

The people power being harnessed for cleaner and cheaper energy

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Credit: AI-generated image ([disclaimer](#))

As Europe weans itself off fossil fuels, local energy networks are tapping renewable sources to fill the gap and cut consumer bills.

They might look like ordinary plugs, but hook up a [heat pump](#) or electric-vehicle charger using one of the smart widgets and the result could be

big environmental gains and household savings.

In the northern Spanish city of Valladolid, Santiago Campos is testing a new technology that promises to change the way he and many others consume energy at home. Campos had a series of smart widgets installed in his house late last year and is now set to reap the benefits with more [energy efficiency](#) and lower heating bills.

Big bonuses

"I'm doing this for environmental reasons and also to save money at home, in particular to use my heat pump efficiently," said the 55-year-old Campos, who works for a local electricity cooperative called Energética Coop. "I also want to contribute to the development of a new service that I think could have a big impact for our members and for the environment."

Welcome to the REDREAM project. It is seeking to spur the use of cheaper sources of renewable power.

Deploying a data-based technological system that optimizes how and when consumers use energy, the initiative is helping Europe wean itself off fossil fuels such as coal and natural gas.

Months of headlines about soaring energy costs have highlighted the importance of Europe's goal to green its energy. Even before Russia's invasion of Ukraine more than a year ago, the EU was preparing higher renewables targets for 2030 as part of the fight against [climate change](#).

Renewables will account for at least 40% of EU energy consumption on average at the end of the decade, up from a previous 2030 goal of 32%, according to new draft European legislation.

Yet this goal poses challenges, not least because of the intermittent nature of renewables such as solar and wind power.

Peaks in [energy demand](#) rarely align with peaks in renewables production. Fire up a heat pump at home in the evening and chances are the electricity used will have been generated from [fossil fuels](#).

Affordable and easy

"Current options for consumers to change their [energy usage](#) are very limited," said Dr. Álvaro Sánchez Miralles, an energy expert who coordinates REDREAM. The three-year initiative runs through September this year.

The project's big idea is an "energy ecosystem" that can reduce peaks in demand by spreading energy usage more evenly throughout the day. The system can control devices remotely and take advantage of conditions when renewables are readily available.

For example, if it's a bright sunny day and [solar power](#) is in abundance, the system knows to use the opportunity of cleaner, cheaper energy to charge things like electric vehicles.

All of which means being able to make more use of renewables and doing so in a way that is practical for households, according to Miralles, who is a senior associate professor at the Institute for Research in Technology (IIT) at the Comillas Pontifical University in the Spanish capital Madrid.

An app interface helps consumers better understand usage and an "energy assistant" advises on options.

One mode automatically switches on devices when renewables are

abundant and cheaper. Another sends an alert about these moments to consumers and leaves it to them to decide whether or not to activate devices.

In Valladolid, Campos says he has let the technology make all the decisions about his heat pump and praised the whole system.

"I set it to automatically control my heat pump," he said. "It's been so easy to use and is already having a big effect."

Campos says it's too early to calculate precise savings.

While only a handful of users in Spain, Croatia and the UK is so far testing the technology, when scaled up in the years to come it could have a significant impact in boosting renewables.

"Our real ambition is to have millions of users so we can bring about these changes en masse," said Miralles.

Role reversal

Through local partners, REDREAM is also helping consumers to become renewable producers too—a role that has spawned the term "prosumers."

This can take different forms—from building a wind turbine in a community to installing solar panels on household roofs. The team sees another opportunity here to increase renewables and drive down [energy costs](#).

In Valladolid, Campos is looking at how the REDREAM technology might enable him to make more direct use of the solar energy he's generating on his roof in powering his own home.

Through the technology, local power generation and household energy consumption can be integrated.

Others too see benefits in greater local renewables production.

Kostas Galanakis is coordinator of the Smart-BEEjS project—a consortium of eight universities and research centers across Europe promoting the development of "positive energy districts", or PEDs.

The project complements EU plans to establish 100 such energy districts by 2025. It started in 2019 and runs through April this year.

PEDs are communities or neighborhoods that, through generating their own renewables, produce more energy than they consume.

Virtuous circles

This energy can then be sold back to the grid and, when profits are reinvested, a virtuous circle is created: revenues from renewables are used to accelerate local green transitions and can help poorer households pay their energy bills.

Successful examples exist, but they are typically small-scale. Smart-BEEjS is using them to try to determine what works and what is needed for more PEDs to emerge.

Galanakis points to cases like Aardehuizen in the Netherlands and Denmark's Samsø Island, where consumers are reaping economic and environmental rewards by producing their own energy.

Aardehuizen has just 23 homes. Each is heated with passive solar heat (large windows on the south), solar collectors, wood stoves and heat pumps. While the community is connected to the electricity grid, it is

largely self-sufficient thanks to solar panels.

In 1997, Samsø won a government contract to become energy self-sufficient based on 100% renewables. More than a quarter of a century on, the island generates all its own electricity and heat with offshore and onshore wind turbines and solar panels.

While political support and new funding are crucial for PEDs to flourish elsewhere, the evidence that the Smart-BEEjS team produces can feed into future policy decisions, according to Galanakis, who is associate professor of innovation systems and entrepreneurship at Nottingham Trent University in the UK.

In the longer term, he sees a growing appetite and enormous potential for building energy systems from the bottom up so the most vulnerable people in society benefit.

"We're focused on decentralizing the energy system to reduce fossil-fuel dependency and to make it socially just so that it doesn't leave vulnerable people behind," Galanakis said.

More information:

- [REDREAM](#)
- [Smart-BEEjS](#)
- [EU-funded energy research and innovation](#)

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