Nipron GAZE into the future

Nipron Wave
Vol.72

Highlights

1. **PV Oasis Special! The DC grid-type renewable energy storage system**
   Cubicle power storage systems combining everything needed for in-house consumption in a single unit.
2. **New factory aiming for 90% renewable electricity**
   Introducing Mie Smart Dream Factory.

Today, risks lie in environmental inaction

Today, the demand for private companies on environmental issues is larger than ever as evidenced in the addition of “**nature positive**” as one of the major metrics along with the “**carbon neutral**.”

A company’s attitude toward tackling environmental issues has a significant impact on its evaluation.

Nipron is the leader in the use of renewable energies as major sources of power by developing and offering devices and systems to maximize the use of distributed renewable energy sources, such as solar power stations and rechargeable batteries.

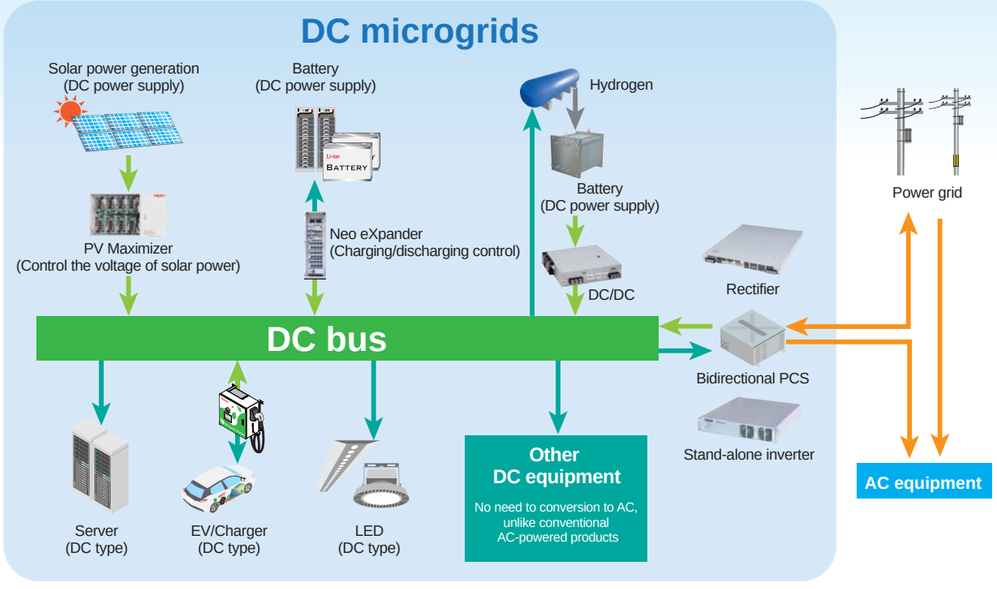
New terms for a new age: carbon neutral and nature positive

The term “carbon neutral” refers to an initiative to hold the total greenhouse gas practically to zero by subtracting the absorption of CO_2 by planting trees, for example, from the total greenhouse gas emitted in particular activities and processes. On the other hand, the term “nature positive” refers to activities to actively undertake restoration and conservation of environment while minimizing the destruction of natural environment. Both “carbon neutral” and “nature positive” are key concepts in addressing environmental issues and will play important roles in building a sustainable society.

DC grid-type renewable energy storage system

PV Oasis

PV Oasis improves the efficiency of power feed by limiting the AC/DC conversion loss with the connection of PV power generation systems and batteries with DC. It is also an ideal system for building the DC micro grid, which is drawing people’s attention as the next-gen power distribution system.



The many advantages of PV Oasis

Helping make decarbonization a reality

Realize carbon neutrality, which is essential in bringing forward a sustainable society.
The combination of PV power generation with batteries help realize the carbon neutrality. This scheme stabilizes otherwise unstable PV power supply and further improves the utilization of renewable energy by storing the surplus power in batteries and using it whenever necessary.

EV charging with 100% renewable energy

EV charging at any time of day or night with 100% renewable energy generated in a parking lot

A 100% renewable energy EV charging system can be constructed by connecting Nipron's DC compatible EV chargers to PV Oasis without the influence of weather and time. The power can be utilized efficiently as the system allows the supply of DC power from PV power station and batteries directly to EV chargers without a conversion. Even with a blackout, the system still can charge EVs from the PV power and batteries because PV Oasis can operate as a stand-alone system.

pp.5-6 for details

Solutions to blackouts

PV Oasis works as an emergency power supply system using its batteries. Also, PV Oasis without the grid connection can maintain the power feed uninterrupted.

Normal

■ The PV power is used in the building and, at the same time, excess power will be stored in batteries and used efficiently.

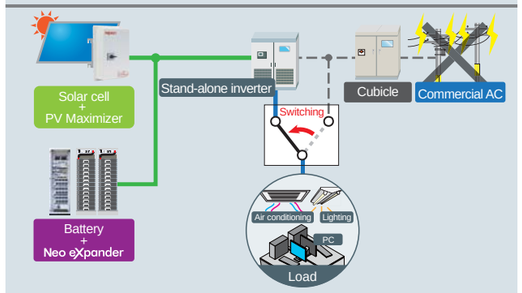
Natural disasters

Blackout

■ In an event of a blackout, it is possible to use the PV power, which is often unstable, by stabilizing it with the batteries.
■ Also, the power stored in batteries can be used at night.

