FY2024 Commissioned Project for the City-to-City Collaboration for Zero-Carbon Society Program

Promotion of Environmental Infrastructure Development in Ulaanbaatar's Cold Climate

December 19, 2024

Oriental Consultants Co., Ltd.

Oriental Consultants Co., Ltd.

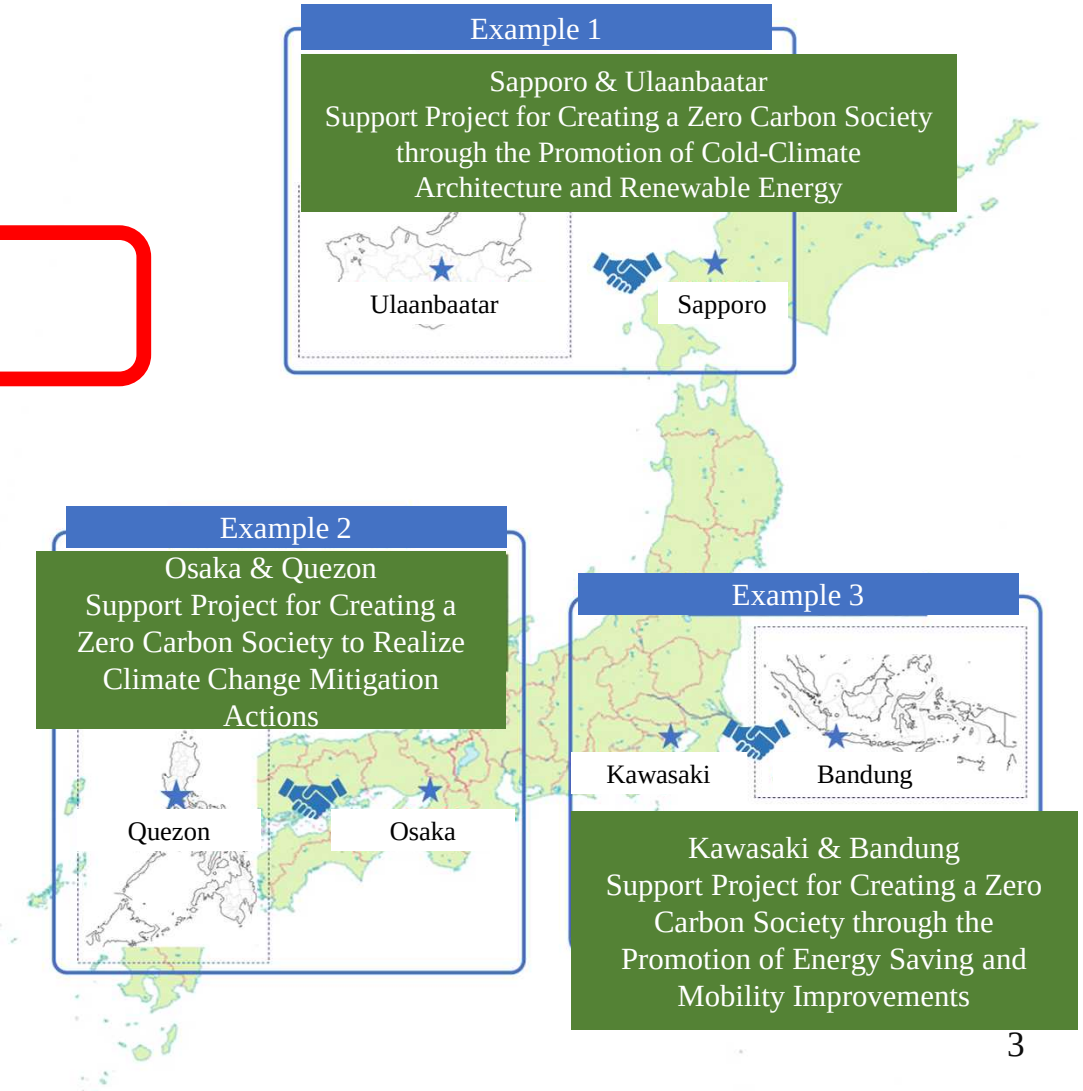
We aim to create new social value through infrastructure development and business creation by leveraging our expertise and knowledge gained over half a century.

- Establishment: December 24, 1957
- Head Office: Sumitomo Fudosan Nishi-Shinjuku Building No. 6, 3-12-1 Honmachi, Shibuya City, Tokyo
- Capital: 500,950,000 yen
- President: Hidenori Nozaki
- Employees: 1,296 (as of September 2022)

Business segments (social value creation for the entire community)

Projects have been implemented with five cities under the Ministry of the Environment's City-to-City Collaboration for Zero Carbon Society Program.

