August 9, 2023
NR-Power Lab Co., Ltd.
NGK INSULATORS, LTD.
Ricoh Company, Ltd.

NR-Power Lab Collaborates with CollaboGate Japan and Sassor to Start Building the World's First VPP System Using Decentralized Identifiers

~ Optimizing control of energy resources with AI to realize profit maximization ~

NR-Power Lab Co., Ltd. (hereinafter "NR-Power Lab"), a jointly invested company with NGK INSULATORS, LTD. (hereinafter "NGK") and Ricoh Company, Ltd. (hereinafter "Ricoh"), announced that collaborating with Japanese IoT start-up CollaboGate Japan, Inc. (hereinafter "CollaboGate Japan") and Sassor Inc. (hereinafter "Sassor"). NR-Power Lab has started building a proprietary virtual power plant (VPP) system to realize tight security at low cost using decentralized identifiers (DID)*. Aiming for early commercialization, the companies will complete building of the system within fiscal 2023 and begin field trials from fiscal 2024.

A VPP uses digital technology to perform integrated control of various energy resources, functioning like a large power plant. These resources include electricity generated through renewable energy sources, storage batteries, and electricity consumed by facilities and homes. To make effective use of energy with a VPP, it is essential to have the capability to handle diverse energy resources and a system to optimize the energy resource portfolio. When building a VPP system, system reliability is important, while operation costs, including security, also need to be reduced.

The VPP system to be built by NR-Power Lab uses AI to predict the amounts of power that will be consumed and generated, and then automatically perform optimal control of multiple and diverse energy resources into a portfolio that maximizes profit. Furthermore, even when energy resources have been expanded, the use of DIDs enables an accurate grasp of data provided from each individual energy resource. This makes it possible to reduce the amounts of capital investment and personnel that were needed with a conventional centralized identity management system, so that the reliability of energy sources can be ensured while costs are also reduced. This is the first time in the world that DIDs have been used to ensure energy resource reliability.

NR-Power Lab will play a central role in constructing the system, tying together the knowledge and technologies of each company. CollaboGate Japan's DID platform "NodeX" and Sassor's energy resource optimal control AI "ENES" will be combined with NGK's storage battery control technology and Ricoh's blockchain technology and other IT and digital application expertise.

As of the end of July 2023, a total of eight companies are to participate in the field trials from fiscal 2024, including IHI Corporation and TAKUMA Co., Ltd. as co-creation partners. The plan is to work with co-creation partners to secure diverse energy resources and verify control methods and accuracy improvements, while also conducting an economic viability study and so forth. The call for co-creation partners will continue as the expansion of services proceeds.

NR-Power Lab will strive to solve issues associated with spreading renewable energy, which is essential to realizing a decarbonized society. It will do so by combining the strengths of our co-creation partners and harnessing their physical assets, digital technologies, and services. Through these efforts, NR-Power Lab aims to contribute to realizing a sustainable society.

Through businesses that integrate both companies' existing technologies and expertise, NGK and Ricoh will support the widespread adoption and introduction of renewable energy and contribute to realizing a sustainable society.

*Decentralized Identifier (DID): A technology for managing the IDs of subject individuals (or corporations or pieces of equipment), using technology such as a blockchain. This enables individuals to control access to their personal data while communicating safely with various people, services, and equipment.

Co-Creation Partners

Company name	Role in co-creation
IHI Corporation	Examination and economic evaluation of utilizing a microgrid
CollaboGate Japan, Inc.	Provision of NodeX DID platform
Sassor Inc.	Provision and joint development of ENES AI for energy resource optimization control
TAKUMA Co., Ltd.	Examination and economic evaluation of utilizing a waste material power plant
Palcosmo Co., Ltd.	Examination and economic evaluation of utilizing an air conditioning system, ascertainment of usage amount of each type of energy
Hokkaido Electric Power Co., Inc.	Construction of VPP system and observation of field trial
YAMABISHI Corporation	Examination and economic evaluation of utilizing a solar power generation system paired with an energy storage system
Laplace System Co., Ltd.	Examination of optimal operation of solar power system and energy storage system using a VPP, and economic evaluation thereof.

