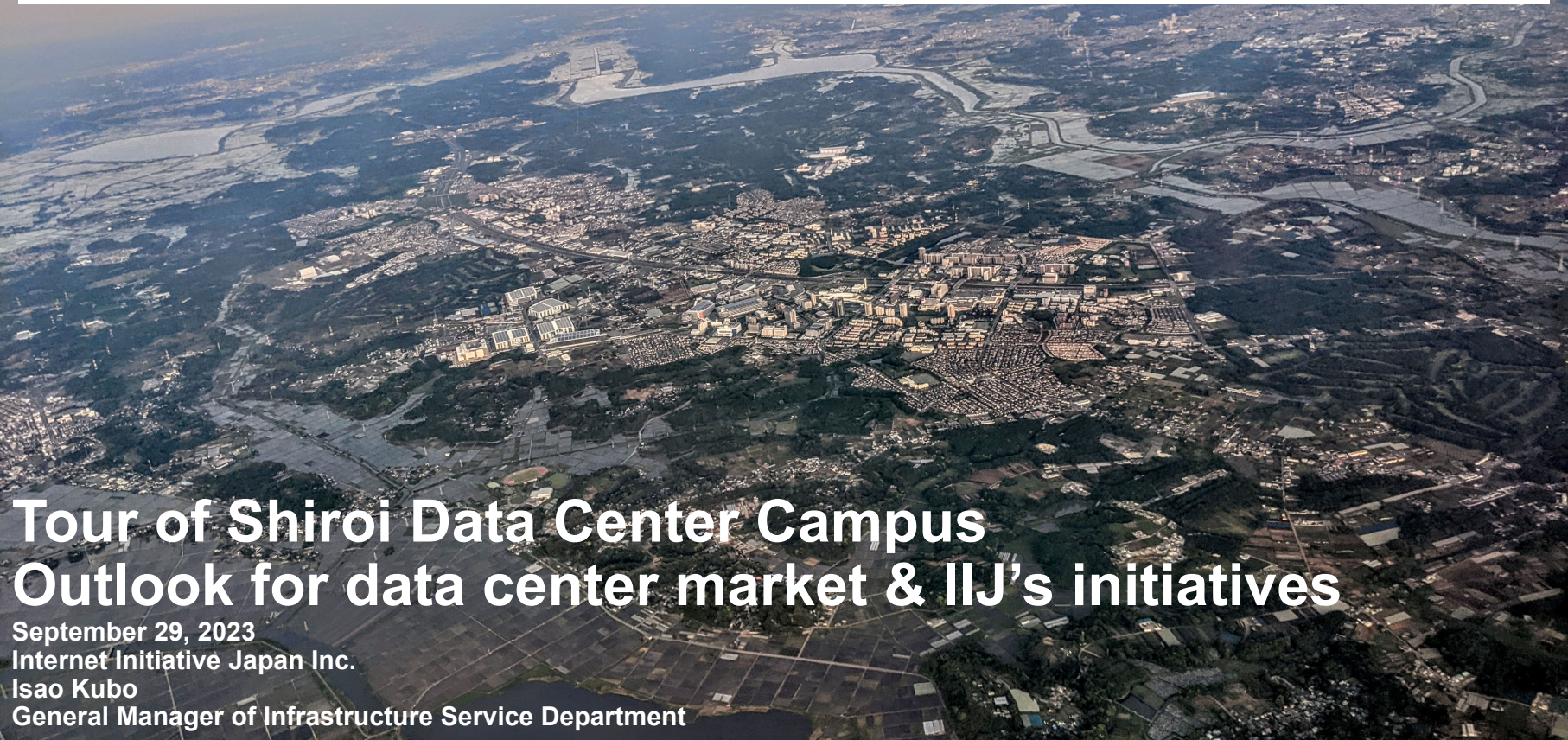
Note for readers of this English translation

This document is a summary and has been translated from the Japanese original for reference purpose only. In the event of any discrepancy between this English translation & the Japanese original, the Japanese original shall prevail. Some slides from the original Japanese version have been omitted.



Tour of Shiroi Data Center Campus
Outlook for data center market & IIJ's initiatives

September 29, 2023
Internet Initiative Japan Inc.
Isao Kubo
General Manager of Infrastructure Service Department

Outlook for data center market & IIJ's initiatives

1. Market trends and business models of data centers
2. IIJ's initiatives for Data Center
3. Initiatives for carbon neutrality

1. Market trends and business models of data centers

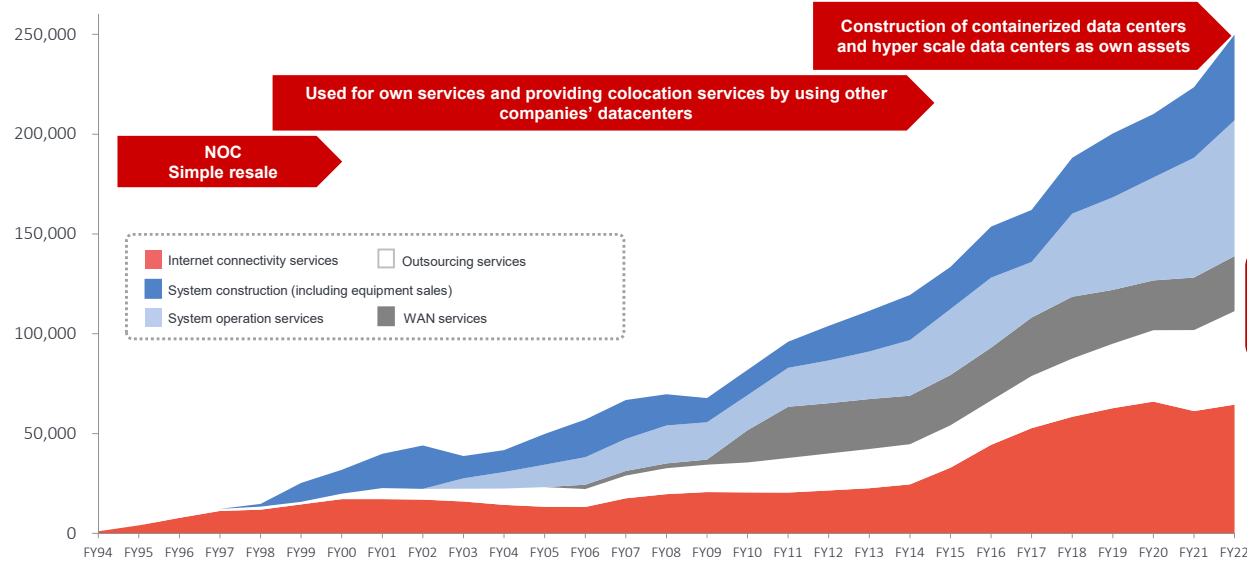
Transformation of the data center market