2017 – Present:
Osaka & Quezon (Philippines)
2017 – 2018:
Osaka & Ho Chi Minh (Vietnam)
2020 – Present:
Sapporo & Ulaanbaatar (Mongolia)
2021 – 2023:
Kawasaki & Bandung (Indonesia)
2024 – Present:
Sakai & Da Nang (Vietnam)



City-to-City Collaboration for Zero-Carbon Society Program

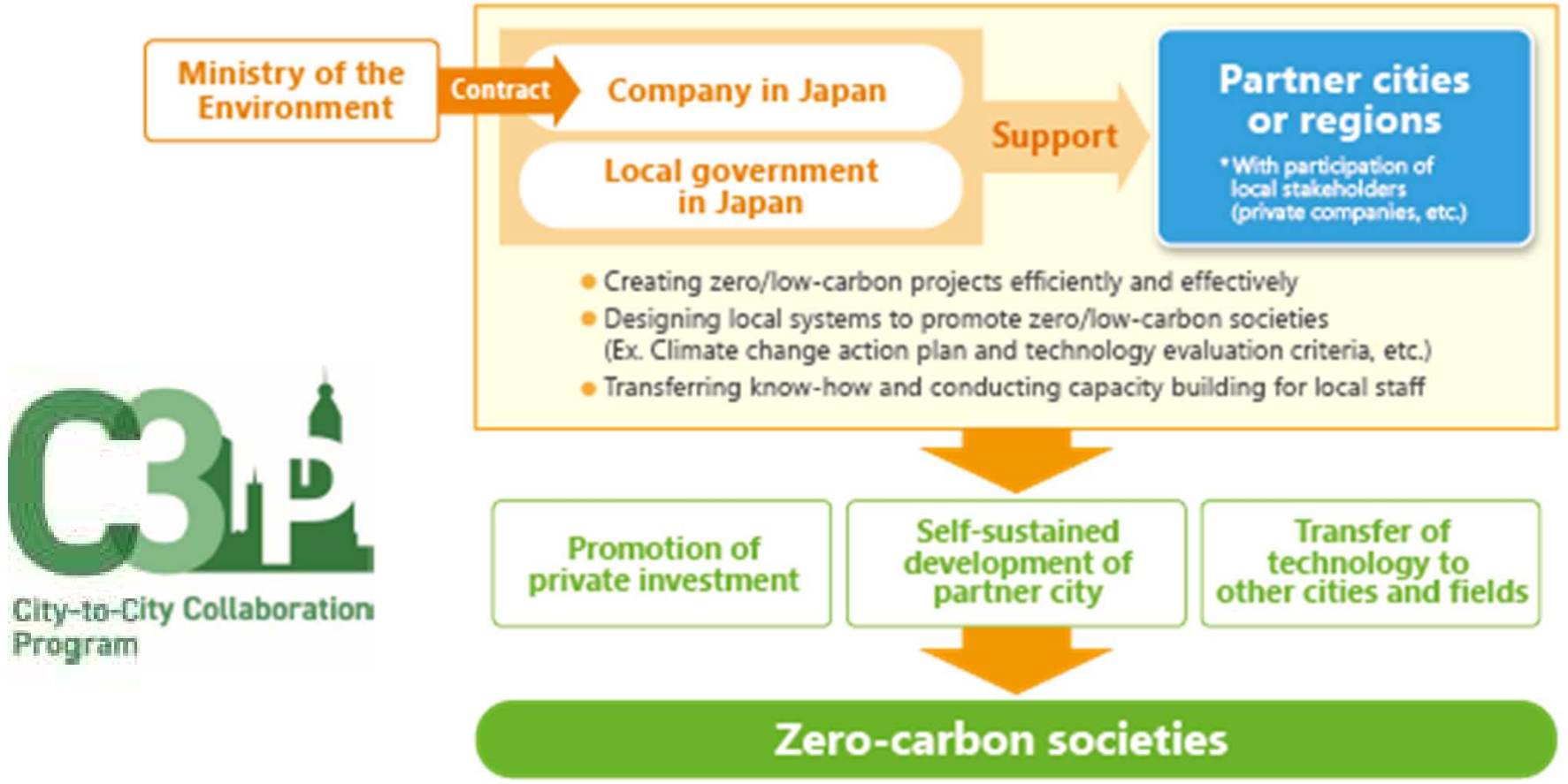
Approx. 70% of global greenhouse gas (GHG) emissions come from cities. To achieve the 1.5-degree target set in the Paris Agreement, **the acceleration of climate action in cities** is essential.

Planning and Implementation

Cities collaborate with various stakeholders to plan and implement measures.

City-to-City Collaboration for Zero-Carbon Society Program

Supporting the transfer of Japanese cities' experience and expertise in creating zero-carbon societies to other cities around the globe through collaboration between Japanese and overseas municipalities



