TEPCO

DX White Paper 2024

TEPCO

Tokyo Electric Power Company Holdings,Inc.

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On TEPCO DX White Paper

The TEPCO Group will promote business structure transformation through thorough digitalization

Tokyo Electric Power Company Holdings, Inc.
Managing Executive Officer
Chief Information Officer and
Chief Information Security Officer

闇 知道

This is a white paper introducing Digital Transformation (DX) efforts of the TEPCO Group. The TEPCO Group operates throughout the entire value chain of the energy business, supported by many stakeholders. We appreciate if many of you could understand our aimed image and examples of our DX.

The TEPCO Group is working to transform the business structure to achieve both stable power supply and carbon neutrality. DX activities are positioned as measures to support such transformation. TEPCO DX is aimed to "drive the realization of zero-carbon energy society" based on the company's raison d'être (reason of existence), and sets "thorough digitalization" as a specific action. Thorough digitalization will refine the "one-stop power" business model and acquire the "transition partner" business model, which are two business models that the TEPCO Group is working on to transform its business structure. The latter half of the white paper will introduce examples and actual results.

TEPCO DX is believed to realize a zero-carbon energy society by connecting with our stakeholders and partners through data. As the TEPCO Group owns information of 1/3 of customers and power facilities in Japan, social data infrastructure Zero Carbon Energy Data Hub has been built to distribute data to local governments and other industries and has started to provide services.

DX utilizes latest technology and data to transform work processes, thereby creating new businesses or "building the future". We hope to aim for a future of zero-carbon energy society with many of you.

Direction of transformation through DX

- TEPCO DX drives the realization of a sustainable zero-carbon energy society through thorough digitalization
- Stable supply of zero-carbon energy, comfortable life for customers, and reduced CO2 emission and resilience for the society and community are realized

TEPCO DX

Drives the **realization of a zero-carbon energy society** through thorough digitalization

Comfortable life

Customers

Energy-saving

Cost reduction

Connecting data with ...

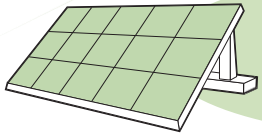
Society / community

Reduced CO2 emission

Resilience

TEPCO DX
Thorough digitalization

Value



Zero-carbon energy

Stable supply of electricity, hydrogen, etc.

Goal

Mitigate global warming and drastic climate change, and maintain biodiversity

Business transformation and business model realized through digitalization

- Work processes are transformed into data-driven business operations through thorough digitalization
- Refine the conventional one-stop power business model, and acquire the transition partner business model to realize a zero-carbon energy society
- Zero Carbon Energy Data Hub is built as an infrastructure to distribute data on zero-carbon energy society, which provides data and services

Concept

Before DX

Complement experience and know-how with data

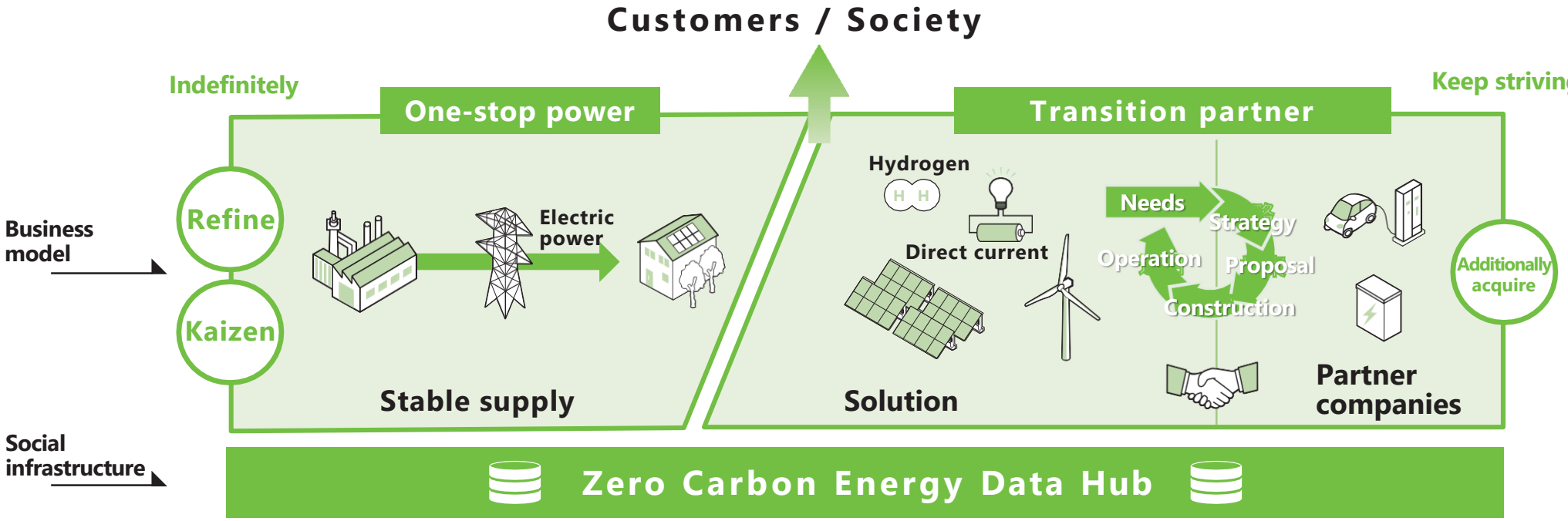
+D → D+

After DX

Business operations with thorough digitalization

Data-driven business operations

Outline of business model aimed for by TEPCO DX



Examples of provided values through thorough digitalization

Connecting data with ...

Stable Supply

- Shortening of facility shutdown period due to prediction of facility failure, improvement of operability through data utilization, suppression of increased emission of CO_2

Cost reduction

Streamlining / Optimization

- Shifting resources to transformation activities and new carbon-neutral businesses by formalizing know-how and experience

Increased profit

Well-being

- Zero personal injuries due to elimination of unsafe actions based on accident cases
- Employee happiness through connections with colleagues who share common thoughts and feelings

Employee satisfaction

Surprise / Awareness

- Proposal of carbon-neutral products and services by estimating individual needs from attribute, facility, action and history data
- Diagnostic chart on what to do based on owned products, actual results and CO2 emissions

Increased sales / Customer satisfaction

Security / Safety

- Regional disaster prevention and ensuring safety by coordinating information on disasters, rainfall, etc.
- Real-time distribution of operation data and footage of nuclear facilities

Gaining trust

Collaboration

- Energy data linkage with prosumers and operators, social implementation of locally produced and consumed Area EMS*1 in a decarbonized region
- Business creation through real-time DER*2 control and aggregation

Market creation

*1 : EMS = Energy Management System　*2 : DER = Distributed Energy Resources

Five action guidelines

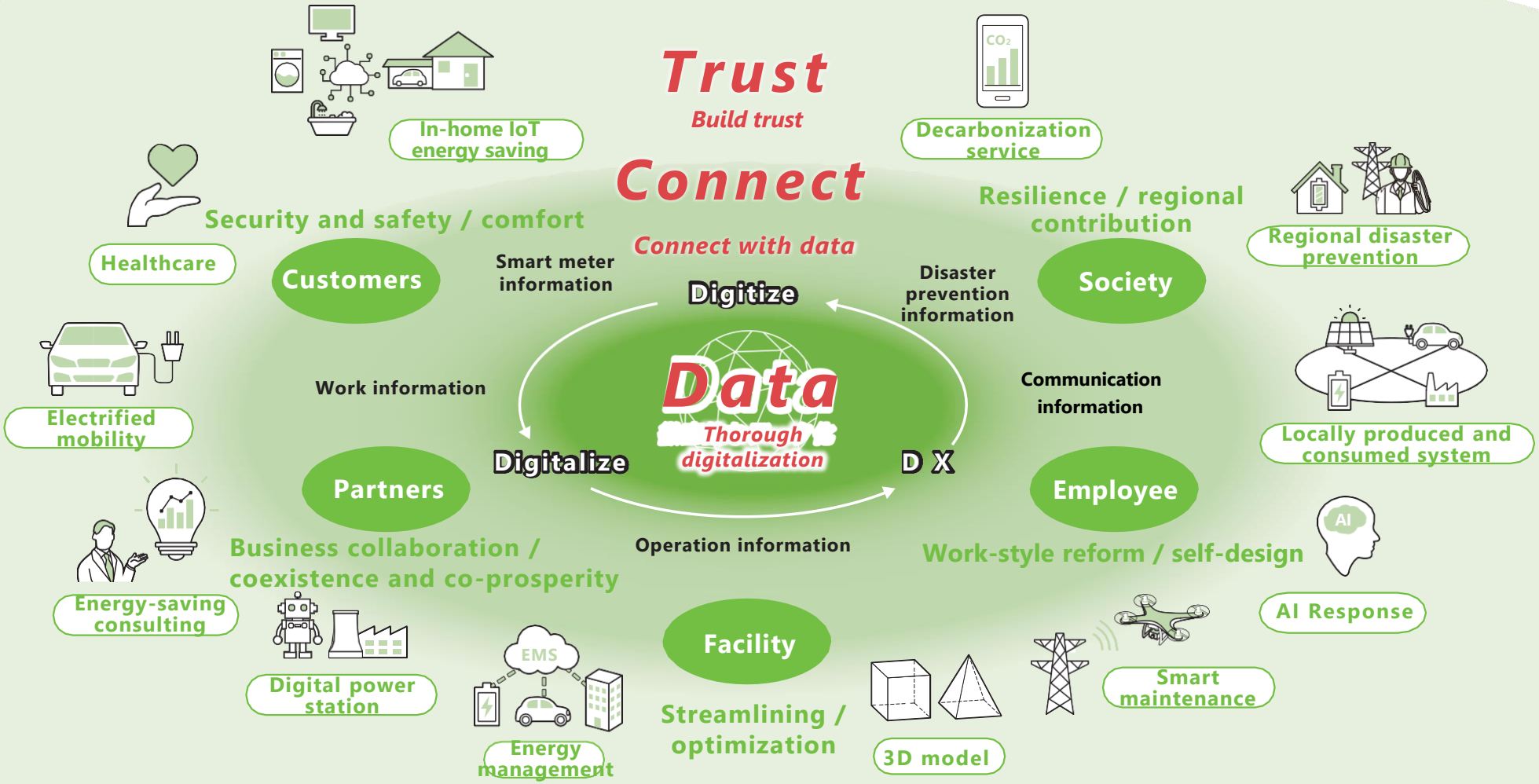
・Set action guidelines for each employee to ensure realization of transformation through “data”

5 articles of transformation

1. **Thoroughly convert work operations into data, believing the power of data**
2. **Speak with data to make decisions that depart from intuition, knack and guts**
3. **Connect with colleagues and partners crossing departmental boundaries with the common language of “data”, and exchange ideas to co-create values**
4. **Build trust of the society and customers with transparent data**
5. **Each and every person is involved. Believe in data when taking action, and unlock yourself from customs**

