

# Sustainable energy system for achieving novel carbon neutral energy communities



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# SUSTENANCE – the ‘final sprint’ towards the finish line. Focusing on replicability.

**Author: Katarzyna Bogucka-Bykuć**

The Institute of Fluid-Flow Machinery Polish Academy of Sciences

**The key focus of the SUSTENANCE project is to build carbon-neutral energy communities by establishing local, sustainable and efficient integrated energy systems. Currently in its final stage, SUSTENANCE aims to develop and demonstrate smart techno-socio-economic and eco-friendly solutions for community-level, multi-energy renewable energy systems. Since the project’s inception, demonstration activities have been conducted in three different neighbourhoods in Europe and India. This facilitates mutual learning, knowledge transfer, and co-innovation, enhancing the value and replicability of the innovative solutions developed so they can be used by other communities within these countries and beyond.**

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**Fig. 1** Hans Bjerregaards, Bjerregaards Consulting, communicating SUSTENANCE towards participants of the #CE4EUislands Workshop, May 2024.

To seek synergies and ensure maximum visibility of the final results, the SUSTENANCE consortium is engaged in numerous activities aimed at enhancing the dissemination, exploitation and replication of the proposed solutions.

## NETWORKING WITH CE4EU SECRETARIAT

In this light, we would like to highlight that SUSTENANCE is networking with the *Clean Energy for EU Islands secretariat (CE4EU secretariat)* to exchange experiences on local energy transitions in both geographical and inland “energy islands”. Can heat pump technology effectively contribute to smart electricity systems facilitating the decarbonization of EU islands? These and other aspects of sustainable, smart and integrated approaches to local energy transitions were discussed at the workshop held just after the latest #CE4EUislands Forum 2024, hosted on the beautiful Pantelleria island in Italy (Fig.1).

As a result, we are pleased to announce that eight CE4EU island members, (Ameland in the Netherlands; Aran Islands in Ireland; Cape Clear Islands in Ireland; Inishbof in Ireland; La Palma and Mallorca in S

pain; San Pietro in Italy and Sherkin in, Ireland), have expressed their interest in receiving initial feasibility studies from the SUSTENANCE partner, NEOGRID. We hope for a ripple effect, with these islands leading the way in replicating the solutions from SUSTENANCE.

## PARTICIPATING IN THE EU BRIDGE INITIATIVE

Since the ultimate goal of SUSTENANCE is to establish the generic applicability of its developed methods and solutions for replication in other sites and communities, the activities undertaken by the partners since the beginning include active participation in the EU BRIDGE Initiative network. This year’s Bridge General Assembly, held on April 9-10, 2024 (Fig. 2), was an outstanding opportunity to showcase the achievements of SUSTENANCE within the network. It also offered an invaluable opportunity to engage with other projects contributing to the European smart energy transition, fostering collaboration and shared learning.



Fig. 2 The group photo of the participants at the #BridgeEU General Assembly 2024 (CINEA - European Climate, Infrastructure and Environment Executive Agency).

## ANNOUNCING SUSTENANCE PRESENCE AT THE ENLIT EUROPE 2024 IN MILAN

Enlit is a constantly growing, inclusive and end-to-end forum that addresses every aspect of the energy agenda. It aims to constitute a community that for 365 days a year collaborates and innovates to solve the most pressing energy-related issues (Fig. 3).



Fig. 3 Enlit Europe – Energy transition event: [www.enlit-europe.com](http://www.enlit-europe.com)



At the European edition, the Enlit community will come together in Milan from 22 - 24 October 2024, to meet and inspire each other and to develop discussions and actions to take steps forward in the energy transition. Join SUSTENANCE for Enlit Europe Conference in Milan this October!

## ENHANCING EXPLOITATION WITH HORIZON RESULTS BOOSTER

Last but not least, SUSTENANCE actively cooperates with the Horizon Results Booster, and as a result it has upgraded its Exploitation Strategy by defining its key exploitable results and detailing the business plan for the selected KER of SUSTENANCE, namely Intelligent Energy Management System (iEMS) developed by STAY-ON Energy Management.



Fig. 4 [www.horizonresultsbooster.eu](http://www.horizonresultsbooster.eu)

Finally, the SUSTENANCE journey is not yet completed, so follow-us and stay tuned for the next steps and updates!

# Sustenance Consortium gathers in Denmark for collaborative project meeting.

**Author: Katherine Brooke Quinteros,**  
Aalborg University

**On June 26th and 27th, the SUSTENANCE consortium convened in Denmark for its latest project meeting hosted by Aalborg University and the Municipality of Skanderborg. This gathering brought together not only the partners from Denmark, the Netherlands, and Poland, but several representatives from India were able make the long journey North and their presence enabled a more enriched and collaborative meeting (Fig. 1).**

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Fig. 1 SUSTENANCE Consortium in the picturesque Skanderborg as of 27.07.2024

As usual, the agenda included the regular updates from the working groups, reviewing activities, and discussing any problems. However, the event was not limited to these routine discussions. It also featured a series of engaging activities that highlighted both the collaborative spirit and the practical applications of the project.

### LAB TOUR AT AALBORG UNIVERSITY

Participants were given an insightful look at Aalborg University's advanced research facilities, providing a deeper appreciation

for the scientific groundwork underpinning the project's goals.

