

An aerial view of a city skyline, likely Shanghai, with numerous skyscrapers and buildings. The scene is overlaid with a complex network of glowing blue and green lines and nodes, representing a digital or smart grid infrastructure. The sky is filled with soft, hazy clouds, and the overall lighting is warm and golden, suggesting a sunrise or sunset. The digital overlays consist of various geometric shapes, including circles, lines, and nodes, that connect different parts of the city, symbolizing the integration of smart buildings into a smart grid.

SIEMENS

Ingenuity for life

Real estates turned into virtual power plants

Increased intelligence enables
new digital services

Smart buildings in smart grids

Sustainable society for future generations

The demand for energy is growing, urbanization is accelerating, and emissions are increasing. Urbanization and climate change are megatrends that are also changing the real estate business. In future, buildings will have an increasingly major role in sustainable energy systems.

Renewable energy is being utilized more and more to curb climate change. This development can also be seen in Finland. However, increasing the use of renewable energy requires some means to balance the power grid. Consumption being flexible based on production is a modern trait. Properties are major electricity consumers, which means that they have the opportunity to balance the power grid by being flexible in their consumption.

Lack of suitable technological solutions has prevented the entry of properties to the energy market. Such a solution is now available. We have launched a new virtual power plant service through which properties can participate in the electricity market to benefit them and society considerably. The virtual power plant service has attracted plenty of attention in the market. The first property is already operating in the reserve market, and more contracts have been signed.

In the digital economy, new innovations are often based on the utilization of data. The virtual power plant service is an example of a digital economy operating model where the customer purchases measurable value instead of technology. The core of the service is an intelligent energy platform. An ecosystem to provide new and versatile services is being built around this platform. The entire concept was created in cooperation with a bold and responsible customer – shopping center Sello.

The development of the virtual power plant service has required a combination of Siemens' strong expertise in building technology and power grids, and the opportunities offered by the advanced market. The world needs new solutions to resolve delicate challenges. With our new digital services, we want to be involved in building a sustainable future for properties, societies and future generations.



*Veikka Pirhonen,
CEO, VIBECO Oy*



*Ville Stenius,
Head of Business Line,
Smart Infrastructure,
Siemens Osakeyhtiö*

Major role of properties in fight against climate change

Digital properties can significantly reduce environmental impact. Meanwhile, they will also benefit from the solution themselves.



Renewable energy requires flexibility

To curb climate change and build a sustainable society, we need to increase the share of renewable energy production. Production volumes vary depending on the weather conditions, which is a challenge for the power grid. The production and consumption of electricity must be balanced at all times to ensure disturbance-free power supply.

The balance of the power grid can be maintained by temporarily increasing the production volume or by being flexible in terms of consumption. To temporarily increase the production volume, there are reserve power plants in Finland the energy production of which is based on fossil fuels. The maintenance of these reserve power plants, which are started up occasionally, is expensive for society.

The balance of the power grid can also be maintained by being flexible in terms of consumption. Properties consume 40% of all the energy consumed in Finland, which means that they have a great deal of flexibility potential. If properties are connected to the energy system, they will consume less or more electricity, depending on the needs of the power grid.

Properties to benefit from electricity market



Siemens' virtual power plant service is an easy way to connect properties to the energy market so that they can promote a carbon neutral, sustainable future. The properties' small electrical loads are combined to achieve a load that is large enough to be offered on the electricity market. Previously, small electrical loads could not be used in flexible consumption.

The transmission system operator, Fingrid, pays compensation for flexibility that benefits all the properties included in the virtual power plant network. The virtual power plant service is an entirely new source of revenue for property owners, who typically receive investment or rental income from their properties.

The first customers of the virtual power plant service have the opportunity to receive subsidies for their technology investments.

VIBECO – virtual power plant company



A new digital platform economy company established in Finland, VIBECO – Virtual Buildings Ecosystem Oy, is responsible for Siemens' virtual power plant service. VIBECO is responsible for the operations in the energy market so that Siemens can focus on its key expertise, technology solutions.

At present, Siemens is VIBECO's sole owner, but the goal is to expand the ownership base. Other potential owners include real estate investment companies as they have the best perspective on which services provide added value to properties.

As the owner of VIBECO, Siemens' technology expertise is the basis of the new company's services. The services are offered to customers as an easy comprehensive solution that includes the technology, expertise, services, and possibly also funding.

The company's first digital service is the virtual power plant service for properties. In future, the company will also offer other data-based services which can be produced on the open platform not only by Siemens, but by other companies operating in the ecosystem.

Properties form networks to operate together

New cooperation opportunities and digital services are offered to properties through a smart energy platform.



Smart solutions verify the future

The smart energy platform combines properties into a virtual ecosystem to provide them with an entirely new opportunity to save money, increase efficiency, reduce emissions, eliminate maintenance backlog, and use new sources of revenue and business models. Virtual real estate ecosystems are the foundation of smart cities and ecological society.

In a virtual ecosystem, the properties communicate with other parties to achieve benefits. The virtual power plant service is one example of such an ecosystem. The properties are flexible in their consumption of electricity, depending on the needs of the power grid. The small electrical loads of the properties are combined and offered to the electricity market together, which means that everybody benefits.

In addition to flexible electricity consumption, the properties can offer temporary flexible heat consumption. Major CO₂ emissions will be avoided when the reserve power plants, which are powered with heavy fuel oil, don't need to be started.

