EU-DREAM

A STUDENT GUIDE TO CONSUMER-CENTRED SOLUTIONS

Bridging the **digital divide** in Energy



Helping customers benefit from the energy transition

The way we use electricity at home is changing fast. Electric vehicles, solar panels, electric heating and cooling, and connected devices. Households' electrification, decarbonization, and digitalization, are helping create a cleaner, more efficient energy future.

But there is catch: every home is turning into its own mini energy ecosystem, where all these technologies have to work together to deliver real benefits.



For homeowners, keeping all smart energy assets in sync can quickly feel overwhelming.

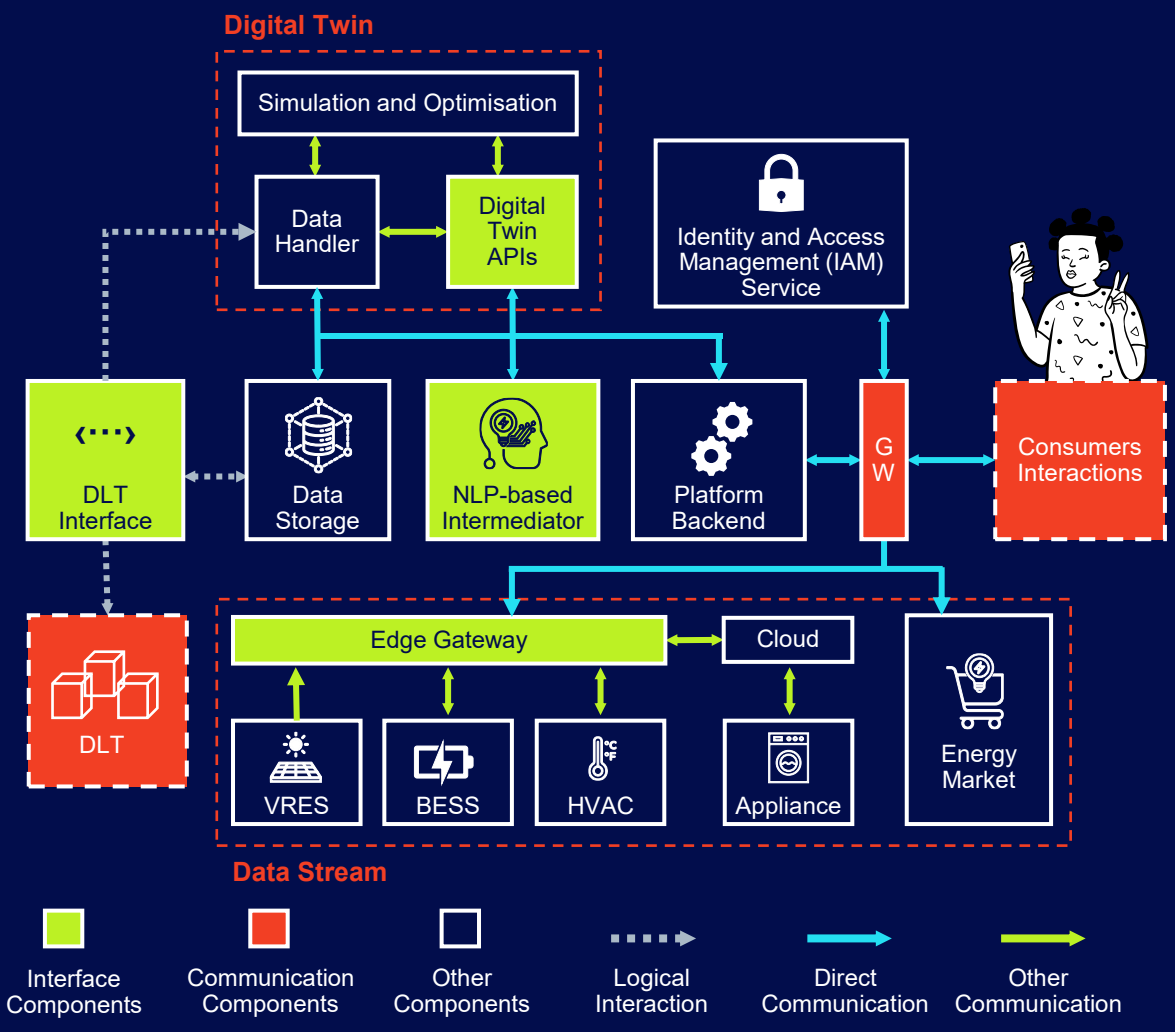
Most people do not want to think about this every day.