### WORKSHOP ON SOCIO-ECONOMIC PERSPECTIVES

A pivotal workshop conducted by the University of Twente (UT) focused on the socio-economic lessons emerging from the project. This session explored the broader implications of the project, delving into how it affects communities and economies. It was an opportunity for participants to reflect on the human and social dimensions of their work, ensuring that the project's benefits extend beyond mere technical achievements.

## VISIT TO SKANDERBORG AND VOERLADEGAARD

A bus trip to Skanderborg provided a tangible connection to the project's real-world impact. Partners had the opportunity to visit Voerladegaard, the Danish village directly involved in the Sustenance project. Here, they engaged in spirited discussions with local inhabitants (Fig. 2). Despite the language barriers, these interactions were enlightening by offering diverse perspectives and providing a deeper understanding of the project's impact on the community (Fig. 3 a,b).

## LOOKING AHEAD

The insights and experiences gained from this meeting will enrich the Sustenance consortium's future endeavours. By integrating socio-economic perspectives with cutting-edge research and community engagement, the consortium sets a strong foundation for ongoing success.

In summary, the recent meeting in Denmark exemplified the consortium's dedication to fostering innovation, collaboration, and community impact. The knowledge shared and relationships strengthened will propel the Sustenance project towards its ambitious goals. ■



**Fig. 2 SUSTENANCE Consortium in the picturesque Skanderborg as of 27.07.2024**



**Fig. 3a Susanne Skaarup, Skanderborg Municipality, presenting upcoming in SUSTENANCE towards the inhabitants of Voerladegaard (J. Ptak, Energa-Operator SA).**



**Fig. 3b Project meeting with the inhabitants of Voerladegaard (J. Ptak, Energa-Operator SA).**

# From Energy Communities to Energy Colonies.

**Author: Aditya Pappu,**  
University of Twente

In recent times, there has been an increase in renewable energy sources such as PV and storage systems, such as lithium-ion batteries, as well as an increase in electrification due to more electric vehicles and heat pumps. This rapid transition from a fossil fuel-centric energy system to a renewable-based energy system is called the energy transition. Unfortunately, the Dutch grid is unable to handle the ever-increasing bi-directional flows of electricity resulting from such a transition. This article aims not only to present some solutions that are being developed to address this challenge under the SUSTENANCE project but, interestingly, to also show how existing solutions in the natural environment can already help us understand and illustrate what is actually needed to manage energy in a sustainable, reliable and efficient way when functioning as a colony or community...

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In parts of the Netherlands such as Amsterdam, Flevoland, Gelderland and Noord-Holland, requests for new connections are being put on hold due to the electric grid reaching its capacity<sup>1</sup>. Renewable energy sources such as PV systems create an intermittent peak energy supply in certain parts of the day. However, these peaks of energy production are mis-matched with the parts of the day when there is a peak demand for energy. This can lead to geographical and temporal cases of scarcity and congestion.

The deployment of PV systems and flexibility devices such as batteries and electric vehicles is transforming traditional consumers of electricity into *prosumers*. This has led to groups of prosumers living close to each other to pool their flexibility and form Energy Communities (EC). Residents of an EC share similar technical and ethical objectives regarding energy production and consumption. Vriendenerf (Fig. 1), one of the Dutch demonstration sites in SUSTENANCE, is an EC consisting of twelve dwellings for elderly citizens and one common building for community events<sup>2</sup>. In

- 1 Gridlock: How the Netherlands hit capacity? [Online] Available at: <https://www.enlit.world/smart-grids/grid-management-monitoring/gridlock-how-the-netherlands-hit-capacity/>
- 2 Environmentally friendly facilities at Vriendenerf. [Online] Available at: <https://www.vriendenerf.nl/Milieusparende-voorzieningen/>



12 Fig. 1 Vriendenerf EC, the Dutch demonstration site

addition, the community has a common shed to store bikes and a shared vegetable garden.

## CONSIDER LESSONS LEARNT FROM TINY ANTS?

Given that ECs are relatively new, much is unknown regarding how ECs should react and aid in the ongoing energy transition. Some think that the emergence of ECs may be detrimental to the main grid. So, how can ECs survive or even better, aid in the energy transition? Maybe we can turn to one of the oldest and most experienced researchers that the natural landscape has to offer: the tiny ant. Ant colonies face numerous challenges in their daily existence. Predators such as birds, spiders, and other insects constantly threaten their survival. Additionally, they must compete with other colonies and species for territory and sustenance. Environmental changes, including extreme weather and habitat destruction, can disrupt their complex social structure and foraging patterns. Disease and parasites also pose significant risks, potentially wiping out large portions of a colony. A single ant by itself cannot fend off such a wide variety of existential threats. Therefore, ants form gigantic colonies and implement impressive,

distributed coordination and adaptability mechanisms to survive.