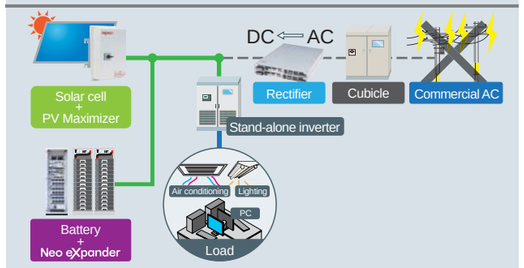
Two types of in-house consumption to choose from

In-house consumption system with the grid connection



Power feeding by switching to stand-alone operation mode

In-house consumption system without the grid connection



No need to switch to stand-alone operation at any time
Power feeding without interruption

Other features

Supports the demand at peak load

Using PV Oasis can smooth out the amount of power needed to be purchased to meet peak demand.

Supports VPP

It receives output power commands from the aggregator and remote-controls the PCS.

Reduce risks of rises in electricity costs

The cost of electric power continues to rise due to various reasons, including the shortage of power, caused by a decrease in the thermal power, and the price hike of natural gas and coal. This system reduces the amount of power that needs to be purchased, reducing the amount of electricity bill and lowering the risk of increased power cost.

PV Oasis

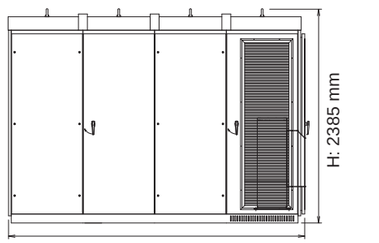
Cubicle power storage systems (180 kWh type)

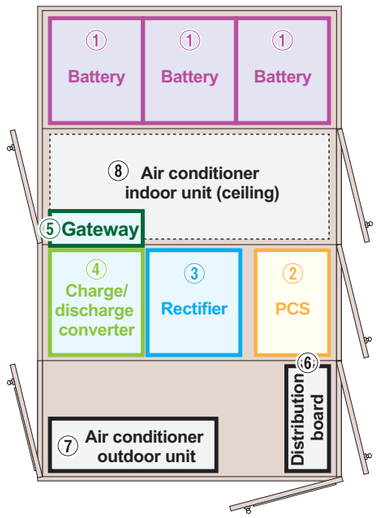
Combines everything needed for in-house photovoltaic power consumption in a single unit.

■ **Facility specification**

Items	Specification
Battery capacity	180 kWh
Rectifier capacity	30 kW
Charge discharge capacity	50 kW

■ **External dimension**





Conceptual drawing of equipment placement

① Battery

Uses the current mainstream lithium-ion batteries

② PCS

Supplies power to AC devices in the cubicle

③ Rectifier

Supplies power from the grid when the remaining power in the batteries runs low due to continuous rainy weather, etc.

④ Charge/discharge converter

Controls charge and discharge of storage batteries, and remote monitoring and control.

