - Italy

Architect and PhD in Architectural Technology. Since 2006 she collaborates with numerous research projects at Department of Architecture of Roma Tre University, focused on energy efficiency, dynamic simulation, and energy certification. Since 2007 she is an enrolled Teaching Assistant in Architecture Technology. She is a KlimaHouse Energy Consultant, and participated in the international Solar Decathlon competition in 2014, certifying "RhOME for denCity", the prototype that won first prize.
Since 2017 to 2021, she has been a research fellow, investigating residential models for housing emergency and energy efficiency in mediterranean climate. Since 2021 she is Assistant Professor at Roma Tre University, on ecological transition for self-sufficient urban districts and climate mitigation and decarbonisation actions in proximity spaces. Since 2022 she is the professor of Environmental Design Laboratory, at Department of Architecture of Roma Tre University, also testing the self-sufficient urban districts methods with the Lab students. She participates, as a speaker, in many scientific conferences and is author of numerous scientific articles and contributions in books.

PRESENTATION TOPIC

ABSTRACT

Renewable energy decentralization system and the urban space

'Transition' commonly refers to changes during the time of a specific geographical unit but rarely considers changes in the spatial organization of the power energy system and how urban space, place and scale can shape it. Considering the geographies of a low-carbon energy transition means not only understanding and mapping the consequences of the policies implemented in a place, but also assuming some implications as significant as the spatial differences of places and the interactions that take place within them at different scales. The lecture analyzes how the structure and the spatial organization of five urban landscape in Rome can affect configuration and sizing of a decentralized renewable energy production system.

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

ROSARIA VOLPE
University of Catania – Italy

Rosaria Volpe is Assistant Professor (Tenure-track) at the University of Catania. Her research activities include: renewable energy communities design, modelling and operation, positive energy districts, energy management and control, energy efficiency and flexibility, computational fluid dynamics and heat transfer. She serves as Principal Investigator of European and national projects on the topic of Renewable Energy Communities and Positive Energy Districts.
She is awardee of a Starting Grant on the topic of energetic modelling of RECs. She won the best paper award from the AIGE Conference in 2018 on the topic of decentralized energy distribution. She was Visiting Researcher at the University of the Basque Country in 2020 for six months, where she investigated the maximization of biogas from pyrolysis to be fed into a cogeneration system and Visiting Researcher at the Tokyo University in 2023 for 1 month where she tackled the topic of energy distribution in Asian countries. She is Leader Subtask C “Organizing Principle and Impact Assessment” of the International Energy Agency, Energy in Building and Communities, IEA EBC Annex 83 "Positive Energy Districts".

PRESENTATION TOPIC

ABSTRACT

Theory and practice for Positive Energy Districts: implications from the agenda 2030

The concept of Positive Energy Districts (PEDs) represents a transformative approach to urban sustainability by integrating renewable energy systems, energy efficiency measures, and innovative urban planning to have a net positive energy surplus. As such, PEDs have the potential to redefine energy landscapes and promote equitable and resilient urban development through advanced frameworks for energy surplus redistribution. A case study in Southern Italy will be proposed to link PED strategies to the agenda 2030 and specifically tailoring Sustainable Development Goals and targeted indicators to PEDs applications to gain awareness on their impact in terms of climate action, energy equity and sustainable urbanization.

IV IEA EBC Annex 83 PhD Summer School

"Understanding Positive Energy Districts: Case-Studies Analyses for Replication"

PROFILE

FRANCESCO REDA

VTT Technical Research Center - Finland

With extensive experience in R&D, innovation program design, and international ventures, I provide strategic guidance in the innovation landscape. I establish international ventures, engage funding resources, facilitate technology transfer, and support industries in transitioning to circularity. My focus is on bridging research and business, managing EU-funded research, and delivering results in energy-efficient buildings, smart cities, and process industries. I collaborate with EU and national agencies to design innovation programs and shape the EU R&I agenda. I work with organizations like ECTP, A. SPIRE, and the IEA-EBC Programme. Over the past decade, I've authored 40+ papers on sustainable societal transformation.

