NTT Global Data Centers Sustainability Strategy in ASEAN

The journey to Net-zero - Insights into data center initiatives and operations

25th Aug 2023, NTT Global Data Centers

Takashi Nogami

CDCSP, VP of Global Data Center Operation Strategy, NTT Global Data Centers

CDCSP®
Certified Data Centre Sustainability Professional

NTT

Takashi Nogami is Vice President of Global Data Center Operation Strategy and Head of APAC/Japan Data Center Sustainability program management at NTT Ltd. He has credential of Certified Data Center Sustainability Professional (CDCSP, CNet).

He has 26 years experiences in telecom and data center field not only in Japan but other regions as well. From 2010 to 2013, Takashi served as Deputy of Managing Director in NTT Communications India. During the time, NTT decided to acquire Netmagic Solutions, a data center /managed hosting company based in Mumbai, India. From 2013 to 2017, he was responsible for post merger integration for Netmagic. From 2017 to 2021, Takashi was VP of Strategy, Customer Service division in NTT Communications Japan, responsible for operational standardization and optimization in network operation. In 2021, he moved to the Global Data Center division. In addition, from 2022, he is in charge of chair of board of Global Data Service Joint Stock Company, a data center company in Hanoi, Vietnam.

PfMP · PgMP · PMP · PMI-PBA

Overview

of our net zero strategy

01 NTT and NTT Global Data Centers at a glance

02 NTT Ltd. Sustainability goals

03 NTT Global Data Centers APAC

04 New initiatives and outlook

NTT and NTT Global Data Centers At a glance

NTT Group at a glance

NTT Corporation: listed on the Tokyo stock exchange (TYO9432)

$97 billion
Global Revenue

Fortune Global
#83

330,000+
Employees Worldwide

A
S&P Rating

150+ years
Heritage

Top 5
Global IT Services Provider

Presence in
80+
Countries & Regions

More than
75%
Of Fortune Global 100 Are Clients

Global Brand #41
Brand Finance

As of May 2023

NTT Group at a glance

R&D **$3.6B**
Annual Spend

5,000
Research Professionals

18,000+
Patents

Top 5 IP Backbone
by CAIDA

Network Coverage
190+ Countries & Regions

As of May 2023

Supporting a sustainable society

Environmental initiatives

Participating in climate change initiative (SBT), support TCFD

EP100: Save energy & EV100: Electric vehicles / electric transport

Diversity and inclusion initiatives

Participating in The Valuable 500

SDGs initiatives

Supporting the UN Sustainable Development Goals
Selected as one of the World Benchmarking Alliance's top 10 digital companies

Selected for ESG (Environment, Social and Governance) investment indexes

Dow Jones Sustainability Index (DJSI)

FTSE4good Index Series

NTT Global Data Centers Footprint

Approx. 2,000 MW IT Power (Planned inclusive)

Americas

US

Hillsboro | Sacramento | Santa Clara | Dallas | Chicago Ashburn | Phoenix

EMEA

UK | London
Germany Frankfurt | Munich
Berlin | Hamburg | Bonn
Netherlands | Amsterdam
Switzerland | Zurich
Austria | Vienna
Spain | Madrid
South Africa | Johannesburg

India

Mumbai | Bengaluru
Chennai | Noida | Kolkata

APAC

Japan Tokyo | Osaka | Kyoto
China Hong Kong, Shanghai
Malaysia | Cyberjaya
Singapore
Thailand | Bangkok
Vietnam | Ho Chi Minh City, Hanoi
Indonesia | Jakarta

As of May 2023, NTT Ltd. Group and NTT Communications Group including JV with 3rd party.
The above plans are subject to change.

Global Data Centers: Investing globally to meet local needs

NTT has significant capital to transform the data center landscape globally.

FY2022

Germany	Germany	South Africa	Austria
			
Frankfurt 4D Data Center	Frankfurt 1I Data Center	Johannesburg 1 Data Center	Vienna 1C Data Center

US

Ashburn VA8 Data Center

FY2023

India	India	Germany	Germany	India	India
					
Navi Mumbai 1B Data Center	Navi Mumbai 2-1 Data Center	Frankfurt 4G Data Center	Rhein-Ruhr 1B Data Center	Navi Mumbai 2-2/13 Data Center	Bengaluru 3X Data Center

FY2024

Germany	India	India	Malaysia	US	India	India	US	US	US	US
										
Frankfurt 4E/F Data Center	Chennai 2A Data Center	Delhi (Noida) 2A Data Center	Cyberjaya 6 Data Center	Ashburn VA6 Data Center	Mumbai 9 Data Center	Kolkata 1A Data Center	Hillsboro HI2 Data Center	Phoenix PH2/3 Data Center	Dallas TX2/3 Data Center	Chicago CH2 Data Center

FY2025

India	India	India	Thailand	India	US	Vietnam	India	Japan
								
Navi Mumbai 1C Data Center	Mumbai 10 Data Center	Bengaluru 4 Data Center	Bangkok 3 Data Center	Navi Mumbai 1D Data Center	VA10 Data Center	Ho Chi Minh City1 Data Center	Mumbai 11 Data Center	Keihanna Data Center

FY2026

US	UK
	
Ashburn VA7 Data Center	London 1B Data Center

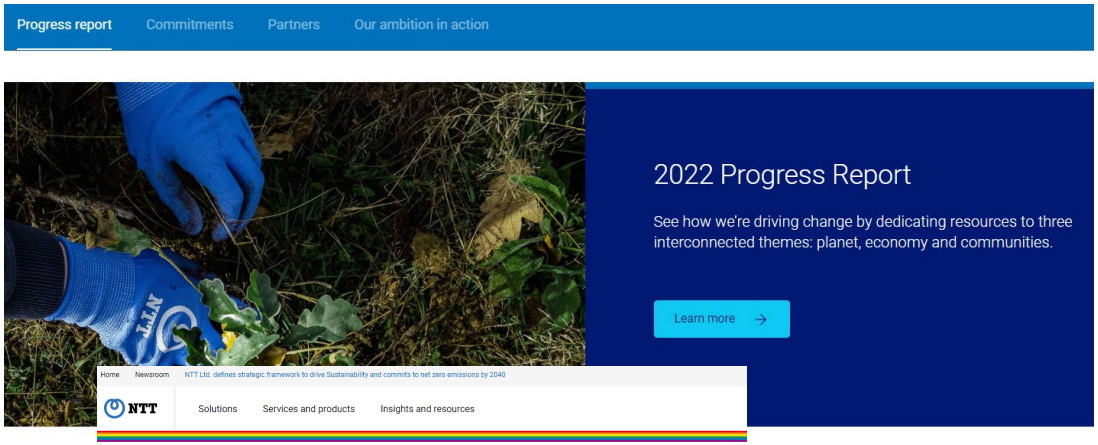
As of May 2023, NTT Ltd. Group including JV with 3rd party.
The above plans are subject to change.