After the spread of cloud/ hyper scale data centers in 2010s, what a data center should be changes along with edge computing, carbon neutrality and AI in 2020s and beyond.

Data center market

- **1990s Dawn of data center** From the computer center/ communication station to datacenters
- **2000s Popularization period** Widespread to enterprise users along with Internet
- **2010s Transformation period** Popularization of cloud and appearance of hyper scale data centers
- **2020s~ Drastic change period** Existing many hyper scale data centers Demands for sustainability Popularization of new technologies and infrastructures such as 5G, AI , IoT etc.

IIJ consolidated revenues transition



Issues to be addressed

Response to shifting to a hierarchically structured data center market
- Spread of hyper scale data center
- Edge Computing

Emergence of demand for AI processing infrastructure
- Increased CPU/GPU power consumption

Realization of carbon neutrality
- Continuous promotion of energy conservation
- Diversification of procurement methods for renewable energy
- Providing environmental value

Business models of data centers

1990s Dawn of data center
From the computer center/ communication station to datacenters

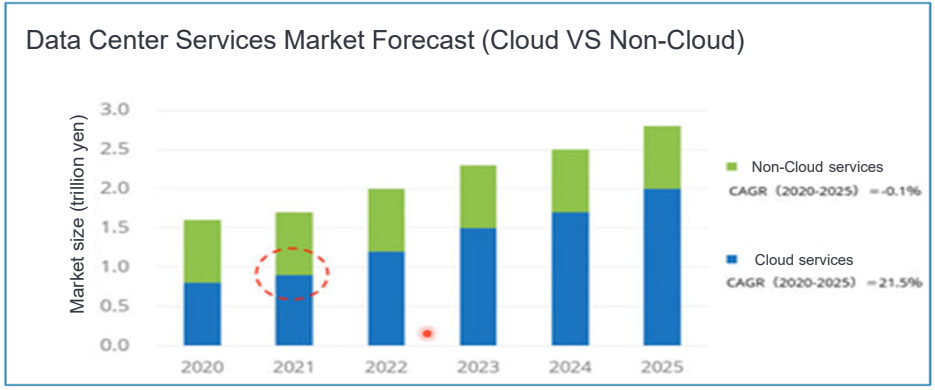
2000s Popularization period
Widespread to enterprise users along with Internet

2010s Transformation period
Popularization of cloud and appearance of hyper scale data centers

2020s~ Drastic change period
Existing many hyper scale data centers
Demands for sustainability
Popularization of new technologies and infrastructures such as 5G, AI , IoT etc.

The data center market grew before 2020 with the following applications
- **Colocation/housing which provides rack spaces for setting enterprise internal systems**
- **Hosting services which provides enterprise severs**

Colocation/housing market for enterprises remains flat by spread of cloud services.
In 2020s and beyond, hyper scale data centers which provide spaces for setting infrastructures of mega cloud enterprises continue to grow strongly.



Source: IDC “Domestic Data Center Services Market Forecast 2020-2025”

Shift to a hierarchically structured data center market

While hyper scale data center facilities are being built as a new business model and cloud services are becoming more multipolar, response times are required to process vast amounts of data, and more processing functions are being demanded at the edge. While economies of scale in facilities are prioritized and the efficiency is increasing, we believe that in a data-driven processing environment, the hierarchization will continue to grow along with the networks that seamlessly connect with these facilities.

Hyper scale layer

Hyper scale data centers are located at the top layer, and have large amounts of computing resources, tens of MW facilities, high availability and scalability

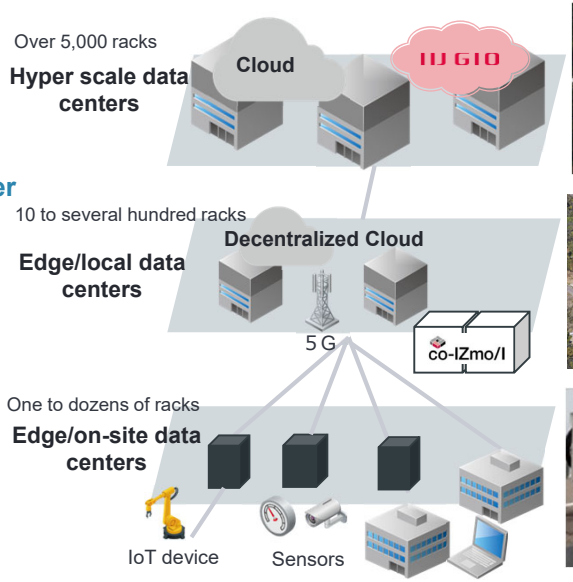
Regional scale layer

Edge/local data centers are deployed at the regional or city level. These data centers will provide data center services and distant BCP sites to customers such as local governments and enterprises.

Local scale layer

Edge/on-site data centers are small data centers deployed at the user's sites that enable to process and to provide storage of real-time data from edge devices and sensors and ultra-low latency application execution.