PRESENTATION TOPIC

ABSTRACT

Another side of the Positive Energy Districts: Industrial-Urban Innovation symbiosis

Exploring a perspective on Positive Energy Districts (PEDs), emphasizing their potential to foster industrial-urban innovation symbiosis. While PEDs are often viewed as urban initiatives designed to produce more energy than they consume, their integration with industrial ecosystems offers a transformative approach to energy sustainability and innovation. By linking urban energy systems with industrial processes, PEDs can become dynamic hubs for circular energy flows, shared resources, and mutual benefits.

The discussion will delve into how industrial activities within or near PEDs can align with renewable energy systems, such as solar, wind, and hydrogen production as it serves as an energy carrier for various applications, including industrial processes, clean transportation, and long-term energy storage and is key in decarbonizing hard to abate industrial sectors. Industrial processes can provide consistent energy demand, while excess energy or waste heat from these processes can support urban applications like district heating, cooling, or electricity storage. This synergy enhances resource efficiency and optimizes energy usage across sectors.

The Industrial-Urban symbiosis hubs also enable the circular use of resources by fostering the efficient exchange of energy, materials, and by-products between urban and industrial systems. In addition to technical insights, the lecture addresses challenges, including infrastructure development and policy frameworks.

IV IEA EBC Annex 83 PhD Summer School

"Understanding Positive Energy Districts: Case-Studies Analyses for Replication"

PROFILE

ADRIANO BISELLO

Eurac Research Institution – Italy

Adriano Bisello graduated in Urban and Environmental Planning in 2006 and holds a Ph.D. in Real Estate Economics. Former freelance consultant for cities and regions, in 2013 he joined the Institute for Renewable Energy at Eurac Research in Bolzano (Italy), where he is now a senior researcher and coordinates the team "Urban Planning and Multiple Benefits Evaluation". Adriano's activities range from local to European-funded projects in the field of smart cities, Positive Energy Districts, NBS-digital public spaces, and urban-energy transition strategies, with a focus on multiple-benefits evaluation. His active involvement in international networks and associations includes:

- Co-leading subtask "C" on evaluation methodologies in the IEA-EBC Annex 83 on Positive Energy Districts.
- Serving as vice-president of ASSURB (Italian Association of Urban Planners) and delegate to ECTP-CEP (European Council of Town Planners) since 2022
- Membership in scientific committees for ISOCARP (International Society of City and Regional Planners) world annual congresses in Jakarta (2019), Bødo (2018), and Toronto (2023)

He serves as an independent reviewer for Horizon Projects, and he recently contributed to European Commission reports on "Systemic Changes in Governance. Equipping local governments for realizing climate-neutral and smart cities" (2023) and "A Practical Guide to the New European Bauhaus. Self-Assessment Method and Tool" (2024).

PRESENTATION TOPIC

ABSTRACT

Planning for PED – Stakeholders perspectives and involvement

Positive Energy Districts (PEDs) are a key element for energy transition and climate neutrality in cities. However, stakeholders' perspectives and involvement play a crucial role in their feasibility, moving from pilot demo cases to large scale adoption. The lecture focuses on example taken from EU projects and elaborates on expected benefits, engagement actions, digital tools. A reflection on the need and potential benefits of a PED certification protocol will be discussed with the students.

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PROFILE

CODRUT PAPINA

Urbasofia Company – Romania

Codruț Papina is an urban and landscape planner, doctoral student and researcher, holding a degree in Landscape Design and Planning with a master’s degree in urban management for Competitive Cities. He is a PhD candidate at UAUIM Bucharest with a focus on the development of urban peripheries, biophilic cities, sustainable approaches on how cities can grow and transform. He is holding valuable experience in co-creation processes for strategic planning, urban design and urban regeneration.
Coordinator of JPI KINETIC project, lead designer of urban innovation projects, such as Bistrița B-CONNECT, and Bucharest Sector 6 FAVORIT+, and project manager of EU applied research projects focusing on urban transformations and urban regeneration, varying from Nature-Based Solutions to energy transition, under the umbrella of participatory planning.

PRESENTATION TOPIC

ABSTRACT

Urban Strategy Roadmaps for PEDs: Integrating Co-Creation at Every Step

This lecture explores the transformative value of co-creation activities in shaping innovative urban practices, using Positive Energy Districts (PEDs) as a guiding example. Highlighting case studies from Bucharest, Copenhagen, and Parma, it showcases how co-creation processes can align diverse stakeholder inputs to deliver actionable urban strategies.