## FINDING SUSTENANCE

Ants use pheromones to navigate and find paths efficiently<sup>3</sup>. When a foraging ant using a random walk discovers food, it releases a pheromone trail on its way back to the colony. Other ants follow this chemical trail, reinforcing it with their own pheromones if they also find food, leading to a strong, collective path to the resource. This pheromone-based communication allows ants to adapt quickly to changes and optimize their routes. The presence of the pheromone acts as recurrent positive feedback not unlike the acknowledgement packets sent in the Transmission Control Protocol (TCP) used on the internet<sup>4</sup>. Therefore, without any central intelligence present, ants utilize a simple but robust distributed communication mechanism to locate and communicate the location of their food for the colony.

ECs require energy management algorithms to optimize their energy production and consumption such that they can use their flexibility to fulfill their energy demand and aid the main

3 <https://en.wikipedia.org/wiki/Ant#Communication>

4 <https://www.nextnature.net/story/2013/what-ant-colony-networks-can-tell-us-about-what%E2%80%99s-next-for-digital-networks>

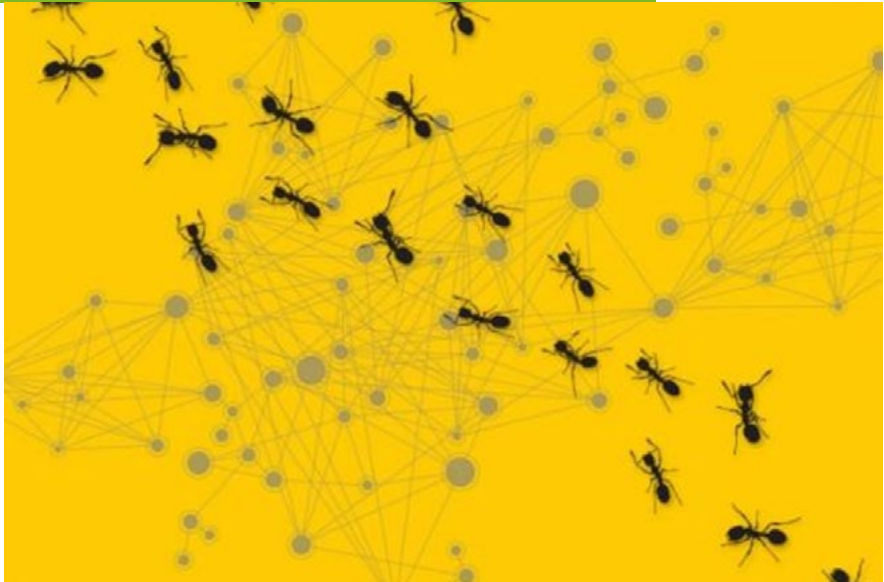


Fig. 2 The world of ants can teach us a lot about distributed networks<sup>5</sup>

electrical grid. Energy management algorithms require distributed communication about power profiles and device constraints between houses. The communication mechanisms employed must be robust to network disruptions and device agnostics. In other words, a simple local communication mechanism that results in global information dissemination - like an ant colony.

## TO FORAGE OR NOT TO FORAGE?

Research by Deborah Gordon from Stanford shows that ant colonies display an interesting behavior pattern for survival during harsh conditions called emergent restraint<sup>6</sup>. For example, some harvester ant colonies tune their foraging behavior

to the surrounding environmental conditions. Harvester ants manifest water from seeds. However, harvester ants can lose a lot of water by foraging for seeds during dry conditions. Therefore, foraging for sustenance during dry conditions is a costly operation for ants. During harsh environment conditions, fewer foraging ants leave the nest. Since fewer ants leave the nest, fewer ants return and therefore fewer new foraging ants leave the nest in search of food. The number of ants returning to the nest signals the availability of food and the cost of the foraging operation to the next batch of departing ants. This allows the next batch of ants to ask the question, "Is it worth it?". In a way, the decision to forage or not during dry conditions is asking the harvester ants

<sup>5</sup> <https://www.csail.mit.edu/news/what-ants-teach-us-about-exploring-networks-efficiently>

<sup>6</sup> <https://www.nationalgeographic.com/science/article/how-anternet-succeeds-by-showing-restraint>



to take the famous Marshmallow test, and it seems ants choose long-term survival over short-term gratification<sup>7</sup>.

The main electrical grid is running out of capacity and cannot always fulfill the energy demand of an EC. ECs must sense the 'condition' of the electrical grid and, in case of energy scarcity, ration their existing energy reserves to the fulfillment of at least the critical energy infrastructure of the EC. Simple rationing rules at the house level can lead to emergent restraints at the EC level for survival during times when the main grid is out of the equation (i.e. during 'dry conditions').

## TOGETHER WE CAN

While each ant acts on simple communication rules, the result is a single hive-mind that shows emergent behavior patterns of restraint and survival, with some ant colonies surviving up to 25 years. Local behavior based on simple rules leads to collective behaviors at the global level, which researchers refer to as *collective intelligence*.

ECs are not so different from ant colonies. They consist of individual prosumers who each have their own energy usage patterns but collectively share a common global aim. ECs need mechanisms to achieve their global

aim (for e.g. an ecological aim of CO<sub>2</sub> minimization) without relying on any singular central intelligence, but by employing simple communication and consensus mechanisms amongst its constituent prosumers. ECs need to, with consensus, establish simple energy rationing rules at the prosumer level, which can translate into a successful survival scheme at the EC level during harsh grid conditions. All of this and more can be learnt from the beautiful and complex world of the humble ant. At the University of Twente, we are working on distributed and asynchronous energy management algorithms and with the help of Saxion University of Applied Sciences, we are also validating our algorithms as part of the energy management system deployed at Vriendenerf.