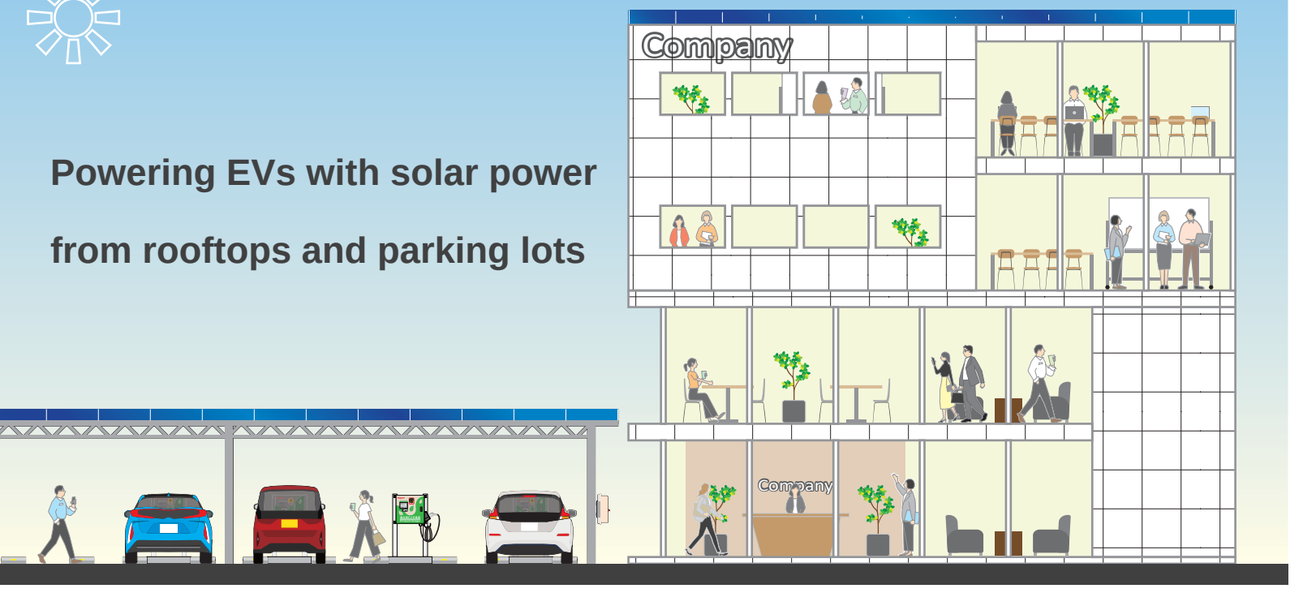
⑤ Gateway

⑥ Distribution board

⑦ Air conditioner outdoor unit

⑧ Air conditioner indoor unit

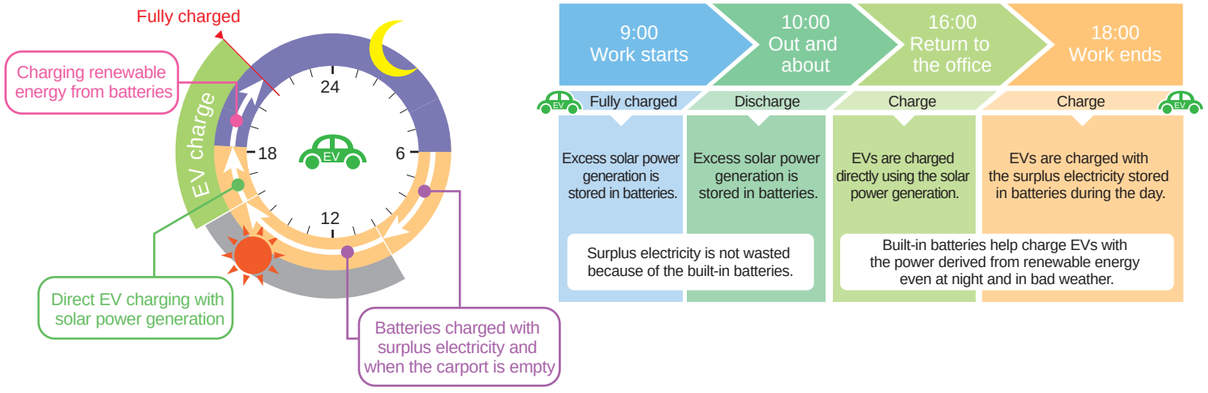
Powering EVs with solar power from rooftops and parking lots



EV charging with 100% renewable energy at any time of day or night

Our Solar Carport is ideal for business and government vehicles often used during the daytime, because batteries are provided along with solar panels, enabling EVs to be charged with 100% renewable energy anytime without the influences of weather and time. If an extended period of bad weather makes it difficult to run the system with 100% renewable energy, the system also allows users to charge EVs and batteries using commercial AC power.

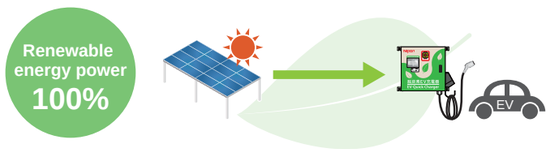
Weekday flow of the company EV (example)



Genuine zero carbon driving

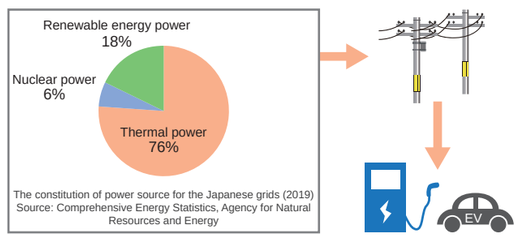
Nipron's EV Solar Carport

A sustainable energy source is used by charging EVs with the power generated by solar panels. This system pushes the Zero Carbon Drive initiative to the limit, while minimizing impacts on the environments.



Power from the commercial power grid

The thermal power generation is the major source of commercial power. Because fossil fuel is used for the thermal power generation, it emits the greenhouse gas.

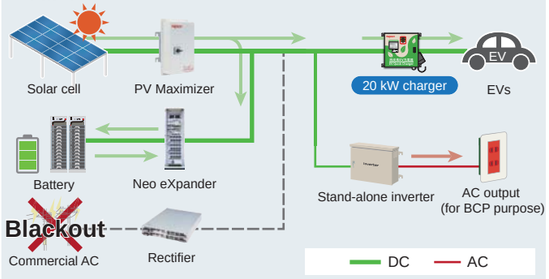


Solar-generated electricity provided in emergencies

The Solar Carport serves as a shelter, providing electricity from photovoltaic power generation and rechargeable batteries in a wide-area power failure (blackout) caused by a natural disaster. It serves as a renewable energy power plant and EV charging station in ordinary times and as a shelter during a disaster if required by the national or local government.

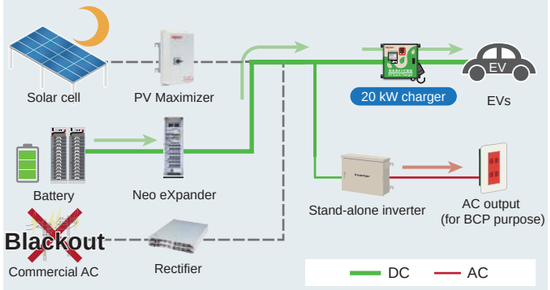
Blackout during sunny weather

Power generated from the solar cells or from batteries can be supplied to EV charge and particular loads even if there is a blackout.



Blackout at night

Even if there is a blackout at night, electricity can be supplied to EVs and emergency equipment from storage batteries.

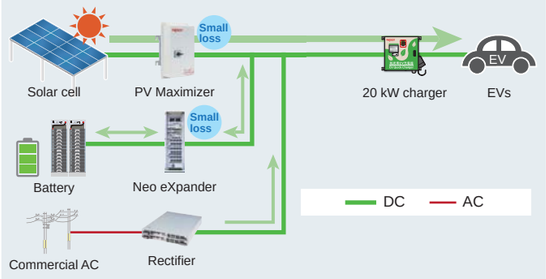


High efficiency charging with DC control

The DC-based system offers a high efficiency with the DC connection of PV system and batteries with less number of DC-AC conversions.

