

# Learning from Disaster: The First Step Toward a World-Class Soma Works

## Utilizing renewable energy to turn Soma into a world-class facility

The Soma Works recovered from the Tohoku Earthquake and tsunami and resumed production with extraordinary speed. Now, the facility is transitioning from a disaster recovery phase to an expansion phase, and a variety of lessons learned from the disaster are being implemented. The first major actions are Business Continuity Planning (BCP) and the photovoltaic (PV) solar power generation system introduced as a power-saving measure. This involves a new model of renewable energy utilization.



Aerial view of Soma Works  
(Solar panels are installed at four locations on the premises.)

### Applying the lessons of 3/11 to BCP

The Soma Works (Soma, Fukushima Prefecture) is one of the production bases of IHI's Aero-Engine & Space Operations, and is a global leader in quality, turnaround, and cost. Soma provides integrated manufacturing from materials to processing, and specializes in aircraft engine and gas turbine parts. Although the Soma Works did not suffer any damage or human casualties from the tsunami after the Tohoku Earthquake on March 11, 2011, all infrastructure was damaged in some way, including buildings, gas, water, electricity, and wastewater processing. Thanks to local efforts led by factory foremen and team leaders, the facility had almost completely returned to the level of pre-disaster production activity by the middle of May, earning praises from engine manufacturers around the world.

Out of the damage inflicted by the Tohoku Earthquake and tsunami, and the subsequent recovery activity, there emerged two challenges faced by the Soma Works. The first was a

recognition of the insufficiency of its Business Continuity Planning (BCP), and specifically the need to ensure a minimum level of power for communications and other essential infrastructure. The second was a need for power-saving measures during periods of increased electricity demand, particularly in summer.

At the Soma Works, deliberations began with the creation of a concrete BCP. Which devices need power, and how much?

Given the difficult experience of fuel shortages during the disaster, renewable energy that does not require fuel is a natural choice as an emergency power source, and so the adoption of a photovoltaic (PV) solar power generation system was decided. The adoption of wind power was not chosen because of the lack of a suitable location on facility grounds.

In the event of a large-scale disaster that tests a BCP, the priority of restoring production lines becomes lower, because the supply chain is disrupted. In reality, the first week after the disaster was devoted to confirming employee safety and ensuring living conditions. During this period, maintaining the

communications infrastructure was of critical, even life-or-death importance. Accordingly, the necessary capacity for backup power was estimated at 25 kW·h. This capacity is enough to keep ten 25 W PCs running for 100 hours, for example.

From the results of the above inquiry, IHI introduced a 100 kW PV system and a compact 25 kW·h lithium-ion battery as part of the BCP for the Soma Works. This system has been operational since March 2013.

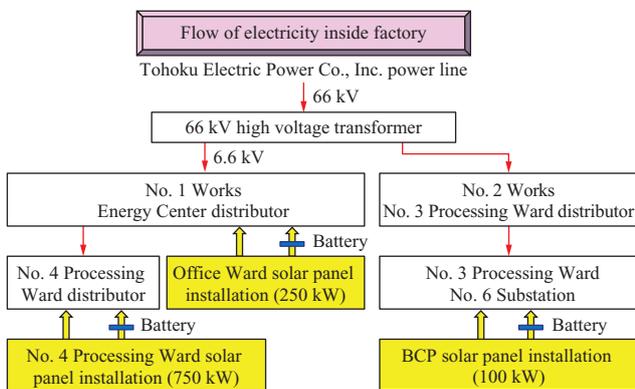
### Providing enough power for air conditioning

After announcing an overall recovery in May 2011, another pressing issue emerged: summertime electricity usage restrictions.

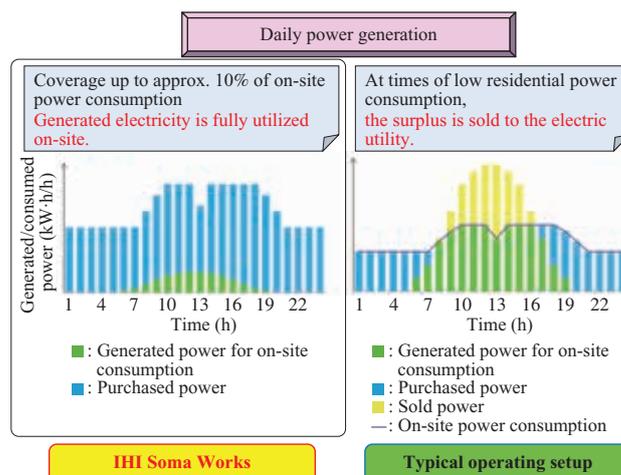
Like many other factories in the Tohoku region, the electricity restrictions posed an extremely severe hurdle for the Soma Works, but by acting on the combined ingenuity of the entire facility staff, Soma was able to rise to the expectations brought about by its status as a symbol of rapid post-disaster recovery, and successfully overcome the electricity usage restrictions. In future years, this key theme of power saving will further solidify as a social issue in the face of rising electricity costs caused by increasingly expensive fuel and the lack of surplus power.

As a power-saving measure to address this issue, a 1 000 kW PV system has also been installed at the Soma Works, in addition to the PV system for BCP. This power-generating capacity was decided on the basis of estimates for air conditioning, a major cause of increased power consumption in the summertime. Factory air conditioning is not a luxury, but rather a vital infrastructure for ensuring quality given the high precision demanded of the components manufactured at Soma. In order to introduce this PV system, an investigation into temperature and hours of daylight was conducted in advance, and it was found that there is sufficient sunlight when air conditioning is required (28°C or higher). Installation locations were then selected, prioritizing sites on the premises that are unsuitable for parts manufacturing, and a goal was established for the amount of electricity to be generated. After installing the PV system (May 2013), we confirmed that the designated electrical output is being obtained as expected, meaning that the air conditioning power for the facility in the summertime is being covered.

At the Soma Works, measures to reduce peak power



Schematic of Soma Works PV system



Peak cut effect achieved with PV systems and batteries (illustration)

consumption are also being developed. After the disaster, peak power consumption was reduced by shifting the operating times of heat treatment equipment that consumes large amounts of power, for example. However, increases in production are anticipated as a result of increased global demand for aircraft engines. For this reason, the power consumption of the facility as a whole, and the peak power consumption, are expected to rise.

To address this issue, IHI planned the introduction of 1 MW/2 800 kW·h lithium-ion batteries. By combining the power generated by the 1 100 kW total output of the PV systems with the power of the lithium-ion batteries charged at night, and using these power at peak times, the amount of externally supplied power required by the entire facility can be reduced by approximately 10 to 15%. These lithium-ion batteries has been operational since March 2014.

### A new model of renewable energy

The PV systems at the Soma Works are set up so that all of the generated power is consumed at the facility. When considering whether to introduce renewable energy sources, there is a tendency to argue about how many years will be required to recover costs by selling electricity back to the power company. In contrast, the Soma setup reduces the burden on the electric power provider by lowering the base power requirements without affecting the existing electrical systems, and represents a new model of renewable energy utilization in an era when power conservation is the responsibility of society as a whole.

The Soma Works will continue to develop a variety of measures developed as a result of the lessons learned from the Tohoku Earthquake and tsunami, and will continue striving to become a truly world-class facility.

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