Our ESG ambition

NTT Group and NTT Limited

NTT Ltd. sustainability commitments

- Net-zero emissions across our operations by 2030, and across our value chain by 2040
- 100% renewable energy in our data centers by 2030, and in our offices and facilities by 2035



4 November 2021

NTT Ltd. defines strategic framework to drive Sustainability and commits to net zero emissions by 2040

Global technology leader develops strategic framework to drive sustainable change across three interconnected pillars:

- **Connected Planet**: Use technology solutions that help protect, restore, and regenerate the natural world, conserving precious natural resources for future generations.
- **Connected Economy**: Use trusted technology to help organizations thrive and make their contributions to a sustainable and more resilient digital future.
- **Connected Communities**: Support diverse, inclusive, and accessible communities where NTT operates to ensure that everyone has the opportunity to realize their potential.

London, United Kingdom – 4 November 2021 – NTT Ltd., a global technology and business solutions provider, is

NTT Ltd's sustainability themes

Connected Planet

Using technology solutions to help protect, restore and regenerate the natural world, and conserve precious natural resources for future

- **Climate change**
- **Biodiversity**
- **Circularity**

Connected Economy

Using our trusted technology to help organizations thrive and make their contributions to a sustainable and resilient digital future.

- **Smart solutions**
- **Privacy and data security**
- **Ethics, values and governance**

Connected Communities

Supporting diverse and inclusive communities in areas where we operate by enabling access to opportunities for people to realize their potential

- **Digital access**
- **Education and upskilling**
- **Diversity, equity and inclusion**

GDC's net zero strategy: focusing on reducing greenhouse gas emissions to proactively prepare for climate-related and potential broader environmental risks and opportunities

NTT GDC Net Zero commitment

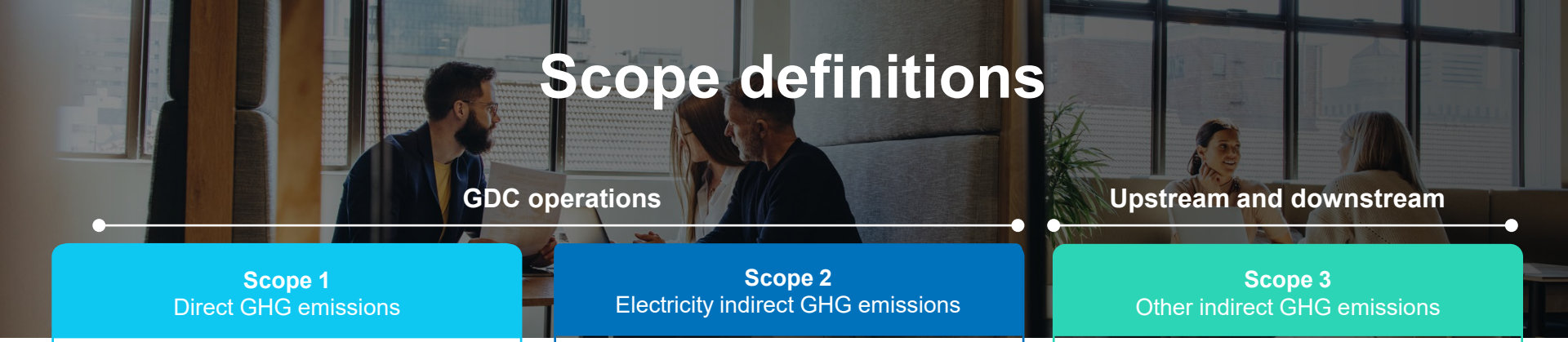
by 2030

Reduce **scope 1 and 2** emissions by at least **90%** from FY21 baseline

Procure **100% renewable energy** to power our data centers

by 2040

Reduce **total emissions** by at least **90%** from FY21 baseline



Scope definitions

GDC operations

Scope 1
Direct GHG emissions

Emissions from fuel combustion as well as fugitive emissions from sources owned or controlled by the company.

- **Back-up power generators**
- **Owned / controlled vehicle fleet**
- **Fugitive emissions**

Scope 2
Electricity indirect GHG emissions

Emissions from generation of electricity consumed by the company.

- **Power distribution**
- **Lighting**
- **Cooling**
- **UPS**

and any other non-IT power consumption

Upstream and downstream

Scope 3
Other indirect GHG emissions

Other emissions that are a consequence of the company's activities but occur from sources not owned/controlled by the company.

Power use by client's IT equipment

- **IT Load**

Embodied carbon in:

- **Offices**
- **Datacenter facilities**

and other scope 3 categories

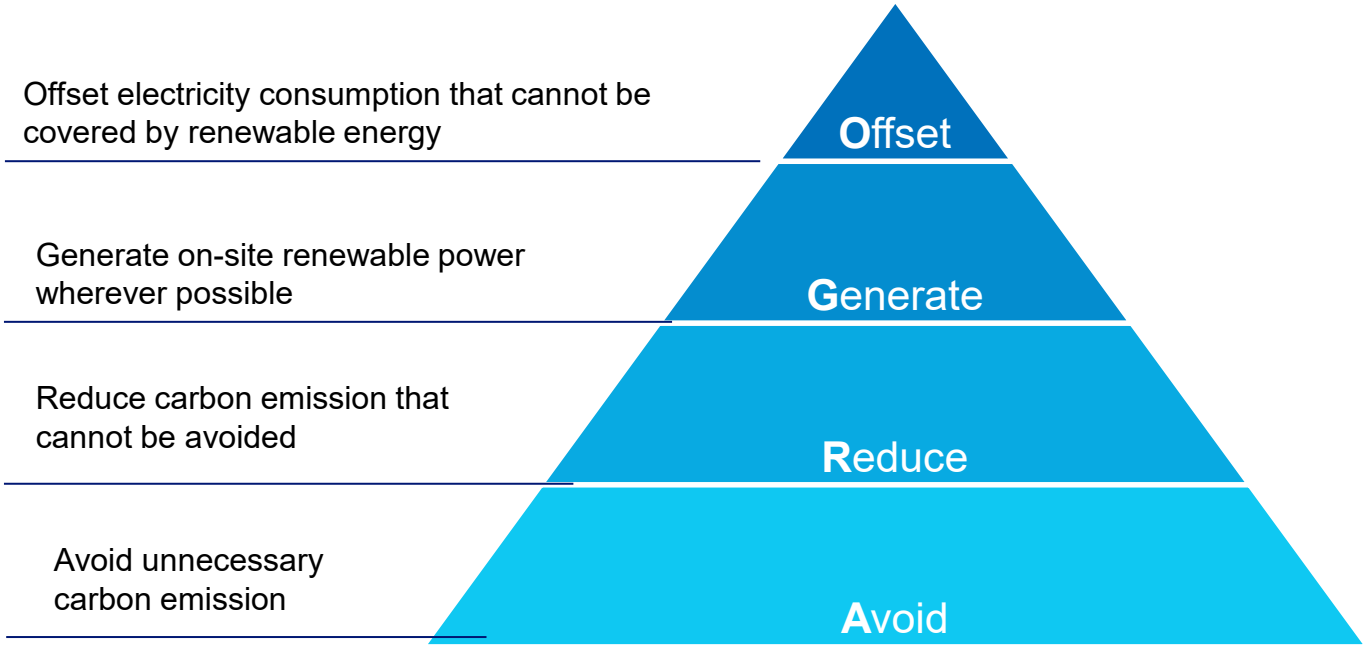
Definition of scope 1, 2 and 3 emissions categories as per GHG Protocol1