■ About NR-Power Lab

NR-Power Lab started operations in February 2023 as a joint venture of NGK INSULATORS, LTD. and Ricoh Company, Ltd. with the objective of developing electricity-related services. NR-Power Lab aims to be a company that contributes to the realization of a sustainable society. Specifically, by combining NGK's control technologies for storage batteries with Ricoh's expertise in utilization of IoT and digital technologies, NR-Power Lab aims to be a company that can help to meet the challenge of spreading renewable energy, which is essential to realizing a decarbonized society, by combining physical products, digital technologies, and services.

https://www.nr-power-lab.jp/

*Interview: "Specific Approaches to the Challenge of Spreading Renewable Energy through Co-Creation" (Japanese only)

https://www.nr-power-lab.jp/from-lab/product-reports-001/

Appendix: Progress of the VPP Business and Construction of a Proprietary System

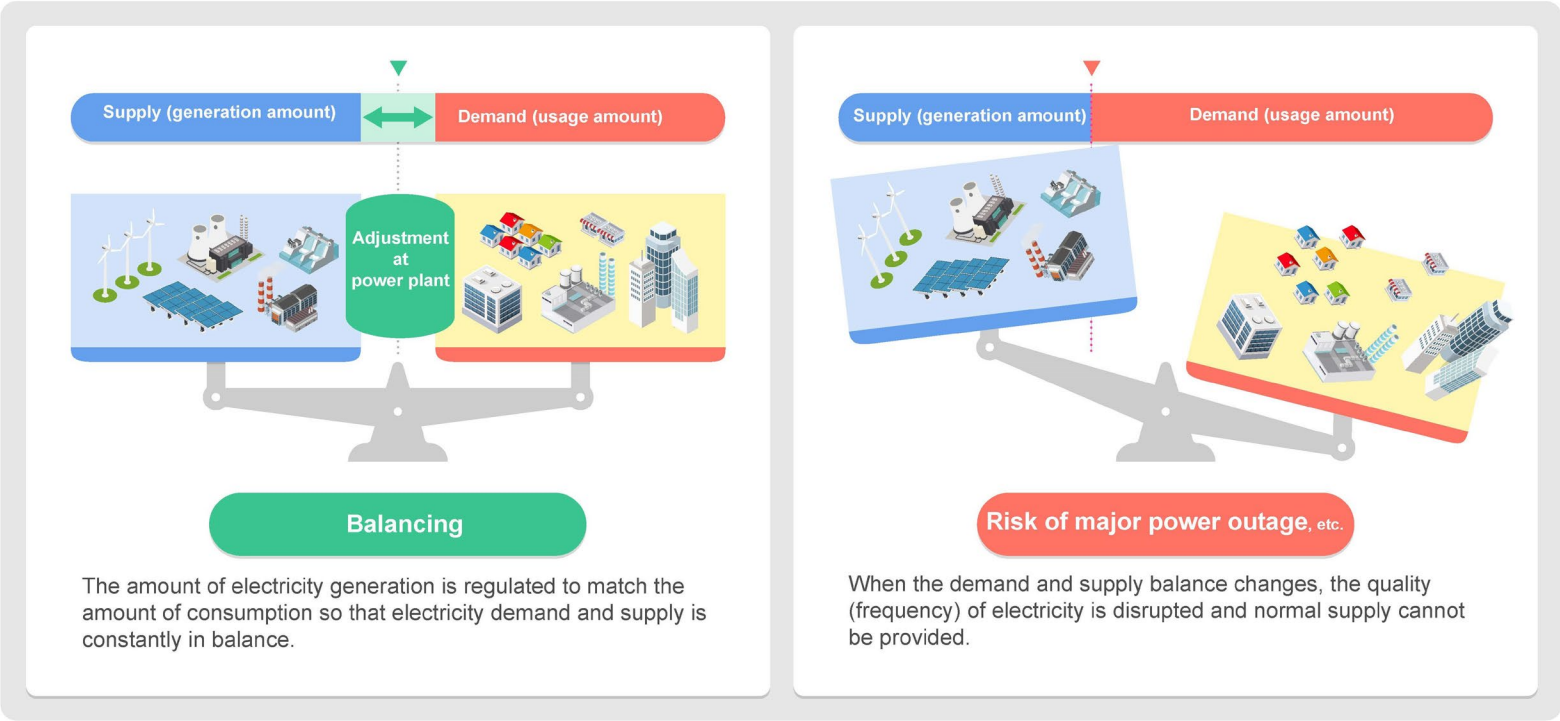
NR POWER Lab

NR-Power Lab Co., Ltd.

Progress of the VPP Business and
Construction of a Proprietary System

Balance Necessary for Electricity

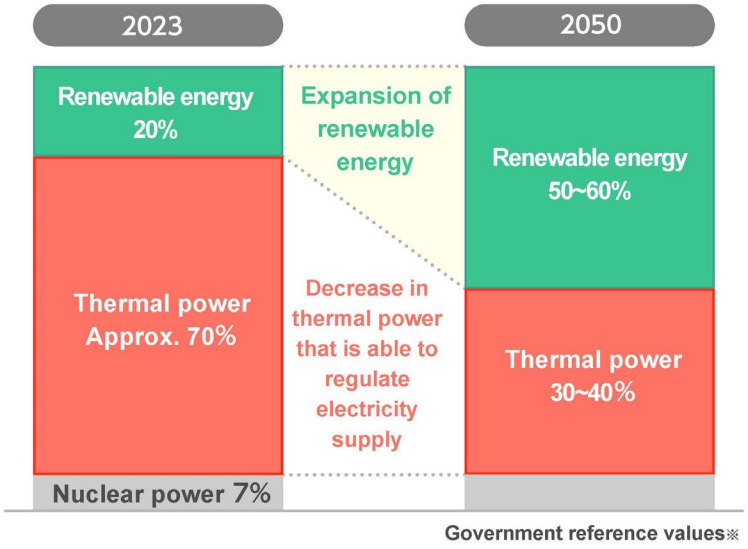
- Electricity is constantly balanced to have the same amount of demand (usage amount) and supply (generation amount).
- Currently, the quantity of electricity generated primarily at thermal power stations is regulated to match the amount of usage.
- If the balance of demand and supply is not maintained, the risk of a large-scale power outage increases.



*Electricity is managed and regulated not only for quantity, but also voltage and amperage, etc.

Increasing Importance of Regulated Power Sources

- Renewable energy is unstable as it is affected by natural conditions such as weather.
- Meanwhile, as renewable energy expands, the number of thermal power stations, which have electricity regulation functions, will decrease.
- To realize carbon neutrality, regulated power sources are extremely important for supporting renewable energy.



※Decrease in thermal power that is able to regulate electricity supply (Japanese)
https://www.meti.go.jp/press/2022/11/20221122001/20221115002-a.pdf

The spread of renewable energy is essential for achieving carbon neutrality, however…

The power supplied by renewable energy is unstable because it is affected by the weather