Conceptual image of the hierarchy



IIJ's Initiatives

The Shiroi DCC 2nd Phase Building started operation in July 2023. Construction of the Shiroi DCC 3rd phase building is under consideration.

A system module building will start operation at Matsue DCP in May 2025.

The DX Edge was released in November 2021.

Uses

Core cloud platforms used by large-scale cloud service providers

Platforms for Saas operators

Backbone system platforms used by companies

Decentralized cloud regional colocation operators, 5G & MEC※, etc.

On-premise system platforms (private cloud) &

edge computing

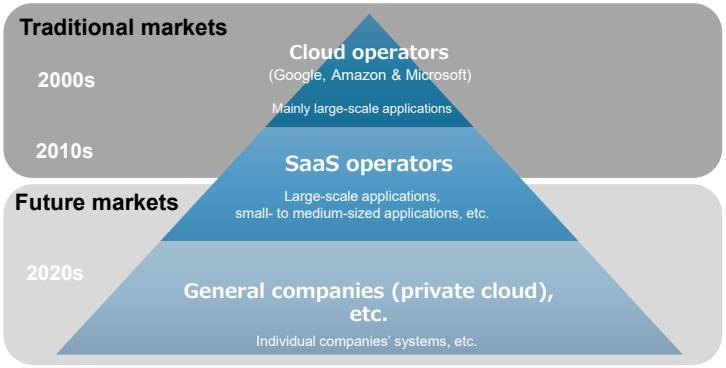
*MEC: Short for the Multi-access Edge Computing. One of the edge computing standards that factors in accessibility from local 5G terminals, Wi-Fi devices, IoT devices, etc.

The situation of foreign operators and their impacts

Although many new foreign data center operators will begin operating in FY2024 or later, IIJ's data centers mainly accommodate own facilities and the target of colocation for enterprises is other than mega clouds, so the impact on IIJ's business from the entry of foreign operators will be limited.

DC Operation Status	Market Entry	DC Operators	Target Clients
Currently operating	Have been operating DC business in Japan	COLT, Equinix, MCDRT, DigitalEdge (CTC)	Existing customers + GAFA
	New entrant	AirTrunk	GAFA
		Google	In-house use
Will start in the future	New entrant	Other than above	GAFA ?

Conceptual image of target markets



Foreign operators that have announced their entry into Japan

Enterprise name	Location	Opening Period	IT load (MW)
AirTrunk	Inzai, Chiba	2021	60MW
	Nishitokyo	Undisclosed	110MW
Colt	Keihanna	2023	45MW
	Inzai, Chiba	2024	20MW
	Tokyo	2025	75MW
Digital Edge	Osaka	2022	14MW
Equinix	Saito, Osaka	2021	14MW
	Inzai, Chiba	2021	54MW
ESR Cayman	Nanko, Osaka	2023	39MW
	Higashikurume, Tokyo	2025	20MW
GLP	Tokyo and Osaka metropolitan area	2024-2028	900MW (50MW×18 locations)
Lendlease	Saitama	2024	-
MCDRT	Saito, Osaka	2023	21MW
Princeton Digital	Saitama	2024	100MW
STT GDC	Inzai, Chiba	2024	60MW
Vantage	Tokyo	2024	80MW
	Osaka	2024	40MW
Google	Inzai, Chiba	2023	Undisclosed

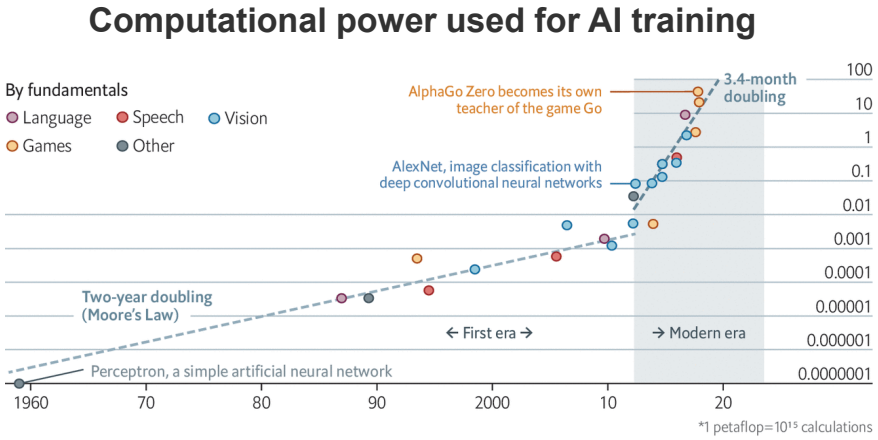
Source: Prepared by IIJ from their press releases, etc.

What is required of data centers in the age of AI

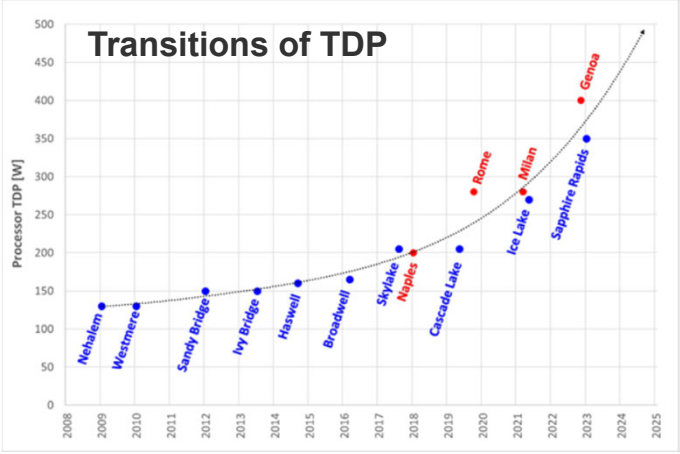
Computational power required for AI training has doubled every 3- 4 months since 2012, far exceeding the 2 years of Moore's law. The demand for AI, represented by ChatGPT, will expand further in the future, and CPU/GPU processing power will be required to increase. And data centers will be required to efficiently install a large number of CPUs/GPUs for AI.

