



Clean and efficient building energy management

Tieto Distributed Energy Solution (DES)

tieto *EVRY*



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Executive summary

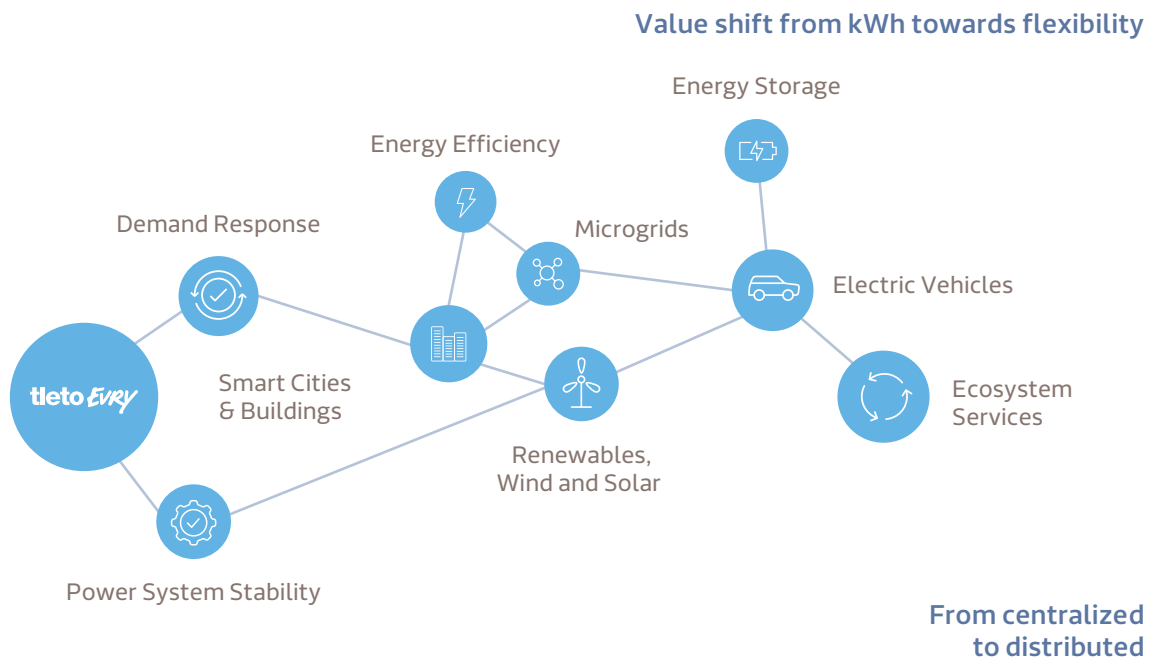
The energy revolution is powered by advances in renewable energy technologies, electrified transport, energy storages and digitalisation.

Buildings use approximately 30-40% of all energy in the Nordic area. To be able to meet the decarbonisation targets of Nordic countries and cities, it is of utmost importance that the building sector's energy consumption is transformed to significantly higher efficiency and steered towards the use of carbon-free energy.

The means to achieve this transformation are manifold, and to have a concrete and clear plan is essential. The electrification of heating, heat pump technologies, waste heat recovery, smart consumption management, energy efficient construction, CO2 binding materials, and decarbonisation of district heating are some of the key elements in achieving these targets. Different types and ages of buildings require different technologies and solutions, so no single solution can be applied.

That said, it is possible to model and simulate templates for distinct building segments to simplify the available options. Building service providers play a key role in packaging turnkey solutions consisting of multiple technologies to optimise financial and environmental benefits for the building owners. A common factor is that the diversified and increasingly complex building energy systems combined with multiple heating, cooling, and other technologies need to be managed holistically from energy production to consumption to achieve minimised emissions and maximised savings in energy costs.

Digital revolution progresses with the strive for CO₂ neutral society



Increasingly weather dependent and decentralised energy system needs to be digitally managed from energy production to consumption. Digitalisation enables both system stability and new connected services.

Climate targets

Meeting the climate targets requires a holistic transformation in the way energy is produced and used. Countries need to significantly increase the portion of renewable energy in production, improve energy efficiency and digitalise energy management in major steps.

Doing this will have an impact on the whole energy system, leading to increased volatility in the energy system and market price. The energy market trading and balancing activities need to be close to real time to enable system stability. Meeting the climate targets will not be possible without automated digital management of the whole value chain from energy production to consumption.