Our ambition

NTT Global Data Centers in ASEAN

Sustainability Strategy in Global Data Center, ASEAN

- In ASEAN, NTT has 12 existing data centers across 5 countries and region, Singapore, Malaysia, Indonesia, Thai and Vietnam. And now planning to expand another 3 data centers in ASEAN region.
- The “ARGO” Approach Toward Net Zero Target.



Current Situation in ASEAN Data Center, GHG emission

Scope 3
Other indirect GHG emissions

Other emissions that are a consequence of the company's activities but occur from sources not owned/controlled by the company.

Power use by client's IT equipment

IT Load

Scope 2
Electricity indirect GHG emissions

Emissions from generation of electricity consumed by the company.

Power distribution

Lighting

Cooling

UPS

Scope 1
Direct GHG emissions

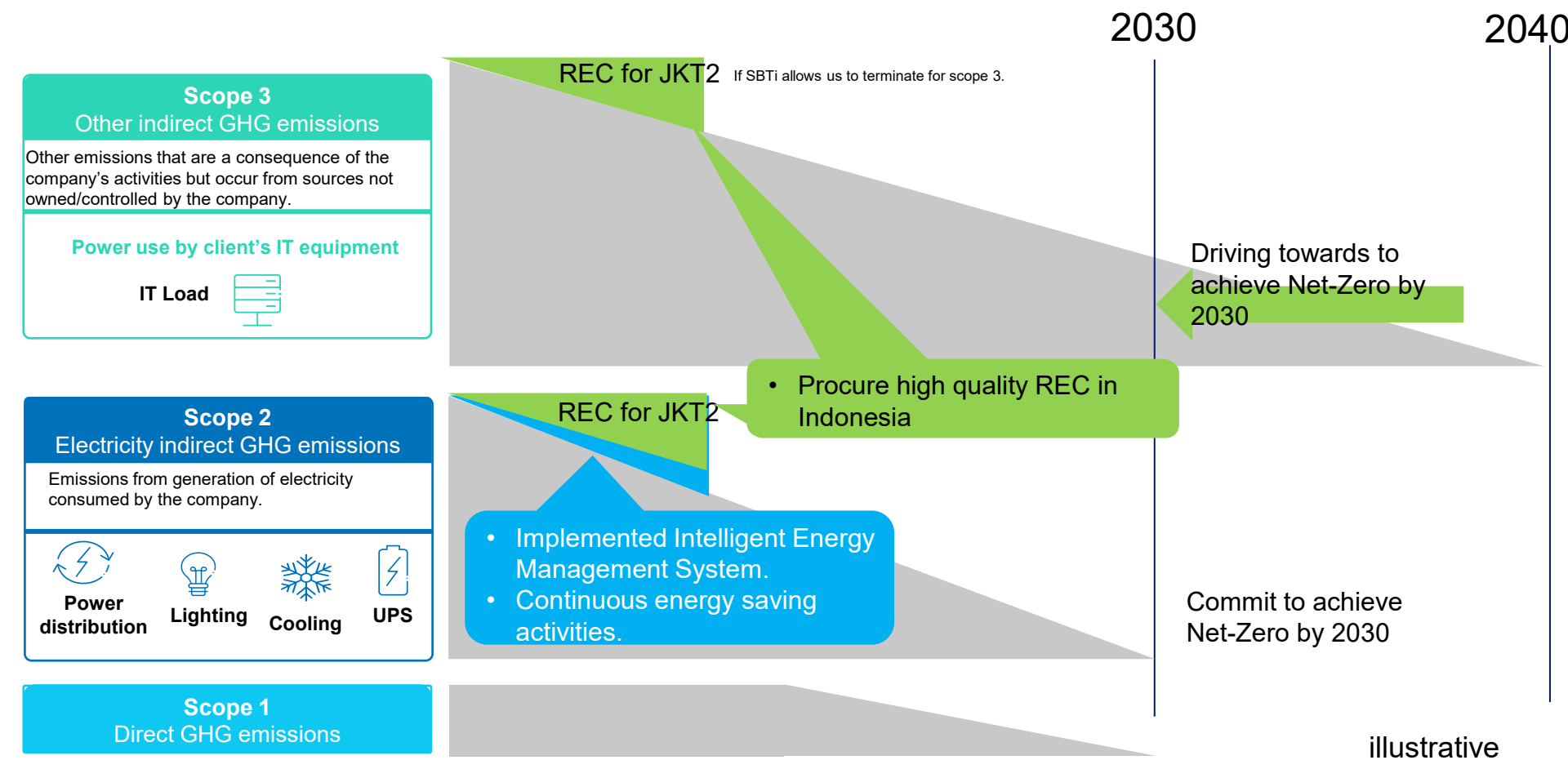
2030

2040