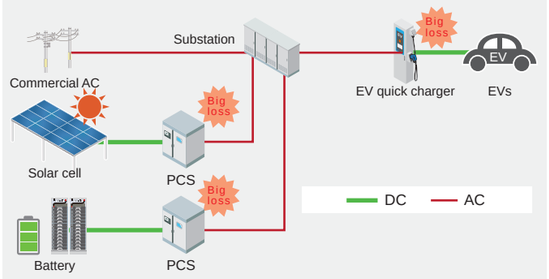
Nipron's EV Solar Carport

High-efficiency system with fewer conversions from DC to AC



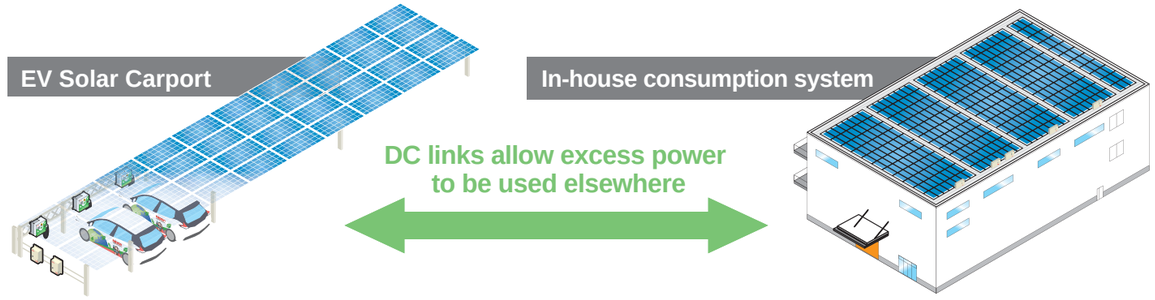
Common EV charging stations

A lot of DC to AC conversions result in significant losses.



Enables inter-system power interchange

If the PV Oasis is introduced in multiple buildings, excess power can be made available for other systems, improving the efficiency of operation.



New factory gets 90% of its power needs from renewable energy!

Mie Smart Dream Factory is on the verge of completion!

Mie Smart Dream Factory Introduced PV Oasis

PV Oasis (DC grid renewable energy storage system) will be introduced in our new factory. The design aims to use the PV power for approximately 80 to 90% of factory's power consumption. PV Oasis systems are installed in the factory's power system and the solar carport system and, by accommodating power among the buildings with a DC link, we aim to further improve the efficiency of system operation. A proprietary DC compatible EV charger is also installed to enable 100% renewable energy charging for company cars and employees' EVs.

Mie Smart Dream Factory overview

Address	282-17, Nishiyama, Taki-cho, Taki-gun, Mie	Land area	11,905.15 m^2
Facility use	Production of AC-DC board-type power supplies, etc	Building area	2,793.82 m^2
Completion	Scheduled on August 18th, 2023	Total floor area	5144.91 m^2 (Factory building)
Building construction	Steel construction 2 stories above ground		

http://www.nipron.com

Advantages of a factory equipped with PV Oasis

Contribute to achieving carbon neutrality

Achieve the high ratio of renewable energy in the factory's power consumption without relying on Tradable Green Certificates.

BCP measure

Photovoltaic power generation and storage batteries make it possible to run the factory even during prolonged power outages due to natural disasters and other factors.

EV charging using 100% renewable energy

High-efficiency EV charging utilizing photovoltaic power generation enables the Zero Carbon Drive initiative for some corporate cars.

DC supply

Highly efficient power supply and fewer AC conversion losses because photovoltaic power generation and storage batteries are connected with direct current.

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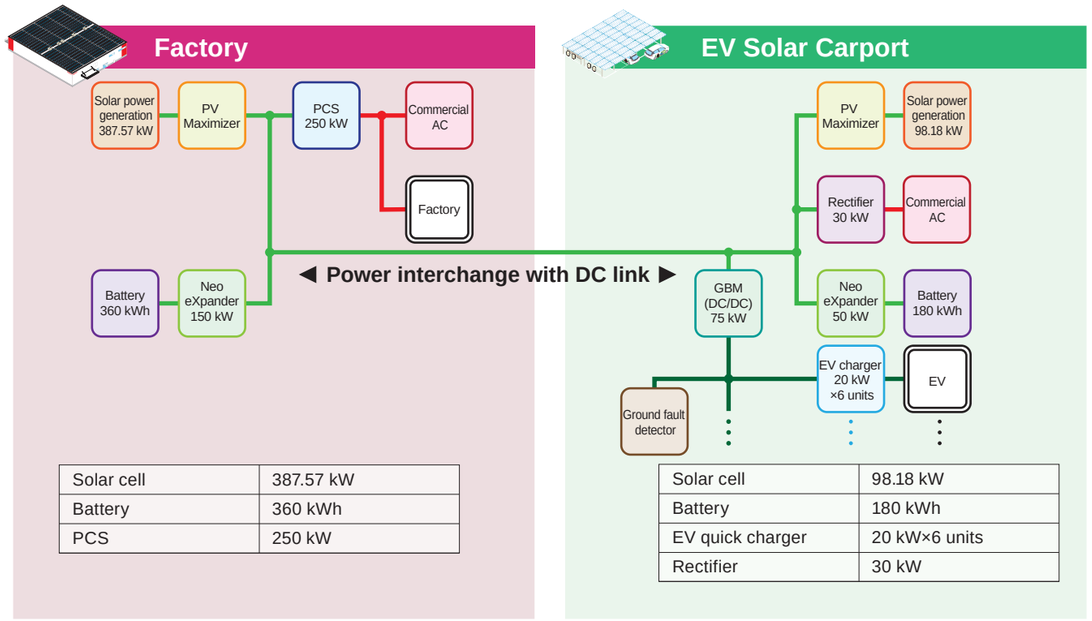
Block diagram



Solar cell	387.57 kW
Battery	360 kWh
PCS	250 kW

Solar cell	98.18 kW
Battery	180 kWh
EV quick charger	20 kW×6 units
Rectifier	30 kW

DC AC

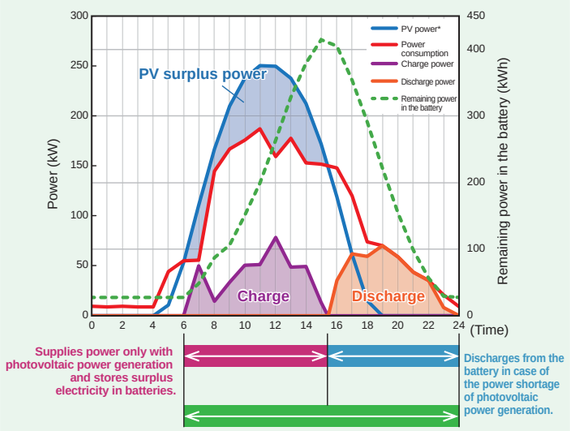
Electric power simulation

This is a simulation of power assuming the power consumption of Mie Smart Dream Factory (the reverse power flow deterrence control equipment is not included).