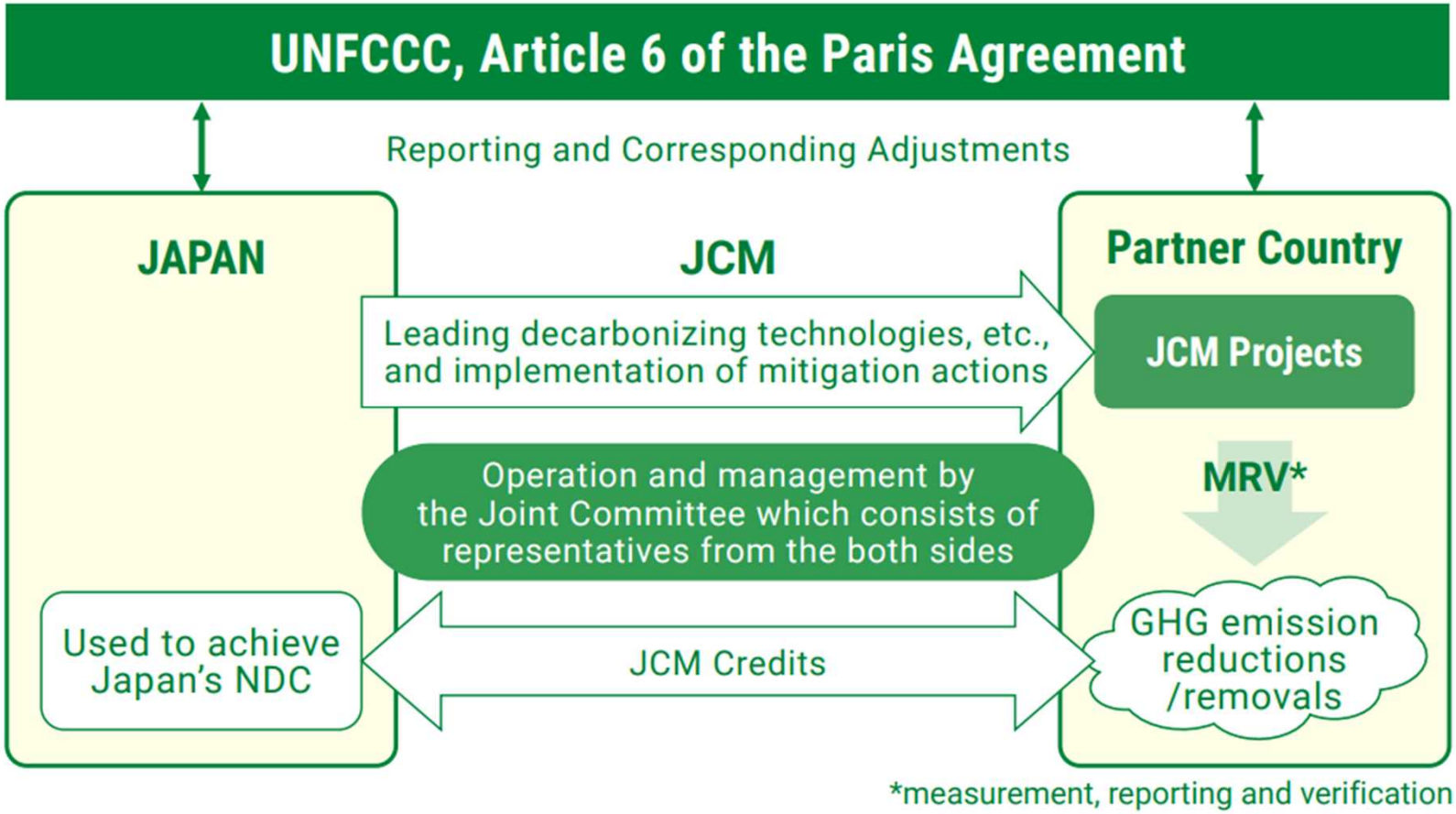
City-to-City Collaboration Program

Horizontal deployment of domestic success stories to overseas municipalities (utilizing JCM Equipment Subsidy Program, etc.)

49 cities and regions in 13 countries, participation by 20 Japanese municipalities

Joint Crediting Mechanism (JCM)

To contribute to global GHG emission reductions and sequestration, Japan operates the JCM by transferring technologies and establishing mechanisms for implementing mitigation actions in developing countries and regions.



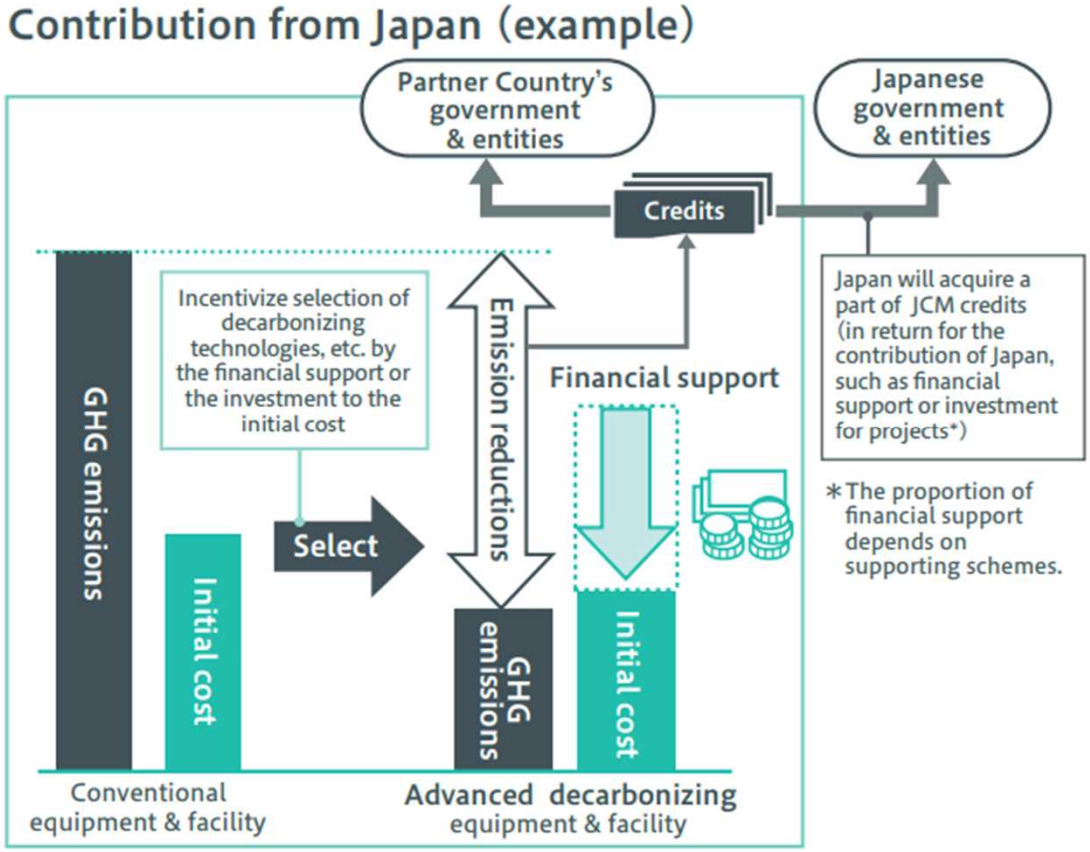
Japan signed its first JCM agreement with Mongolia in 2013, and the mechanism has since expanded to include 29 countries.