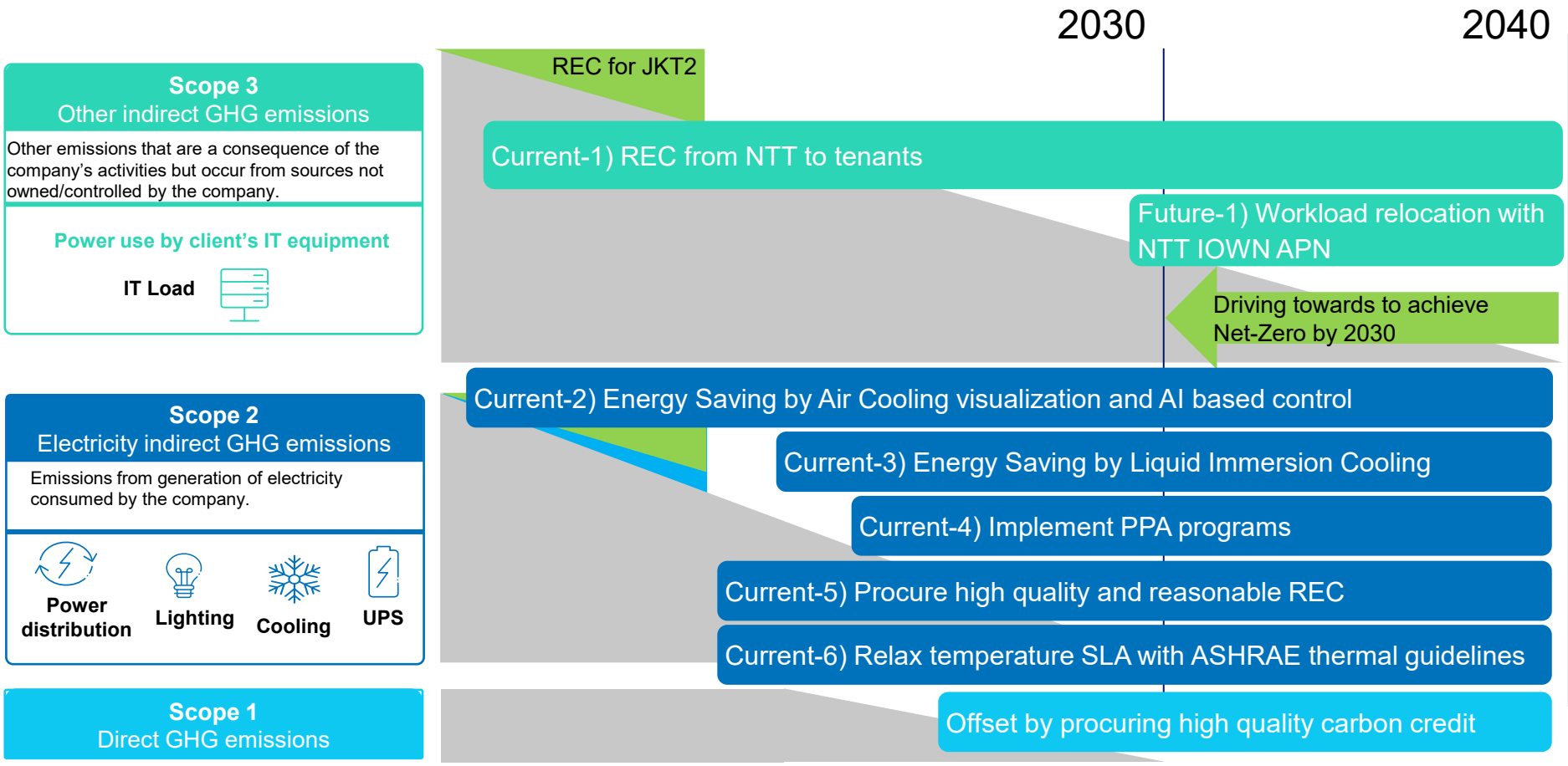
Without any sustainability actions,
GHG emissions are going to be increasing,
as per business expansion.

illustrative

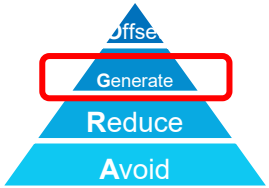
Existing Actions in NTT Global Data Center in ASEAN



Action Items in NTT Global Data Center in ASEAN



Current-1) NTT plans to supply REC to tenants



Utility Companies / PPA Partners

Conventional power: coal, natural gas, and oil.

On-site PPA / Off-site PPA

Renewable Energy Certification(REC)

Brown Power

Green Power

Environmental Value

NTT GDC

NTT Global Data Centers

REC Supply

Tenants

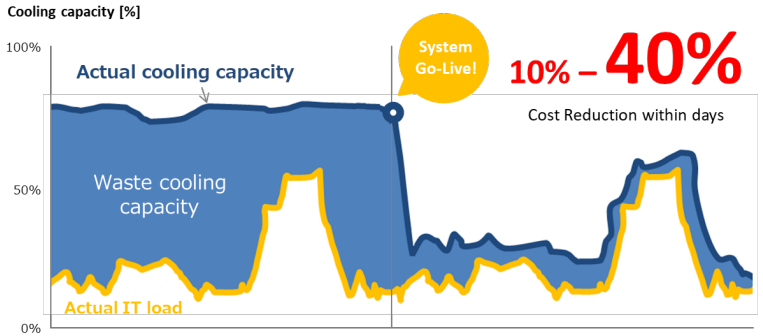
REC (named for customer A)

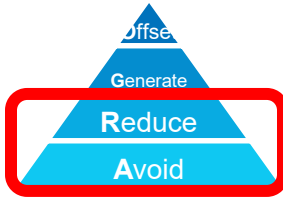
- Redeemed under customer's name
- Easiest, cheapest way to purchase

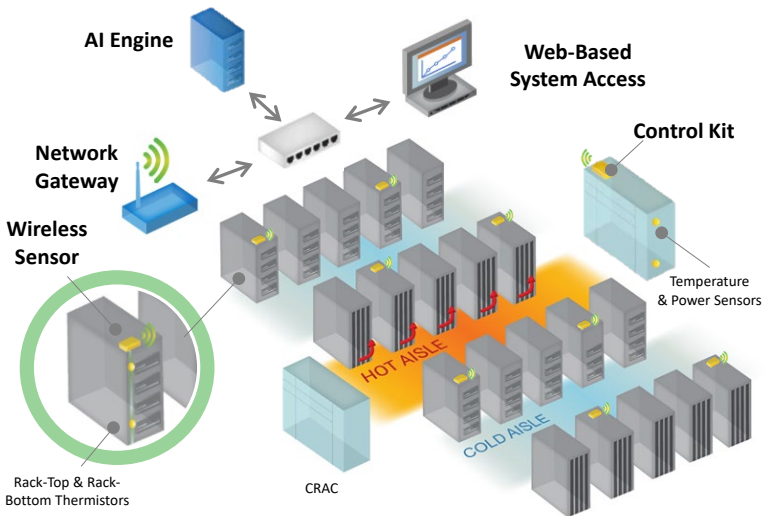
Current-2) Intelligent Energy Management Systems