The energy transition is not a signal of doom but an opportunity for us to look at the research done by the oldest lab on the blue planet, nature, so that we can learn to transform our energy communities into energy colonies, and successfully navigate the energy transition. If ants, with a brain which is a million times smaller than that of humans can work together, then surely, we can as well, right?

Read more about research on the world of ants from the Gordon Lab, Stanford: [www.web.stanford.edu/~dmgordon](http://www.web.stanford.edu/~dmgordon) ■



# The newest technology moves into a block of flats built in late 70's and makes itself comfortable.

**Authors:** Jörg Verstraete, IMP PAN/KEZO Research Centre  
Sebastian Bykuć, IMP PAN/KEZO Research Centre  
Adrian Lis, KEZO Foundation

**Many technologies support decarbonization activities: there are great insulation materials, efficient heat sources, advanced ventilation solutions, etc. - it is even possible to construct a zero-energy building, provided this is what is conceived right from the start . The modernization of existing energy systems is however an on-going challenge, as the integration of new technologies is much more difficult or sometimes even impossible considering the costs and scope of the renovation.**

The block of flats belonging to the Mickiewicz Housing Association in Sopot, serving as the Polish demonstrator in SUSTENANCE, is a typical representation of Polish housing. This kind of multi-floor buildings were built typically in the late 70's in Poland, and as such the Polish demonstrator offers a significant replication potential. Such buildings were usually connected to district heating or to a local fossil fuel heating network, with domestic water heating achieved by individual gas boilers in every apartment. The decarbonization of the energy systems in this kind of building is always difficult and challenging.

### So how to proceed with the energy transition in such a typical, old-fashioned housing district?

In order to answer this intriguing question, the Polish Team of Sustenance has suggested a solution. As a first step, they managed to install the following elements of a modern energy system: a heat pump (Fig. 1), photovoltaics (ongoing), an energy storage, and EV/V2G chargers (Fig. 2), and managed to deeply modernize the secondary substation. But it is the second step, the inclusion of an Intelligent Energy Management System (developed by STAY-ON), which is the most crucial project result. It integrates all these components into one, smart energy management system, that optimises the operation



**Fig. 1 Heat pumps in front of the Mickiewicz 59 block of flats (K. Bogucka-Bykuć, IMP, 2024).**

to save money and reduce the carbon footprint (more details can be found in the previous edition of our Newsletter).

### **Will EV chargers and electrical modernization transform the Mickiewicza Housing Association?**

The market for electric vehicles continues to grow, although recent data indicates that sales of EVs are slowing down. While this was to some extent expected by economic analysts, it is interesting to check if any unexpected societal barriers emerged. A typical argument for EVs is that they can be charged relatively cheaply at home, especially from photovoltaics. However, this argument becomes moot if people do not have this ability. The SUSTENANCE project aims to test new technology in old blocks of flats, which including e-mobility. To this extent, the project renovated the electrical connection to the garages to improve the possibility for owners to install their own EV chargers. In addition, the EV chargers can benefit from the PVs and energy storage unit that were installed for the inhabitants of the Mickiewicza Housing Association with the aim to verify if such a solution could lower the barriers and facilitate residents to switch to electric transportation (Fig. 2).

The concept of communal car-sharing using an EV is also considered, which could further reduce the cost of e-mobility for the residents.

A unique/pioneering solution tested in the Polish demo consists of abidirectional V2G (vehicle to grid) EV charger, which allows an electric car to play the role of a (mobile) electricity storage, which, just like a battery, can support the local energy system of the building and also increase the self-consumption of green energy. This is the first test installation of this type in a housing estate in Poland.

### **Will inhabitants of the Mickiewicza Housing Association become pioneers in terms of organizing themselves into “collective prosumers”?**

Different paths were analysed as a potential solution for Polish citizens to legally organize themselves into a kind of “energy community”, and to make it feasible from both the technical as well as economic point of view. The KEZO Foundation’s tasks in the SUSTENANCE project were primarily related to the investigation of the socio-business area. The key priority was to prepare the Polish demonstrator to operate in the form of an energy community and begin the process of the “green” energy transition.

Over the last two years, Poland has seen changes in the law, thanks to which the number of legal forms in which prosumers (i.e. producers and, at the same time, consumers of energy) are allowed to operate. The forms of "collective prosumer" (2022) and "tenant prosumer" (2023) were added to the pre-existing form of "individual prosumer". Each of the legal forms cited allows willing individuals and organizations to engage in the energy transition process.

Within the framework of the SUSTENANCE project, the changes involved achieving three main goals: 1) providing the community of the demonstrator with cheaper and greener electricity, 2) reducing the need for fossil fuels in the demonstrator's community, 3) enabling the benefits of "clean" transportation as well as making an electric car available for test use/rides by the residents of the demonstrator).



**Fig. 2** One of the EV chargers installed at the Mickiewicza Housing Association and Nissan Leaf used for tests (S. Bykuć, IMP, 2024).