The factory operates with 100% renewable energy during the day and it can be operated with the power from the batteries at night. According to the annual simulation, the self-sufficiency rate is 88.4%.

Summer August 4th

PCS capacity: 250 kW PCS efficiency: 95.2%

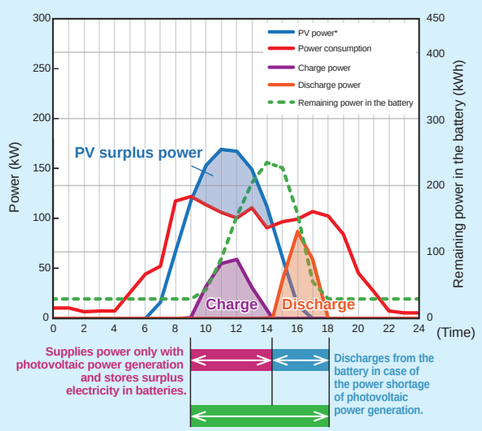


Operates only with renewable energy (100% renewable energy)

*Calculated based on average solar radiation over the past 20 years on August 4th

Winter December 23rd

PCS capacity: 250 kW PCS efficiency: 95.2%



Operates only with renewable energy (100% renewable energy)

*Calculated based on average solar radiation over the past 20 years on December 23rd

Simulation of annual introduction (Renewable energy rate)

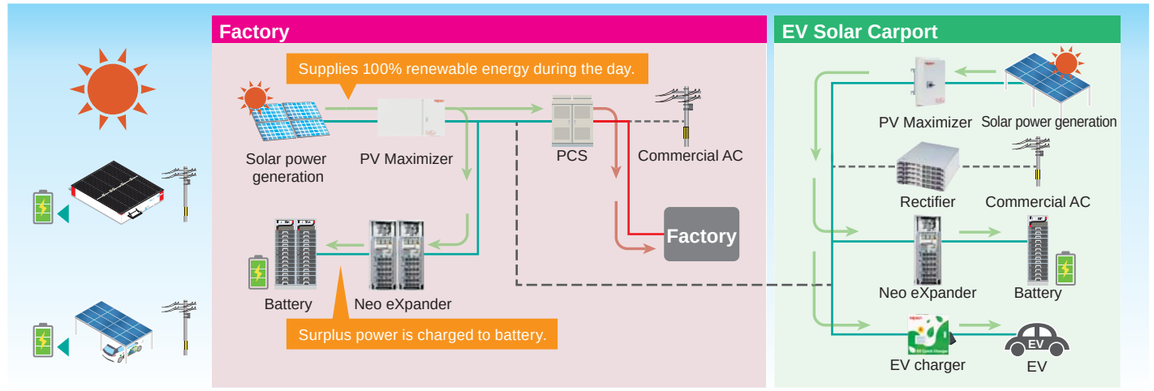
Item	PV power (kWh)	Power consumption (kWh)	Purchased power (kWh)	Charged power (kWh)	Discharged power (kWh)	Renewable energy rate
Annual	583,594	391,608	45,323	95,282	90,142	88.4%

PV capacity	485.7 kW
Battery capacity	540 kWh

Operation concept

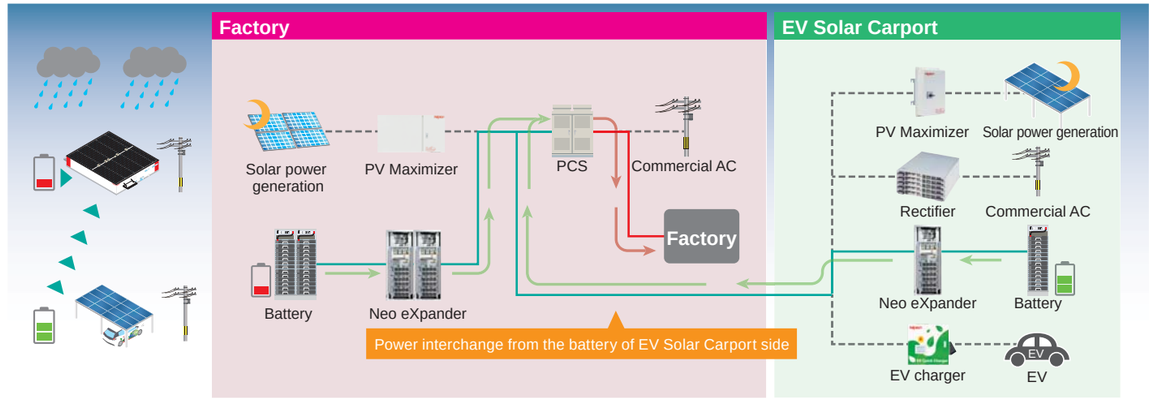
Sunny weather

When the power generation is high during the day, PV power alone is used to power the factory and EV chargers, with the excess power stored in batteries.