EU-DREAM puts a smart intermediator, your personal energy assistant, at the heart of the home. It reflects what end users actually want, in simple, everyday terms, building the awareness, trust and confidence people need to engage with the energy market on their own terms.

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The technologies behind a smart energy assistant

At its heart, EU-DREAM is a digital platform that unites five powerful technologies: Digital Twins, Artificial Intelligence (AI) agents, Natural Language Processing (NLP), Blockchain and Distributed Ledger Technologies (DLT) interfaces.



Logical view of EU-DREAM architecture

The Digital Twin: a living copy of your home

The **Digital Twin** is a dynamic virtual replica of your household, capturing your energy assets, resources and services. It lets you monitor, simulate and optimize your energy use, and event test participation in energy and flexibility markets, all without ever touching the real system.

DLT: security you can trust

To keep every data exchange secure, EU-DREAM uses **Blockchain**, yes, the same technology behind cryptocurrencies.

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The **Distributed Ledger Technologies** interface acts as a secure bridge between the platforms' applications and the blockchain. It gives components like the Digital Twin and databases a clean, protected connection, enforcing strict access controls and keeping verifiable records, so your data stays safe.

The NLP intermediator: an energy assistant in plan language

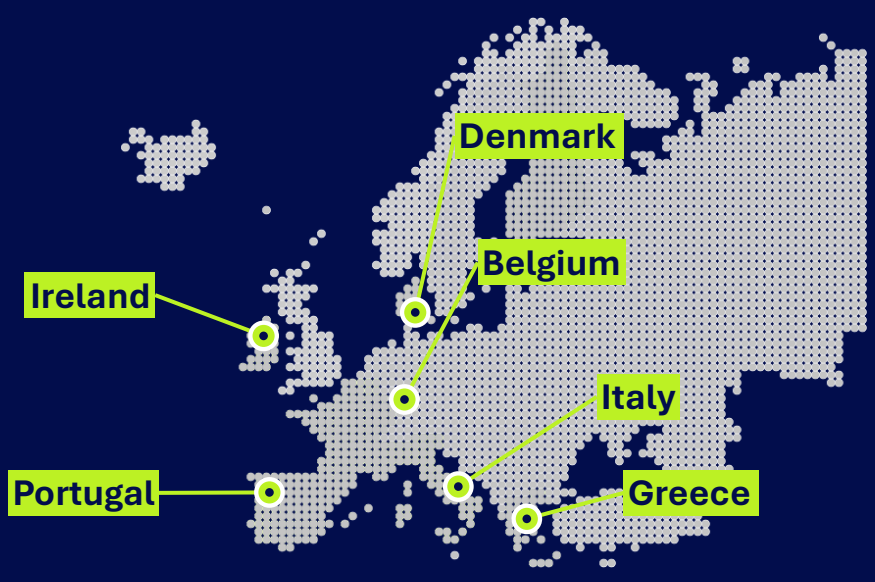
NLP is the branch of AI that lets computers understand and talk in human language. If you have used ChatGPT, Gemini, Grok, Mistral or DeepSeek, you are already an NLP user, as Large Language Models are NLP in action.

EU-DREAM's NLP intermediator is the conversational face of the system. It turns complex energy data into simple, everyday language, interpreting what you want, reading your Digital Twin, and analysing the right data to deliver clear, context-aware insights and recommendations.

Behind the scenes, two **AI agents** do the heavy lifting:

- Optimization agent: Manages your flexible and programmable appliances, generating smart schedules and operational tips for the devices you choose.
- Simulation agent: uses Machine learning to forecast your home energy behaviour, from everyday consumption to local solar and wind generation, over any time horizon.

