SUSTENANCE e-Newsletter 7/7
December 2024

Sustainable energy system for achieving novel carbon neutral energy communities

The Energy Transition in Practice: Highlights from theSUSTENANCE Project

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In This Issue:

Reflecting on Three and a Half Transformative Years with SUSTENANCE

As the SUSTENANCE project approaches its conclusion in December 2024, we find ourselves looking back on an inspiring and dynamic journey spanning over three and a half years. This global collaboration brought together partners united by a shared commitment to advancing sustainable energy solutions. It has been a time of growth, learning, and fruitful collaboration.

Fig. 1 SUSTENANCE Consortium in the picturesque Municipality of Skanderborg (July 2024).

Fig. 2 Consortium and a Project Review Meeting in Enschede (November 2023).

This final newsletter captures the main lessons we've learned along the way. These insights reflect the highs and lows of our journey—the things that worked well and the areas where challenges still remain. From integrating electric vehicles (EVs) and heat pumps with solar panels to exploring how local communities can move towards energy independence, we've gathered a wealth of knowledge.

HIGHLIGHTS FROM OUR JOURNEY

A key factor in SUSTENANCE's success was the chance to collaborate and connect across the globe. Our General Assembly Meetings, held in Denmark (Fig. 1), the Netherlands (Fig. 2), Poland (Fig.3), and India (Fig.4), provided invaluable opportunities for partners to share progress, exchange ideas, and plan for the future. These gatherings helped us refine solutions, gain new insights, and foster connections with like-minded individuals who share our vision of a sustainable future.

Demonstrator sites across the EU, such as Voerladegård village in Denmark, the University of Twente and the Olst communities (Aardehuizen and Vriendenerf) in the Netherlands, and the Mickiewicza Housing Association in Sopot, Poland, demonstrated how these ideas work in real-life settings. Meanwhile, three Indian demonstrators, located in Borakhai, Barubeda, and the IITB Campus in Bombay, showcased innovative approaches to leapfrogging traditional systems. ■

Fig. 3 SUSTENANCE partners in front of the late 70s apartment block – demonstrator site of the Mickiewicza Housing Association in Sopot, (Consortium Meeting, June 2023).

Fig. 4 SUSTENANCE Partners next to the prototype of an e-rickshaw at IITB in Bombay (Consortium meeting, February 2024).

Key Lessons from the SUSTENANCE Project

As a result, the experiences gained throughout the project's duration have led to six major insights:

Lesson 1: The Integration of EVs, Heat Pumps, and PVs is Difficult but Effective

Lesson 2: The Path to More Autarkic Community Energy Can Begin in Different Places and Follow Various Paths

Lesson 3: Heating is even more context dependent than electricity, and its electrification presents distinct challenges for the grid

Lesson 4: Regulation lags behind technological and scientific advancements, impeding widespread progress

Lesson 5: Transferring Business Ideas across Contexts is stymied by differences in Conditions

Lesson 6: While citizensgenerally support the energy transition, they lack awareness of the details and their role in the process

Lesson 1: The Integration of EVs, Heat Pumps, and PVs is Difficult but Effective

A single PV or EV-charging installation does not have a significant impact on either the energy system or the energy transition, but many small installations in close proximity to each other can have a big effect. This effect was demonstrated both by simulations done within the SUSTENANCE project and by the real-world transformer overload at the Aardehuizen demonstrator. To tackle the challenge of aging infrastructure unable to handle the influx of these new installations, SUSTENANCE project partners worked on optimizing self-consumption. They showed that flexible and coordinated control of these installations through the developed Energy Management Systems can avoid transformer overloading. However, a lack of standardization across these installations and systems, while managed within the project, requires further examination in the future. For instance, all demonstrators struggled with the lack of grid standards and grid feeding infrastructure regarding vehicle-to-grid integration.

Lesson 2: The Path to More Autarkic Community Energy Can Begin in Different Places and Follow Various Paths

Acknowledging the differences in starting points for various communities, along with their disparate goals, is fundamental to exploring the diverse paths that lead to more autarkic energy systems. For instance, a striking contrast exists between some of the Indian demonstrators, which lacked reliable access to electricity before SUSTENANCE and the European demonstrators. Even among the European demonstrators, notable differences emerged. The Dutch Vriendenerf community was founded with the idea of becoming as self-sufficient and sustainable as possible and continues to strive towards that goal. In contrast the Polish Mickiewicza community, originating from a late 1970s hosing association, is among the leaders in its recent moves to pursue more sustainable and self-sufficient energy. Context plays a significant role. The Indian demonstrators are leapfrogging directly to more sustainable solutions, bypassing some of the challenges European demonstrators still face. Additionally within the EU varying regulations can prevent some demonstrators from completely disconnecting from the grid even if they wish to. Not only that, but in efforts to preserve centrally steered energy systems in Europe, stricter, more rigid top-down control of the grid can actually be counterproductive and reduce the contributions of more autarkic energy communities from balancing the grid. Rather, softer steering signals could be more effective - this mirrors dilemmas in other domains, e.g. centrally planned economies.