You can prepare for electric vehicles

Actions to curb climate change will most likely increase the number of electric vehicles in Finland in the next few years strongly. You can prepare for the electricity consumption peaks caused by the recharging of electric cars without having to make expensive investments.

A smart energy platform makes the electric vehicle recharging infrastructure part of the real estate system. The consumption of electricity is managed as a single whole in the entire property – and to an increasing extent with the other parties active in the ecosystem. Optimization of the total electrical power can be used to avoid investments in the expansion of the electricity system. The property's electricity consumption will be temporarily decreased in other areas during times when many people are recharging their electric cars. The consumption will remain within the specified target limits, which achieve enables cost saving.

Siemens' solution can also be integrated with a solar electricity system and electricity storage. The property can store, buy, sell, or use electricity it has produced itself or purchased on the market when it is affordable. The electricity storage also assists in managing electricity consumption peaks.

Knowledge-based management provides added value



Siemens' smart energy platform enables efficient knowledge-based property management. By analyzing data, situations can be anticipated and the property can be controlled intelligently to meet environmental targets, ensure optimal conditions, and improve profitability.

Maintenance actions can be planned and carried out at the correct time. More specific information on the property's electricity consumption profile can be obtained to negotiate more affordable contracts. Data from outside the property – such as weather forecasts – can be uploaded to adapt operations to the prevailing conditions in advance.

With responsibly owned and managed properties, the goal is to use technological solutions that enable smart control and use. Developed in the EU, the Smart Readiness Indicator is also guiding real estate owners in this direction. Its criteria will be renewed at the end of 2019.

A property will earn measurable added value immediately after joining Siemens' virtual ecosystem. Furthermore, the property will be able to actively, efficiently, and safely operate in our smart, networked society. The owner will be able to be among the first to utilize new digital services and business models that increase competitiveness.



Siemens' expertise ensures easy implementation

Joining a virtual power plant is easy for the property. Siemens will deliver the smart energy platform and other technical solutions as part of the service. Siemens will also handle control of optimal consumption. The customer will pay a fixed service charge and receive the actual profit.

Siemens' building technology, IoT solution, data analysis, micro-grid, and property business model expertise ensure the service's success. The more networked a property is, the more significant information security becomes. Siemens' solution ensures the safety level required by critical infrastructure.

Tried and trusted solutions and technologies are used when providing the service.

Responsible properties are profitable and promote sustainable development

Trailblazers are already utilizing the virtual power plant service to boost their profitability and promote sustainable development. A characteristic common to them all is responsible operation.



Virtual power plant service started with the shopping center Sello

Sello shopping center is already active in the energy market. It is the first significant property complex in Finland to be part of the electricity reserve market offered by Fingrid. Automation enables the property to make decisions on buying and storing energy, as well as using the stored energy, depending on the needs of the market. The virtual power plant solution realized at Sello has become a significant new operating model that also benefits other Finnish properties.

“This progressive project is blazing a trail in how shopping malls can be involved in the climate protection effort and work for the good of the environment and society as a whole. Project solutions also take into account customer satisfaction and good operating conditions for tenants in the shopping center,” says Matti Karlsson, CEO of Sello.



Anssi Laaksonen,
Siemens Osakeyhtiö

“In addition to building technology and digitalization solutions, a solar power system has been installed in the shopping center. The solution also includes recharging stations for electric vehicles. Siemens’ smart energy platform enables efficient implementation of new services at Sello.”

Profitable and green Helsinki Central Railway Station

The virtual power plant service will cover three of VR Group's properties: the Helsinki Central Railway Station, and the Pieksämäki and Oulu depots. Temporary changes can be made at the properties without any disturbance to the operation or the conditions.

Long-term cooperation, which has increased the energy efficiency of VR Group's properties, will be complemented with the virtual power plant service that Siemens will deliver as a turnkey solution.

"We have been developing the efficiency of property maintenance and energy use for a long time now. The virtual power plant service is another way of increasing the profitability of properties, as it provides a new way to earn money with them. Renewable energy is challenging the entire energy system. The increased need for load following power due to the energy revolution is creating new possibilities for properties, and possibly new obligations in the future as well. We want to already make preparations for these changes now," says Juha Antti Juutinen, Director of Real Estate at VR Group.



**Markku Lilja,
Siemens Osakeyhtiö**
*"As far as we know,
no other city or
town in Finland
or elsewhere has
started utilizing the
possibilities of the
electricity market
on this scale."*



Lappeenranta – first town to extensively utilize flexible consumption

Lappeenranta is one of the first towns in the world to make use of the possibilities offered by flexible consumption on this scale. During the first stage, the virtual power plant service will be delivered to nine properties owned by the city of Lappeenranta. The plan is to add fifty other properties to the service later on.

Siemens is responsible for the technical solutions and controlling the consumption of Lappeenranta's properties that participate in the balancing power market."

"The virtual power plant solution will decrease the town's environmental impact and increase its profit. For the town, it is great that in addition to renting out facilities, income can also be obtained through offering capacity for flexibility in the electricity market," says Markku Mäki-Hokkonen, Lappeenranta City Development Manager.



**Mikko Aalto,
Siemens Osakeyhtiö**
*"Properties have
plenty of flexibility
potential: you just
have to know which
changes can be
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disturbing the op-
erations. Siemens'
expertise ensures
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