Representatives of the KEZO Foundation recommended that residents be constituted in the form of a 'collective prosumer'. This legal form is ideally suited to an energy community operating within a multi-tenant building. By adopting this legal form, the residents and the housing association that unites them (which is also a shareholder within the established energy community) will benefit not only from a reduction in bills for electricity consumed in the common parts of the building, but also from a reduction in energy bills in the apartments of the shareholders. Such green energy will

also power electric car charging points (including the car of the demonstrator made available to residents).

One of the meetings with citizens regarding the creation of the local community in the form of a 'collective prosumer' was held on July 15, 2024 at the premises of the Mickiewicz Housing Association (Fig. 3).

Summing up, it is a small step that helps to accelerate the pace of the energy transition in Poland, but it is a giant leap for the residents of the Mickiewicz Housing Association. ■



**20** Fig. 3 Meeting with the inhabitants of the Polish demo regarding the set up of the "collective prosumer" (K. Bogucka-Bykuć, IMP, 2024)

# Highlights from the first ever **SUSTENANCE** project meeting in India.

Author: Editorial Board

The "SUSTENANCE H2020 project & RE-EMPOWERED EU-India Project Joint Workshop on carbon neutral sustainable energy systems" kicked-off the SUSTENANCE project gathering, followed by the SUSTENANCE Consortium and General Assembly meetings, which took place between 6-8 February 2024 in India (Fig. 1).

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**Fig. 1 SUSTENANCE and RE-EMPOWERED delegates from EU and India at the networking workshop in the Indian Institute of Technology in Bombay (IITB), 6.02.2024**



**Fig. 2 V2G car being tested at the Shunya building at Indian Institute of Technology in Bombay, India (J. Ptak, Energa-Operator SA, 2024)**

Highlights from the first ever SUSTENANCE project meeting in India

EU partners of SUSTENANCE from Denmark, the Netherlands and Poland visited two of the three Indian project demonstrators for the first time during the project realisation. Firstly, partners were given a guided tour around the demonstration site on the Indian Institute of Technology in Bombay (IITB) campus. This included a visit to the Team SHUNYA building,

where researchers demonstrated the operation of the smart electrical building and India's first vehicle to grid field demonstration (Fig. 2).

There were also demonstrations of the prototypes for the EV chargers, e-rickshaw (Fig. 3) and the multi-utility heat pump and wind turbine.





Fig. 3 Prototype of an e-rickshaw at IITB in Bombay (SUSTENANCE Consortium, 2024).

Highlights from the first ever SUSTENANCE project meeting in India

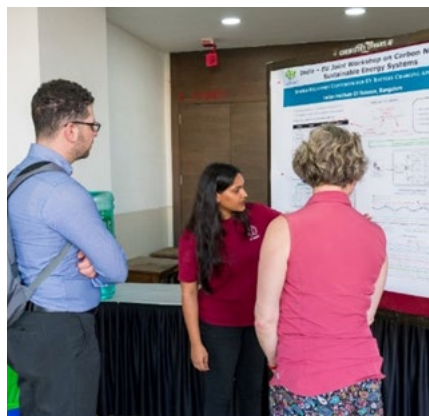
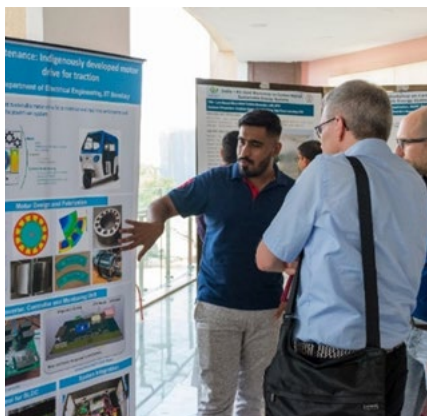


Fig. 4 a,b Poster presentations (SUSTENANCE Consortium, 2024).

Additionally, a poster presentation session was conducted to provide a glimpse into the ongoing research by the members of the project (Fig. 4 a,b).

The last day of the project gathering was devoted to visiting Barubeda Village in Jharkhand, where one of the three Indian demonstration sites is located (Fig 5a,b). The core income

source of villagers in Barubeda is agriculture, with limited access to water for household and drinking purposes. The village lacks any access to public transportation, and the inhabitants generally walk over 3 km to reach the nearest road. Therefore, the village is in dire need of a stable energy supply, and thus, the inhabitants are keen to establish a local sustainable energy system.



**Fig. 5 a,b The remote village of Barubeda, Ranchi in the state of Jharkhand (J. Ptak, Energa Operator SA, 2024)**

Therefore, the objectives of SUSTENANCE for Barubeda Village are to deliver a sustainable, clean local energy system for the remote off-grid village to improve the living standards of the villagers by providing reliable electricity access, e-rickshaw-based green transportation and reliable water supply.