Joint Crediting Mechanism (JCM)

The JCM Equipment Subsidy Program utilizes decarbonization and other technologies to support the introduction of equipment with low GHG emissions in JCM partner countries and conducts measurement, reporting, and verification (MRV) for the installed equipment.

・To ensure efficient project implementation, an international consortium consisting of Japanese and foreign entities is formed.
・Up to half of the initial investment cost is subsidized for the project.

Ministry of the Environment's JCM Financial Support Program (2013–2024)
Total No. of projects: **246** (in 29 partner countries)



In Mongolia, 10 projects have been implemented, including those for the introduction of solar power generation systems and high-efficiency heat supply boilers.

Sapporo and Ulaanbaatar: History of City-to-City Collaboration

Ulaanbaatar joined the World Winter Cities Association for Mayors (WWCAM) in 1998. The Ulaanbaatar Declaration was adopted at the 2012 Mayors Conference, advocating the efficient use of energy and heat.

Technical Exchanges as Cities in Cold Regions

・Mongolia became a JCM partner country on January 8, 2013.
・Under the Japan-Mongolia Mid-Term Action Plan, it was decided that JCM projects would be implemented through close public-private collaboration.

Ulaanbaatar Declaration 2012

City-to-City Collaboration Projects (2016)

・An energy project involving mining and industrial facilities and heat supply equipment to reduce air pollution
・Promotion of effective utilization of renewable energy (solar and wind) to support decarbonization
・An electricity generation project utilizing waste from areas surrounding the city

Exhibition booth at the Winter Expo held in Ulaanbaatar City in 2012

Sapporo and Ulaanbaatar: History of City-to-City Collaboration

Other Technical Exchange Activities

JICA Partnership Program

・Sapporo City Fire Bureau: Ulaanbaatar City Firefighting Technical Support Project (FY2013 to FY2015)
・Sapporo City University: Parenting Guidance for High-Risk Children with Congenital Hip Dislocation (January 2014 to March 2016)
・Sapporo City Waterworks Bureau: Water Transmission and Distribution System Improvement Project for Water Supply in Ulaanbaatar City (January 2016 to December 2018)

JICA Technical Cooperation

・Sapporo City Urban Renewal & Development Bureau: Ulaanbaatar City Master Plan Development and Implementation Capacity Building Project (2016 and 2017)

Major Visits to Sapporo from Ulaanbaatar City

2012: Mayor, Director of the Investment Bureau, and a Mongolian Tourism Delegation
2014: Director of the Strategic Policy and Planning Division, Mayor's Office
2016: Director of the Strategic Policy and Planning Division of Ulaanbaatar City
2018: Director of the Administrative Management Division, Governor's Office
2020: Ulaanbaatar City Administrative Delegation
2023: General Manager

Kankyo Hiroba Hokkaido 2023 Mongolia Seminar

Sapporo and Ulaanbaatar: City-to-City Collaboration in Cold Regions

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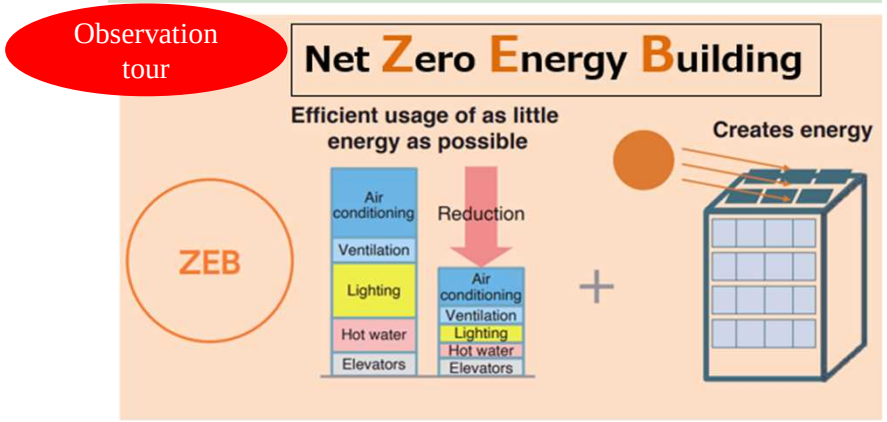
Expanding decarbonization initiatives tailored to Sapporo's local characteristics in Ulaanbaatar