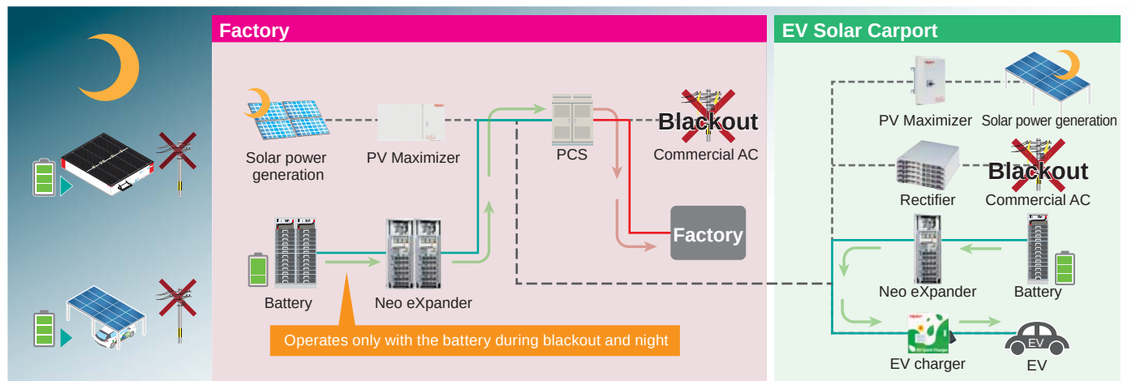
Bad weather/At night

When the power generation drops in a bad weather, the power is supplied primarily by the solar power, with the power stored in the batteries complementing the shortage.
Also, a shortage of power in one building can be complemented by excess power in another building through the DC link.



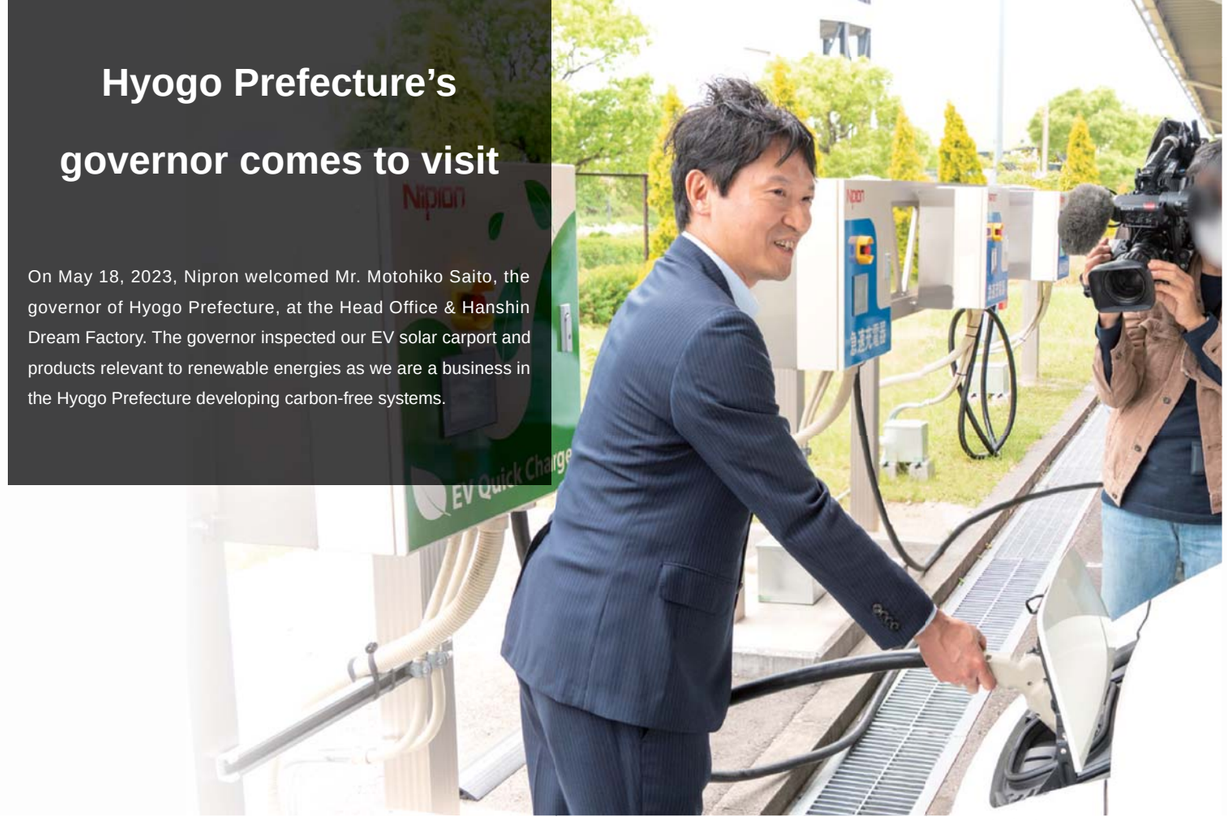
Blackout

In an event of a blackout and if the power generation is available, the solar power will be the primary source of power, with the shortage covered with the power stored in the batteries.
When the solar power generation is not available, such as during the night, the system operates only on the power from the batteries.



Hyogo Prefecture's governor comes to visit

On May 18, 2023, Nipron welcomed Mr. Motohiko Saito, the governor of Hyogo Prefecture, at the Head Office & Hanshin Dream Factory. The governor inspected our EV solar carport and products relevant to renewable energies as we are a business in the Hyogo Prefecture developing carbon-free systems.