TEPCO DX vision

Mitigate global warming and drastic climate change, and maintain biodiversity



Achieving both Fukushima revitalization and decommissioning

Ensuring nuclear safety

Connect with internal and external parties as well as customers (Connect) through thorough digitalization (Data) and gain trust of the society (Trust), thereby expanding new businesses such as decarbonation services (realization of business structure transformation)

TEPCO DX roadmap

2050 Substantially zero CO2 emissions from energy supply

Transform the business structure to achieve both long-term stable supply and carbon neutrality

2030 Reduction of CO2 emissions from electricity sales by 50%
(compared to FY2013)

Trust
Build trust

Decarbonization solutions based on co-creation

- Creation of highly value-added services through cross-industrial alliances
- Next-generation city planning through advanced energy management
- Zero Carbon Energy Data Hub as a social infrastructure

Connect
Connect with data

Resilient energy value chain

- Improvement of customer services utilizing advanced technology
- Strengthening of energy network utilizing real-time data
- Regenerative energy as the main power source through smart power generation

Data
Thorough digitalization

Acquisition of competitive power through human resources and cultural reforms

- Promotion of value demonstration by assigning appropriate resources to the appropriate place at the appropriate time
- Development of DX personnel through reskilling of “D” and “X”
- Development of an environment for all-employee participatory transformation activities

Promotion of development of digital foundation

- Building of digital service platform and democratization of data
- Revamping of legacy system and integration of data
- Ensuring cyber security by a specialized organization

Transformation of human and organizational culture → **Transformation of business** → **Contribution to the society**

Examples of transformation

Examples of transformation through TEPCO DX

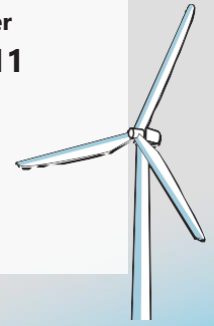
Power generation | **Power transmission and distribution** | **Demand**

Nuclear power

- Advanced facility management utilizing 3D model technology ... P10

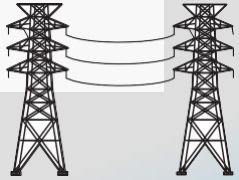
Renewable energy

- Smart maintenance of power stations utilizing drones ... P11
- Accelerated restoration and maximized power generation through real-time management ... P12



System

- Advanced maintenance of power transmission and distribution facilities utilizing drones ... P13
- Advanced maintenance of substations utilizing advanced digital technology ... P14

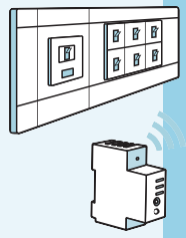


Comfortable life

- Improvement of CX/EX through analysis of customers' voice ... P15

Solutions

- CN promotion service through use of energy data ... P16
- Development of healthcare service utilizing power data ... P17



One-stop power

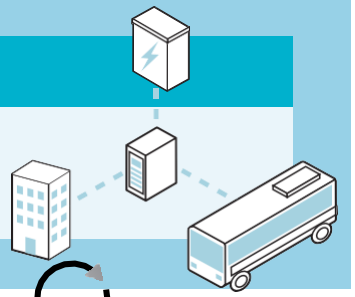
Resilient energy value chain

Transition partner

Decarbonization solutions based on co-creation

Next-generation city planning

- Building a next-generation community with Area EMS ... P18



Zero Carbon Energy Data Hub

01 Advanced facility management of nuclear power stations utilizing 3D model technology

TEPCO Holdings

- BIM*1 model is introduced as digital technology that can express the shape of buildings and structures in three dimension
- Not only the exterior but also interior structures such as walls and penetrations are visualized by creating 3D models of buildings of nuclear power stations
- Aim for further advancement of nuclear power station operations while ensuring that safety design is maintained by accurately planning and implementing penetration maintenance

Key points of the initiative

3D modeling of building details

- Various design requirements are converted into data for centralized, integrated management
- Requirements can be comprehensively confirmed with a bird's-eye view
- Vast amount of plan view and shape information can be efficiently confirmed

Easy information sharing

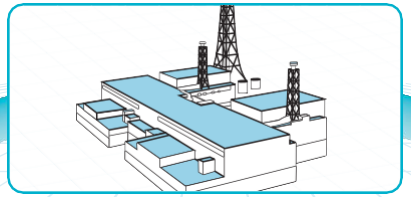
- Failure to factor in requirements is prevented in the design phase
- Miscommunication among organizations and companies is prevented
  - ➡Construction errors are consistently prevented from design to the field

Prospects of the initiative

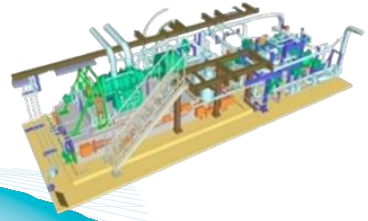
Further pursuit of safety

- Improve accuracy of design and construction by sharing models with external parties
- Prevent discrepancies in information between systems and streamline field operations

Example of wall display of requirements



3D modeling of nuclear power stations



Example of 3D modeling of building

Simplifying design requirements and structural understanding

Advancement of maintenance plan

Further effective use of 3D models

- ✓ Advancement of data management
- ✓ Expansion of scope of collaboration and utilization of external software
- ✓ Tracking management of areas that need repair

*1 : BIM = Building Information Modeling

02 Smart maintenance of hydro and wind power stations utilizing drones

TEPCO Renewable Power

- Renewable energy (especially hydro and wind power) is being promoted as the main power source, based on growing interest in carbon neutrality and needs for renewable electricity which has small cost fluctuations
- Although maintenance work has traditionally consumed a lot of manpower and time, the corresponding operating costs and work accident risks are an issue
- Advancement of maintenance work utilizing drones is planned to realize smart power stations that connect facilities, people and work operations with data and creates maximum values

Key points of the initiative

Unstaffed operation of a wide range of maintenance work

☐ Remote monitoring and remote control utilizing drones in various aboveground and underwater maintenance work contributes to not only improving productivity and reducing work loads but also preventing personal injuries by eliminating dispatch during emergencies

Strong internal and external promotion system

☐ Collaboration system with major domestic telecommunications infrastructure operator is developed. A system that enables autonomous drone flight within a 2km radius is established at hydroelectric dams that were previously radio insensitive.

Prospects of the initiative

☐ Shorten trouble investigation time*1 by approx. 96% at maximum

☐ Completely eliminate major personal injury risks during emergency dam inspection work

Image of utilization of drones at a hydro power station

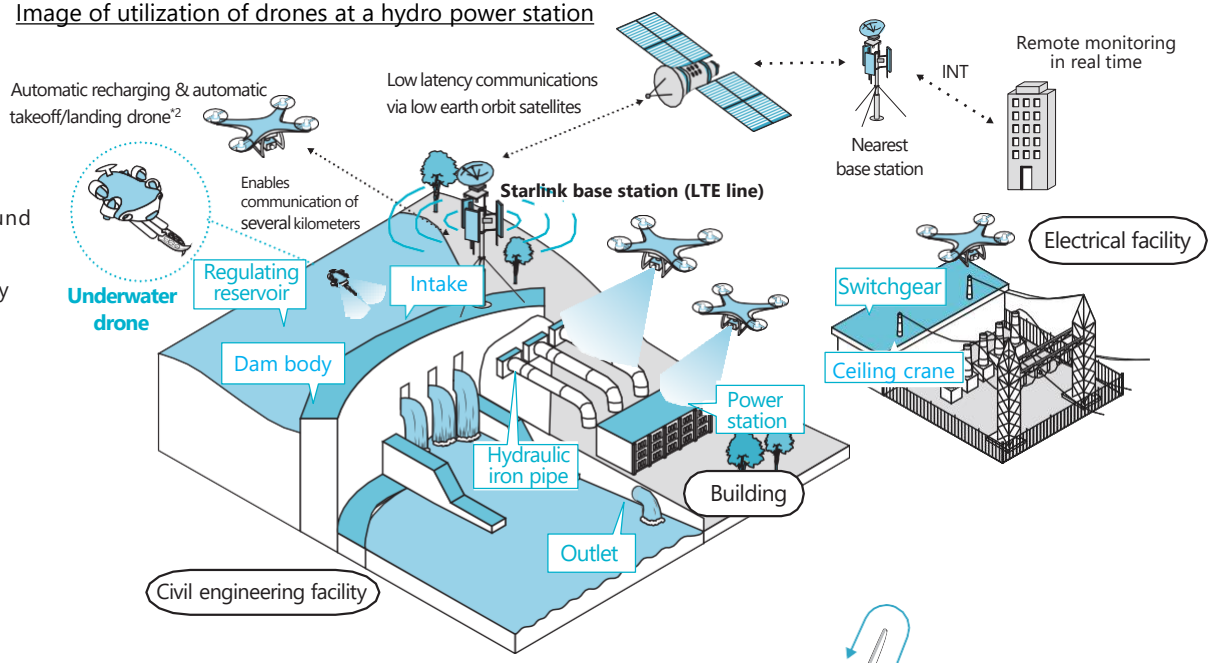
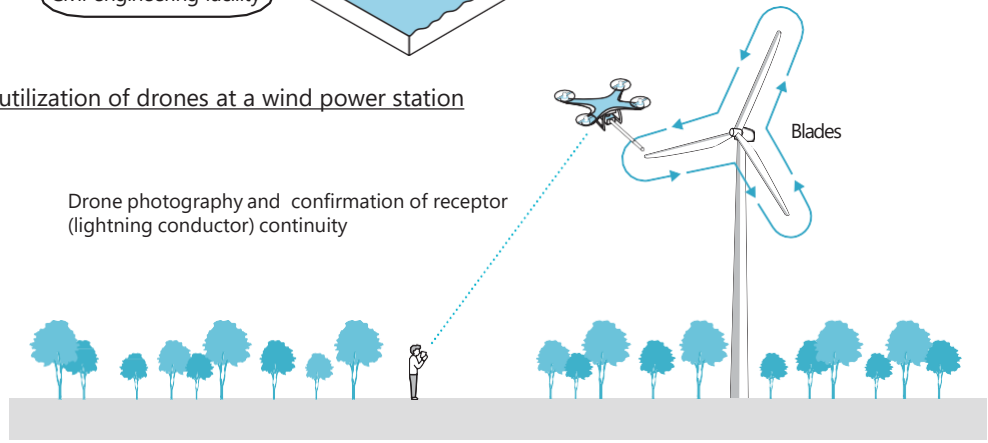


Image of utilization of drones at a wind power station



*1: Time from occurrence of the trouble to start of investigation is shortened from "more than 2 days including arrangement of personnel and materials" to "within 2 hours"

*2: Dam inspection by remote operation with autonomous flight drones utilizing satellite communications facilities for the first time in Japan

03 Accelerated restoration and maximized renewable energy generation through real-time management

TEPCO Renewable Power

- Development of a system that ① collects, stores and connects, ② effectively utilizes and ③ monetizes data is promoted since 2020
- Environment to easily access internal data of power generation status and income and expenditure status is built to realize data-driven real-time management
- Social values, such as stable supply, increased power from renewable energy and contribution to disaster prevention, are created with faster decision-making in the field, advancement of management decision-making and optimization of the entire watershed by utilizing AI