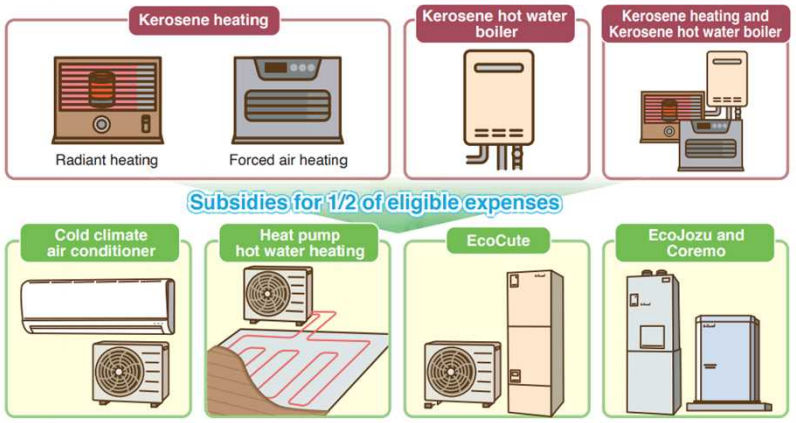
Local characteristics: cold, snowy climate

Promoting Net-Zero Energy Housing (ZEH) and Zero Energy Buildings (ZEB) to significantly reduce heating energy consumption



Constructing energy-efficient buildings and apartment buildings

Promoting energy transition from kerosene heaters and hot water boilers



Transition to energy-saving equipment using electricity or gas

Ulaanbaatar

Introducing the ZEB concept into buildings

Promoting energy saving and renewable energy

Introducing high-efficiency heat supply systems

Energy transition

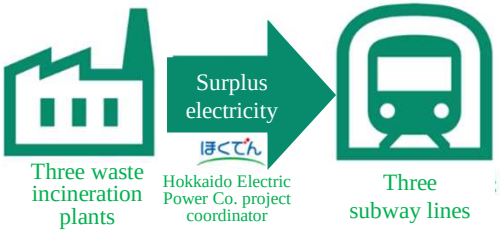
Model projects for facilities, apartment buildings, hospitals, factories, etc. (utilizing JCM)

Sapporo and Ulaanbaatar: City-to-City Collaboration in Cold Regions

Sharing knowledge on advanced initiatives tailored to Sapporo's local characteristics with Ulaanbaatar

Local characteristics: concentration of population and urban functions

Utilizing surplus electricity from waste incineration plants



Supplying surplus electricity from waste incineration heat to the subway system

Expanding and upgrading district heat supply systems


Installation of heat conduits


Utilization of snow and ice heat


Cogeneration system


Utilization of woody biomass

Developing heat supply systems in central Sapporo

Observation tour

Hydrogen model city district

Stationary hydrogen stations

Observation tour

Low-carbon smart city

Shin Sapporo Energy Center

Ulaanbaatar

Utilization of resources and waste

Maximum utilization of natural energy sources for local production and local consumption