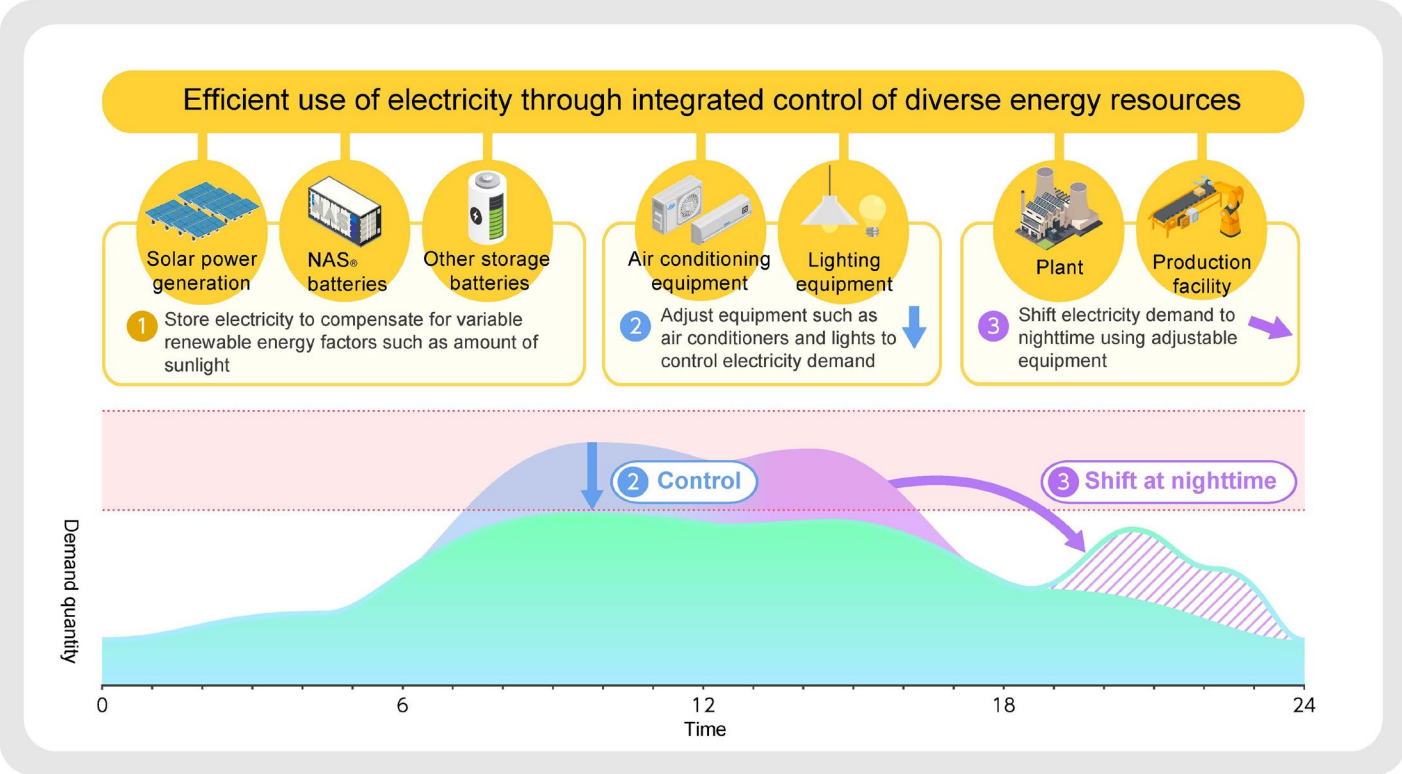
The proportion of thermal power stations, which act as regulators, is decreasing

If we cannot regulate the unstable renewable energy power sources,
then introduction of renewable energy cannot be progressed!

Virtual Power Plant VPP Framework

- Regulated power source able to support renewable energy = virtual power plant (VPP).
- Isolated energy resources are controlled using IoT to ensure adjustable capacity.