Smart, connected buildings and homes

Buildings consume energy mostly for heating, cooling, air conditioning and lighting. The building stock and installed technology is extremely diverse depending on the age, construction method, location and renovation history of the buildings. To upgrade the buildings for more efficient and smartly controlled energy use is a mix of hardware updates and a digital management layer using IoT connectivity for holistic management of the hardware layer.

Eventually, to achieve significant improvements in efficiency and flexibility, the solution will be a mix of different forms of energy and technology that then has to be centrally managed by the digital layer on top, considering energy markets, emission impacts and building conditions in almost real time.

Micro-production and storage in buildings

Small-scale energy production and storage will play a bigger role in every country. Automated management of micro-production and storage at industrial and commercial buildings, as well as households, will enable maximum use of carbon-free energy with the lowest possible cost, while providing the needed flexibility to the whole energy system.

Electric vehicle charging

The European countries are approaching a critical point in making practical decisions on their electric vehicle charging infrastructure for the future. This requires new types of automated services and systems to control supply and demand, and the use of electric vehicle batteries as part of the energy system balancing assets. Besides providing a distributed fleet of energy storage, electric vehicles can be used at building level to provide flexible energy storage for flexibility in the buildings' energy usage. Many times, the cars will be plugged in for most time of the day. During that time, the car batteries can be both charged, and at times, also discharged, for example for heating, cooling and ventilation to avoid the use of expensive and high-emission energy from the grid at times of demand peaks in the distribution network.

Conditions management and user experience

In addition to efficiency and sustainability, smart building management enables the optimisation of the buildings' environmental conditions and user experience of the people using the facilities, both in commercial and residential buildings. Digital tools enable real-time and use-based management of the environmental conditions to match the need based on building utilisation while giving users a possibility to influence the use of energy, especially in the residential segment.

How to achieve efficient and sustainable building management

The diversified building energy technology and digitalisation of the energy management enable total system management where buildings with controllable energy resources become a seamless part of the energy system.

With DES you can operate virtually the entire value chain from optimising the use of energy in your building fleet to taking in additional benefits from energy and power markets, and enhancing the environmental conditions for the building users.

For building owners and investors, this means a lower operating cost and better return for investment, added with better user experience.

For building service providers, DES provides smart and automatic management and optimisation tools to build service offerings that can be offered as turnkey solutions to customers. With DES, you get a holistic, real-time overview of building operations, so it becomes possible to optimise them and generate new revenue streams. Providers can help customers understand and contribute to the future of green energy. They can leverage their customer base and customer commitment, optimise energy cost, earn income from reserve markets through demand response and manage demand peaks, thereby potentially avoiding the use of expensively run peak power plants.

A theoretical example, based on 100 commercial buildings:

Energy use optimisation: 10% savings in energy costs

Ancillary market participation: 2 million euro per year
(flex capacity of ~200 kW per building)



Solution overview

DES essentially means complementing the current energy production infrastructure with a large network of small energy generation, consumption and storage points controlled centrally. Customers' solar panels and small-scale wind turbines produce power, smart control of assets optimises consumption, and customers' own electricity storage facilities, such as building scale batteries or electric vehicles, form a virtual power plant to optimise energy cost and earn from reserve markets.