Future data center CPUs (Intel Sapphire Rapids, AMD EPYC) have TDPs (Thermal Design Power) exceeding 300W as processing power increases. CPU TDPs are expected to increase in the future to meet AI demand.

When TDP exceeds 300W, it is said that air-cooling is not sufficient. Future data centers will include NW equipment that needs to be cooled by air, so they must be equipped with hybrid air/water cooling and achieve high energy-saving performance to realize carbon neutrality.

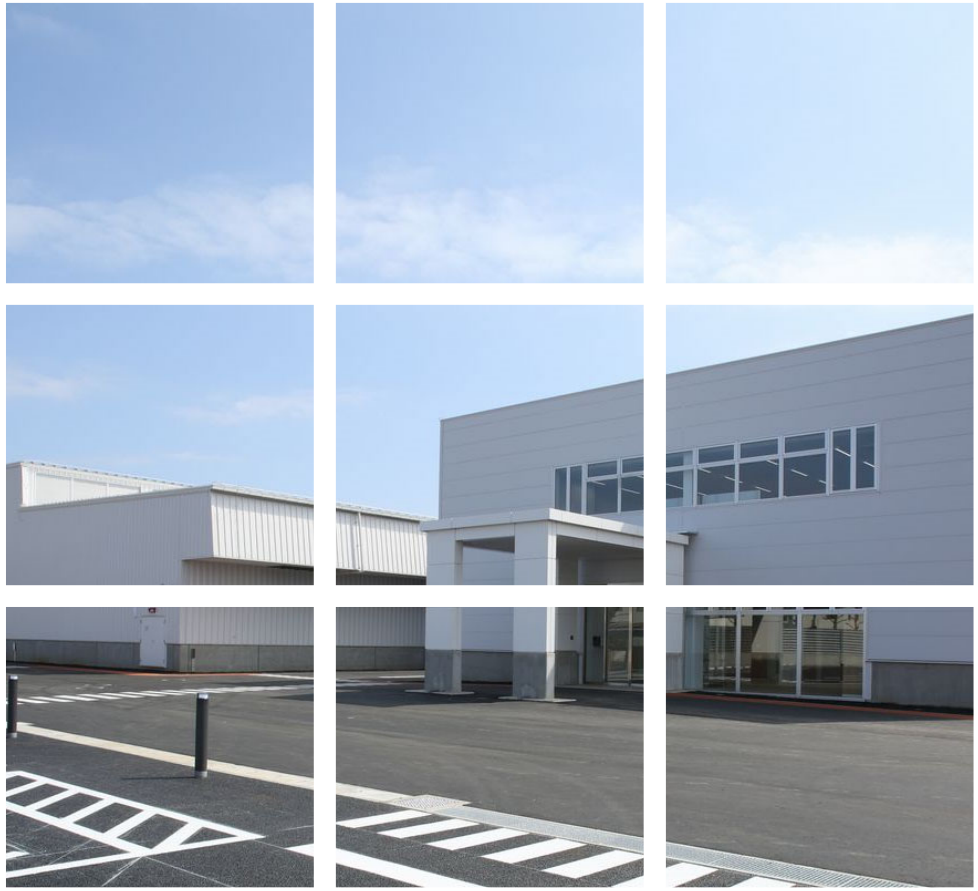


Source:
The Economist https://www.economist.com/technology-quarterly/2020/06/11/the-cost-of-training-machines-is-becoming-a-problem
OpenAI https://openai.com/research/ai-and-compute



Source:
Dell https://infohub.delltechnologies.com/p/the-future-of-server-cooling-part-2-new-it-hardware-features-and-power-trends-1/

2. IIJ's initiatives for Data Center



History of data center construction and technology demonstration

Shiroi Data Center Campus @Shiroi City, Chiba
(1st Phase Building : 2019~)

Shiroi Data Center Campus
(2nd Phase Building : 2023~)

2010
- **Demonstration experiment of IZmo**
  Fabrication & evaluation of a container-type DC demonstration model & a direct outside air-cooling demonstration model

2011
- **Demonstration experiment with respect to the raising of the density of server deployment & operation in a chiller-less facility**
  Validation of the cost reduction effects of improved server storage capacity efficiency, evaluation of operation in a chiller-less facility, & calculation of power saving effects

2012
- **Use of the chimney effect for data center operation**
  Securing of an amount of air necessary for cooling servers without air conditioning by applying the chimney effect, the application of which facilitates air intake & exhaust with waste heat generated by the servers.

2013
- **Demonstration experiment of co-Izmo/D**
  Fabrication & evaluation of a chiller-less & container-type DC demonstration model.
- **IT equipment acceptance test**
  To be conducted with server suppliers. Evaluation of the performance of IT equipment used in a chiller-less facility & clarification of concerns
- **Diagnostic test of server deterioration**
  Evaluation of the rate of deterioration of IT equipment used in a chiller-less facility & clarification of concerns
- **Destructive test of a container-type DC**
  Inspection of the externally invisible structure of a container-type DC disassembled for the demonstration experiment for the fifth year

2014
- **Demonstration experiment of co-Izmo/I**
  Fabrication & evaluation of a container-type DC demonstration model for sales promotion equipped with in-direct outside air cooling

2015
- **PoC of power-related software**
  Evaluation of power dem & forecast software & power peak-cut control software

2016
- **Demonstration experiment of co-Izmo/I V2**
  Fabrication & evaluation of a demonstration model of combined co-Izmo/I. Fabrication & evaluation of a system that features the selective feeding of power generated by fuel cells, PV power generators or DC-UPS

2017
- **PoC of an immersion cooling system**
  Verification of installability & operability, comparison with air-conditioning equipment, & consideration of additional applications including cooling servers equipped with GPU for AI/HPC.