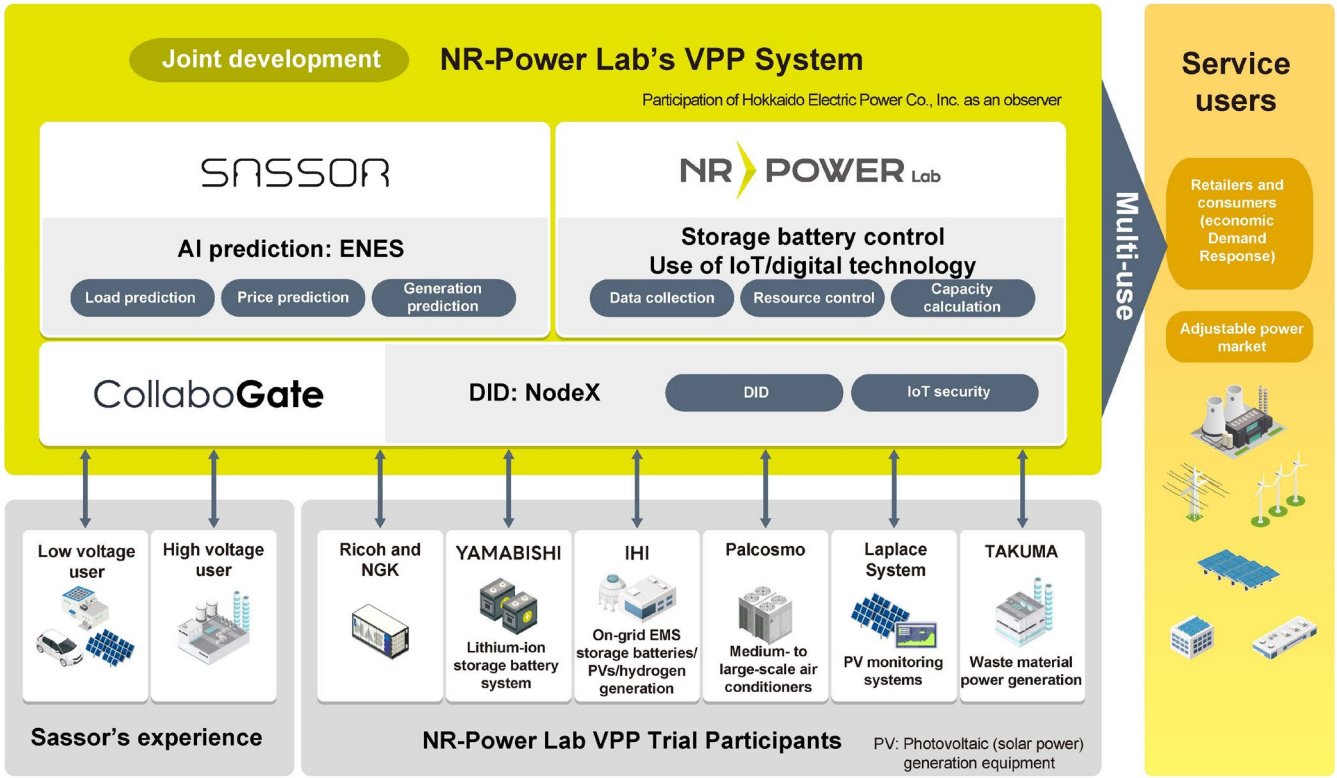
*Energy resources: General physical products that use electricity, such as storage batteries, EVs, air conditioners, lighting, production equipment, etc.



*NAS and the NAS logo are trademarks of NGK INSULATORS, LTD., registered in the U.S. and other countries.