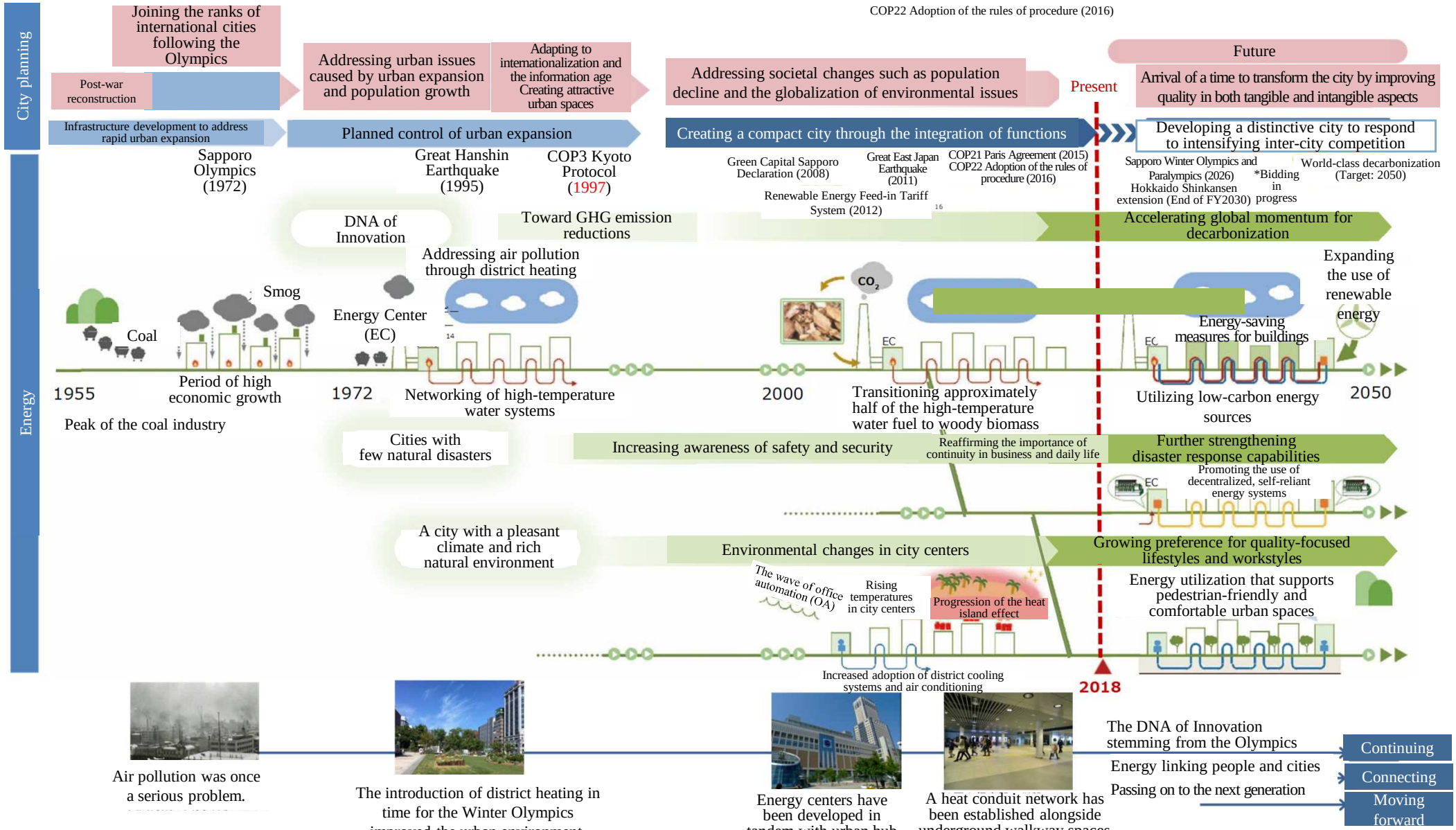
Energy transition

Creation of a low-carbon city

Enhancement of the resilience of urban functions

Sapporo and Ulaanbaatar: City-to-City Collaboration in Cold Regions

Sharing Sapporo's experience of using the 1972 Winter Olympics as an opportunity to transition from a coal-dependent society with Ulaanbaatar, which is promoting air pollution countermeasures



Sapporo and Ulaanbaatar: City-to-City Collaboration in Cold Regions

Developing model projects utilizing JCM to contribute to future large-scale plans

	Small-scale model projects (utilizing JCM)	Contribution to Ulaanbaatar's Large-Scale Plans
Transition to low-carbon housing and facilities	**Introducing the ZEB concept into buildings** ・Feasibility study for introduction in the planned new city hall building and apartment buildings ・ Optimization study for indoor environments ・ Proposal for rooftop solar power generation (private factories, hospitals) ・ Feasibility study for the introduction of geothermal heat pumps (demonstration project)	Green Development Plan Project
Energy transition for heat supply systems	**Introduction of high-efficiency boilers** ・Proposal of LPG boilers for factories	District Heating Improvement Project
Utilization of resources and waste	**Maximum utilization of natural energy sources** ・Feasibility study on ice shelters, biogas, and other natural energy sources proven effective in cold regions like Sapporo and Hokkaido	

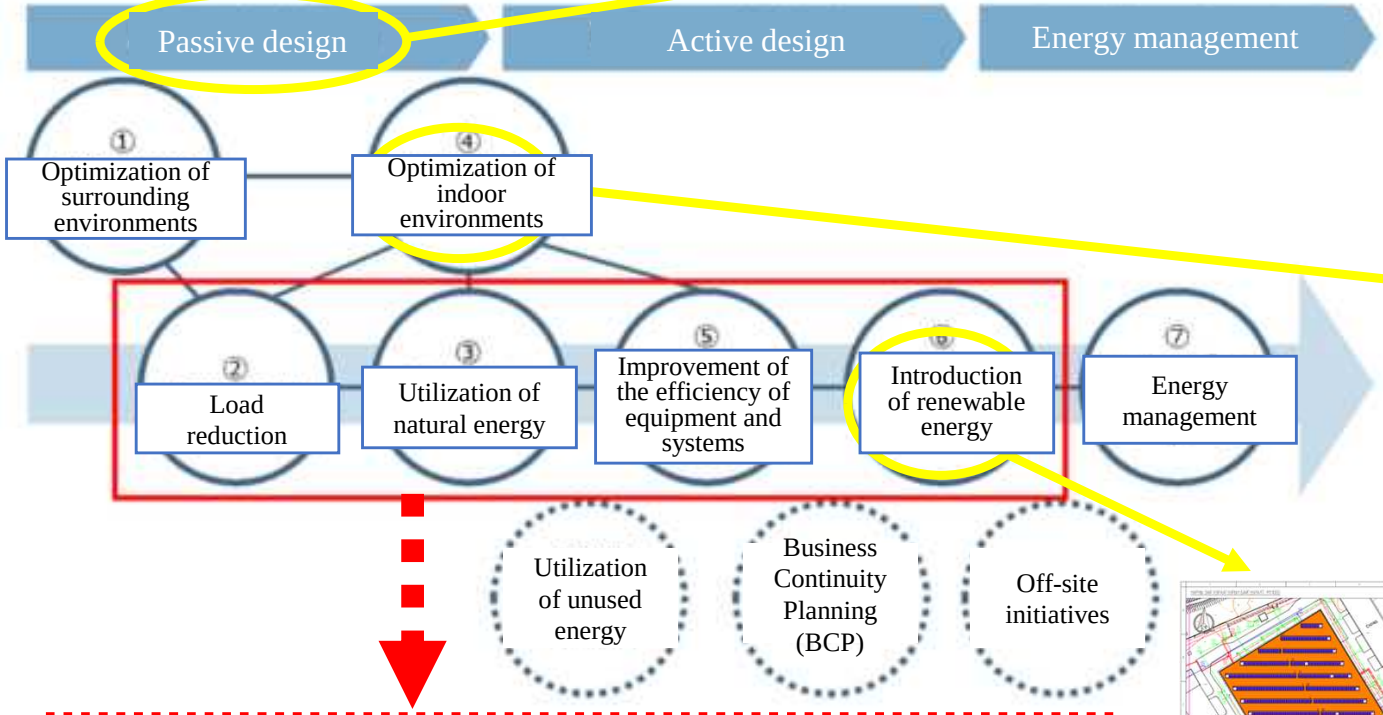
Energy saving in an eco-town covered by the project