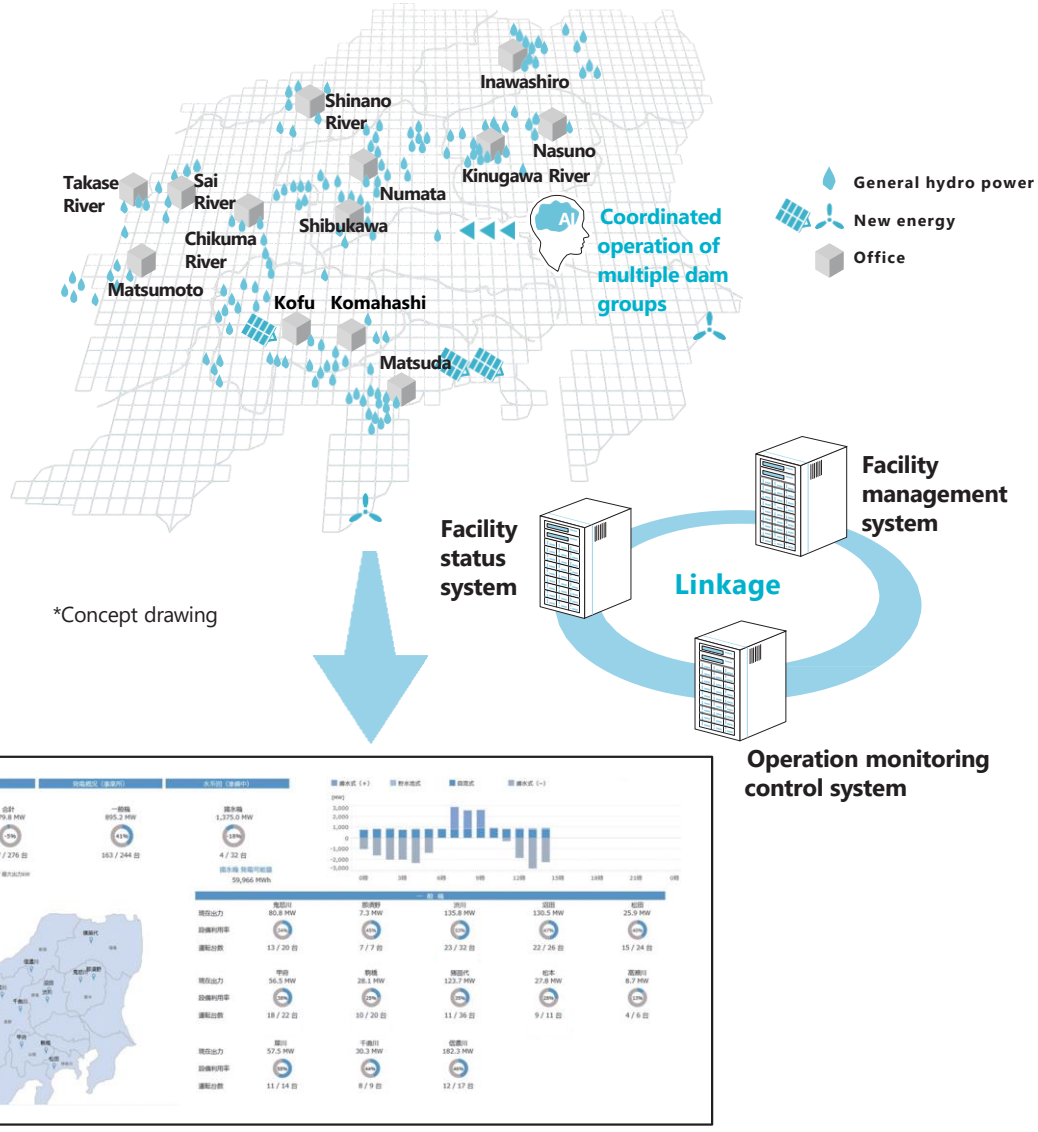
Key points of the initiative

Centralization of various data

- ☐ Operational analysis quality is dramatically improved by utilizing accumulated income and expenditure data and weather data around the power station in addition to existing facility data
- ☐ Advanced analysis is planned by linking weather data that cannot be collected by power station facilities alone
- ☐ Management indicators are visualized in real time with a unique dashboard
- ☐ Security issues are addressed with external collaboration

Both increased power and disaster prevention by utilizing AI

- ☐ Optimized model of dam operation of the entire watershed, including downstream power stations, through coordinated operation of multiple dam groups is simulated using AI utilizing accumulated operation data, thereby contributing to both increased power and disaster prevention



*Concept drawing

Prospects of the initiative

- ☐ Accurate management decisions can be made in real time without going to the field, and troubleshooting is dramatically accelerated
  - ➡ Maximized renewable energy generation
- ☐ Time required for dam operation simulation*1 is shortened by 99% at maximum

*1: Time required for water balance simulation calculation is shorted from “8 hours for a single dam” to “2-3 seconds for multiple dams”

04 Advanced maintenance of power transmission and distribution utilizing automatic drone flight system

TEPCO Power Grid

- Visual checks by going to the site are the basis for facility patrols and inspection work, which requires much manpower and time
- Aging of power transmission and distribution facilities and decrease of inspection workers due to the declining birthrate and aging population are issues, and it is a concern that stable supply will become even more difficult
- Early recovery from disasters and efficient and labor-saving patrols and inspection work are promoted by grasping equipment status with automatic drones and detecting abnormalities with AI

Key points of the initiative

Advanced facility maintenance with AI ×drones

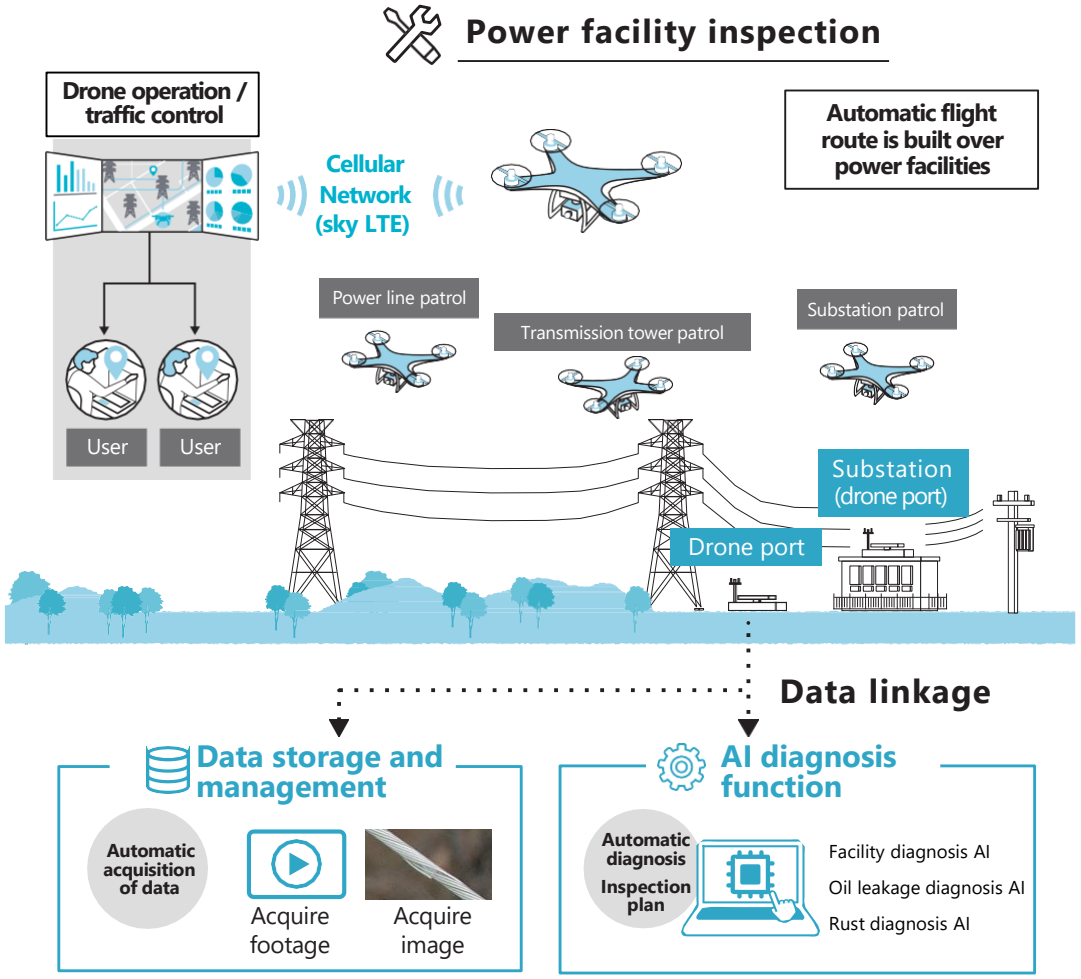
- ☐ Highly safe automatic drone flight system is built based on 3D data and know-how of facilities accumulated through facility maintenance work
  (2,400km drone route is planned to be built by the end of FY2024)
- ☐ High-precision facility diagnosis is realized with AI utilizing a vast amount of facility image data accumulated since 2013
- ☐ Image analysis platform with multiple AI implementations that diagnose image data acquired with the automatic drone flight system is being developed

Various alliances

- ☐ Multiple AI and systems are linked and centralized by cooperating with major system integrators
- ☐ Initiatives are accelerated by expanding the framework of the business association established by electric utilities and major system integrators

Prospects of the initiative

- ☐ Drastically reduced work time and inspection cost by automatizing inspection work and eliminating dispatch
- ☐ The automatic flight system is planned to expand its application to substations and power distribution areas and further strengthen resilience during disasters, after being applied to practical work in power transmission areas



05 Advanced substations utilizing advanced digital technology

TEPCO Power Grid

- The power system has become more complex due to the massive introduction of regenerative energy to realize a CN[*1] society. In order for power transmission and distribution operators to concurrently achieve stable supply of low-cost electricity, strengthened resilience, and decarbonization, more sophisticated substation operations are needed more than ever
- Reduction of patrol and inspection cost and suppression of facility renewal cost are planned by promoting digitization (sensing function, AI, 3D technology, drone, etc.) of substations and remotely grasping and assessing signs of abnormality and status of deterioration of facilities in real time

Key points of the initiative

Utilization of the largest scale of substation facility data in Japan

- ☐ Various data[*2] that could not be collected previously is collected and accumulated by establishing communication and monitoring control NW complying with international communication standards, and by sensing function
- ☐ Relevant drawings are converted into data to link abnormal areas with facility data when facility abnormality occurs, and speedy recovery is aimed for