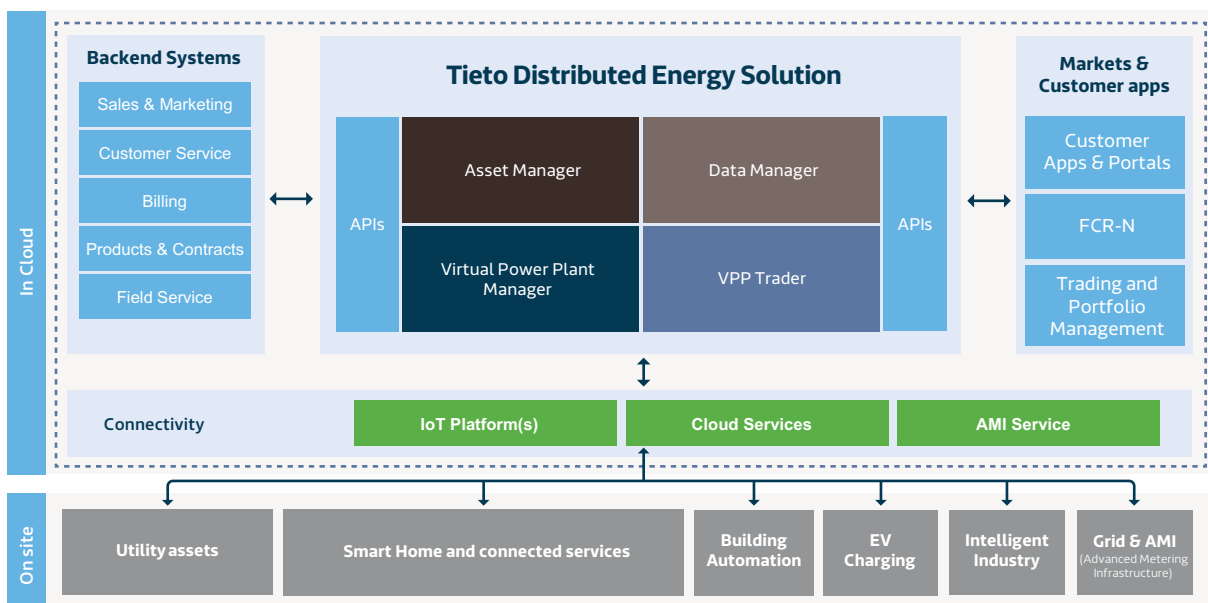
DES enables the integration of different assets from multiple base systems to one management system. These base systems can be IoT platforms or cloud services from service providers specialising in an asset or service. This enables holistic management of an operational environment that is built from multiple systems from multiple service providers. DES is a system of systems that makes integrated service management possible at a cloud level. This makes it possible to use best-of-breed service providers to build holistic solutions and makes it easy to add or remove services and providers.

Distributed Energy Solution components

DES is a modular and scalable solution offered as a cloud service. The approach allows starting with basic functionality and scale up when it is desirable to expand the use of the system.

The modular approach also means the system is easily scalable to fit a large variety of use cases.

DES is used through a browser-based dashboard-style cockpit. It is a digital description of the physical system, from which it is easy to drill down to individual devices and their operation.



Asset Manager

The Asset Manager module forms the core of DES by documenting and managing different types of assets and their relationships to their owners, locations and to other assets. Asset information includes location, customer information, device and service properties, maintenance information and device status. Assets can be added, deleted and edited.

VPP Manager

The VPP Manager module provides a holistic management solution for Virtual Power Plants. Micro-production, real-time consumption control and electricity storages, such as batteries or electric vehicles, form a virtual power plant that is automatically controlling the connected assets based on the desired or planned target outcome.

Data Manager

The Data Manager module has all the capabilities needed by DES to store, use, analyse and visualise masses of data coming in from various IoT platforms, cloud services, third-party solutions and physical devices. It is also possible to relay data to third-party systems, such as endcustomer apps, through data APIs.

VPP Trader FCR-N

Designed specifically for the Frequency Containment Reserve market (FCR-N), the VPP Trader module enables automatic capacity calculation and bidding in FCR-N markets.

Onboarding and pricing

We help you all the way from defining the vision to running the business platform. This includes shaping the scope of end customer services and targets, piloting, implementing and running daily platform operations.

With a scalable pricing model, DES optimises new services operation from the beginning and the service will immediately deliver business results and benefits will grow stronger over time.

Business benefits

TietoEVRY's DES provides one centrally manageable, unified management solution for implementing smart energy management for buildings. Through its versatility regarding new services design, it opens up new revenue streams for building owners, operators and building service providers. With a wide range of possibilities, it enables improved end-user experience, optimised energy costs, extra revenues from reserve power markets, holistic management of building services and quantifiable reduction of CO2 emissions.

Summary and conclusions



TietoEVERY's Distributed Energy Solution is a cloud-based, modular solution for automated digital management of the whole value chain from buildings' energy production, storage and consumption.

Quick to deploy, constantly updated, scalable, modular and flexible, the solution will help you design a profitable service portfolio and give you new opportunities to improve your return of investments and customer experience.

What next

Get in touch with us to get started on a business that ensures your business continuity in the face of the ongoing energy market revolution.

We will be happy to arrange a meeting to give you more detailed results.

TietoEVERY creates digital advantage for businesses and society. We are a leading digital services and software company with local presence and global capabilities. Our Nordic values and heritage steer our success.

Headquartered in Finland, TietoEVERY employs around 24 000 experts globally. The company serves thousands of enterprise and public sector customers in more than 90 countries. TietoEVERY's annual turnover is approximately EUR 3 billion and its shares are listed on the NASDAQ in Helsinki and Stockholm as well as on the Oslo Børs. www.tietoevery.com

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