2018
- **Demonstration experiment of co-IZmo/Z**
  Fabrication & demonstration experiment of a low-cost container-type DC equipped with a refrigeration & air-conditioning unit.

2019
- **Demonstration experiment of automation, lithium-ion batteries, AI-powered control ☆The Shiroi DCC will become a development center of DC technologies☆**
  Evaluation of physical robots, RBA/RPA automation platforms, lithium batteries produced by Tesla, & AI-based air conditioning

2020
- **Opening of the Shiroi Wireless Campus**
  Features a collection of wireless telecommunication technologies including local 5G & private LTE (sXGP)). To be used as a place that provides customers with experience & a facility for conducting demonstration experiments.

2021
- **PoC for edge micro data centers**
  Evaluation of a small-scale data center (one to two meters in height) equipped with equipment & functions required by a data center, for example, an air-cooling system for servers, UPS & physical security, & useable as an edge computing platform.

2022

2023
- **Demonstration experiment of REM-PF (Renewable Energy Matching Platform)**
  Verification of the operation and process for allocation function of electricity with environmental value

Transition of IIJ Data Centers and Positioning of the Shiroi DCC 2nd Phase Building

	Matsue DCP	Shiroi DCC 1st Phase Building	Shiroi DCC 2nd Phase Building	Shiroi DCC 3rd Phase Building (Planning)
				
	Responding to business expansion	Inheriting the functions of the 1st Phase Building Upgraded operations		Responding to New demands Bridge to 3rd Phase Building
Main purpose	Own Cloud Infrastructure	Own Cloud Infrastructure Collocation		Own Cloud Infrastructure Collocation Generative AI LLM
Operation	Scheduled to be introduced	Renewable Energy Matching Platform (REM-PF) Operation Automation		
IT load	Supported average 6KVA/rack and partially 10-20KVA/rack			-80KVA/rack
Cooling	Outside-air cooling			Hybrid cooling of water and outside-air
Construction	Container-type data center	System module-type data center		

IIJ Data Centers Lineup

Operate and provide data centers ranging from hyper scale to edge data centers

“Shiroi Data Center Campus”

“Shiroi Data Center Campus” was established in Inzai area of Chiba Prefecture, a well-known data center cluster, as a hyper scale center to meet the explosive growing demands for DC along with the spreads of 5G, IoT, AI and cloud services etc. The 1st phase building begun operations in 2019, and in preparation for further demands growth, the 2nd phase building on the same site began operations in July 2023. The Shiroi Data Center Campus has a site of 40,000㎡ with the maximum capacity of 50 MW.

<Competitive advantages>

- Use modular structure to reduce construction period and costs
- Achieve energy savings from outside-air cooling systems
- Large lithium-ion batteries for peak shifting to reduce costs
- Use AI for integrated control facilities/IT
- Use robots for operational automation, labor-saving and unmanned operations
- Direct procurement of non-fossil certificates for supply of green electricity

Edge DC Solution “DX edge”

Data Center Anywhere -A small, refrigerator-sized edge DC facility (micro-DC) that can be installed anywhere indoors or outdoors and safely accommodate and operate servers. IIJ signed a partnership agreement with Zella DC which has over 10 years of history as a micro DC specialized manufacturer in Australia, and IIJ provides turnkey micro DC and servers with managed services including operations.

IIJ Shiroi DC
(12U for use indoors)

Warehouse in Tokyo
(25U outdoors model)

Mine in Australia*
(38U outdoors model)
*Case Study of Zella DC

<Competitive advantages>

Scalability	• Can be started on a small scale in a short period of time • Ability to expand or relocate to respond to demands
Operability	• Centralized operation of servers and DC facilities (remote operation and maintenance by IIJ) • Adoption of highly reliable Japanese and U.S. manufacturer components. Plug & Play
Economic feasibility	• Low installation cost compared to constructing a server room • Power savings and low operating costs

Effective as next generation server room as well as edge infrastructure

IIJ established a micro data center in Iceland and started testing a cross-country back up service with 100% renewable energy in collaboration with power generation company for countries where there are high interests in environmental issues.

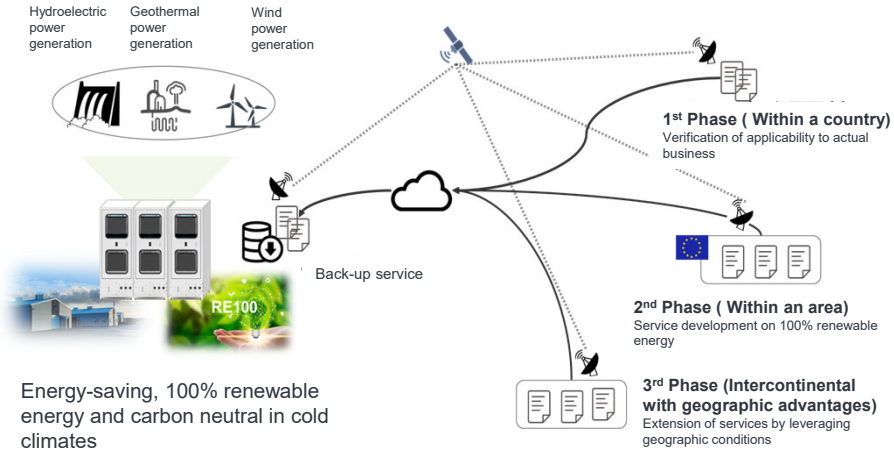
IIJ Group Begins Field Trial of Globally Distributed ICT Infrastructure in Iceland

With assistance from the Iceland's national power company, will test operation of a micro data center in an unmanned environment, as a start toward establishing ICT infrastructure achieving global-scale distributed backup