Wide range of advanced and unstaffed maintenance work

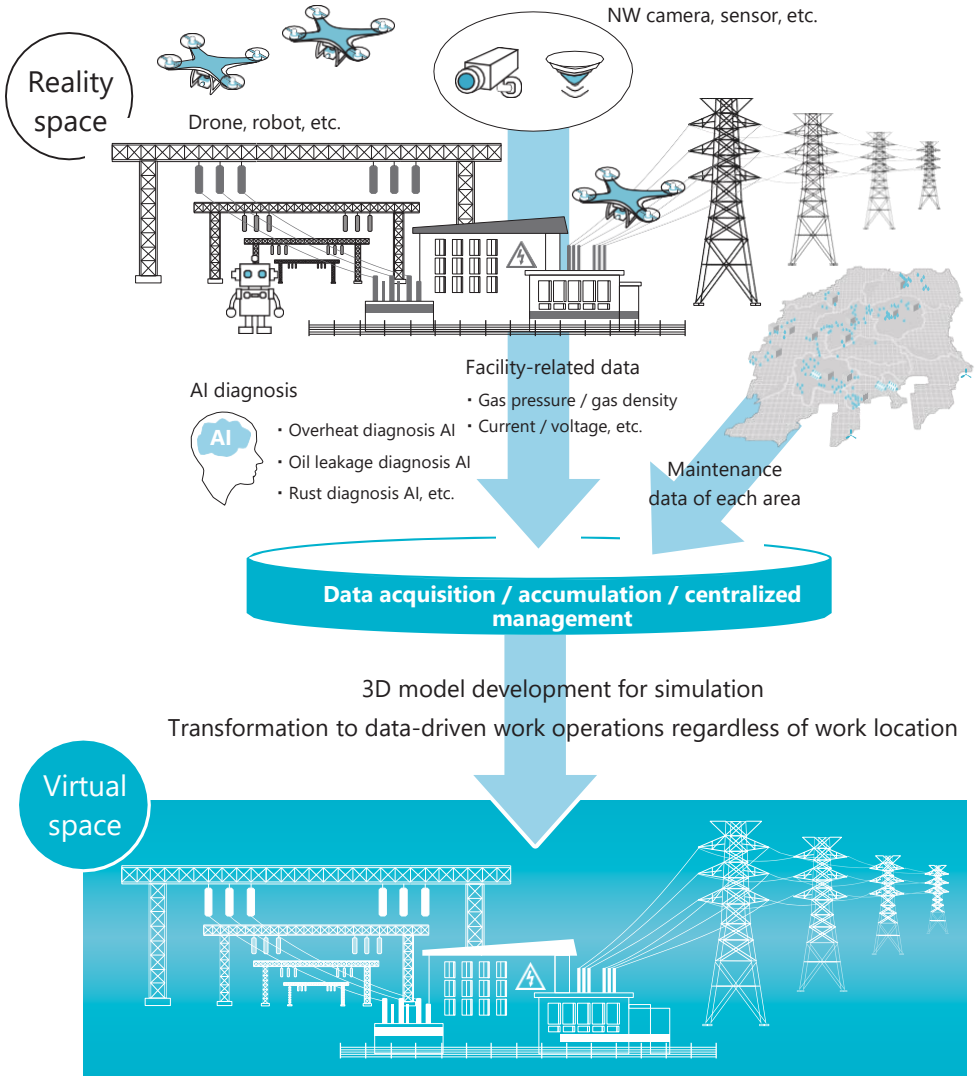
- ☐ 3D models are created based on above data, and advanced simulations are performed
- ☐ Image diagnosis AI is developed. Advancement of field patrol work and labor-saving due to eliminating dispatch are planned, by developing a network that can remotely grasp failure information, etc. and combining it with drones

Various alliances

- ☐ Image diagnosis AI system is developed by collaborating with major telecom companies and AI startups

Prospects of the initiative

- ☐ Fully digital substations are planned to be realized by linking various AI systems, BIM and drones, etc.
- ☐ There is prospect to further reduce and automatize work operations and create new values by analyzing a vast amount of facility data with AI and creating digital twins



∗1 : CN = Carbon Neutral

∗2 : Gas pressure / gas density, current/voltage, operation time, etc.

06 Improvement of CX/EX through advanced analysis of "customers' voice" utilizing AI

TEPCO Energy Partner

- It is an issue to smoothly and promptly respond to customer inquiries
- Response is accelerated (CX*1) by introducing FAQ and chat utilizing AI, and operator work productivity (EX*2) is dramatically improved
- Various cloud solutions are combined to create an operation environment with omni channels

Key points and prospects of the initiative

Improvement of customer satisfaction

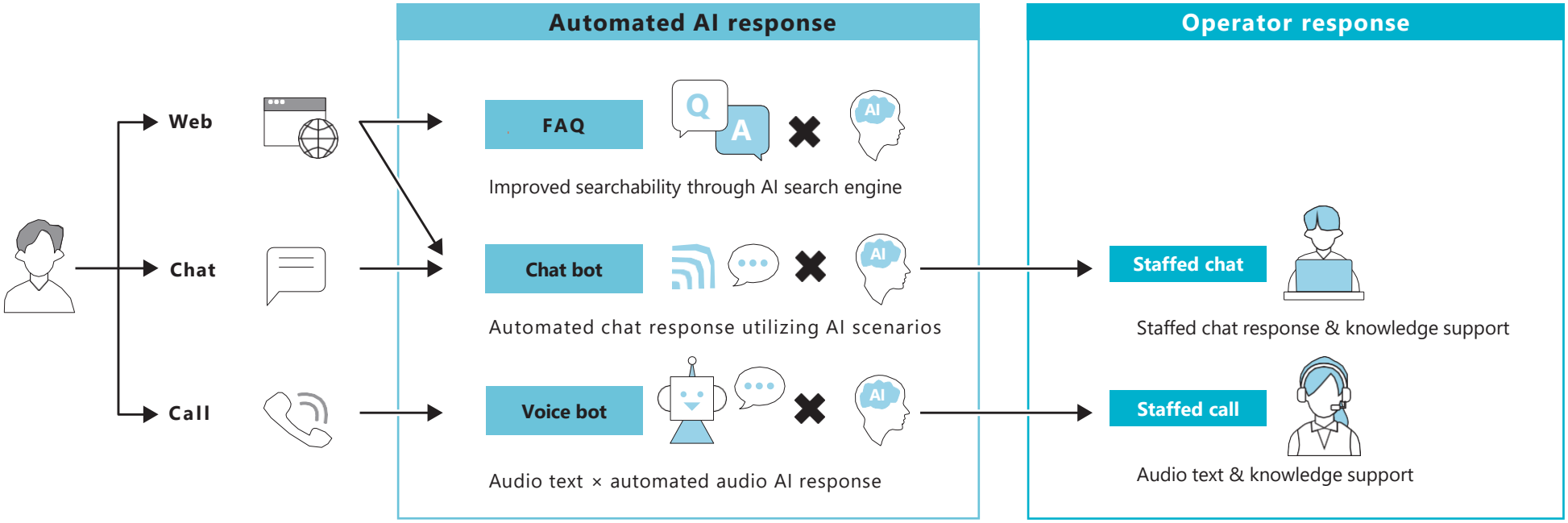
- ☐ Self-solution rate has improved and the number of cases acceptable by operators has increased (approx. 600,000 cases per year) by introducing automated response
- ☐ AI chat satisfaction 97%

Improvement of operator response quality

- ☐ Burden of response service has decreased through automated AI response and smooth text linkage
- ☐ Customer-oriented value is provided due to VOC*3 analysis

Future prospects

- ☐ Improve speed and precision of AI response



*1 : CX = Customer Experience *2 : EX = Employee Experience *3 : VOC = Voice Of Customer

Development of CN promotion service through advanced use of energy data

TEPCO Holdings

TEPCO Energy Partner

- Options for customers have become more complex when shifting from a large-scale centralized to a locally produced and consumed energy system, as international megatrends of GX (green transformation) and review of domestic policies run parallel
- Development of DX services that contribute to the formulation and execution of plans to realize carbon neutrality is promoted in a cross-organizational project framework as a long-term partner to customers, utilizing the strengths as an energy professional and utility data source company

Key points and prospects of the initiative

Challenging social issues of energy system structure transformation

☐ Planning, introduction and monitoring of an optimum energy system for customers, such as renewable energy and storage battery, are supported through active utilization of data

New long-term ×accompanying decarbonization solutions

☐ Long-term customer-oriented services that only the TEPCO Group can offer are provided

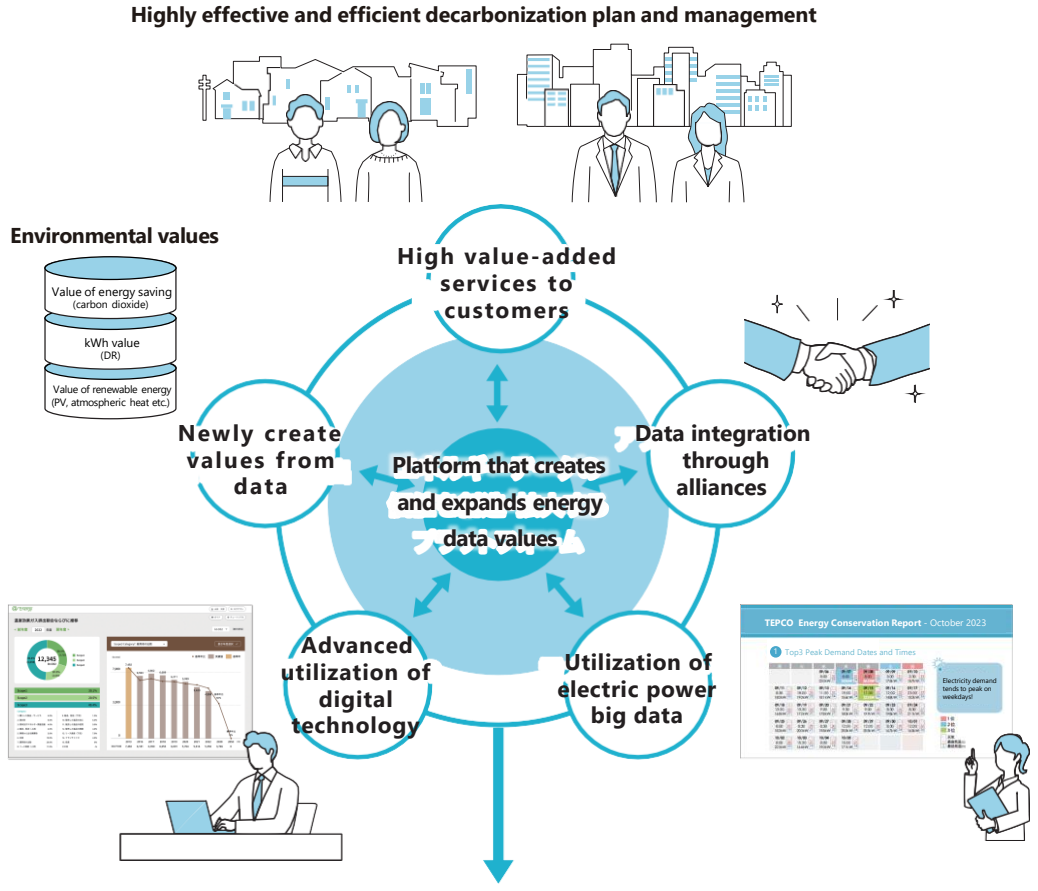
☐ Highly reliable decarbonation plans and measures backed by various internal and external big data are proposed