Energy	Energy saving Heat energy consumption: 114 kWh/m²/year	25%
	Proper utilization of private roads reduces operating costs	
Energy	Energy saving Electricity consumption	20%
Water	Water conservation Water expenses	22%
Materials	Resource conservation Energy absorbed in construction materials	24%
	Green apartments Reduction in utility costs	20%

Saving

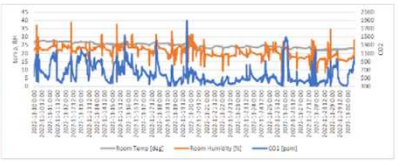
Initiatives for transition to low-carbon housing and facilities

Process for introducing the ZEB concept



Case study on low-carbon model buildings for the planned new city hall building and apartment buildings (October 2021–December 2022)

Lecture on and visit to a passive house (December 2022)



Indoor environment measurement survey (October 2022–January 2023)

Proposal for rooftop solar power generation for private factories and hospitals (from August 2024)

Geothermal heat pump demonstration project for schools (from December 2022)

Dissemination of the ZEB Concept

Examples of Japan's cold-climate technologies

Кейс ①	ZEB
Нэр:	Ariga Planning Co., Ltd.-ийн барилга (Саппоро, Хоккайдо)
Хоккайдо дахь ZEB-ийг хэрэгжүүлсэн анхны барилга бөгөөд BELS-ийн 5 одтой хамгийн өндөр зэрэглэлээр баталгаажсан. Газар доорх дулааны насос, цас хайлуулах технологи ашиглан халааж хөргөх замаар эрчим хүч хэмнэж, цонхондоо Low-E давхар шилээ, бүх байшинд LED, гэрэлтүүлэг/агааржуулалтын удирдлага, BEMS-ийг нэвтрүүлснээр үр ашгийг нь улам дээшлүүлж байна. Дээвэр болон ханан дээр суурилуулсан нарны хавтангууд нь ойролцоогоор 50 кВт хүртэл эрчим хүч үйлдвэрлэх боломжтой.	

Барилгын гадна болон дотоод засал:

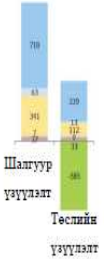
Барилгын тойм:	Барилгын хэрэглээ: оффис гм Бүтэц: Ган бүтэц Давхарын тоо: газраас дээш 4 давхар, подвалгүй	Нийт талбай: 644м2 Дууссан жил: 2018 он Шинэ барилга/сэргээн босголт: шинэ барилга

Суурилуулах тоног төхөөрөмж:

Эрчим хүч хэмнэх (Пассив технологи)	гадна хана	Шүршдэг полиуритан хөөсөн тусгаарлагч 125мм
	дээвэр	Шүршдэг полиуритан хөөсөн тусгаарлагч 150мм
	цонх	Low-E түрхлэгтэй давхар шилэн багцтай
Эрчим хүч хэмнэх (Идэвхтэй технологи)	Агааржуулагч (дулааны эх үүсвэр)	Газрын гүний дулааны насос
	Агааржуулагч (систем)	Бүрэн дулаан солилцооны систем, шалны
	Агааржуулалт (систем)	
	Гэрэлтүүлгийн төхөөрөмж	
	Гэрэлтүүлэг (систем)	
	Удирдлагын сист	
Эрчим хүч үйлдвэрлэл	Сэргээгдэх эр хүч	

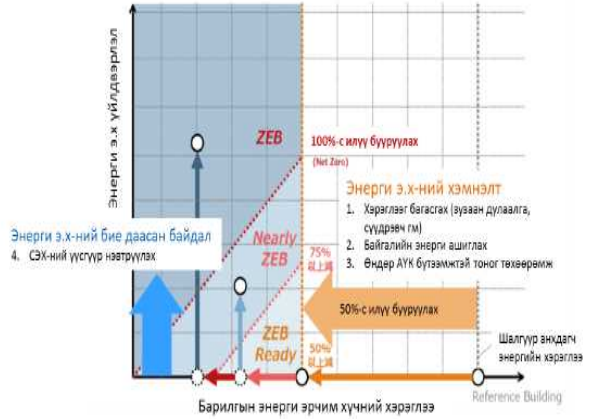
Ур дүн:

Анхдагч эрчим хүчний хэрэглээ (MJ/жил ㎡)	Шалгуур үзүүлэлт	Төслийн үзүүлэлт	BPI / BEI
PAL (Хаших хийц, цонх)	480	272	0.57
агааржуулагч	710.27	339.05	0.48
агааржуулалт	62.55	13.04	0.21
гэрэлтүүлэг	340.65	111.61	0.33
Халуун усны хангамж	7.12	9.02	1.27
Цахилгаан шат	37.27	33.13	0.89
Хосолмол эрчим хүчний үйлдвэрлэл	0.00 0.00	0.00 0.00	-
Эрчим хүч үйлдвэрлэл	0.00 0.00	-584.50	-
бусад	186.95	186.95	-
нийт	1334.81	108.30	0.09
Нийт үйлдвэрлэл (эрчим хүчийг оруулаагүй)	1334.81	692.80	0.52