Lesson 3: Heating is even more context dependent than electricity, and its electrification presents distinct challenges for the grid

Due to climatic differences, not all regions require heating for thermal comfort. Some, like in India, rely more on cooling. In the Indian demonstrator, a heat pump was designed to use the excess heat to dry agricultural products thereby extending their shelf life and improving the quality of life for the citizens involved in the project. In the European cases, the incumbent heating regimes varied in each country, and each demonstrator explored different alternatives depending on the local context. However, the trend towards transitioning from fossil fuel-based systems to heat pumps in all three countries poses challenges to the electricity grid. The project found in both the Danish and Dutch demos, load balancing through Energy Management Systems (EMS) helped counteract some of the strain heat pumps put on the aging electricity infrastructure, significantly contributing to grid stability.

Lesson 4: Regulation lags behind technological and scientific advancements, impeding widespread progress

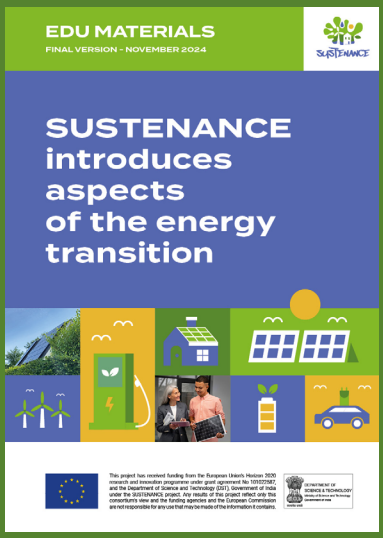
While the project partners invented a number of technologically feasible solutions, the broader implementation of these innovations was significantly hindered by the existing regulatory framework. Several regulatory challenges were identified during the project. First, technological and scientific advancements often clashed with existing regulations. One example was energy sharing across the community. Implementing solutions to increase self-consumption includes managing energy across households, yet, in the EU, sharing energy between households requires specific legal arrangements that are difficult to establish due to complicated procedures. Additionally, EU countries transpose EU directives at different speeds and in various ways, adding to the complexity. Isolated communities, in particular, might also lack access to regulatory processes such as permissions, which impedes the implementation of energy measures that require them. Finally, it should be noted that, not just by the existing regulations, but also by the absence of key regulations. For example, the absence of a standardized framework for renewable energy solutions to ensure interoperability between different renewable energy technologies and existing infrastructure hinders not just the integration between different systems but also limits knowledge transfer across systems.

Lesson 5: Transferring Business Ideas across Contexts is stymied by differences in Conditions

Transferring business ideas from one country context to another within the SUSTENANCE project, while technically viable, encountered challenges based on differences in regulations and market conditions. For instance, NEOGRID's energy management system business model for consumers is based on dynamic pricing and requires smart energy meters in consumers houses. In countries where dynamic pricing is not in place, the product must offer additional benefits beyond cost-savings to remain attractive to consumers. Despite this, the energy management system can still be implemented to optimize the self-consumption of renewable energy, contributing to more self-reliant energy systems in other countries.

Lesson 6: While citizens generally support the energy transition, they lack awareness of the details and their role in the process

As part of the research within the SUSTENANCE project, a survey of citizens conducted across Denmark, the Netherlands, and Poland revealed that while many citizens showed a positive attitude towards the energy transition, they often lacked awareness of the specific actions and steps involved. The survey also found that while some citizen's primary interest in renewable energy is a financial one, there is also a significant portion driven by pro-environmental and sustainability values and pursue the renewable energy transition because of them, even if it means incurring additional costs. Lastly, within the demonstrators, it became clear that this lack of awareness can prevent people from taking action because they are unsure of where to start.

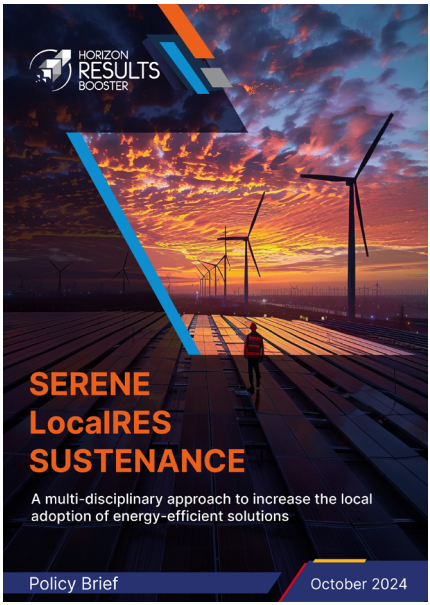


To address this issue, SUSTENANCE developed a compendium of educational factsheets, and these **Edu Materials** are available on the SUSTENANCE website.

Policy Recommendations

Based on these lessons and the project overall, SUSTENANCE together with the SERENE and LocalRES projects formulated 8 recommendations in a policy brief that apply not just to the individual projects but beyond:

1. Capacity building through training tools and workshops for local communities
2. Better alignment between EU and national / local regulations
3. Development of plug-and-play, scalable solutions for citizens
4. National and EU funds to support companies and start-ups
5. Simplification of administrative procedures for energy projects
6. Support for interoperability and standardization
7. Facilitation of energy sharing and regulatory flexibility
8. Combatting misinformation and raising awareness



Implementing these recommendations would not only enhance the spread of new energy transition overall. (The policy brief is available in 7 languages on the project's website.)

Looking Ahead

While the project itself is wrapping up, the work doesn't stop here. The lessons, tools, and recommendations we've developed will continue to guide efforts in the energy transition for years to come. We want to thank all the partners, stakeholders, and communities who played a part in this journey.

For more details on what we've achieved, check out the project website!

https://h2020sustenance.eu

Project Factsheet

More info:
www.h2020Sustenance.eu
SUSTENANCE H2020 project

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