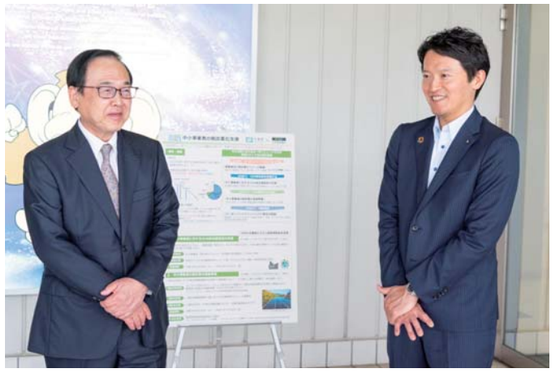


Hyogo Prefecture's governor

Offered a hands-on experience of EV charging with 100% renewable energy

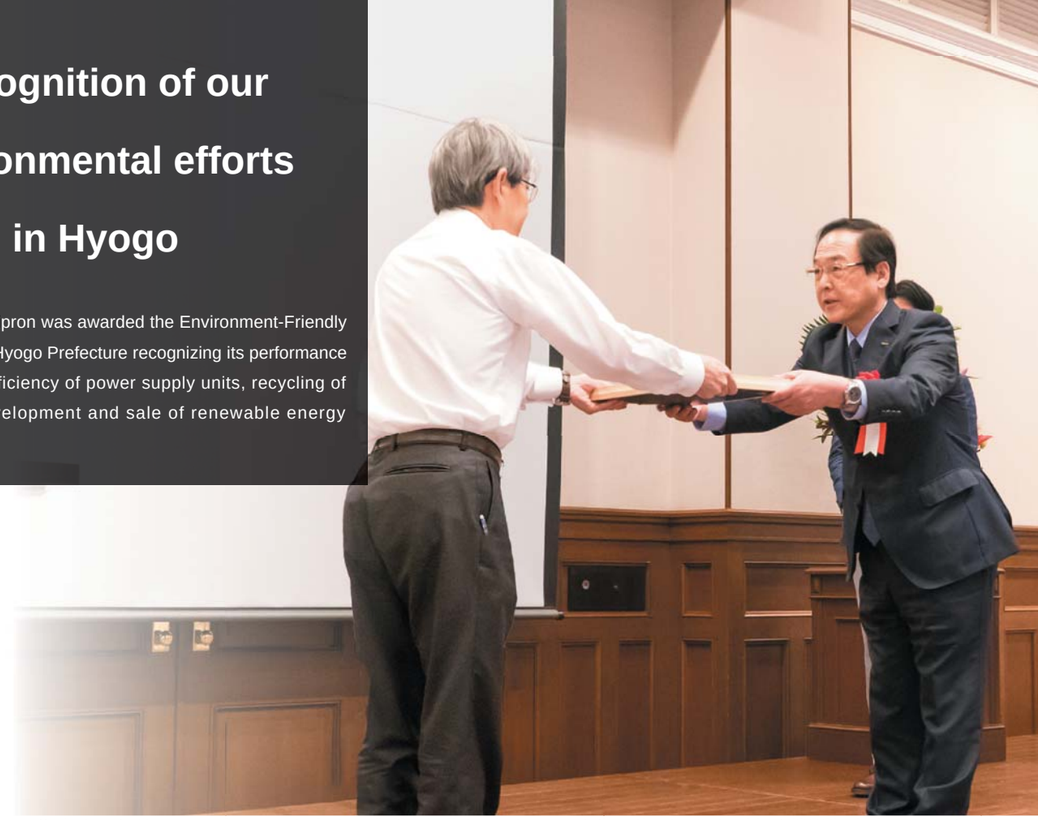
Mr. Futami, Representative Director & President (COO), presented our business operations and products at the exhibition hall. Then we introduced the EV solar carport, a system that can charge EVs with 100% renewable energy using the power from solar panels and batteries. We offered Governor Saito an opportunity to experience the flow of power from solar panels and batteries, i.e. the flow of power produced 100% from renewable energy.

Operating the EV charger



Recognition of our environmental efforts in Hyogo

On June 6, 2023, Nipron was awarded the Environment-Friendly Business Award of Hyogo Prefecture recognizing its performance in improving the efficiency of power supply units, recycling of batteries, and development and sale of renewable energy products.



Mr. Hattori, Deputy Governor of Hyogo Prefecture (left), Mr. Futami, Representative Director & President (COO) of Nipron (right)

Activities leading to the award

- Accepting the visit of student promotors of global warming prevention activity, Hyogo Prefecture, and offering an opportunity of learning on the environment.
- Commercialization of "solar carport, EV charging station," enabling an introduction of renewable energy using a parking space.
  The product allows the use of solar power and the power from batteries to charge EVs and as an emergency power in responding to disasters.
- Serving for the introduction of new energies, such as the provision of a high efficiency power system that does not depend on the commercial power by using the DC power of PV without conversion.
- Helping to reduce wastes by extending the service life of products by improving the efficiency of power conversion in PSUs.
- Serving for the recycling of batteries by collecting Nipron products and offering them to recycling service providers to use them as new battery materials.

Award certificate and award plaque

Customer Interview: Reason to have adopted a Nipron power supply

Interview

Inspired by the made-in-Japan quality and long service lives of Nipron products

Nipron products have been selected by A.T.WORKS, Inc., a company offering low power consumption and sophisticated proprietary servers, including the industry's first 1/4U server.

Mr. Keisuke Nakano, General Manager, Product Department
A.T.WORKS, Inc.

What made you choose our PSU?

Although we were originally using imported PSUs for our hosting service, those units were causing headaches for us, often failing unexpectedly after about a year of operation or becoming unstable and affecting the operation of hard disk drives. We requested the supplier to look into the situation and take actions but their response was slow. This was a big problem because the lack of information made it difficult for us to explain the situation to our customers. With such an experience, when we saw Nipron's Japan-made PSUs introduced at an exhibition, we were particularly impressed by their long service life. That led us to choose Nipron's PSU.

What was the difference with the imported PSUs?