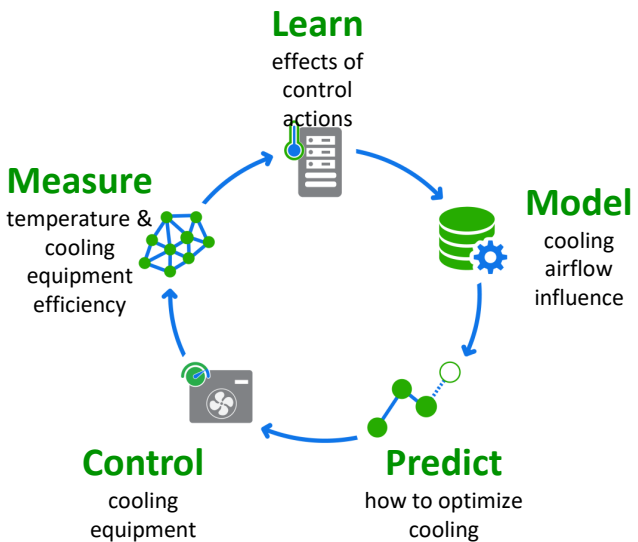
10-40% savings achieved!!

Energy Saving & Temperature Monitoring

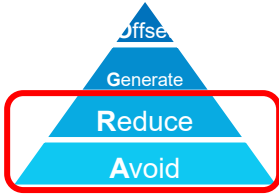








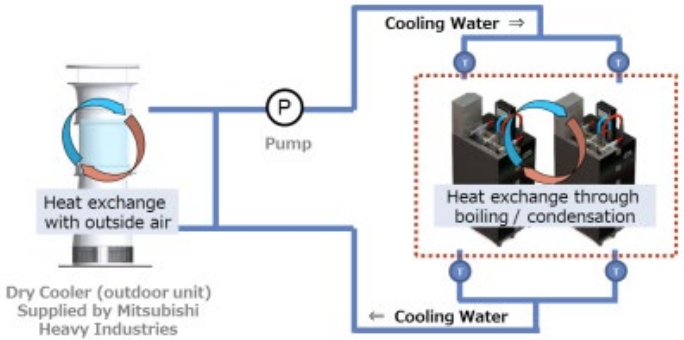
Current-3) Energy Saving by Liquid Immersion Cooling



- Higher density of servers equipped with high-performance CPU and GPU at data centers
- Concluded PoC using Mitaka East data center as a field with **focus on the liquid immersion cooling technology** as a next-generation cooling method **that helps reduce environmental burden dramatically.**

Theoretically, energy efficiency is approx. PUE 1.06, making it possible to reduce GHG emissions from an existing data center by slightly more than 30%.

Determination of issues regarding design and operations.



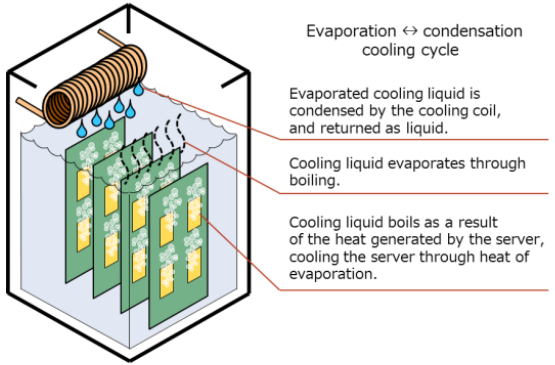


Image of Two-phase Liquid Immersion Cooling

Current-4) Implement PPA schemes

NTT

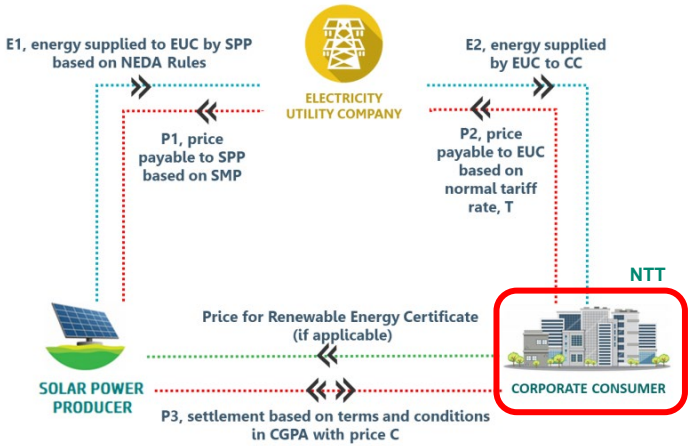
Offset
Generate
Reduce
Avoid

Malaysia CGPP Program

Admitted with a partner!!
Starting in 2025

Suruhanjaya Tenaga
Energy Commission

Information Guide
For Corporate Green Power Programme
(For Solar PV Plant)



Guide_CGPP-_31_Jan_2023.pdf (st.gov.my)

Singapore RFP1 & 2

On going process

Electricity Imports

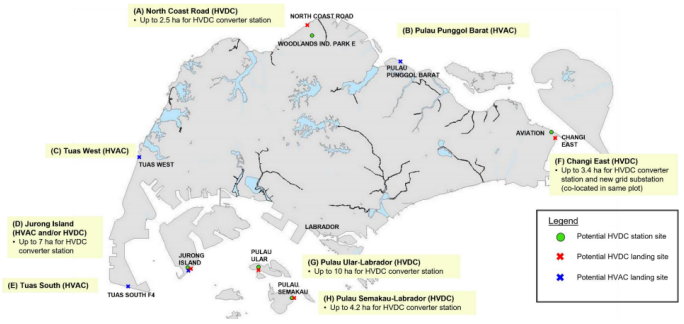
On 25 October 2021, EMA announced that two Requests for Proposal (RFP) will be issued for up to a total of 4 gigawatts (GW) of low-carbon electricity imports into Singapore by 2035, as part of Singapore's efforts to enhance energy security by diversifying energy supply sources. This is expected to make up around 30% of Singapore's electricity supply in 2035. The remaining supply will continue to come from various sources, ranging from the current natural gas-fired power plants to solar and waste-to-energy sources.