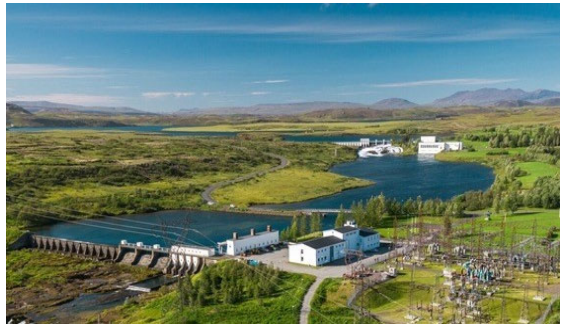
TOKYO – April 18, 2023 - Internet Initiative Japan Inc. (TSE Prime: 3774), one of Japan's leading Internet access and comprehensive network solutions providers, and its wholly owned UK subsidiary IIJ Europe Limited (London), today announced the start of a field trial in Iceland with the cooperation of Landsvirkjun, Iceland's national power company (Reykjavík, Iceland). In the trial taking place from this April to March 2024, a micro data center (MDC) serviced by IIJ is being installed in the Landsvirkjun Írafoss hydropower station in southern Iceland, and testing will be conducted on the way to establishing ICT infrastructure for integrated operation and management of data centers distributed across countries and regions.
Located approximately halfway between the American and European continents, Iceland is geographically well situated to become a North Atlantic communications hub. A further reason for choosing Iceland for the trial is the availability of electric power from 100% renewable energy, which is in line with IIJ initiatives toward achieving carbon neutrality in its own data centers.

An MDC is a data center housing the air conditioning units for server cooling, UPS (uninterruptible power supply), security cameras and other equipment and functions needed in a data center, all in a compact size (height approx. 1 to 2 meters), with the advantage of being installable both indoors and outside. Aims of the field trial include testing the capability of operation in an unmanned environment, without offices in the vicinity, and verifying the market potential for distributed backup across countries and regions, such as in "data embassies" (data storage facilities inside the territory of alliance partners). In this field trial, IIJ Europe will be responsible for remote control of the MDC installed in Iceland, while the IIJ Group as a whole will conduct verifications aimed at value creation through linkage with cloud, IoT and other services.

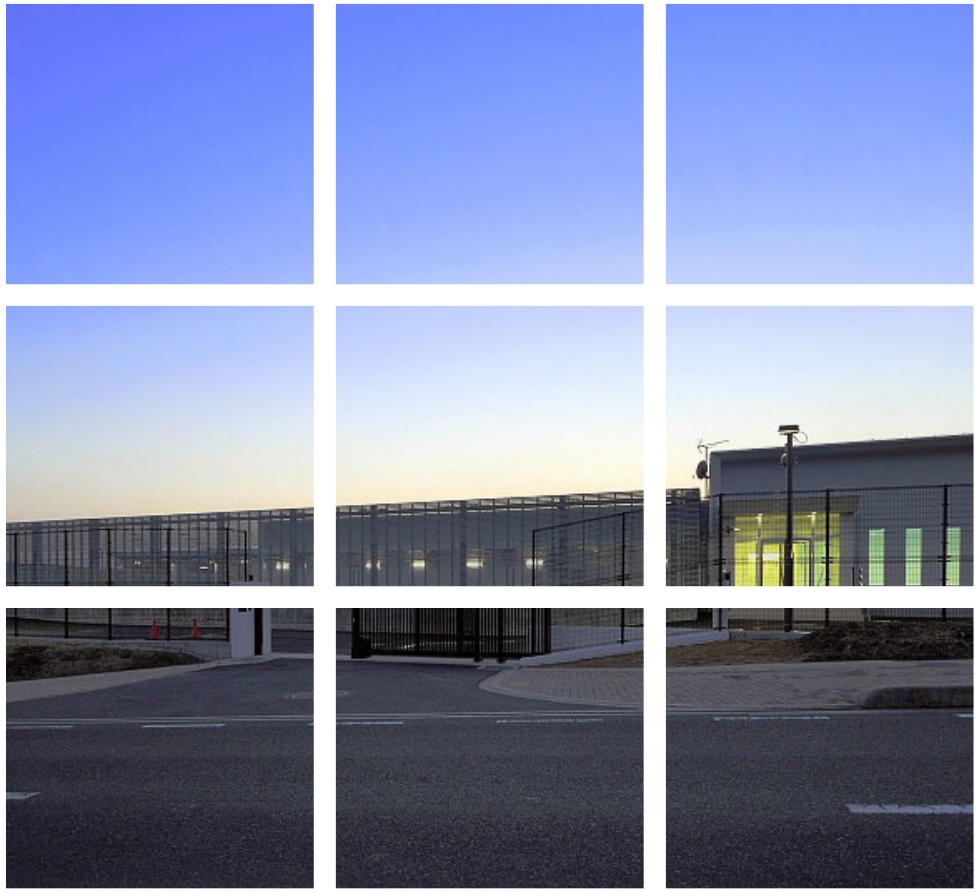
https://www.iij.ad.jp/en/news/pressrelease/2023/0418.html



Energy-saving, 100% renewable energy and carbon neutral in cold climates



3. Initiatives for carbon neutrality



Realization and Future of Carbon Neutral Data Centers

Leveraging data center resources to create new value to customers and society - continue in Shiroi DC 2nd Phase Building

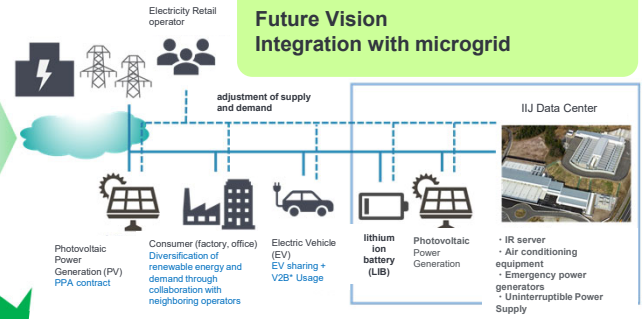
Traditional data centers

- Off-site fossil fuel-derived electricity
- Power generator + UPS
- Air conditioning equipment