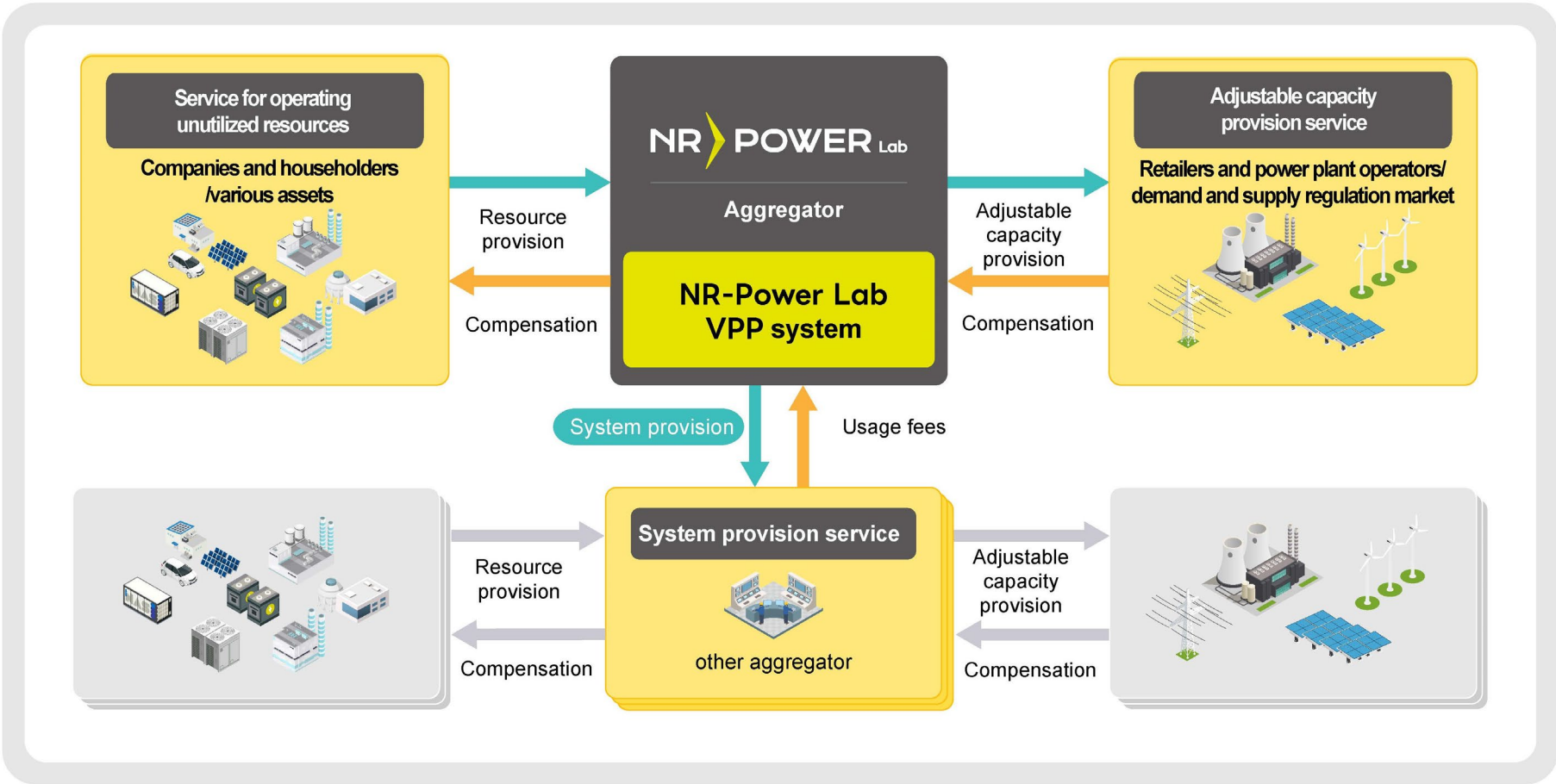
Features of NR-Power Lab's VPP System

- Feature 1: Diversity of energy resources: Compatibility with a multi-type and diverse portfolio (combination).
- Feature 2: AI technology: Prediction of consumption and generation quantities to optimally control energy resources and maximize profit.
- Feature 3: Decentralized identifiers (DID): Ensures energy resource reliability while also reducing cost