Overall, it was an immensely eventful visit for the partners in the SUSTENANCE project and the affiliated stakeholders as they familiarized themselves with the ongoing progress at the Indian demonstration sites in order to successfully achieve the established objectives in a timely manner. ■



**Fig. 6 PV installation in the Barubeda Village (R. Sinha, Aalborg University, 2024).**

# Conference announcement: Smart Energy Hubs Conference, the Netherlands, 20 Nov 2024

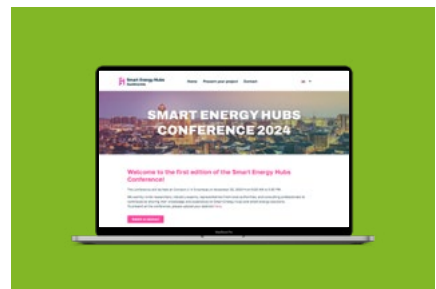
**Author: prof. Richard van Leeuwen,**  
Saxion University of Applied Sciences

The concept of Smart Energy Hubs broadens the scope and scale of smart energy management systems to encompass city districts and industrial areas. Smart Energy Hubs represent a comprehensive array of solutions designed to fully integrate renewable energy sources into local energy systems. These solutions range from simple measures, such as curtailing energy generation, sharing capacity and matching demand and supply among groups of customers to more complex system integrations.

The latter include energy storage, power-to-heat, power-to-gas and power-to-fuel technologies which link different energy sectors to balance energy generation and demand. Some of these measures are developed and tested within the SUSTENANCE at the neighbourhood scale, but they have the potential to be scaled up to larger districts.

Therefore, I am pleased to announce that on November 20, 2024, Saxion and the University of Twente will organize the first conference on Smart Energy Hubs in Enschede, the Netherlands. Presentations about SUSTENANCE will be given at the conference in the track on energy communities.

Looking forward to meeting you in Enschede later this year to share with you the innovations and results of the SUSTENANCE project! ■



**Fig. 1 Smart Energy Hubs Conference, Enschede, the Netherlands**

**25** [Smart Energy Hubs Conference  
conferentie.smartenergyhubs.eu/en/](https://conferentie.smartenergyhubs.eu/en/)

# Workshop announcement: SUSTENANCE at Sustainable Places Conference (#SP2024)



Save the date (25 Sept'24) and join SUSTENANCE for the following workshop:

“Energy Communities 2050: Renewables, Citizens, and Collective Self-Consumption” (onsite, 180’)

Around 45% of renewable energy production in the EU could come from citizens by 2050, and energy communities are a clear enabler of this projection. In this two-part workshop:

- the 1st session will address technologies and user engagement,

with participation from the LocalRES, Masterpiece, DE-RISK Project, Reschool Project, and COMMUNITAS projects.

- the 2nd session will address regulations and barriers, with participation from the COMANAGE Project, SUSTENANCE H2020 project, BECKON, Accept, and FEDECOM-projects”.<sup>1</sup>

The solutions and insights from these ten EU projects are crucial to support the growth of energy communities. ■

26 1 <https://www.sustainableplaces.eu/wp-content/uploads/2024/07/SP24-full-draft-agenda-v7.pdf>



# SUSTENANCE at the Grid Service Market Symposium in Switzerland

We are pleased to inform that prof. Hessam Golmohamadi from Aalborg University has participated in the Grid Service Market Symposium held on 1-2 July 2024 in Lucerne, Switzerland. He presented there a paper entitled "Flexibility provision from Local Energy Communities exemplified by the SUSTENANCE H2020 project and SERENE H2020 projects" (Fig. 1).

"The integration of a large amount of new renewable energy sources poses great challenges for the European electricity grids & markets. Network reinforcement, market harmonisation and integration are both solutions and challenges for the various players in the electricity industry. The integration of new technologies and methods to provide grid services and optimise the use of existing infrastructure is changing the face of the electricity industry in the long term". ■



**Fig. 1 Prof. Hessam Golmohamadi, AAU at the GSM Symposium, 2024.**

# SUSTENANCE at the 2. "Science for Society" Congress, Warsaw, June 2024

Promotion of the effects of scientists' work is a key issue today - said Dariusz Wieczorek, Minister of Science in Poland during the 2. "Science for Society" Congress, which took place on June 9-10 2024 in Warsaw, Poland<sup>1</sup>. The Minister of Science further emphasized that the key issue today – apart from increasing expenditure on research and development – is to promote the achievements of scientists and research institutions.

Scientists from IMP PAN and its KEZO Research Center took this splendid opportunity to communicate SUSTENANCE towards the society!

- Link to the interview with dr Weronika Raadziszewska (in Polish language) about the realization of both SUSTENANCE and SERENE H2020 projects in the Polish perspective of the project demonstrators located accordingly at the Mickiewicz Housing Association in the City of Sopot and in the Municipality of Przywidz: [www.youtube.com/watch?v=uFzxwOTIA3I](https://www.youtube.com/watch?v=uFzxwOTIA3I)



**Fig. 1** IMP PAN stand at the 2. "Science for Society" Congress, Warsaw, June 2024.

- More information about the event (in Polish only): [www.nauka-dla-spolectwstwa.pl/doniesienia-medialne/](http://www.nauka-dla-spolectwstwa.pl/doniesienia-medialne/)

The solutions and insights from these ten EU projects are crucial to support the growth of energy communities. ■

# SUSTENANCE at ISUW2024



**Fig. 1 Prof. Zakir Hussain Rather disseminating SUSTENANCE at ISUW2024 (Source: ISUW2024).**

Prof. Zakir Hussain Rather from Grid Integration Laboratory, IIT Bombay, participated in the Indian Smart Utility Week 2024 organized by the Indian Smart Grid Forum (ISGF) for the session on Emerging Technologies for Future to disseminate the ongoing work under the SUSTENANCE project at the Indian demonstration sites (Fig. 1).

