

Regional Power Producer and Supplier Featuring Compact Grid for the Local Production for Local Consumption of Renewable Energy

There has been growing interest in recent years in a new type of regional power producer and supplier (PPS) whereby local government and business jointly participate in the supply of electric power. An early example of this was the commencement of operation in March 2019 of two compact grids intended to facilitate the use of locally generated renewable energy at Hioki City in Kagoshima Prefecture. This trailblazing initiative is aimed at reducing both energy costs and environmental impacts while also creating new local employment opportunities and promoting economic activity. Hitachi Power Solutions has provided comprehensive support, extending from project planning and assistance with funding applications to equipment installation. Hitachi Power Solutions also intends to continue working with the power system operator to pursue further progress.



Challenges

Solutions

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| <p>1 It is necessary to take advantage of national programs targeting decarbonization and regional revitalization to introduce renewable energy and to promote the local production for local consumption of energy.</p> | | <p>Develop compact grid system for the local production for local consumption of energy.</p> |
| <p>2 It is necessary to overcome the challenges facing the regions, including depopulation and shrinking employment opportunities. In addition, it is necessary to establish ways to keep money flowing in the region by changing from paying electricity bills to power generation companies outside the region to power companies inside the region.</p> | | <p>Encourage regional revitalization by leveraging the commercial operation of a new regional PPS to foster employment opportunities and economic activity.</p> |
| <p>3 There is a lack of expertise in how to establish and operate the procedures and systems for the commercial operation of this new type of regional PPS.</p> | | <p>Provide total support from business planning to operational assistance.</p> |

Project Background

Joint project began with a single consultation

Located not far from Kagoshima City, the prefectural capital, Hioki City is actively pursuing environmentally conscious urban development that includes use of renewable energy. In March 2019, the city commenced operation of its compact grid power distribution network that combines photovoltaic power generation with a co-generation system. The project received support from FY2017 and FY2018 projects of the Agency for Natural Resources and Energy for funding initiatives for the local sourcing of energy that take advantage of the characteristics of the regions in which they are located*1. The system enables the local production for local consumption of energy through the supply of locally generated renewable energy and is made up of an EMS*2 for managing and coordinating energy supply and demand that integrates two compact grids covering the city.

What set all this in motion was an inquiry made by local company, Taiyo Gas Co., Ltd., to Hitachi Power Solutions.

Mr. Kobira, president of Taiyo Gas Co., Ltd. who is also the representative director of Hioki Regional Energy Co., Ltd., the company set up in 2014 to run the project with funding from Hioki City and other sources, recalls events as follows, "As a local energy company in a city where the population is slowly shrinking, we had a strong desire to establish a new type of regional PPS that could contribute to regional revitalization by cutting energy costs and reducing the load on the environment. However, fearing that we lacked the scale and expertise for such a task, we found when we took our story to Hitachi Power

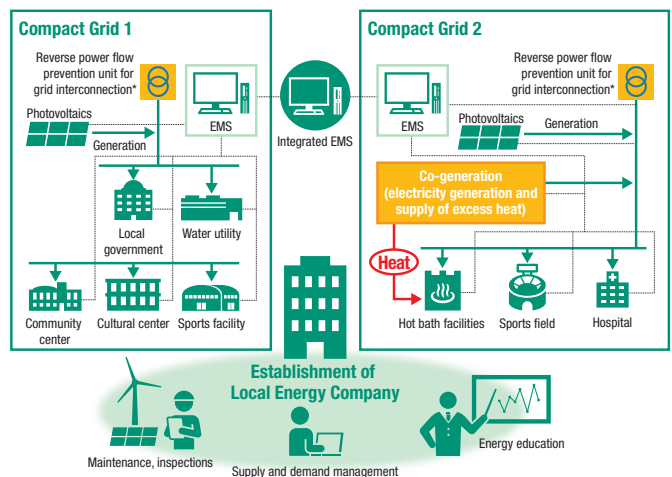


Representative Director
Hioki Regional Energy Co., Ltd.

Mr. Ryuhei Kobira

Solutions that they believed in what we wanted to do, initial contact having been made through the wind power company set up in Hioki City." Through ongoing work encompassing study groups, surveys, and investigations, this led to a business feasibility study and a successful application for funding, culminating in the day when this trailblazing initiative for a new type of regional PPS commenced full operation. As Mr. Kobira said, "Hitachi Power Solutions became our partners in the true sense of the word, going above and beyond a mere business relationship by, for example, coming all the way from their headquarters in Ibaraki Prefecture to attend monthly meetings." In this way, Hitachi Power Solutions served as a one-stop source of support for the project, extending from business planning to approvals and other negotiations with local government and companies; engineering, procurement, and construction (EPC contract) of the associated facilities; operation and maintenance; and business management support.

