

Heat Pump Awards 2026

Application submission

DACS-HW: Unlocking Grid Flexibility at Neighborhood Scale

Rheem (Intergas) | Innovation Award

1. Application overview

Award category	Innovation
Title of the project	DACS-HW: Unlocking Grid Flexibility at Neighborhood Scale
Organisation Name	Rheem (Intergas)
Exact address of the project	Lahuisstraat, Dalen, 7751 EH, Netherlands
Funding	Private; Public
Organisations involved in the project	Ministry of Economic Affairs, Enexis, Technical University Eindhoven, Samen Energie Neutraal, Inversable, Enablemi, The Code Crew, Rheem (Intergas).
Project ending date	12/02/2026
Project website	www.dacs-hw.nl
Sector of application	Residential

2. Applicant & EHPA contact details

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EHPA member involved	Rheem
Role of EHPA member	Director Corporate Affairs

3. Project description and benefits

Project description (goal, problem addressed, and solution provided by the heat pump)

As Europe electrifies heating, grid congestion has emerged as one of the greatest barriers to the energy transition, at least in the Netherlands. DACS-HW addresses this challenge with a groundbreaking solution: the collective, grid-aware control of heat pumps at neighborhood level, transforming thousands of individual appliances into a coordinated flexibility resource.

In a real-world pilot in Dalen, the Netherlands, 100 heat pumps were connected through an innovative digital control platform linking grid forecasts, real-time data and consumer preferences. The project successfully demonstrated that coordinated control can reduce peak electricity demand by 25%, without any noticeable loss of comfort for residents.

What makes DACS-HW truly innovative is that it moves congestion management from large industrial assets to ordinary households. By integrating grid operator forecasts, open communication principles, advanced control algorithms and consumer participation, the project created a scalable blueprint for unlocking flexibility behind the meter.

More than a successful pilot, DACS-HW proves that smart coordination can create additional grid capacity, defer costly network reinforcement and accelerate the deployment of sustainable heating technologies. It demonstrates how digitalization, flexibility and citizen participation can work together to build a more resilient, affordable and future-proof energy system.

Expected or achieved benefits

Delivered a scalable blueprint for grid-flexible heating, combining digital control, consumer participation, and interoperability for future large-scale deployment.

Maintained household comfort, demonstrating that flexibility can be activated without noticeable impact on residents.

Created additional effective grid capacity, enabling further electrification without immediate network reinforcement.

Obstacles/barriers encountered during development

Consumer participation and engagement, as flexibility solutions depend on residents' willingness to allow external control of their heating systems. Building trust, ensuring transparency and safeguarding comfort proved essential.

Regulatory and market barriers, including the absence of mature business models and market mechanisms that reward residential flexibility, limiting large-scale deployment despite the demonstrated technical potential.

Why should this project win an award?

DACS-HW has moved grid flexibility from theory to reality. At Intergas, efficiency has always been part of our DNA. We became a market leader by developing some of the most innovative and efficient gas-fired boilers in Europe. Today, we are applying that same drive for innovation to heat pumps.

The challenge, however, has changed. In the past, efficiency was about reducing energy consumption. Today, it is increasingly about making the smartest use of scarce grid capacity. DACS-HW proves that the next generation of heat pumps can do more than heat homes efficiently; they can actively support the electricity system.

In the age of electrification, the most efficient heat pump is not the one that consumes the least electricity, but the one that creates the most value from every kilowatt available. DACS-HW makes that vision a reality.

4. Technical specifications

Capacity of unit(s)	500kW combined
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Energy sources used	electricity
Coefficient of Performance (COP)	COP 4,68 by A7/W35
Service provided	heating
Refrigerant type	R32

Heat pump details (compressor technology, heat exchanger, system configuration)

No answer provided.

5. Renewable energy integration and grid response

Integration of renewable energy sources

No answer provided.

Response to energy demand / smart grid integration

The DACS-HW system was specifically designed to make residential heat pumps an active part of the electricity system rather than passive consumers of electricity. Each heat pump remains focused on maintaining indoor comfort, but its operation can be temporarily adjusted in response to local grid conditions and electricity demand.

Key features include:

Forecast-based grid management: Distribution grid forecasts are used to identify periods when local network congestion is expected. The control platform proactively adjusts heat pump operation before grid limits are reached.

Dynamic load management: During periods of high electricity demand, the electrical power consumption of participating heat pumps can be temporarily limited. This reduces peak load on the local distribution grid while preserving household comfort through the thermal buffering capacity of the building and heating system.

Collective flexibility control: Instead of controlling a single asset, DACS-HW coordinates a fleet of 97 residential heat pumps. This aggregation enables meaningful flexibility at neighborhood level, creating a virtual flexibility resource for the grid operator.

Consumer-centric operation: User comfort settings remain a key boundary condition. Flexibility actions are only activated within predefined comfort limits, ensuring residents experience little or no noticeable impact.

Smart-grid integration: The system creates a direct link between distribution grid needs and residential heating assets through a digital control platform. This allows heat pumps to support congestion management, increase the effective capacity of existing grids, and facilitate larger-scale electrification without immediate network reinforcement.

In the pilot, this approach achieved peak-demand reductions of 25%, demonstrating how

residential heat pumps can function as distributed grid assets while continuing to provide reliable heating and comfort.