Companies interested to participate in the RFP process may refer to the following pages for the details and submission process of the first and second RFP respectively.

- First Request for Proposal (RFP1)
- Second Request for Proposal (RFP2)

ANNEX C: POTENTIAL SITES FOR ELECTRICITY IMPORTS

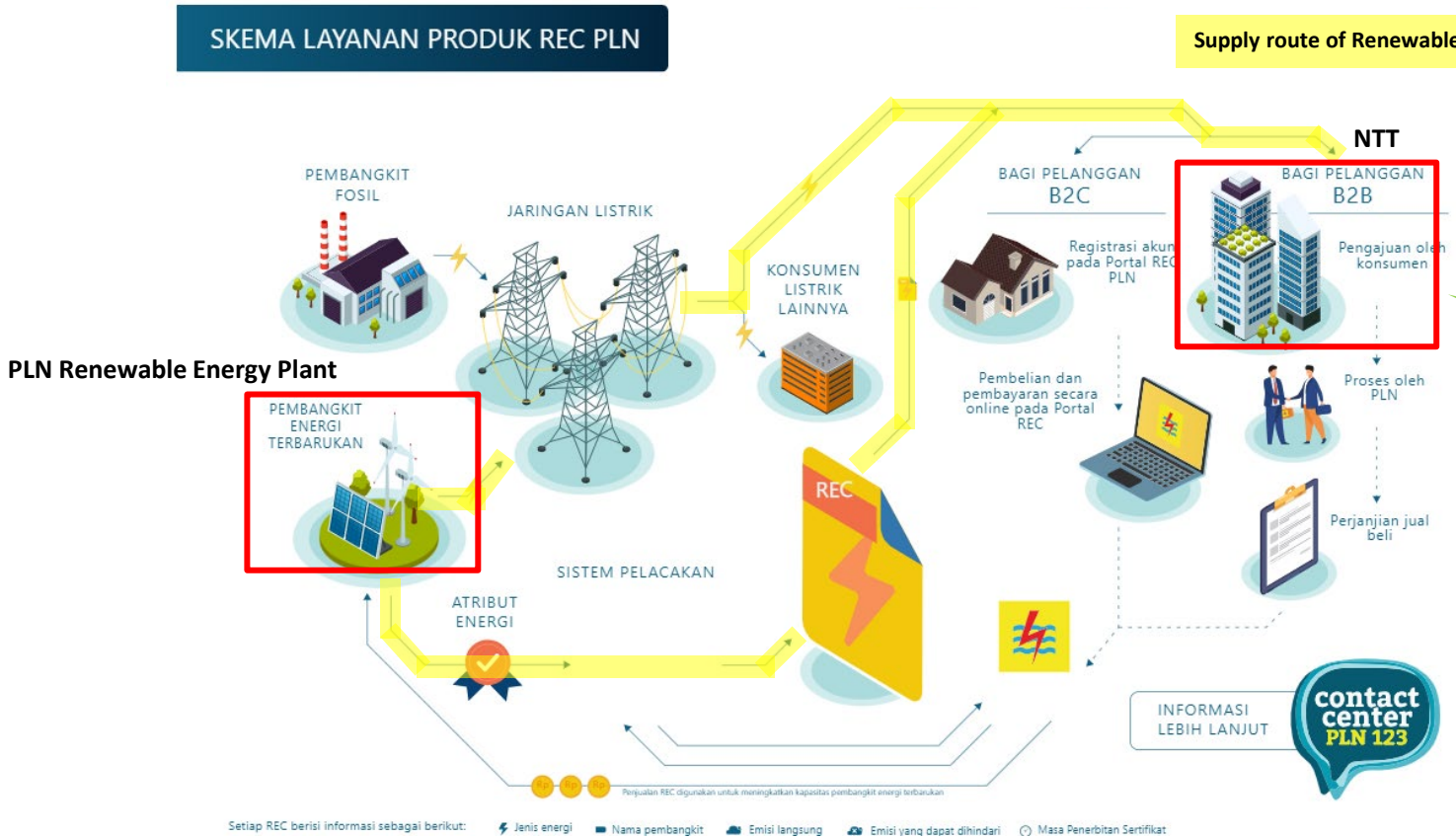
The diagram below shows the potential sites that may be reserved for the purposes of electricity imports[11]. Participants may write to EMA to express interest in these sites, via the process specified in **Section 4**. As landing sites are scarce and may not suit the specific needs of a Participant's Proposal, Participants may also suggest the use of their own private landing sites[12]

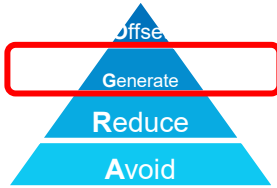


[11] The allocation of the sites to the Participant is subjected to the approval of the relevant planning and technical agencies.
[12] The use of the private landing sites for landing electricity imports will be subject to the approval of the relevant planning and technical agencies.
[13] Singapore Power will be responsible for the connection of the HVDC converter station to the grid substation on the mainland.

EMA | Electricity Imports

Current-5) Procure high quality and reasonable REC

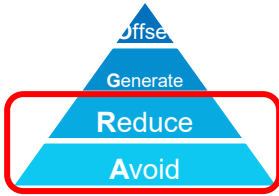




Since July 2022, NTT Jakarta 2 DC has been covered by 100% REC

https://layanan.pln.co.id/renewable-energy-certificate/informasi

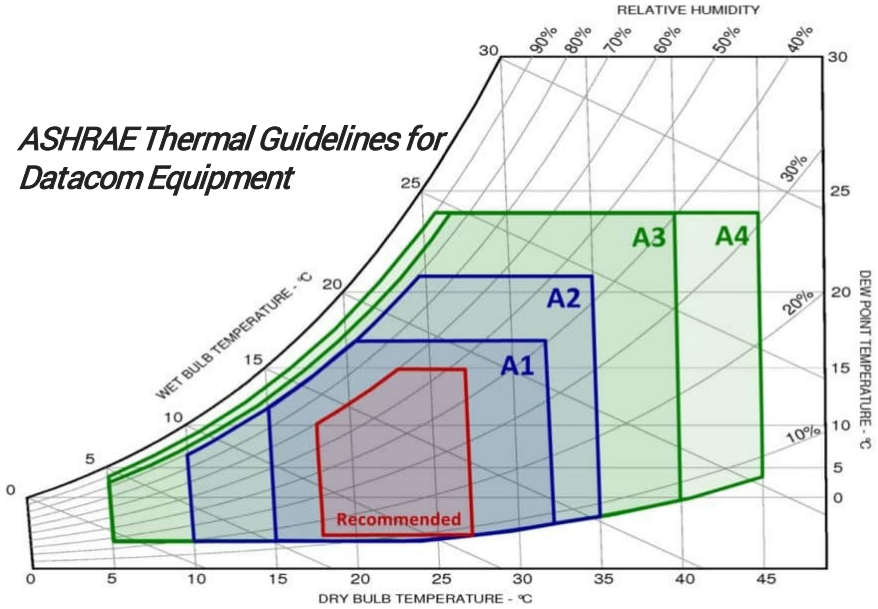
Current-6) Relax temperature SLA with ASHRAE thermal guidelines