EU Dream Innovative Concept is Demonstrated in 6 Living Labs in 6 EU Countries.



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Energy with a human face

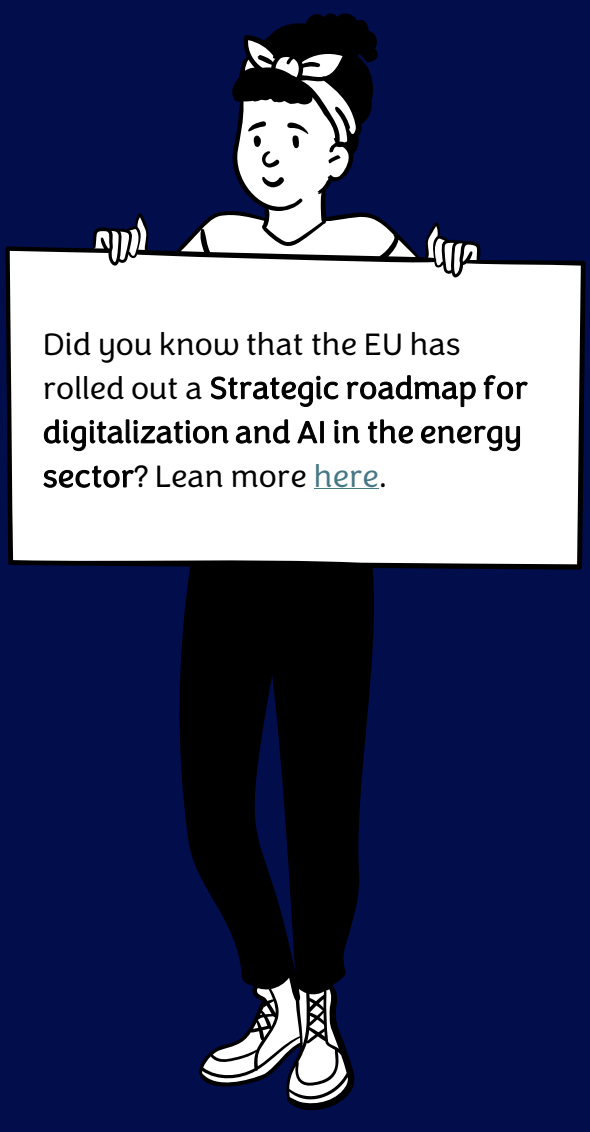
Leveraging people's data to automatically optimize their home energy management is advantageous for customers as it takes out the constant decision-making burden. However, it also brings some challenges to ensure the tools deliver value for everyone.

EU-DREAM solutions are designed to interact directly with consumers. Different households have different needs, preferences, lifestyles, and levels of digital literacy, meaning that **a one-size-fits-all approach can easily exclude part of the population**. Factors such as income level, housing conditions, age, family composition, access to technology, or energy poverty can significantly influence energy consumption patterns and the ability to participate in energy and flexibility activities.

Engaging consumers throughout the development process helps researchers and engineers better understand real-world expectations, concerns and barriers to adoption.

Through its pilot activities and stakeholder engagement efforts, EU-DREAM seeks to collect insights from a broad range of consumers including vulnerable households, to promote fairness, inclusivity and accessibility.

This work is led by professionals from the Social Science and Humanities, who work hand in hand with EU-DREAM's technical partners to develop inclusive and user-centred solutions.



Did you know that the EU has rolled out a **Strategic roadmap for digitalization and AI in the energy sector**? Lean more here.

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Resources for students

Wanna know more about EU-DREAM technologies? Check out these links below!

Deep dive into EU-DREAM's five core technologies in this article from Fondazione LINKS.

Understand how people use their appliances in this article from Politecnico di Torino:

Start with AI-driven forecasting with this introductory course from InnoEnergy, taught by KU Leuven Associated Prof. Kazmi.

Take a virtual tour of EU-DREAM's Living Lab in the City of Genk, Belgium, which focuses on vulnerable consumers.

Review our following partners sites for related job and internship opportunities:

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Website: https://eu-dream.eu/ || **LinkedIn:** linkedin.com/company/eu-dream

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