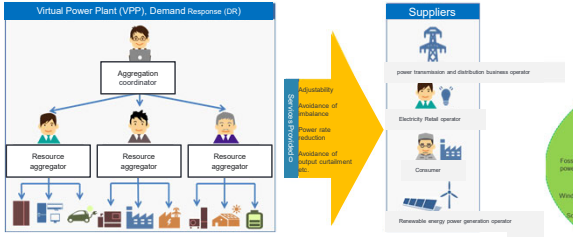
IIJ Carbon Neutral Data Centers

- Off-site renewable electricity
  - Non-fossil certificate
  - PPA, Self-consignment
- On-site renewable electricity
- Power generator + UPS
- Large capacity battery
- Outside-air cooling systems
- IT Demand Controls

Future Vision
Integration with microgrid

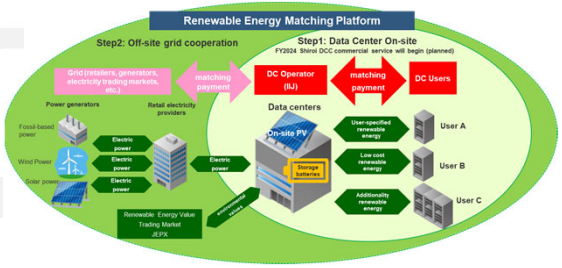


July 2022
Contributing to the stability of the power market as a VPP (Virtual Power Plant)



Reference: IIJ to Participate in "Virtual Power Plant (VPP)" Project of Kansai Electric Power
July 28, 2022 Press Releases: **IIJ to Participate in "Virtual Power Plant (VPP)" Project of Kansai Electric Power**
Source: Agency for Natural Resources and Energy website
https://www.enecho.meti.go.jp/category/saving_and_new/advanced_systems/vpp_dr/about.html

April 2023
Supply environmental value to customers by Direct Procurement of Non-Fossil Certificate and energy matching platform



April 2023
Matsue city in Shimane Prefecture was selected as a Leading region for decarbonization by Minister of the Environment
IIJ Matsue DCP supports the decarbonization of Matsue City

Policy for Greenhouse Gas Reduction Initiatives at IIJ's Own Data Centers

IIJ Group contributes to the reduction of greenhouse gas emissions in society as a whole by improving the efficiency of social activities through the provision of network related services and by sharing computer resources through the provision of cloud services. However, the use of electricity is essential for delivering these services.
IIJ recognizes the importance of reducing greenhouse gas emissions at its own data centers, which consume about 80% of all electricity consumption, by "usage of renewable energy (*2)" and "improvement of energy conservation. "

Measures	Targets
Usage of renewable energy	The target is to increase the renewable energy usage rate of data centers (Scope 1 and 2 (*3)) to 85% in FY2030.
Improvement of energy conservation	The target is to keep the PUE (*4) of the data center at or below the industry's highest level (*5) until FY2030 through continuous technological innovation.

https://www.iij.ad.jp/en/sustainability/materiality01/climate/tcfd/

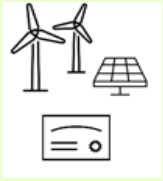
(*1) TCFD: Task Force on Climate-related Financial Disclosures
(*2) Renewable energy: Including substantial renewable energy through the use of non-fossil fuel certificates
(*3) Scope 1 and 2 (Greenhouse gas emissions by a company): Direct emissions from the use of fuels and industrial processes at the company and indirect emissions from the use of electricity and heat purchased by the company (as defined by the GHG Protocol)
(*4) PUE (Power Usage Effectiveness) : Total data center facility energy usage divided by IT equipment energy usage
(*5) Industry's Highest Level PUE : PUE 1.4 or lower (As of April 2023, the Agency for Natural Resources and Energy has set a benchmark index and target level of PUE as 1.4 or lower in the data center sector, and operators that achieve this are considered excellent energy conservation operators.)

Initiatives for "Use of Renewable Energy": Carbon Neutral Roadmap

Increase the rate of renewable energy early and gradually increase the percentage of renewable energy which has high additionality

FY2022 (The result of renewable energy rate was 46.1% as of March 2023)

Step1: Increase the rate of renewable energy early by utilizing non-fossil certificates/green power certificates, etc.

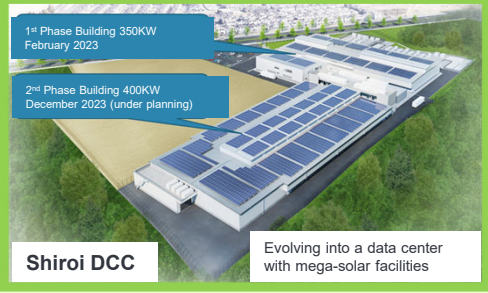


Renewable energy electricity

Matsue DCP
April 2022
The rate of renewable energy was 100%

Step2: Increase the proportion of renewable electricity※1 which has high additionality

Step2-a: Installed cost-effective on-site private power generation at Shiroi DCC/ Matsue DCP



※1 Electricity that encourages the development of new renewable energy generation facilities. For example, the concept of power from new solar power plants as additionality, rather than power from old hydroelectric power plants.