The session focussed on the efficient interfacing of distributed energy resources and micro-grids and the resulting electrification of areas

previously deprived of its benefits, which has been one of the primary objectives of the SUSTENANCE project.

The session was chaired by Mr. SK Soonee, Former CEO, Grid Controller of India, and moderated by Mr. Pradyot Koley, Department of Science and Technology, and was attended by several distinguished speakers in the power and energy sector. ■

More about event: [www.isuw.in](http://www.isuw.in)



# SUSTENANCE at the #BridgeEU General Assembly 2024

We are pleased to inform that SUSTENANCE was represented by Ewa Domke from the Institute of Fluid-Flow Machinery Polish Academy of Sciences at the #BridgeEU General Assembly held on April 9th and 10th 2024 in Brussels.

This was an outstanding opportunity to discuss the results achieved by SUSTENANCE within the initiative and to explore what other projects are working on, contributing to the European smart #EnergyTransition together! ■



**30** Fig. 1 The group photo of the participants to the #BridgeEU General Assembly 2024 (CINEA - European Climate, Infrastructure and Environment Executive Agency).

# SERENE and SUSTENANCE – Interview with BRIDGE projects



# bridge



As you might know, SUSTENANCE participates in #BridgeEU. This initiative of the CINEA - European Climate, Infrastructure and Environment Executive Agency is bringing together many European projects involved in a swift and smart energy transition.

When participating in the ENLIT Conference 2023, prof. Birgitte Bak-Jensen took this

opportunity to talk with the secretariat of #BridgeEU. As a result you can now watch the interview, in which prof. Bak-Jensen explains how both SUSTENANCE and SERENE projects (that she coordinates), aim to facilitate smart energy transition in Europe and beyond and how BRIDGE initiative is helping to achieve those goals. ■

[youtube.com/watch?v=WS2nDL9qJN4](https://youtube.com/watch?v=WS2nDL9qJN4)

# SUSTENANCE at ENEX EXPO Energy Fair in Poland



Fig. 1 ENEX EXPO Energy Fair in Poland (Source: [www.targikielce.pl/en/enex](http://www.targikielce.pl/en/enex))

Over 25-years of development has made Kielce City the most essential points on the map of Poland's renewable energy sector, a household name for all energy efficiency and technology aficionados. The ENEX EXPO attracts companies strongly focused on the development of the power engineering sector. ENEX EXPO offers the opportunity to meet leading manufacturers and distributors as well as see the industry's latest solutions. ENEX is the place to establish valuable relationships that will pay off in the future. On

7th and 8th of February 2024, Kielce exhibition and congress centre became the stage for world premieres and strategic agreements.

Therefore, Patryk Chaja (*from Institute of Fluid-Flow Machinery, Polish Academy of Sciences (IMP PAN) and its KEZO Research Centre PAS*) took this networking opportunity and participated in the *26th International Power Industry and Renewable Sources of Energy Fair ENEX* (Fig. 1), interlinked with *ENERGIA PL Conference*, to present and discuss *SUSTENANCE* (Fig. 2 a,b) ■



**STAY-ON Energy Management** is a company offering products and solutions in the field of energy storage Energy Management Systems (EMS) for distributed resources and microgrids. The company's services include proprietary EMS with smart algorithms to manage energy storage systems and other energy assets such as EV chargers and heat pumps. STAY-ON provides expert services related to ESS investment analyses. The solutions offered include thermal modules to extract energy from waste heat generated by Vanadium Redox Flow Batteries. ■

[www.stay-on.pl](http://www.stay-on.pl)

The organisation is a NGO acting in the form of a foundation. It was developed in cooperation with the Institute of the Fluid-Flow Machinery of the Polish Academy of Sciences and KEZO Research Centre of the Polish Academy of Sciences.

It's main role is to support and develop cooperation among Science – Industry – Public Administration towards the development of common projects, but also more intensive market introduction of new technologies and scientific ideas. ■

## WŁASNOŚCIOWA SPÓŁDZIELNIA MIESZKANIOWA IM. A. MICKIEWICZA W SOPOCIE

**The Adama Mickiewicz Housing Association in Sopot** was established in 1957. The first multi-family eleven-storey buildings were built between 1969-72. The residential area is fully equipped with technical infrastructure including a boiler house, roads, power, water-sewage and gas grids as well as a commercial building.

Interestingly, the Adama Mickiewicz Housing Association has been ahead of its time since its inception. It took a pioneering approach to the construction of the apartments, which saw members contributing 50% of the value and then paying the rest in instalments over the next 25 years. Whilst this is a common practice today, it was unheard of in communist Poland!

This pioneering approach remains unchanged among its inhabitants, and thus also today the engagement and activeness of the residents plays a crucial role in the decision-making process in terms of the new investments and refurbishments inside and outside the houses. ■

[www.wsmsopot.jimdofree.com](http://www.wsmsopot.jimdofree.com)



## Indian Institute of Technology (IIT) Bombay

Established in 1958, the second of its category of academic institutions in India, IIT Bombay was the first to be set up with financial support from United Nations Educational, Scientific and Cultural Organization (UNESCO). In 1961, the Indian Parliament decreed the IITs as 'Institutes of National Importance'. Since then, the institute has grown from strength to strength to emerge as one of the top technical universities in the world.