☐ CN consulting capabilities are strengthened with accumulated data to ensure more efficient customer CN

Various alliances

☐ Alliances through partnerships with financial institutions are expanded to broaden customer contact points and improve provided values

☐ There is prospect to refine energy data integration and analysis technology and further improve added values to realize CN



Contribution to transformation of energy system structure for locally produced and consumed renewable energy

08 Development of healthcare service utilizing high-definition power data and AI technology

TEPCO Power Grid

- Energy Gateway, Inc. is established with an AI startup to develop and expand IoT platform services
- TEPCO's unique sensing technology of electric power data is utilized to accumulate and analyze high-definition electric power data
- Owned high-definition electric power data is utilized to develop a wide range of healthcare services such as nursing care, monitoring and medical care
- Innovations are being created by building an ecosystem with various industrial, government and academic organizations

Key points and prospects of the initiative

Promotion of health by visualizing daily rhythm

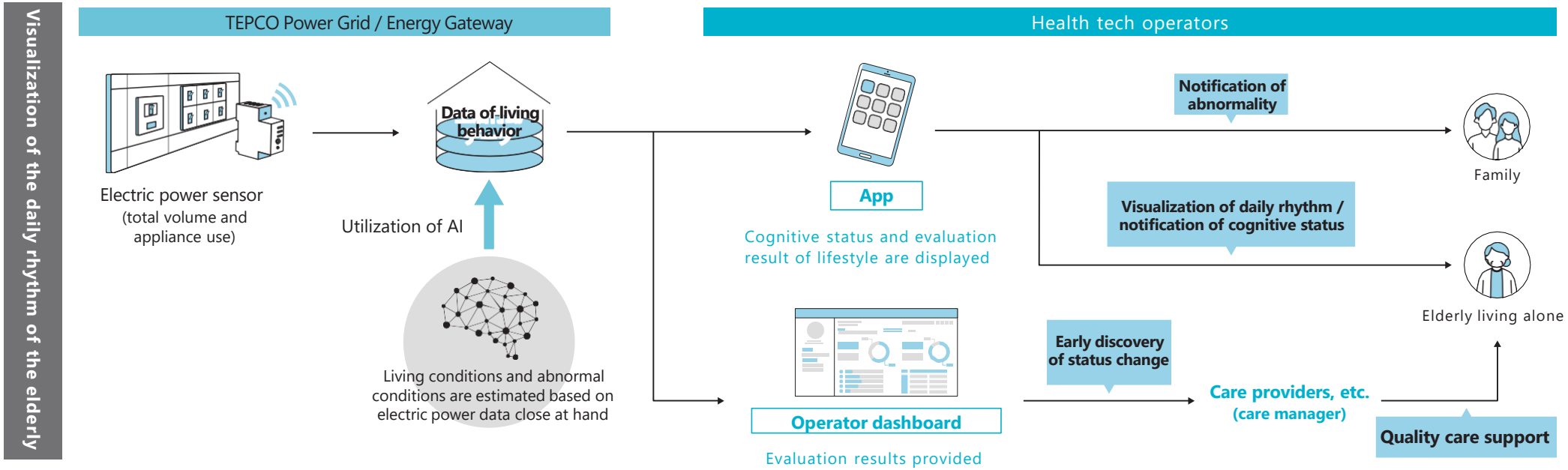
☐ High-precision electric power data is collected and analyzed to estimate the daily rhythm of the elderly by utilizing AI

☐ Services are provided based on the estimated daily rhythm to improve QOL of customers

Innovation through various co-creation opportunities

☐ The world's first prediction model*1 for cognitive decline using electric power data is jointly developed (detection rate exceeds 80%)

☐ Development of healthcare services is being promoted together with industry, government and academia by collaborating with medical organizations, local governments and external companies



*1 : Contributes to early discovery of mild cognitive impairment (MCI) which is the pre-stage of dementia

09 Building a community based on CN and disaster prevention utilizing Area EMS

TEPCO Holdings

- Both "decarbonation of power sources" and "electrification of demand" are needed to realize a carbon neutral society
- Area energy management system (Area EMS) that maximizes the use of regional renewable energy is implemented to flexibly operate renewable energy power sources and storage batteries according to regional characteristics and promote carbon neutrality of the entire region and strengthen disaster prevention performance
- By continuing to collaborate with government agencies, educational institutions and companies in the siting region, decarbonization-oriented regional development business and new businesses are promoted and new values are created

Key points and prospects of the initiative

Development of EMS according to area characteristics

- ☐ Area energy management according to the characteristics of each area is developed by utilizing various renewable energy generation and power transmission and distribution facilities as well as accumulated data and know-how and collaborating with local governments (scope of management to be expanded in each area)
- ☐ Demand information is collected in real time and visualized on a dashboard, thereby realizing storage battery control based on data
- ☐ Prediction precision is planned to be improved by analyzing accumulated power generation and demand/supply data utilizing AI

Building local communities through "industry-government-academia collaboration"

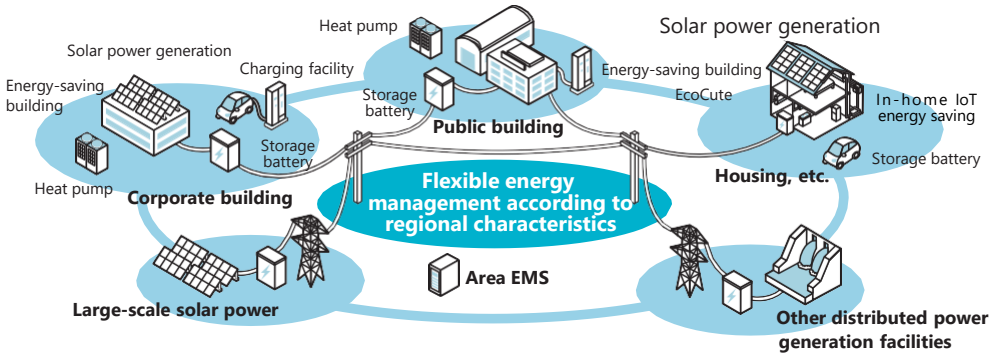
- ☐ Local production and consumption of energy is promoted through areal energy solutions within the partnering area and energy sharing among different areas
- ☐ Carbon neutralization of the entire region and disaster prevention performance is enhanced

Further creating values through the aggregation business

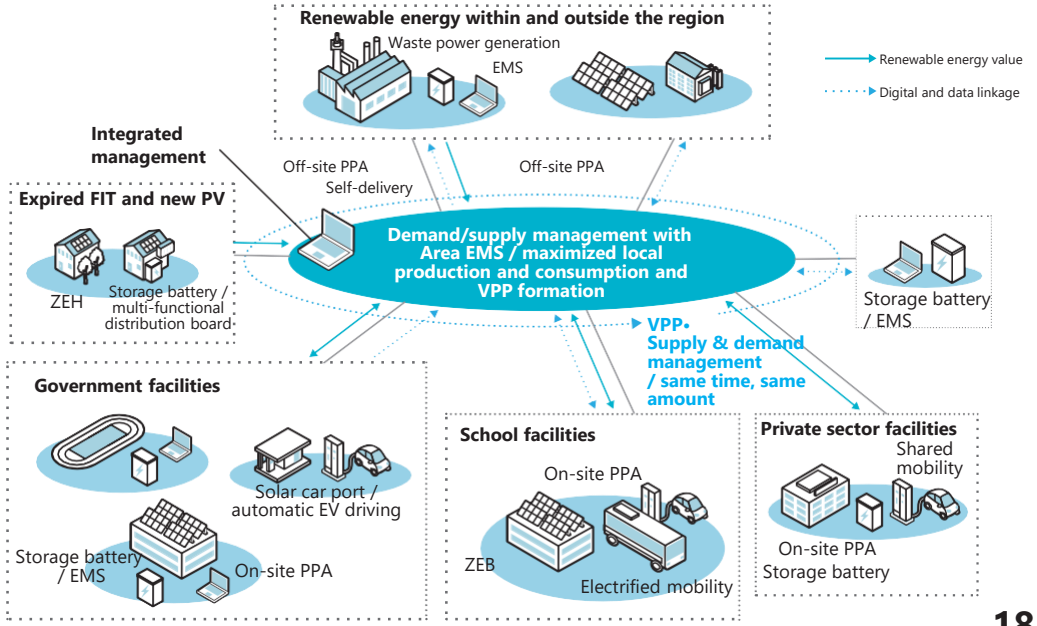
- ☐ VPP*1 (virtual power plant) that is integrally controlled with IoT technology is developed by utilizing storage batteries as a regulating force, while establishing small-scale, distributed renewable energy power sources in partnering regions
- ☐ There is prospect to further create values by developing a next-generation power distribution scheme with a new aggregation platform

＊1：Participation in the VPP (Virtual Power Plant) construction demonstration project of the Ministry of Economy, Trade and Industry since 2016