From FY2023 onwards

Shiroi DCC Non-Fossil Certificates Procurement
- **Increase the rate of renewable energy**
- **Provide customers with renewable energy values**

Step2-b:
Promote the procurement of renewable electricity through off-site PPA※2 (including self-consignment)

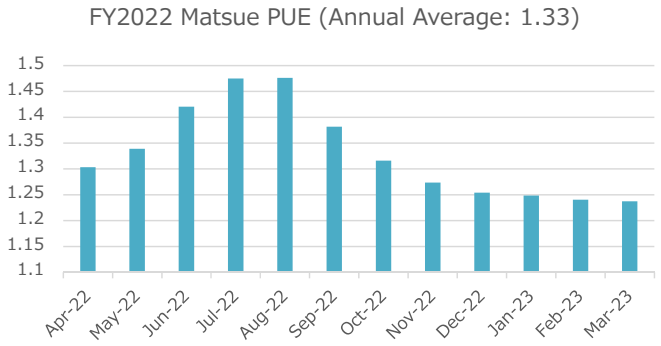
※2 PPA (Power Purchase Agreement):
An electricity sales contract between an electricity user (consumer) and an electricity provider (PPA provider) who sells electricity to the consumer.

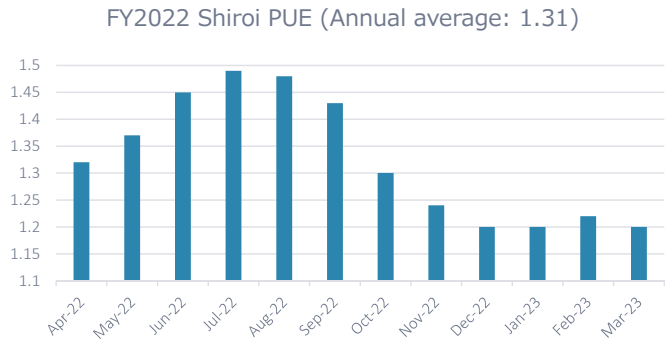
Initiatives for improvements in energy efficiency: The status of FY2022

Measure	Goals
Use of renewable energy	We aim to raise our data centers' (Scope 1 and 2) renewable energy usage rate to 85% by FY2030.
Improve energy efficiency	Through ongoing technological innovation out to FY2030, we aim to have the PUE readings of our data centers below the industry ceiling.

A benchmark target for data centers was set **PUE of 1.4** by the benchmark system of the "Energy Saving Act."

Both Matsue DCP and Shiroi DCC achieved PUE of 1.3s



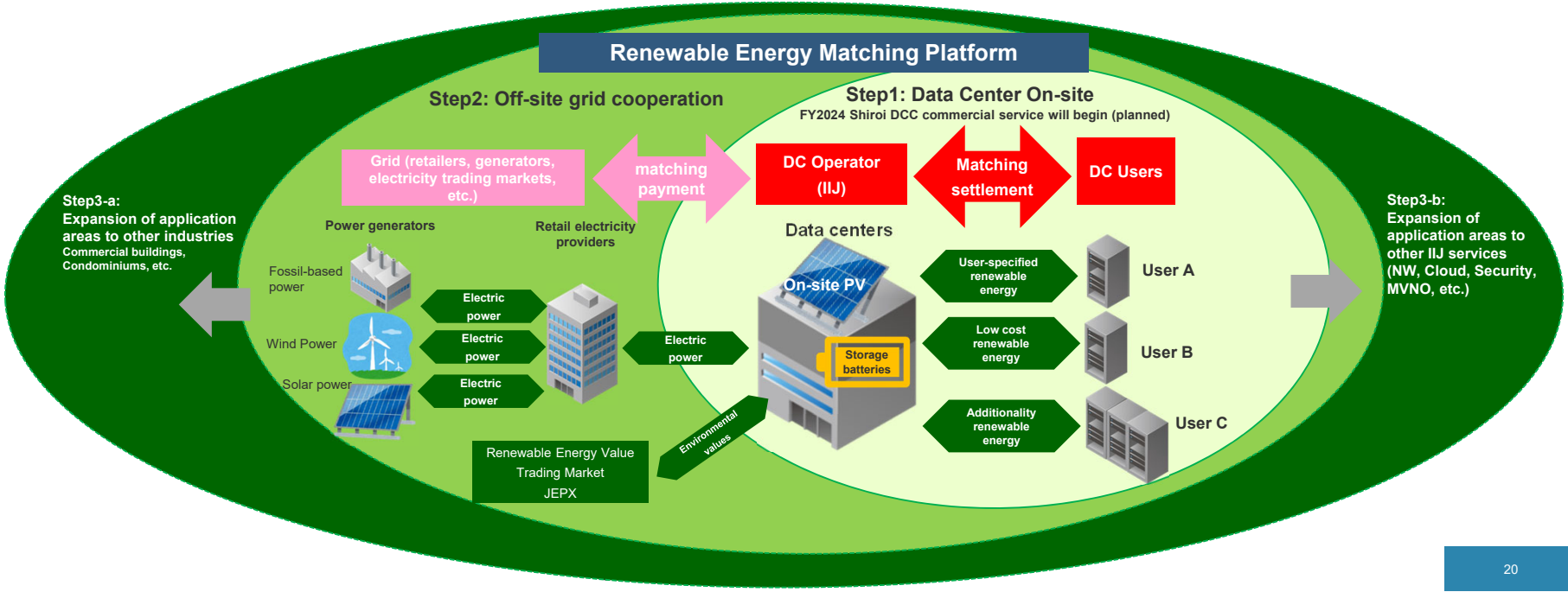


Providing new values: Responding to an increase in DC users' decarbonization needs

Renewable Energy Matching Platform

Renewable Energy Matching Platform classifies and manages on-site (solar power generation, storage batteries)/off-site renewable energy power, certificates, and other supply-side power, and provides a service of “allocation/proof of use" of power and environmental values in response to user needs and “settlement of transaction" linked to the digital currency DCJPY (tentative name).

Considering an environmental value settlement function using a digital currency DCJPY based on P2P tracking system of THE KANSAI ELECTRIC POWER CO., INC. with DeCurret DCP Inc.



Thank you for listening!

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