6. Innovation, monitoring and replicability

General (all awards)

Why the project is innovative *(all awards)*

DACS-HW is innovative because it redefines the role of the heat pump in the energy system. Rather than focusing solely on improving the efficiency of a single appliance, the project transforms residential heat pumps into intelligent, grid-responsive assets that actively support the electricity network.

Key innovations include:

Neighborhood-scale flexibility: DACS-HW demonstrated that a fleet of 100 residential heat pumps can be coordinated as a single flexibility resource, providing measurable congestion relief on a local electricity grid. This moves flexibility from large industrial consumers to ordinary households.

Predictive, grid-aware control: The system combines grid forecasts, real-time monitoring, and advanced control algorithms to proactively reduce peak demand before congestion occurs.

Maintaining comfort while supporting the grid: Unlike traditional demand-response solutions, DACS-HW leverages the thermal storage capacity of buildings to provide flexibility without noticeable impact on residents' comfort.

Scalable and interoperable architecture: The project developed and validated an open digital control framework capable of connecting heat pumps, homeowners, aggregators, and grid operators, creating a blueprint for large-scale deployment across Europe.

A new definition of efficiency: For decades, heating efficiency focused on reducing fuel consumption. DACS-HW introduces a new dimension of efficiency: maximizing the value of scarce grid capacity. By reducing peak demand by 25%, the project demonstrates how heating systems can simultaneously improve comfort, sustainability, and grid resilience.

Monitoring approach (performance, cost, and carbon targets) *(all awards)*

DACS-HW uses a digital monitoring and control platform that continuously collects operational data from participating heat pumps and combines this with electricity grid data, congestion forecasts, and user comfort settings. This enables real-time optimization of both heat pump performance and grid flexibility services.

For Large Heat Pump or Building Solutions Award

Why the project serves as a model for others *(Large Heat Pump or Building Solutions Award)*

No answer provided.

Potential for expansion to other locations/industries *(Large Heat Pump or Building Solutions Award)*

No answer provided.

Barriers to replication elsewhere *(Large Heat Pump or Building Solutions Award)*

No answer provided.

Business opportunities for expansion, licensing, or commercial production *(Large Heat Pump or Building Solutions Award)*

No answer provided.

For Innovation Award

Technology/technique developed solely for this project *(Innovation Award only)*

Yes. While DACS-HW builds on commercially available heat pump technology, the project's innovation lies in the development and validation of a dedicated grid-flexibility control system that was specifically designed to coordinate residential heat pumps in response to local grid conditions.

Differentiation from state-of-the-art solutions & market maturity *(Innovation Award only)*

DACS-HW is best described as an advanced pilot and pre-commercial demonstration project. The technologies used, including heat pumps, digital monitoring and remote control, are commercially available. The innovation lies in their integration into a grid-flexibility ecosystem and the successful validation of this concept in a real residential neighborhood involving 100 households.

The project has moved beyond laboratory testing and proof-of-concept stages. It demonstrated technical feasibility, consumer acceptance and measurable grid value under real operating conditions. As a result, DACS-HW provides a clear pathway toward large-scale commercial deployment as distribution system operators and energy markets increasingly seek cost-effective flexibility solutions to support electrification and mitigate grid congestion.

Regional benefits (energy savings, emissions, jobs, infrastructure) *(Innovation Award only)*

DACS-HW delivers both immediate and long-term benefits to the region by enabling the energy transition to progress faster without requiring major investments in electricity infrastructure. The project demonstrated how residential heat pumps can help solve local grid congestion, one of the most significant barriers to electrification in the Netherlands and across Europe.

More efficient use of existing grid infrastructure by reducing peak electricity demand and unlocking additional distribution network capacity. This helps accommodate the growing number of electrified homes without immediate grid reinforcement.

Acceleration of the energy transition by enabling greater adoption of electric heating technologies while maintaining reliable grid operation.

Lower carbon emissions through increased utilization of heat pumps and reduced reliance on fossil-fuel-based heating, supporting regional and national climate goals.

Reduced societal costs by postponing or avoiding expensive network upgrades. This can lower the overall cost of the energy transition for grid operators, consumers, and society.

Creation of a regional innovation ecosystem, bringing together manufacturers, grid operators,

technology providers, researchers, and residents to develop and validate new flexibility solutions.

Commercial potential *(Innovation Award only)*

DACS-HW has strong commercial potential because it addresses a rapidly growing market need: enabling electrification in regions where electricity grid capacity is becoming a limiting factor. As heat pump deployment accelerates across Europe, grid operators, energy suppliers, aggregators and technology providers are actively seeking scalable flexibility solutions that can unlock additional grid capacity without costly network expansion.

The project creates commercial opportunities in several areas:

Large-scale deployment of flexibility services by integrating grid-aware control functionality into residential heat pumps and connected heating systems. Licensing of the control and communication architecture to heat pump manufacturers, aggregators, distribution system operators and energy service providers. New flexibility business models, allowing homeowners to participate in congestion management and future flexibility markets while maintaining comfort. Replication across Europe, particularly in regions facing grid constraints and increasing electrification of heating and transport. The concept is technology-neutral and can be applied to large fleets of residential heat pumps. Commercial differentiation for manufacturers, enabling heat pumps to offer not only energy-efficient heating but also measurable value to the electricity system.