* PAL: Perimeter Annual Load Factor

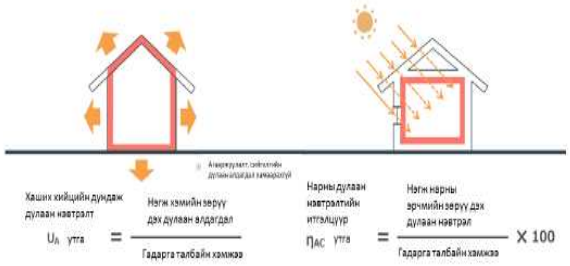
Overview of energy-saving performance calculations in Japan



Source: METI, Agency for Natural Resources and Energy,
https://www.enecho.meti.go.jp/category/saving_and_new/saving/zeb_report/pdf/report_160212_ja.pdf

Хаших хийцийн дулаан хамгаалалтын үзүүлэлт ба түүний тооцоолол

Хаших хийцийн дулаан хамгаалалтын үзүүлэлтэд дулаан дамжуулах дундаж хэмжээ U_A, нарны дулаанаас хамгаалах үзүүлэлт хөргөлт шаардлагатай улирлын нарны дулаан нэвтрэлтийн итгэлцүүр η_AC -г ашигладаг.



1 р бүс	2 р бүс	3 р бүс	4 р бүс	5 р бүс	6 р бүс	7 р бүс	8 р бүс
0.46	0.46	0.56	0.75	0.87	0.87	0.87	-

1 р бүс	2 р бүс	3 р бүс	4 р бүс	5 р бүс	6 р бүс	7 р бүс	8 р бүс
-				3.0	2.8	2.7	6.7

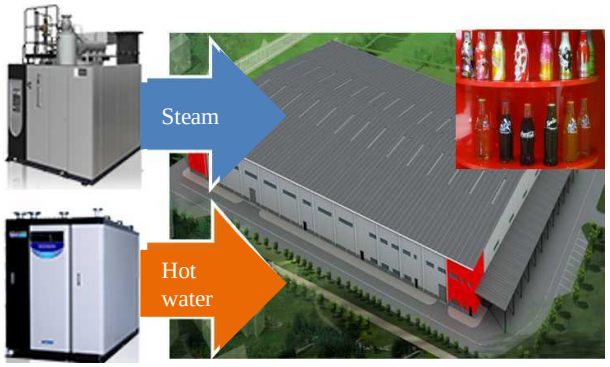
Sapporo and Ulaanbaatar: City-to-City Collaboration in Cold Regions

Initiatives for energy transition for heat supply systems

Introduction of high-efficiency boilers

An existing coal-fired boiler
(food factory for convenience stores)

Heavy use of coal



Proposal based on JCM achievements involving the introduction of an LPG boiler in a beverage factory

Initiatives for resource and waste utilization

Maximum utilization of natural energy sources

Ice shelter for trial introduction in Mongolia

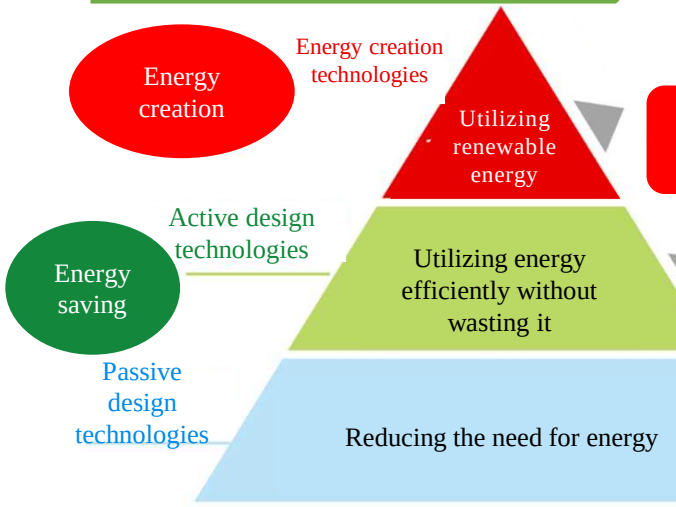
Seminar and observation tour (October 2024)

Study on biogas equipment using manure from cow sheds
(dairy company)

On-site investigation by the Mongolian University of Science and Technology and Japanese companies (October 2024)

Sapporo and Ulaanbaatar: City-to-City Collaboration in Cold Regions

The City-to-City Collaboration Program, which builds on the relationship developed through the WWCAM and was officially launched during the COVID-19 pandemic, aims to contribute to Ulaanbaatar's carbon neutrality through technical and human resource cooperation as well as knowledge sharing.

Sapporo's knowledge and experience	City-to-City Collaboration Program	Contribution to Ulaanbaatar
	Energy transition for heat supply systems	Improvement of district heating (LPG)
	Utilization of resources and waste	Solid fuel production from resources
	Transition to low-carbon housing and facilities	Green Development Plan (energy saving)

Technical cooperation	・Promotion of ZEB initiatives (rooftop solar power generation) ・Waste-to-fuel conversion ・High-efficiency heat supply (LPG boilers)	・Utilization of JCM Projects (private sector) ・Utilization of JICA, ADB, Green Climate Fund (GCF), etc.
Human resource development	・Cooperation in capacity building for construction and heat supply-related personnel	・Utilization of the JICA Partnership Program
Knowledge sharing	・Site visits for decarbonization technologies ・Sharing knowledge on policy initiatives	・Collaboration on initiatives for achieving carbon neutrality

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Маш их баярлалаа

Хамтран ажиллана уу