Building a local community based on carbon neutrality and disaster prevention



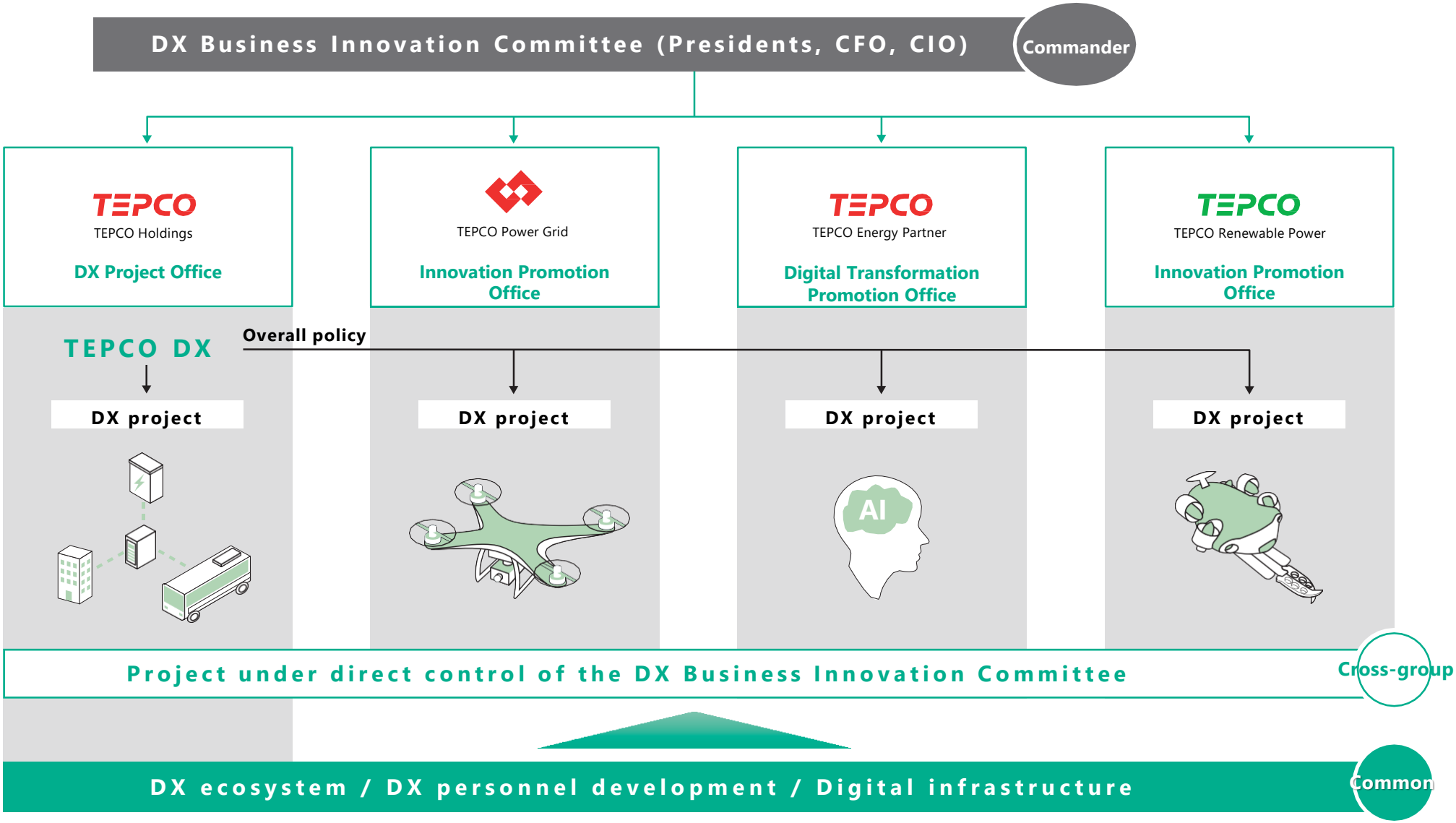
Formation of VPP of a decarbonization-oriented region



Foundation for DX promotion

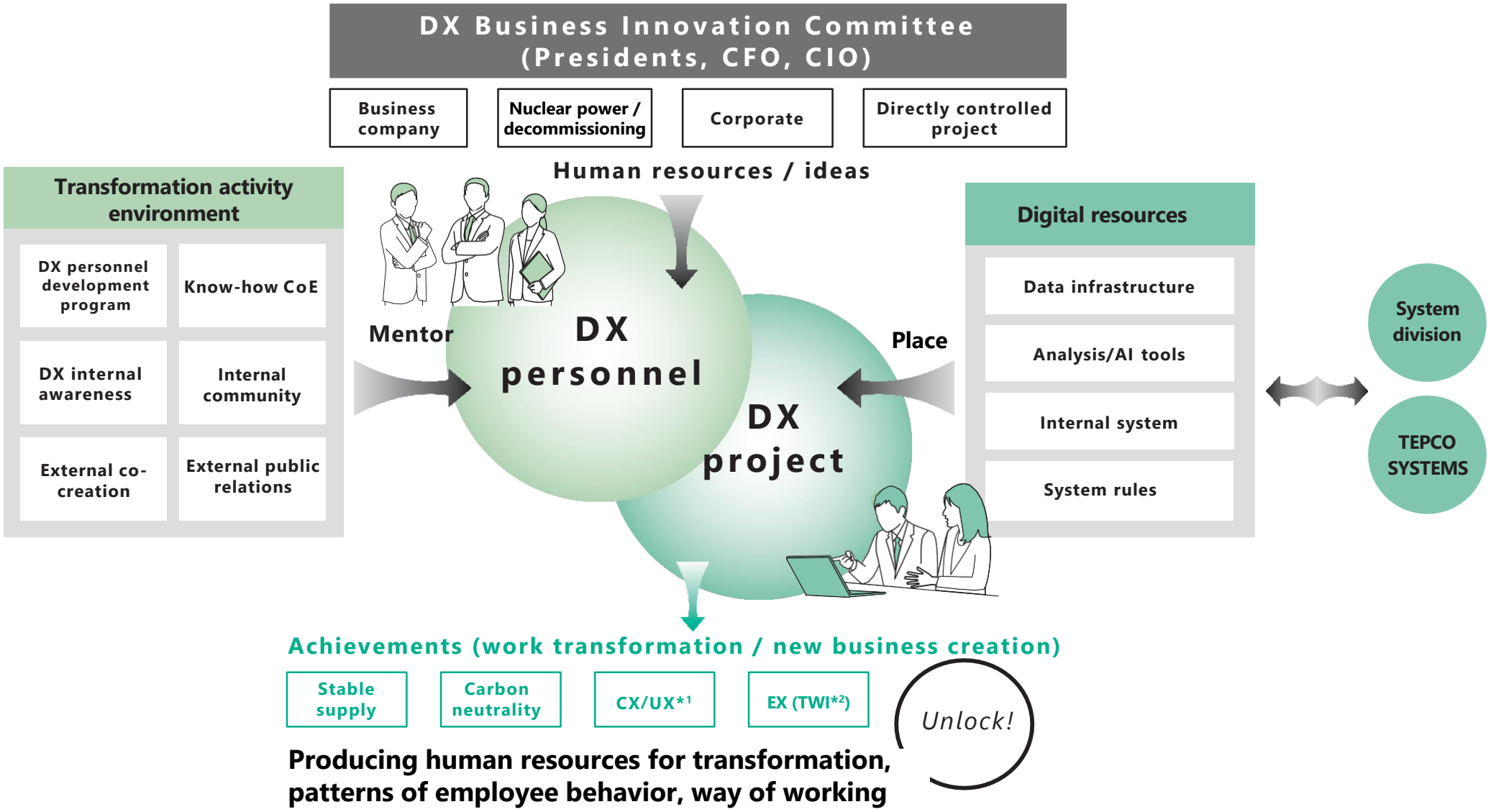
01 Framework of DX promotion organization

- Cross-group DX Business Innovation Committee, consisting of Presidents, CFO and CIO, has been established with collaboration also with the Board of Directors
- Overall policy of the TEPCO Group "TEPCO DX" is developed and the DX project is promoted under the DX Business Innovation Committee
- Directly controlled cross-group projects are formed, and DX ecosystem, DX personnel development and digital infrastructure are prepared



02 Ecosystem of DX promotion

- DX ecosystem aiming for DX personnel development and DX project promotion is developed to promote TEPCO DX
- Extensive collaboration with the human resources division, IT/system division and other business divisions



*1 : UX = User Experience

*2 : TWI = TEPCO Work Innovation (initiative to create a comfortable working environment and promote workstyle reform)

03-1 DX personnel development policy

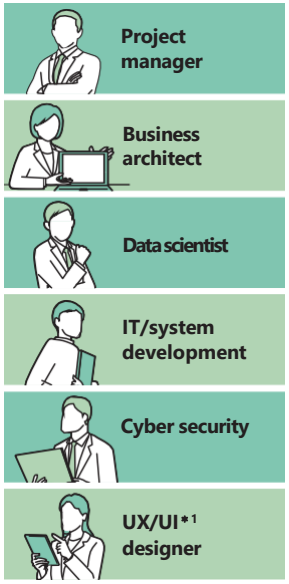
- Policy of development of DX personnel based on the trend of latest technologies such as generative AI is developed along with the management philosophy and business strategies
- Image of DX personnel is defined for 6 positions in 4 levels based on the digital skill standard, based on knowledge, skills and experience required for the promotion of TEPCO DX
- Approx. 6,000 people, which accounts for 20% of all employees, have been developed up to FY2024 as core personnel for DX promotion

DX personnel development policy

DX personnel portfolio

Skill level is defined for 6 positions in 4 levels based on the digital skill standard

6 positions of TEPCO DX human resource



Certified levels and expected roles

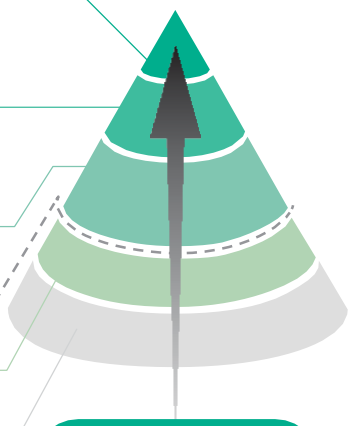
Lv.4 Advanced expertise / guidance
Lead company-wide DX with high expertise and play a leading role

Lv.3 Promotion
Play a central role in the promotion of each project of DX

Lv.2 Practice
Execute the role required for each organization with support from Lv.3 personnel

Lv.1 Understanding
Understand the methods and technologies of DX

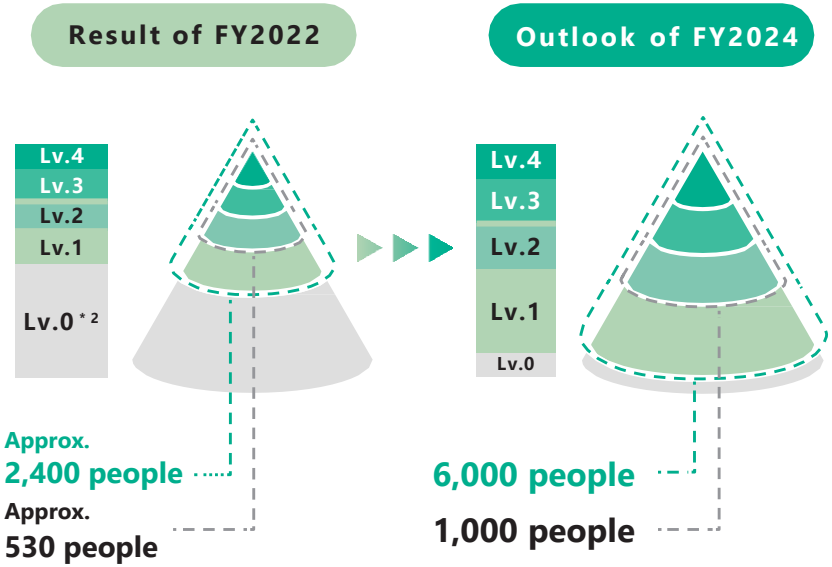
Lv.0 Basics
Know the importance of DX



All employees aim for Lv.1 and higher

Development goal and result

Approx. 20% (6,000 people) of all employees have transformed into core personnel for DX promotion



*2 Digital literacy education has been implemented for all Group employees

*1 : UI = User Interface

IPA case studies on the use of digital skill standard

IPA case studies on the use of the IT passport test

03-2 Reskilling cycle of DX personnel

- DX personnel development cycle of company-wide awareness, visualization, development, assignment and value demonstration is implemented to improve motivation and capabilities of each employee and maximize performance of the entire organization
- DX personnel leads business structure transformation by promoting assignment and value demonstration in priority projects*1 through development of internal DX resources and recruitment of external personnel

Measures and coordination for fostering culture

Company-wide awareness

- Raise awareness of DX among all employees including corporate executives and management (DX study session for corporate executives, etc.)
- Encourage acquisition of DX-related qualifications certified for each position (development and operation of a self-learning community, etc.)