Participants will learn a two-tiered approach to building and using Roadmaps for PEDs:

1. **Co-Creation Processes Roadmap** – A framework for structuring participatory activities to collaboratively design a strategic vision.
2. **The Roadmap as a Strategy** – A tool to operationalize the co-created vision, breaking it into clear milestones and action steps toward implementation.

The session provides practical tools and insights to design urban strategies that embed collaboration, ensuring scalability and adaptability to meet development needs/goals.

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PROFILE

MICHELE ZINZI

ENEA - Italy

Michele Zinzi is graduated in engineering and holds a PhD in energetics. He is researcher at ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) since 2000l, which he was responsible in many national and international projects for. Fields of expertise include: energy performance of buildings, with focus on opaque and transparent component of the envelope, urban heat island and related mitigation solutions, user-centric analysis in the urban built environment. He is the national executive committee member in the IEA Energy in Buildings and Communities Programme, and he serves as board member in the IEA-EBC Air infiltration and Ventilation Centre and in the EU-Set Plan Working Group on Energy Efficiency in Buildings. He is associated editor of the Energy in Buildings and E-Prime journals, published by Elsevier, and editorial board member of Climate Journal, published by MDPI. He was advisory and scientific committees’ member of many international conferences. He has co-authored more than 150 publications for scientific and technical journals, as well as for relevant international conferences.

PRESENTATION TOPIC

ABSTRACT

Countering Urban Heat Island to reduce energy demand and use in buildings

The synergic effect of local and global climate changes causes the overheating of the urban built environment with serious consequence at several levels: health, environment, energy, social. Urban Heat Island is a major effect of such changes and one of the most severe environmental effects in cities. The magnitude of the phenomenon and the impacts on buildings will be documented through the case of Rome. The implementation of PED requires the reduction of energy needs that are generally pursued at the single buildings scale. Such reduction can also be achieved by lowering the urban temperature at district/neighbourhood/city scales by different urban heat mitigation techniques. Construction materials, characterised by high albedo value or other innovative mechanism, radiating away the solar irradiation keep urban surface coolers and reduce the thermal loads of buildings. Urban green infrastructures pursue the same objective thanks to the cooling effect of plants via evapotranspiration. Blue technologies can also be applied for local heat mitigation, thanks to the cooling power of the water evaporation. This speech offers an overview of the work carried out on the topic by ENEA in collaboration with several national and international partners during the past years, including experiences carried out in laboratory, in the real environment and by numerical analyses.

IV IEA EBC Annex 83 PhD Summer School

“Understanding Positive Energy Districts: Case-Studies Analyses for Replication”

PROFILE

URSULA EICKER

Concordia University - Canada

Ursula Eicker is the Canada Excellence Research Chair (CERC) in Smart, Sustainable and Resilient Communities and Cities, full Professor in the BCEE Department, and Director of the Next-Generation Cities Institute at Concordia University. Her work focuses on decarbonization strategies for cities using living labs and urban digital twins for scenario modeling and operational optimization. A German physicist with a Ph.D. in Solid State Physics and a Habilitation in Renewable Energy Systems, she has led international research on building energy efficiency and renewable energy systems.

Prof. Eicker's research aims to create zero-emission, sustainable cities by integrating renewable energy and improving urban livability. She leads a team of 50+ students and developers on eco-districts and living labs across Canada, supported by the Tools4Cities urban modeling platform. In 2020, she founded the Next-Generation Cities Institute, bringing together 14 research centers and 200 researchers. Since 2024, she has served on the Canadian Green Municipal Fund council and on advisory boards for IREC, MaREI, and Unibail-Rodamco-Westfield.

She has published 8 books, 20 book chapters, over 140 peer-reviewed papers, and 340+ conference papers, and is the editor-in-chief of the Journal of Urban Futures.

PRESENTATION TOPIC

ABSTRACT

Modeling costs and emissions for community energy solutions

While energy communities and Positive Energy Districts (PEDs) become important drivers for the energy transition in Europe, the concept and legal framework are not known in many other countries. To advance the integration of local renewable energy systems and building efficiency measures in a community energy project, it is crucial to design and implement solutions that are economically viable in different context.

A workflow and software framework will be presented that allows automated modeling of an entire energy community including building demands and resulting choices for the energy system components. Life cycle costing and emission reductions then facilitate the decision makers choice. The financial viability of solutions in different context and tariffs will be discussed.