- Thermal envelope of the rack space is a critical factor determining the DC energy efficiency
- 1% DC energy efficiency improvement for every 1°C rack space temperature elevation
- IT equipment is more sensitive to thermal acceleration than thermal envelope

Thermal envelope expansion

Recommended envelop (18 - **27°C**, 10 - 70% RH)
→ **A1** envelop (15 - **32°C**, 8 - 80% RH)



New initiatives and outlook

NTT announced

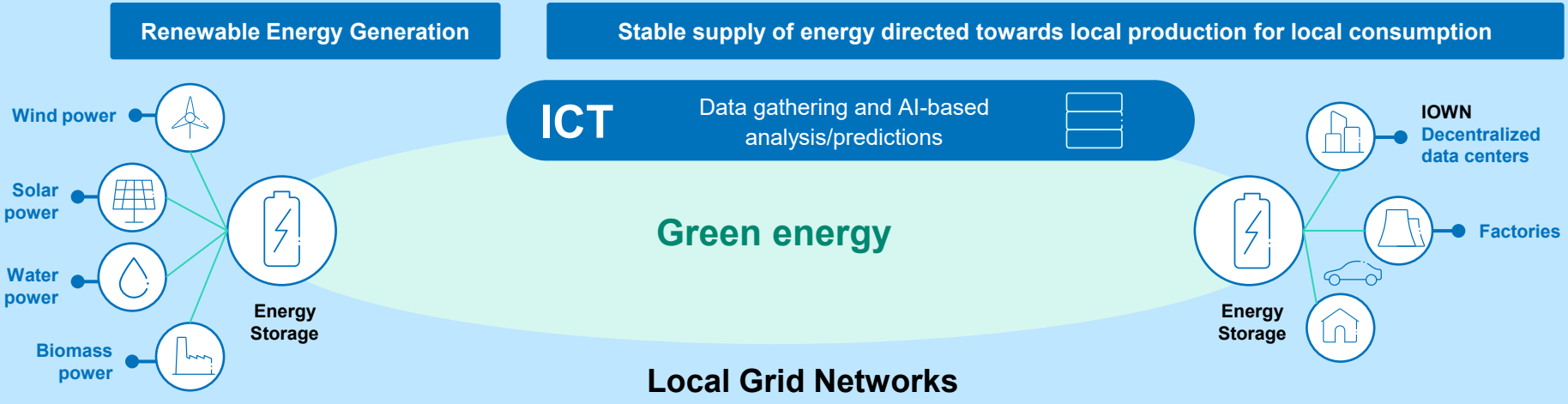
～1tn JPY investment for “Green Energy x ICT” in 5 years

NTT as a creator of new value and supporter of a global sustainable society

Achievement of a recycling-oriented society

Achievement of Green Solutions

- Will promote green solutions that can be achieved by “Green Energy X ICT” (will make investments of **~¥1.0tn/5 years)**
- Will expand our renewable energy generation business and achieve a stable supply of optimized an efficient energy directed towards local production for local consumption



Investing in renewable energy

NTT to acquire Green Power Investment (GPI), a green power plant company in Japan

NTTアノードエナジー　jera

NEWS RELEASE

2023年5月18日
NTTアノードエナジー株式会社
株式会社JERA

再生可能エネルギー発電事業者グリーンパワーインベストメント社等の買収について

NTTアノードエナジー株式会社[*1]（以下、「NTTアノードエナジー」）と株式会社JERA[*2]（以下、「JERA」）は、米国の再生可能エネルギー事業者Pattern Energy Group LP[*3]（以下、「Pattern Energy」）が保有する株式会社グリーンパワーインベストメント（以下、「GPI」）をはじめとする国内再生可能エネルギー事業を共同で取得することとし、本日、Pattern Energyとの間で株式売買契約を締結しました。今後、必要な手続きを経て、2023年内に株式等の取得を完了する見込みです。

GPIは、2004年の設立以降、一貫して再生可能エネルギーの開発・建設・運営に取り組む、国内再生可能エネルギー発電事業のリーディングカンパニーです。同社は、2006年に陸上風力発電所の開発・運営を開始し、2020年には、当時日本最大となる陸上風力発電所「ウィンドファームつがる（出力12.2万kW）」を、2023年5月11日には「住田

NTT Anode Energy and JERA to Acquire Green Power Investment

2023/05/18

NTT Anode Energy Corporation[*1]("NTT Anode Energy") and JERA Co., Inc. [*2] ("JERA") concluded an agreement with Pattern Energy Group LP[*3] ("Pattern Energy"), a US renewable energy company, for the joint acquisition of Green Power Investment Corporation ("GPI") and other renewable energy businesses in Japan that are currently owned by Pattern Energy. The transaction is expected to complete by the end of 2023, after all the required procedures are finished.

GPI is a leading renewable energy power generation company, dedicated to the development, construction and management of renewable energy facilities in Japan since its foundation in 2004 and is one of the largest onshore and offshore wind platforms by combined capacity in Japan. GPI currently owns and operates 6 renewable energy projects totaling 337 MW, has two projects under construction totaling 192 MW. In 2020, GPI completed the 122MW Wind Farm Tsugaru, the then largest onshore wind power plant in Japan. Recently, on May 11, 2023, GPI started commercial operations of the 113MW Sumita Tono Wind

New NTT technology: “IOWN”

- I **Innovative**
- O **Optical** and
- W **Wireless**
- N **Network**

Lower Power Consumption
Photonics – Electronics Convergence Processor

Low latency NW
All Photonics Network (APN)

Large capacity and high capacity

IOWN Concept: Electronics to Photonics

To support a smarter and more sustainable society, it is necessary to improve computing capacity, reduce power consumption, eliminate communication delays, and ensure stable communications beyond the performance of conventional computing technologies and the Internet.

