

Engineering Business

(JFE Engineering Corporation)

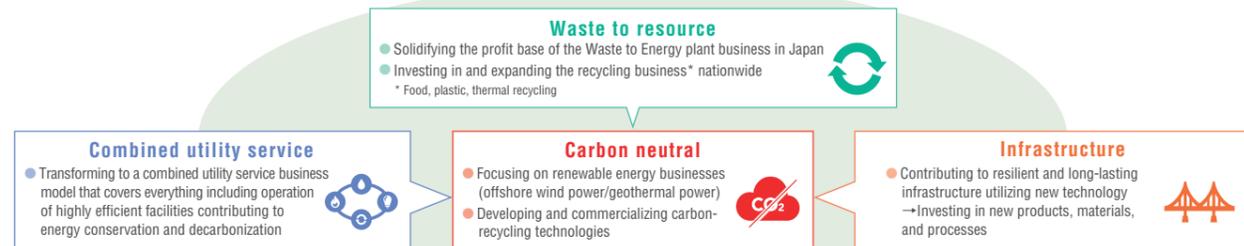
By promoting digital transformation (DX), “Tsu-ku-ru,” “Ni-na-u,” and “Tsu-na-gu”* the foundations of life for achieving SDGs Just For the Earth

JFE Engineering has taken up the challenge of achieving SDGs (Sustainable Development Goals) through planning, designing, building, and operating infrastructure supporting people’s daily lives and industry. DX is necessary for our company to continue to be a front-runner in the engineering industry while further accelerating those initiatives.

DX is transforming all operations, and there are no products or services unrelated to DX. We are promoting DX in all areas by securing and training DX-related human resources and proactively investing toward the realization of a green society (GX) and the sustainable enhancement of corporate value (SX).

* “Tsu-ku-ru,” “Ni-na-u,” and “Tsu-na-gu” are Japanese words whose meanings for us are the following:
 Tsu-ku-ru: Construction of plants.
 Ni-na-u: Operating, maintaining, and managing business.
 Tsu-na-gu: Handing over a beautiful planet to the next generations, good communication between our customers and us, throughout JFE, and construction of data networks, three elements essential for achieving SDGs.

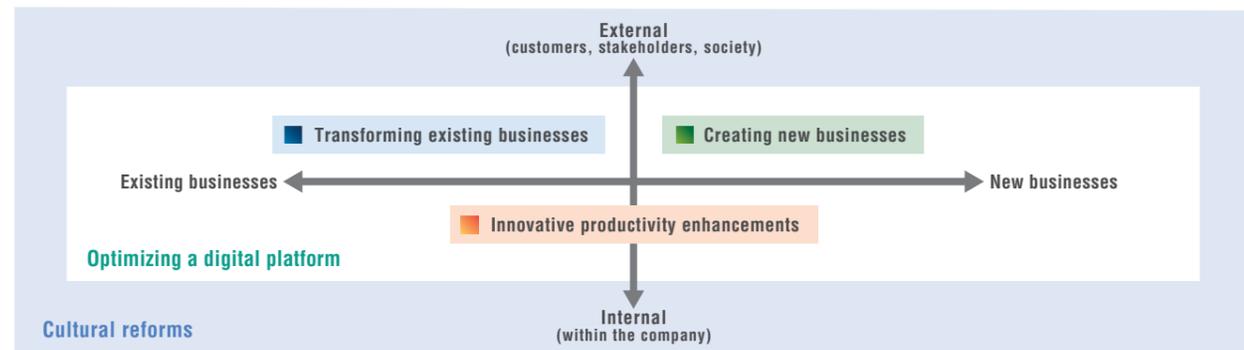
The Seventh Medium-term Business Plan designates four priority areas: waste to resource; combined utility; infrastructure; and carbon neutral, and a policy for business expansion. We believe that digital transformation is essential for the achievement of this policy, and have positioned DX as an initiative to support all business areas.



DX Accelerating achievement of SDGs with DX

To accelerate these initiatives, we established a new DX Headquarters in fiscal 2022. The DX Headquarters is promoting DX in the three key areas of “innovative productivity enhancements,” “transforming existing businesses,” and “creating new businesses.” The organization is made up of IT engineers engaged in using cloud platforms and data analysis, engineers who gather data from plants and other worksites and implement AI on edge devices, and human resources for DX promotion who work together with business divisions to resolve various internal and external issues.