Globally, the institute is recognised as a leader in the field of engineering education and research. Reputed for the outstanding calibre of students graduating from its undergraduate and postgraduate programmes, the institute attracts the best minds from all over the country. Research and academic programmes at IIT Bombay are driven by an outstanding faculty, many of whom are reputed for their research contributions internationally.

IIT Bombay has also been successful in developing collaboration with peer universities and institutes, both at the national and the international levels, to enhance research and enrich its educational programmes. The alumni have distinguished themselves through their achievements in and contributions to industry, academics, research, business, government, and social domains. The institute continues to work closely with the alumni who have excelled in industry, academics, research, business, government, and social domains to further its activities through interactions in academic and research programmes as well as to mobilise financial support. ■

[www.iitb.ac.in](http://www.iitb.ac.in)



## Indian Institute of Science Bangalore

The Indian Institute of Science (IISc) was established in 1909 by a visionary partnership between the industrialist Jamsetji Nusserwanji Tata, the Mysore royal family and the Government of India.

Over the last century, IISc has become one of India's premier institutes for advanced scientific and technological research and education. Its mandate is "to provide for advanced instruction and to conduct original investigations in all branches of knowledge as are likely to promote the material and industrial welfare of India." In keeping with this guiding principle, the Institute has strived to foster a balance between the pursuit of basic knowledge and applying its research for industrial and social benefit.

IISc's research output is diverse, interdisciplinary and cuts across traditional boundaries. The Institute has over 42 academic departments and centres that come under six divisions. It also places equal emphasis on student learning, with about 4000 students pursuing several postgraduate and PhD programmes, as well as newly initiated undergraduate programs.

IISc has a vibrant and diverse campus spread over 440 acres of greenery in the city of Bengaluru (formerly Bangalore), India's hub of high-tech companies (in multiple domains such as aerospace, electronics, and information technology), educational and research institutions, and numerous start-ups. In recent times, IISc has also entered collaborations with several technology giants to work on varied solutions to problems in strategic areas. Over the years, numerous alumni and faculty members have established their own start-ups to take their research directly to society. ■

[www.iisc.ac.in](http://www.iisc.ac.in)



## Indian Institute of Technology (IIT) Kharagpur

The IIT Kharagpur exists as an autonomous engineering and technology-oriented institute of higher education established by the Government of India in 1950. Regarded as one of the best engineering institutions in India, it was one of the first of the seven IITs established to train scientists and engineers after India attained independence in 1947 and officially recognized it as an Institute of National Importance. Indian government established IIT Kharagpur. Over the years, the institute's academic capabilities diversified with offerings in management, law, architecture, humanities, etc. IIT Kharagpur is widely acclaimed for the quality and breadth of its research enterprise, and particularly for its openness to multidisciplinary research. Several highly rated initiatives represent a long IIT Kharagpur tradition of cross-disciplinary research and collaboration.

In the quest for excellence in our research endeavours, recognizing the importance of modernization in infrastructure and experimental facilities and ensuring cutting edge innovation in research, the Institute has set up several state-of-the-art facilities over the years. Research and development at IIT Kharagpur cover a wide spectrum and is inspired by both real-world challenges and issues of fundamental importance. Being interdisciplinary is a core principle and our work usually involves researchers from various disciplines and integrating seamlessly to work jointly and progress beyond disciplinary ambit. ■

[www.iitkgp.ac.in](http://www.iitkgp.ac.in)





## Indian Institute of Technology (IIT) Delhi

The Indian Institute of Technology (IIT) Delhi is an autonomous research university based in India. Indian Institute of Technology Delhi is one of the Twenty-Three IITs created to be Centres of Excellence for training, research and development in science, engineering, and technology in India.

Spread over 325 acres in the heart of Delhi, it is counted among the top universities in the world for technical education. It was established in 1961 by an act of the Indian parliament and designated an "Institute of National Importance" in 1963. With a long trail of accomplishments behind it, it added another feather to its cap in 2018 when it was awarded the newly created designation "Institution of Eminence" (IoE) by the Government of India.

It is the mission of IIT Delhi to generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state-of-the-art undergraduate, postgraduate, and doctoral programs. IIT Delhi strives to serve as a valuable resource for industry and society. Its values are focused on excellence in scientific and technical education and research, while maintaining academic integrity and accountability, respect for diversity, and an unfettered spirit of exploration, rationality, and enterprise.

IIT Delhi works to make knowledge a means for serving society. The institute looks to mobilize resources from the industry and academia through a network of alumni to give shape to its vision. Today, these alumni are leading scientists, technologists, business managers and entrepreneurs in various domains, carrying forward the reputation of the institute globally and contributing significantly to building of the nation, and industrialization around the world. ■

[www.home.iitd.ac.in](http://www.home.iitd.ac.in)

# Project Factsheet



More info:  
[www.h2020Sustenance.eu](http://www.h2020Sustenance.eu)  
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