To overcome these limitations, we have implemented "Low power consumption", "Large capacity, High quality" and “Low latency" networks by utilizing photonics technologies such as photonics-electronics convergence devices everywhere from networks to terminals. (Electronics to Photonics)

Computing capacity

Explosion of data volume

Communication delay

Increasing the impact of delays

Stable communications

Expansion of mission-critical use

ROI/ Green ROI

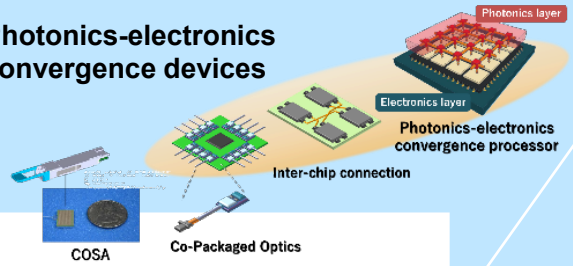
Explosion of Power Consumption

IOWN

Future communications infrastructure by using cutting-edge technologies like photonics and computing technologies

Lower power consumption | **Large capacity and high capacity** | **Low latency**

Photonics-electronics convergence devices

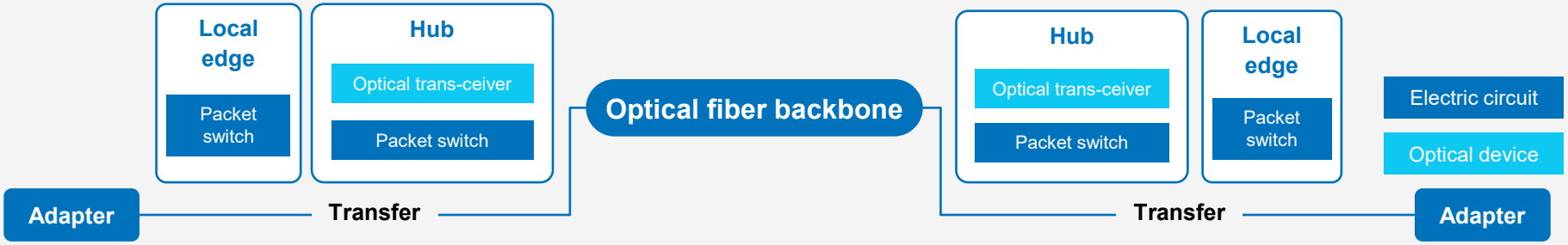


- Smart City
- Smart Sports
- Smart Infrastructure
- Smart Mobility
- Smart Workstyle
- Smart Healthcare
- Smart Education
- Smart Agriculture

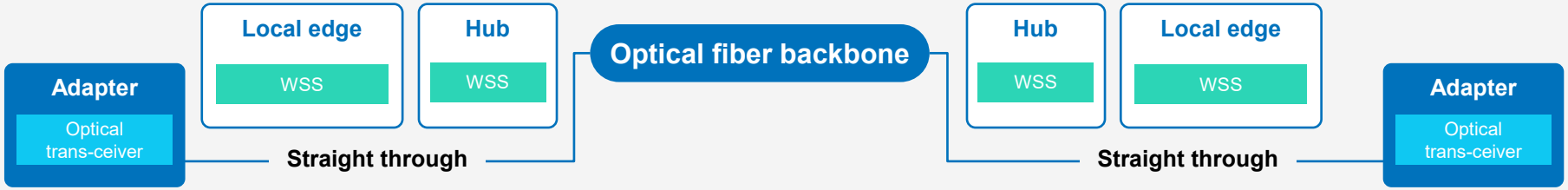
IOWN network:

All-Photonics Network (APN)

Up to now



All-Photonics Network (APN)



WSS: Wavelength-selective switch

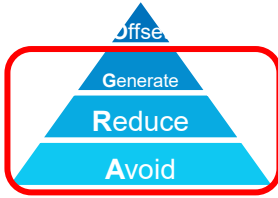
Virtual energy demand/supply control technology

Locally produced and consumed renewable energy

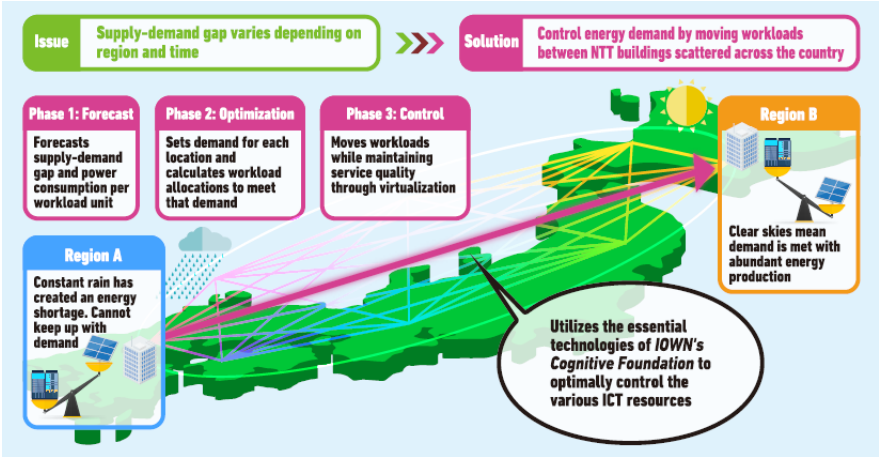
Eliminate supply-demand gaps by adjusting energy/demand through proper workload allocation

At NTT buildings across Japan, weather and other factors have created renewable energy supply and demand gaps. Virtual energy demand/supply control technology will eliminate this gap by moving workloads (work processed by ICT equipment) from sites with insufficient power to those with abundant power, effectively utilizing excess renewable energy. This technology promotes local production for local consumption of renewable energy, optimizing power supply and demand across regions.

NTT



Utilize excess renewable energy to close regional supply-demand gaps



Summary

1. **NTT, and NTT Global Data Center at a glance**

2. **Sustainability direction in NTT group and NTT Limited**

3. **Sustainability direction in NTT APAC Global Data Center**
   - Current situation in APAC DC industry, and existing actions in NTT GDC APAC
   - Initiatives in NTT GDC APAC, such as coordinating vPPA, etc

4. **New sustainability initiatives in NTT**
   - **NTT Announced ～1tn JPY “Green Energy x ICT” investment in 5 years**
     Including M&A for RE company, Green Power Investment, in Japan.
   - **IOWN from NTT**
     Locally produced and consumed renewable energy


NTT
Thank you