*1: The project was entitled "Construction of a Compact Energy Network for Use of Locally Sourced Energy in Hioki City."
*2: EMS: Energy Management System



*Supplies the electric power generated within the compact grids to local loads (equipment and facilities) without allowing reverse power flow back to the main grid. Accordingly, the system does not participate in any feed-in tariff (FIT) scheme.

Project Outcomes

Multifaceted contribution to local community with reduced impact on environment

These two compact grids operating in Hioki City were able to maintain a reliable supply of electric power at a lower cost than before. Along with the stimulation of the local economy provided by higher income from local taxes (a consequence of improved commercial revenues) as well as other income such as facility rents, the project also created new employment opportunities in the form of jobs in the electricity supply business that did not previously exist.

Mr. Kobira had the following to say, "What struck me more than anything else after the project was up and running was how great it is to have no input costs. The

Electricity Sales Department
Hioki Regional Energy Co., Ltd.

Mr. Yasunari Oku



profitability of retail-level operators such as the gas company that I managed for many years is at the mercy of fluctuations in the cost of supply. While we still have maintenance costs and the upfront investment in depreciating assets, we are able to use electric power that we have generated ourselves from solar power. This lack of input costs can then be passed on in the form of lower prices for users. That this is what it means to have *the local production for local consumption of energy* never ceases to amaze me and I am reminded again of what a boon it is."

Mr. Oku of the company's electricity sales department explained the advantages of compact grids and their accompanying economic benefits, "I am currently collating figures for submission to the Ministry of the Environment and the numbers I am getting for things like CO₂ emission factors are much lower than before. We have also received inquiries from various other bodies wanting to visit us, including local governments and renewable energy agencies, and this leaves me with a strong sense of how high expectations are for the use of compact grids that can reduce environmental impact."

With this ability to make use of renewable energy and in the process reducing the energy losses associated with the transmission of electric power from distant locations, compact grids are delivering genuine benefits, not only for regional economies, but also for the global environment.

Future Plans

Giving a further boost to the local production for local consumption of energy

As a prospect for the future, the introduction of storage batteries is currently a subject of ongoing study. The amount of electric power generated from renewable sources varies depending on factors such as sunlight hours and wind strength. If a reliable supply of continuous electric power is to be provided, including during emergencies and without being affected by this variability in generation, then some type of storage batteries for storing the generated power is necessary.

As Mr. Oku put it, "We have calculated that, were storage batteries to be available, we could increase the percentage of electricity generation from renewable energy to the 50 percent range from its current level of around 20 percent, without compromising our top-priority mission of maintaining security of supply." Mr. Kobira added that, "The higher this percentage, the more we can reduce electricity prices, something that should further strengthen our business fundamentals." He also spoke to the future of the business by saying that, "Lifting the renewable energy percentage to its maximum would represent the culmination of this project." He

summed up the project with the following words, "I believe that our efforts to reduce the price of energy to our customers by even one yen represent what an energy company should be. The essence of the local production for local consumption of energy lies in how it enables us to pursue this ideal, contributing to the community through our business as we do so."

The Compact Grid of Hioki City has brought diverse benefits to the city since it commenced operation. Hitachi Power Solutions intends to continue its role in the strong partnership that supports the evolution and development of this new regional PPS that has only just got underway.



User's Profile



Hioki Regional Energy Co., Ltd.

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Established: June 16, 2014

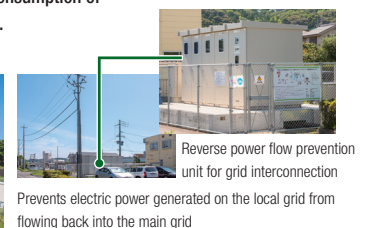
Capital: 20.2 million yen

Business activities: Electricity retailer, authorized electricity distribution and transmission operator, power generation project developer

Delivering the local production for local consumption of energy to provide a bright future for Hioki.



150 kW photovoltaic power generation system (Grid 2)
Site: Rear of Yusuin health center



*The cover photograph shows the photovoltaic power generation system installed at the local government (Grid 1)

Hitachi Power Solutions Co., Ltd.

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