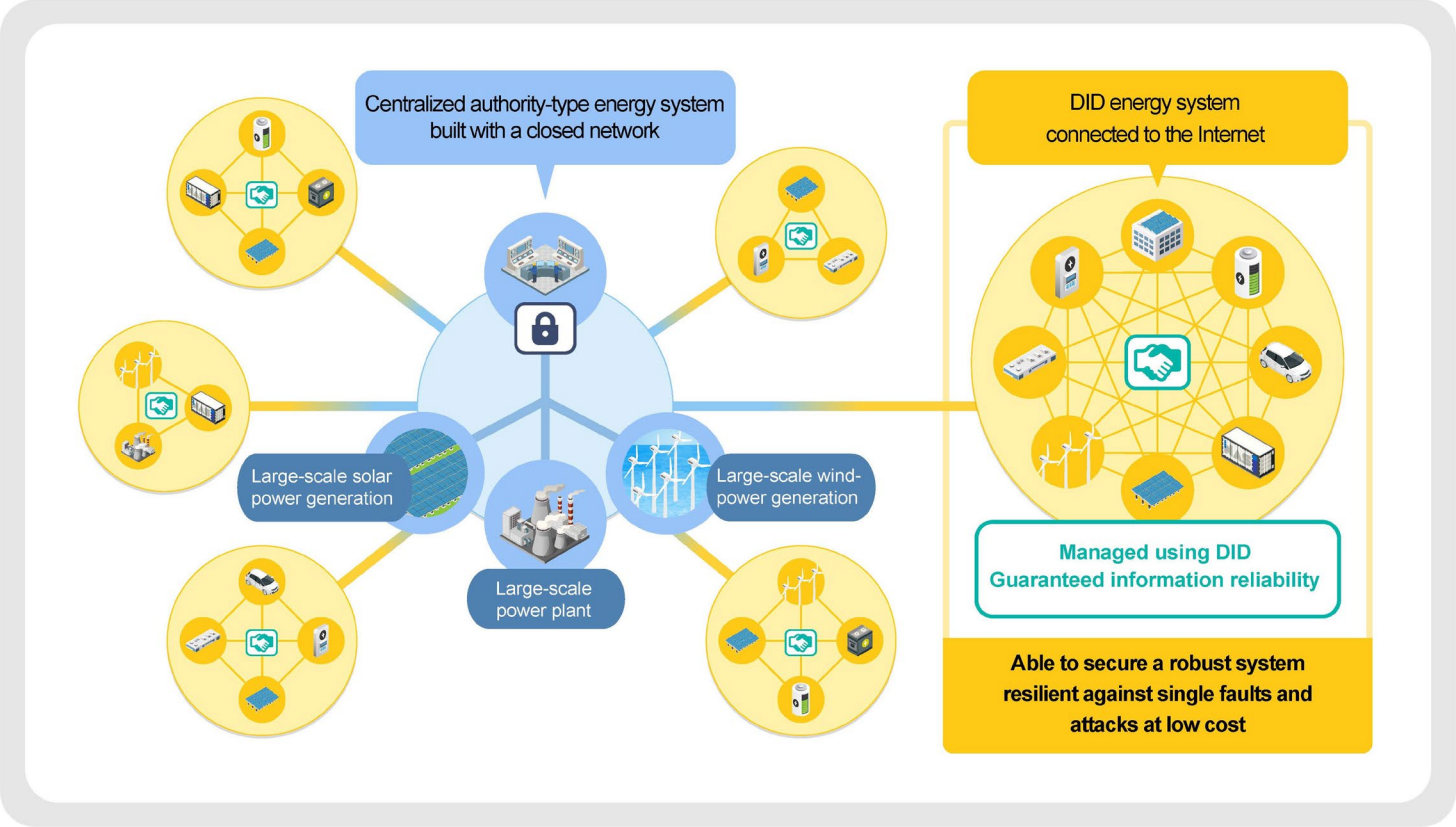
NR-Power Lab's Envisaged VPP Services

- Service 1: Provision of adjustable capacity through energy resource control to electricity companies, etc.,
- Service 2: Provision of the developed VPP system to other companies as a service (SaaS)



Concept for Utilizing Decentralized Identifiers

- In the future, VPP that can support vital electricity infrastructure will need to be highly reliable.
- Efficiently controlling large-capacity energy resources necessarily involves internet connection.
- Aim to realize a balance between a high security level and economy using DID



NR POWER Lab

NGK INSULATORS

RICOH

https://nr-power-lab.jp/en/