Value demonstration

- Develop role models and career path for each position
- Support career challenge based on the career path of each person

Active in DX projects at one's assigned position

- Expand the mechanism that stimulates and evaluates motivation for autonomous career development (various skill certification systems, etc.)
- Expand the "candidacy-system" personnel recruitment system
- Assign appropriate resources to the appropriate place at the appropriate timing of internal and external practical opportunities based on human resources data such as skill, level and qualifications

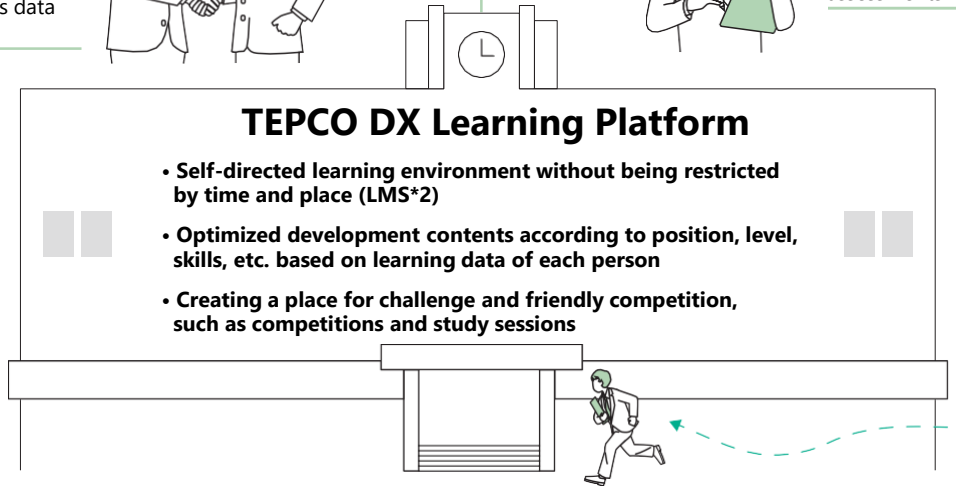
- Build a system for level certification for each position
- Visualize the quality and quantity of DX personnel required to realize the DX vision
- Evaluate personnel including qualitative elements (challenging mindset, etc.) through internal and external assessments

Rate of assignment of highly-skilled personnel to priority projects

100% in FY2024

TEPCO DX Learning Platform

- **Self-directed learning environment without being restricted by time and place (LMS*2)**
- **Optimized development contents according to position, level, skills, etc. based on learning data of each person**
- **Creating a place for challenge and friendly competition, such as competitions and study sessions**



Recruitment of external DX personnel

Expansion of recruitment through flexible evaluation and treatment based on the trend of latest digital technologies

Hired number of highly specialized personnel

237 People in FY 2023

*1 : Major DX projects

*2 : LMS = Learning Management System

04 -1 Fostering of corporate culture

- Contents that create opportunities for each employee to think about and act on DX as their own matter are provided, and various measures to foster company-wide DX culture are deployed such as creating an environment for transformation through the promotion of interaction through DX communities and contact points, building co-creation spaces and introduction of citizen development tools
- Management calls out to mangers to foster a company-wide culture that encourages challenges regardless of position

People Transmission / dissemination

Creating opportunities to make it one's own matter

- Bi-directional communication by management (dialogue meetings, delivery of company-wide message, etc.)
- Introduction of internal and external good practices and new projects
- Distribution of video of role model employees for DX practice
- Provision of training programs that respond to challenges (tool utilization practice workshop, etc.)

Fostering of DX mindset

Process Sharing / consultation

Spontaneous and active interaction

- Call for DX ideas developed in the field (consulting service, business plan contest by level from young employees to organization leaders)
- Development of DX communities, promotion of interaction
- Cross-departmental support for PoC/PJ for business and work transformation
- Reverse mentoring from young employees to management

Promotion of embodiment and implementation of ideas

Place Co-creation / co-learning

Creating an environment for transformation

- Incubation center that promotes internal and external co-creations and new business creation
- agile development garage that searches for possibilities of technologies
- Company-wide deployment of citizen development tools
- Centralized visualization of ideas, PoC, IT tools, etc. throughout the company

Transformation through open and agile co-creation

Unique environment that supports and encourages all-employee participatory transformation activities

▼

"All employees to DX talent" is promoted with each employee playing a leading role

04 -2 All employees to DX talent

- "All employees to DX talent (= DX as each employee's own matter)" is developed as the aim of corporate culture
- All employees are categorized by hierarchical level and degree of change*1 to define the direction of roles and challenges required for each segment
- A mechanism for circulating "challenges" across hierarchical levels and a mechanism for stimulation and mutual enhancement within the community are developed

*1 : Recognition → understanding → empathy→ practice (practice phase is coordinated with DX personnel measures)

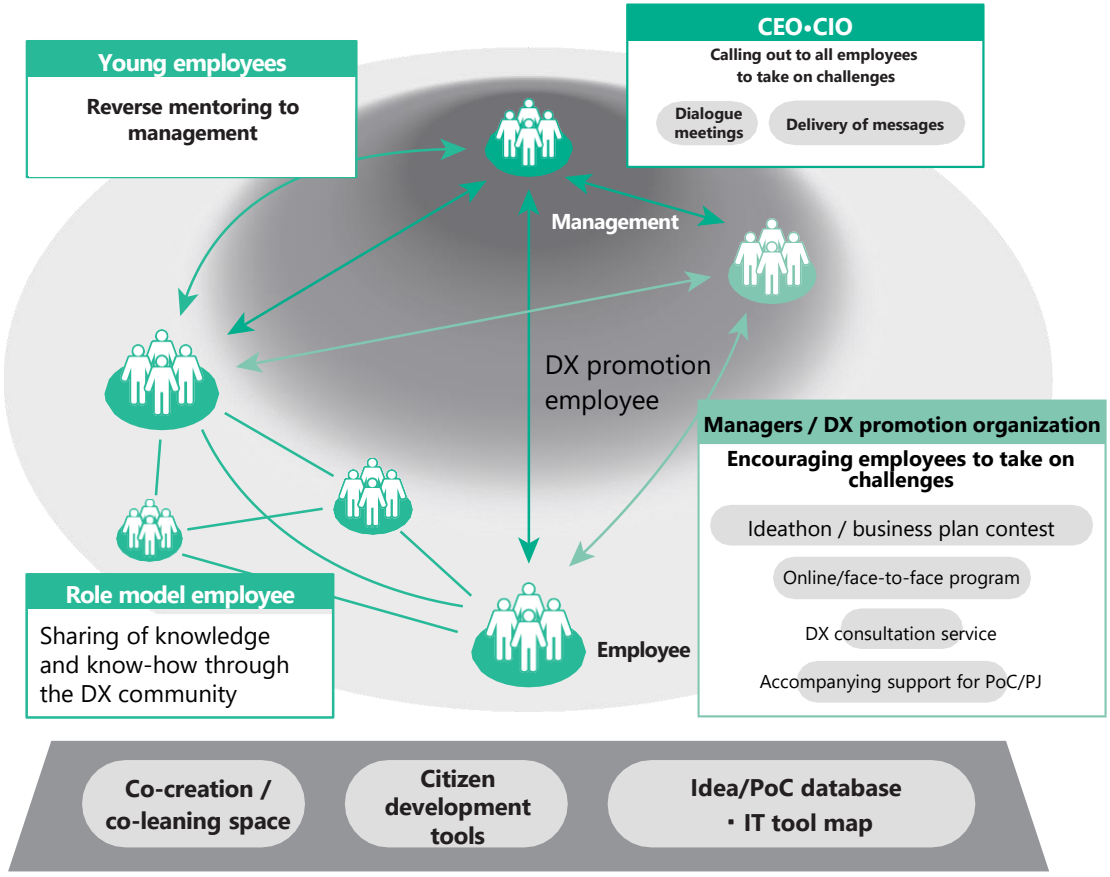
"All employees to DX talent"

Each employee is aware of their own role and responsibility,
and acts to realize the DX vision with initiative and responsibility

Transmission / dissemination
Creating opportunities to make it one's own matter

Sharing / consultation
Spontaneous and active interaction

Co-creation / co-learning
Creating an environment for transformation



3,000 participants in a dialogue meeting with management on 2024.8.21

- **Approx. 6,000 people who listened to top message**
- **Approx. 6,000 contents participants**
- **Approx. 1,000 ideas collected**
- **Approx. 70% feel work transformation**
- **Approx. 1,500 organizations use the citizen development apps**
- **Approx. 400 projects from the field**

05-1 Building and utilization of digital infrastructure

- Infrastructure development is promoted for new value creation and business structure transformation through "data integration and utilization", "system modernization" and "data democratization"
- Business models are transformed and earning power is improved by providing materials that contribute to corporate decisions upon clarifying the location of data and linking data
- Technical compatibility, work compatibility and maintenance cost are visualized for operating systems to develop Kaizen plans and streamline corporate resources
- Data resources of the entire Group are strategically utilized to create new businesses that contribute to solving social issues, thereby promoting co-creation activities flexibly

Data integration and utilization

- Data strategy organization is launched to accelerate improvement of corporate values through data management
- Metadata catalog (book catalog of internal data) is developed to improve data exploration
  Development rate: 87% (2024)
  : 90%*1 (goal for 2025)
- Use of data is promoted by developing "data virtualization infrastructure" which enables easy and fast reference and collection of data

System modernization

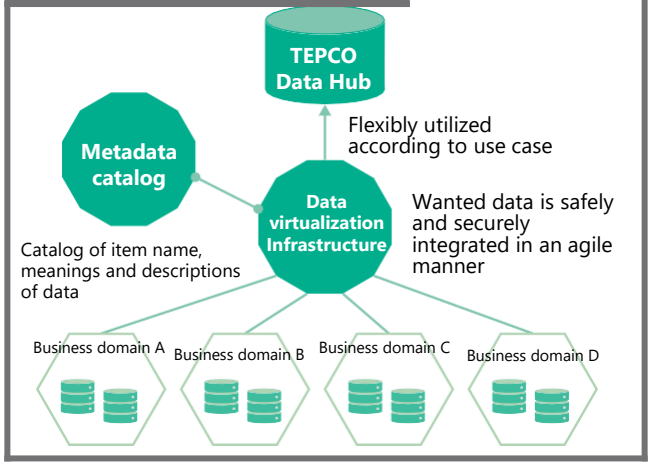
- "Kaizen" plan is developed, including actions such as renewal, discontinuance and reduction of functions, to prevent re-legacy
- Operating systems are evaluated from the perspectives*2 of technology, work compatibility and cost
- Legacy system is efficiently renewed based on evaluation results