IV IEA EBC Annex 83 PhD Summer School

"Understanding Positive Energy Districts: Case-Studies Analyses for Replication"

PROFILE

PAOLO CIVIERO

Roma Tre University – Italy

Paolo Civiero is an architect, Associate professor at the Department of Architecture of Roma Tre University, and vice coordinator of the Laboratory LFT&T (Technical Physics and Technology). His expertise field is focused on Technological design applied to construction, sustainability in built environment and energy efficiency, with a multidisciplinary vision on new construction and rehabilitation at building and district scale towards PEDs. Expert team member of the Scalable Cities study on "Enabling and upscaling Positive Clean Energy Districts", his research addresses energy and digital transition in urban regeneration, aiming to create tools supporting planning, design and co-creation of climate-neutral urban districts.

He is member of several research projects and initiatives addressing these topics of PEDs (e.g. COST Action "PED EU NET", EERA JP Smart Cities, IEA EBC Annex 83) P.I. of several research projects i.e. PEDRERA-Positive Energy District Renovation Model, MakingPEDs, and POSEIDON (DUT-2022), WeGenerate (HE Built4People) and C.Lever (Scalable Cities), and he is also coordinator of Sub Task 1.1 on production, distribution and storage of electricity within the RomeTechnopole project.

PRESENTATION TOPIC

ABSTRACT

Geospatial database tools for the design and implementation of Positive Clean Energy Districts (PCED) scenarios

The lecture aims to show how a geospatial database at neighborhood scale - based on the CityGML standard - is able to support the implementation of positive energy districts (PED) and the redevelopment of existing urban and building heritage, addressing a wide number of technological & economic, energy & environmental, and social engagement issues.

The adoption of the semiautomatic methodologies and digitalization tools developed and tested in ongoing research projects both at national (RomeTechnopole) and international level (MakingPEDs, POSEIDON, WEGENERATE) will be presented focusing on: Digital twins design, 3D models visualization, interoperability issues solved, available multiple analysis and Decision Support System (DSS) for the creation of different intervention scenarios.

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PROFILE

MAURIZIO CELLURA

Università degli Studi di Palermo - Italy

Maurizio Cellura has been a full professor of Building Physics and Energy Systems at the University of Palermo since 2011, focusing on energy efficiency, renewable energy, and decarbonization strategies. He has directed the Centre for Sustainability and Ecological Transition since 2022. Since 2014, he has represented the university in the UN's "Sustainable Solutions Development Network." He served as president of the "Italian Life Cycle Assessment Network" from 2015 to 2019, and as the national representative for the SETPLAN Working Group on "Energy Efficiency in Buildings" since 2019. Additionally, he has held roles in the Euro-Mediterranean Group of Senior Officials on Research and Innovation and the Euro-Mediterranean Bureau of the Union for Mediterranean Regional Platform on Research & Innovation since 2020. Since 2023, he has coordinated the Associated Research Doctorate between the University of Palermo and the University of Messina in Ecological Transition. He has authored approximately 400 national and international publications.

PRESENTATION TOPIC

ABSTRACT

Life Cycle Environmental Impacts of Building Integrated Photovoltaics

Building sector is responsible for 34% of greenhouse gas (GHG) emissions of energy use. In order to limit the GHG emissions of the building sector, it is essential to deploy renewable energy applications such as building integrated photovoltaics (BIPV) in individual buildings, solar neighborhoods, and positive energy districts. The lecture is under the framework of the "Network 4 Energy Sustainable Transition" – NEST Spoke 1 project, to present the life cycle environmental impacts of BIPV and points out the components that contribute the most to the impacts. All the environmental impacts of BIPV are quantified and assessed from cradle to grave per 1 kWh of electricity, with the application of Product Environmental Footprint method. Climate change impact of BIPV panel is 4.30E-02 kgCO2e per kWh of electricity. Fossil resource use is 5.28E-01 MJ, and mineral and metal resource use is computed as 2.80E-06 kg Sb eq. Besides, solar PV cell is the largest contributors to most of the impacts such as climate change (31%), fossil resource use (34%), and water use (71%), etc. The development of BIPV should prioritize improving the manufacturing of PV cells to minimize environmental impacts, enabling their integration into buildings and districts to support renewable energy communities and positive energy districts.

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