We once disassembled the PSUs for checking the quality and found that, in some products, a lead wire under the circuit board was too long or a component broke through the insulation, touching the metallic portion of the cover. We believe that the quality of Nipron products is in a different level.
There were instances in which defects were found in the entire lot and, in such cases, we asked the supplier to withdraw the products regardless of the quantity we purchased. Sometimes, we asked a testing body to see if the PSUs could be used without any problem. We were not buying cheap products but spending a reasonable amount of money. When installing cables of power supply units in producing servers, there were times when the cables came off from the root because of poor soldering between the board and the output cables. Although there would be some tension applied on the cables in harnessing them, we did not see it coming.
It is not practical to check such a defect by opening up every product and thus it is a part we cannot catch in our inspection.

What was the decisive factor in choosing our PSU and how do you rate it after using it? Are you satisfied?

Nipron products are stable and our customers fully agree with the selection because of the products' high reliability.
We can sell our servers as products of high reliability by using Nipron PSUs, which have a good track record. That was the decisive factor.
Because servers cannot be stopped once they start the operation, power supply units of high failure rate cannot be used. The failure rate of Nipron PSUs is extremely low and, even if there was a failure, Nipron is very responsive to our request for investigation, making it easy for us to report the situation back to our customers.
Also, in designing our servers, we try to reduce the size and, at the same time, improve the efficiency of airflow. Since Nipron is kind enough to respond to our request to customize the product, we could optimize the wiring focusing on the airflow. The single cable used in the product has eliminated the need to combine various parts and this is a big help in the manufacturing process as well.

We saw the description of "power supply unit: Nipron" on your website. Is that because it is appealing to your customers?

We use the statement that "Nipron's Japan-made PSUs are employed" because we think the customers' peace of mind is the No.1 priority. Also, since there is a common understanding that "a high-quality PSU = Nipon's PSU," we do receive comments from our customers that the product wouldn't cause problems if Nipron's PSU is used.

PSUs will deteriorate as they are used but some of our hosting service servers using Nipron's PSUs are still working after eight years. When servers fail due to the failure of PSU, we have them returned for inspection but we have never seen a Nipron PSU causing a server to fail. We know that Nipron's PSUs are designed to last as a fact.

HPCFX-350P series
FlexATX power supply
Highly reliable design with ten years or longer life expectancy

Intel® Xeon® processor with HPCFX-350P series
1/4U server with E-2100/2200 series
The chassis is designed for airflow.

The Nipron Story, as told by our Chairperson

A new world for decarbonization! Mie Smart Dream Factory, opening soon, is our testing ground for the PV Oasis Power Storage System

In July 2023, the first month of the 43rd term, Nipron's new fiscal year, we decided to officially name our new Mie factory the Mie Smart Dream Factory (MSDF). There are three reasons as to why we are moving it to a new location.

The first is that this factory, which produces small mass-produced and custom-made power supplies, mainly board-type power supplies, needed to be expanded as the demand has increased dramatically and is expected to continue to increase. In order to maintain our strategic attributes: 100% in-house production, 100% domestic production, on-time delivery in keeping with the quality first policy, and continuous growth, we should secure a minimum profit at a price acceptable to our customers. This requires cutting down manufacturing costs, and it is essential to have room for factory expansion to introduce cutting-edge automated equipment and actively forge ahead with labor-saving investment (primarily for in-house production). However, we don't have land to use at the existing Matsusaka Dream Factory. Preparing a second factory nearby would increase logistics cost, and would also lead to extended production lead time, higher operating costs, and other problems.

Second, for recruiting people, the existing factory is poorly located and inconvenient with unattractive surrounding environment for an electronics-related factory.

The third and final reason is the implementation of BCP (Business Continuity Plan) measures. The existing Matsusaka Dream Factory is warned about high risk of being hit by tsunami that will follow the Tonankai earthquake, which looks set to occur within 30 years. In preparation for a major power outage, we decided to install the PV Oasis Power Storage System, which is being developed by Nipron, in parallel with the construction of the new factory. In order to increase the capacity as much as possible, batteries of 360 kWh (factory) and 180 kWh (EV solar carport) will be installed, and through power interchange between buildings, a total of 540 kWh batteries will be operated, serving as a backup system that will last for approximately 3-4 hours (in cloudy weather) in the event of a blackout. In the near future, we plan to reuse EV batteries to add a system that can cope with long-term (10 days to one month) power outages. For these reasons, we will construct a new factory on an approx. 10,000 m2 plot of land in Taki Crystal Town Industrial Park, about 30 minutes by car from our existing factory. The land is on a bedrock 45 meters above sea level and is free from tsunami disaster. The town of Taki has a history of having been developed by hosting Sharp LCD plant and I like the environment of the town as a whole. I cannot be happier to hear that all the employees working at our existing factory can move to the new one.

The new factory is now 90% complete. Its completion and delivery are scheduled for mid-August, and relocation will be completed by September. In conjunction with this, the PV Oasis Power Storage System and a system capable of simultaneous charging of six EVs will go through an adjustment process before starting operation. The biggest selling point of this power storage system is that its self-generated renewable energy can supply nearly 90% of electricity required for the factory a year, significantly saving on surging electricity costs, while at the same time achieving decarbonization. Additionally, since the system can charge EVs with 100% renewable energy, we can encourage the conversion of company cars and employees' own cars for commuting to EVs, which in turn provides benefits of drastic fuel cost reduction. Furthermore, as mentioned earlier, it gives customers a sense of ease through BCP measures and many other advantages. At Nipron, we are committed to demonstrating the usefulness of the PV Oasis Power Storage System with actual data collected at the MSDF, and to making a "social contribution to decarbonization" through the demonstration results. We appreciate your continued support.

Setsuo Sakai
July 2023

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