Data democratization

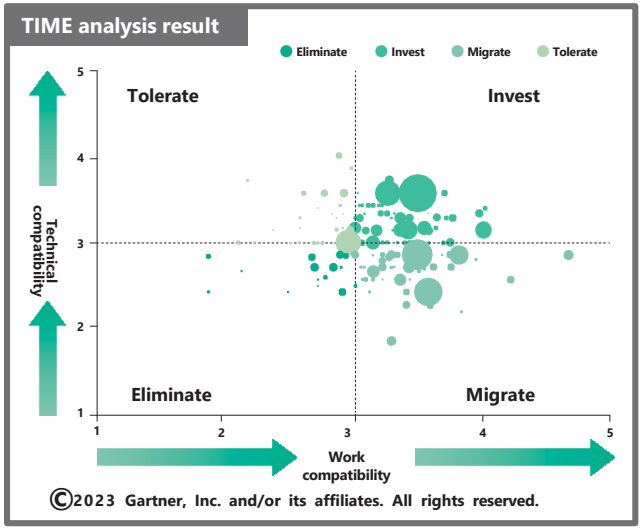
- "Business agile center" is launched, which accelerates actions for "aggressive" promotion of new business areas
- "TEPCO Data Hub", a digital service platform that can link various internal and external data, is developed upon ensuring information security
- Development of data analysis personnel is also emphasized in parallel with the development of an environment that can safely, promptly and easily be handled by anyone
  Advanced data analyzers: Approx. 100 people (2024)

→ Agile support for further improvement of work productivity and creation of new co-created values

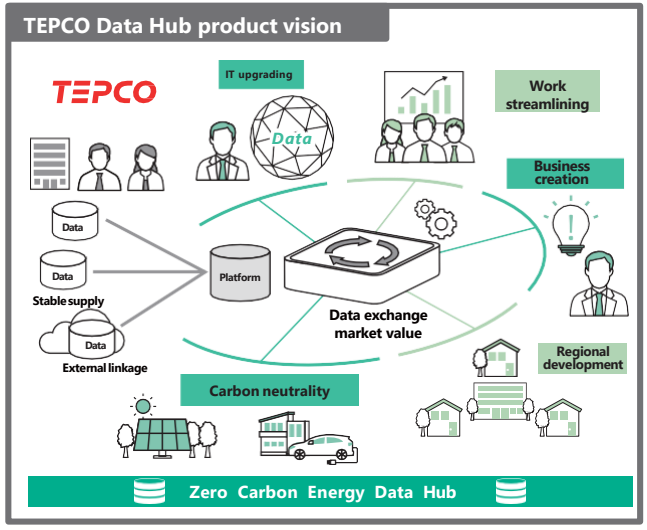
Development of data infrastructure that utilizes metadata



TIME analysis result



TEPCO Data Hub product vision



*1 : Rate of data development is 90% at maximum

*2 : Evaluation of optimization of system arrangement and investment justification through TIME (Tolerate Invest Migrate Eliminate by Gartner) analysis

05-2 “Data-driven management” with next-generation management infrastructure

- Next-generation management infrastructure is developed to realize data-driven management which can make data-driven decisions in all aspects of business, as an initiative to develop and use digital infrastructure
- Signs are grasped from the analysis of major indicators of each business, and instructions are given to restructure the business if necessary. Business portfolio is optimized by deciding to strengthen or discontinue a business based on the analysis of its growth and profitability
- Status of measures is grasped and promoted to achieve the ESG strategy, and information disclosure is expanded

Next-generation management infrastructure

Data integration

Personnel affairs | Procurement | Accounting | Supply and demand (sales and area demand) …

Transformation of field operations, strengthening of control and improvement of productivity through work automation

New ERP (corporate management) data infrastructure

Real-time linkage

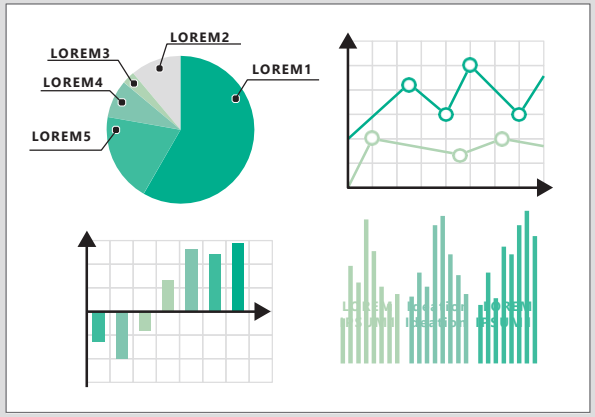
Real-time linkage

Construction budget / Construction results	Facility investment / Facility operability	Consignment fee / Area demand	Billing fee / Electricity usage	Labor cost / Employee indicator	Electricity market price / Foreign exchange
Construction management	Facility management	Consignment	Retail	Personnel affairs	External information

Data collection

Management dashboard

Data-driven management is realized by grasping plans, results and signs in real time and analyzing and utilizing data



Faster management decisions

Improved efficiency and sophistication of cross-departmental work operations

Management

Sophistication of business strategy (reviewed as necessary)

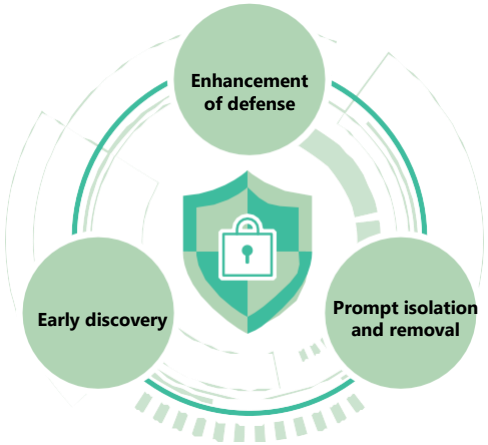
Organization leader / employee

06 Cyber security

- TEPCO positions cyber security as a priority management issue, and security is being reinforced centered on CISO*1 and a dedicated security organization under the cyber security policy
- Organizational and individual capabilities are visualized and sustainably improved based on CSF*3 and NICE*4 of NIST*2 which is an international framework
- Security rules following constantly advancing technologies such as cloud and generative AI are developed to ensure security and promote DX and ICT

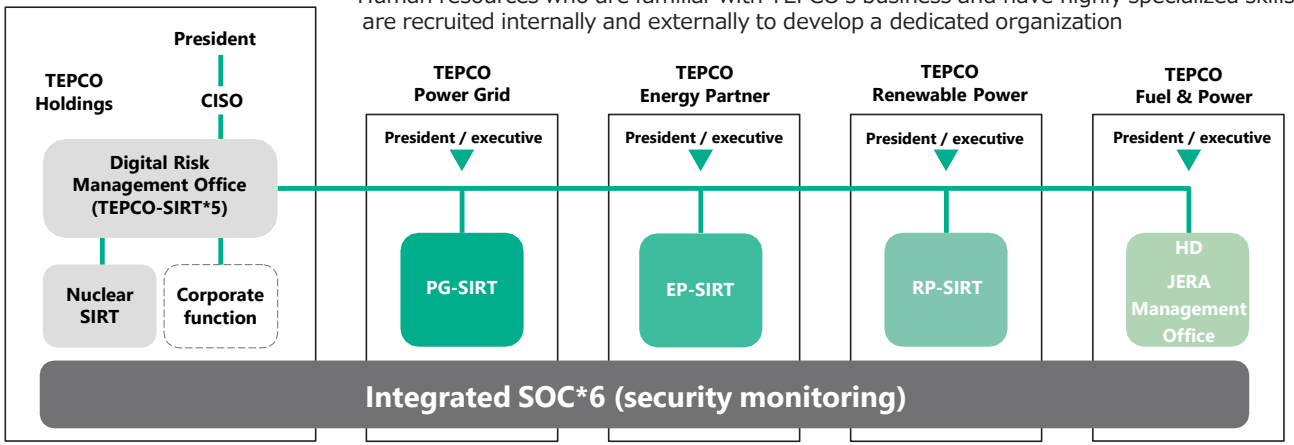
Cyber security policy

- Measures are implemented under the 3 basic policies



Governance framework

- Security management framework is developed by establishing dedicated organizations at HD and each core business company centered on the Chief Information Security Officer (CISO)
- Human resources who are familiar with TEPCO's business and have highly specialized skills are recruited internally and externally to develop a dedicated organization



Risk assessment

- Organizational capabilities are evaluated every year based on CSF of NIST which is an international framework
- Risk assessment is performed every year at subsidiaries and some affiliated companies to develop and execute risk reduction measures
- Contact point to receive notifications and consultations from employees is established to grasp risks from the perspective of system users

Education and training

- Individual capabilities are evaluated every year based on NICE of NIST
- Acquisition and training of specialized security qualifications are supported to develop a large number of international qualification holders such as CISSP*7
- Security literacy of all employees is improved through proactive internal communications, e-learning and targeted e-mail training, and regular case studies on cyber incidents at all organizations
- Annual drills with management and the dedicated organization working together are conducted to continue TEPCO's business during emergencies

*1 CISO : Chief Information Security Officer
*2 NIST : National Institute of Standards and Technology
*3 CSF : Cyber Security Framework
*4 NICE : National Initiative for Cybersecurity Education
*5 SIRT : Security Incident Response Team
*6 SOC : Security Operations Center
*7 CISSP : Certified Information Systems Security Professional

07 Utilization of generative AI

- Generative AI is positioned as the source of growth and competitive advantage, as it is seen as innovative technology that has the potential to lead to tectonic changes in social life and industrial structure
- Generative AI is introduced to TEPCO's dedicated environment for safe and secure use and deployed to all employees, with the purpose to shift resources to highly creative areas due to increased white-collar productivity under the basic policy to "recognize correctly, address risks and use wisely"
- Individual work operations are being enhanced and streamlined with general-purpose AI, and in-house specialized AI is also being planned

General-purpose use case

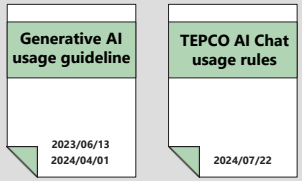
- Bouncing ideas
- Investigation
- Document creation
- Translation / interpretation / summarization
- Proofreading / correction
- Programming

Example of internally deployed AI assistant service (started use from July 2024)

Risks and measures

- Ethical issues
- Intellectual property issues
- Privacy issues
- Hallucination
- Bias
- Shallow fake

- Development of regulations on the use of generative AI (revised according to technological progress)
- Education is planned for the appropriate use of generative AI
- Ethics education, media literacy education, etc.
- Use of the system to label generative AI contents is being planned



Initiatives to promote development and utilization

- Distribution of training videos and articles
- Installation of bulletin board (generative AI navigation)
- Generative AI hands-on seminar
- Implementation of prompt assistance function
- Prompt consultation service
- Generative AI ideathon
- Support for individual projects

- Approx. 5,200 monthly users
- Approx. 4,000 seminar participants
- Approx. 32 prompt posts
- 170 collected ideas
- 27 created projects

Examples of application to practical work

Work area	Use case
Sales	Support for creating service proposal drafts
Engineer	Presentation of assumed factors of facility troubles Search of procedural manuals
Labor management	Review and presentation of industrial accident prevention measures

TEPCO DX White Paper 2024

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First edition published on December 18, 2024

Tokyo Electric Power Company Holdings,Inc.