Both “cultural reforms” including developing human resources and “optimizing a digital platform” on which anyone can perform data analysis are also very important for the efficient promotion of DX. From the next section, we will introduce initiatives in the areas of “cultural reforms” and “optimizing a digital platform” and individual cases in the three key areas of DX promotion.



Cultural reforms

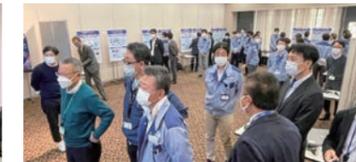
Companywide “DX Day!” event held to build momentum for DX promotion

JFE Engineering held a “DX Day!” event at the Yokohama Head Office (in Tsurumi) on November 24, 2022, to build momentum for its DX promotion. The event used a hybrid in-person and online format to make it easier for branch employees and employees of group companies from outside the Tokyo and Tsurumi area to participate.

The event featured a variety of content that will contribute to DX promotion, including a live demonstration of a robot that can walk on four legs, a poster session introducing companywide DX initiatives, an “ideathon”* led by mid-career and younger employees, and presentations by outside lecturers. Participants gave positive feedback for the next event, with comments including “The content was better than I expected,” “DX information shared at the event seems very useful,” and “I felt the company’s enthusiasm for DX promotion.”

We will hold “DX Day!” again in the future as a place for gathering and sharing DX information to transform the “organizational culture” and “mindset” required for DX promotion.

* Ideathon: A combination of the terms “idea” and “marathon,” with groups competing to come up with ideas, refine them, and produce results within a designated time.



An exhibition-style format using posters of initiatives at various departments. Everybody, including the president, listened to the explanations with great interest.



The “Neighbors” DX session led by mid-career hires used “graphic facilitation” sharing illustrations of the speaker’s comments.



Diverse people including group company employees held an “ideathon” to drive innovation.



Demonstration of a robot that walks on four legs. It is expected to be used for surveys and inspections within plants and in dangerous areas.

Optimizing a digital platform

Ongoing evolution of the internally developed Pla’cello® data analytics platform



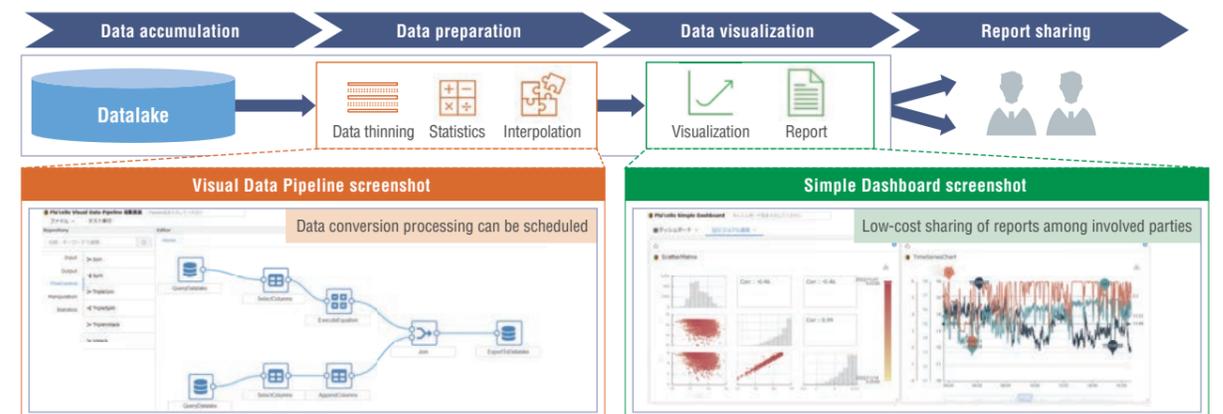
Use of the Pla’cello® data analytics platform, which was released internally in 2018, is spreading throughout the company as a tool which makes it easy for anyone to analyze a variety of data collected from plants. The platform uses a process of data accumulation, data preparation, and data visualization of plant data which makes it possible for users to develop their own systems in a graphical user interface (GUI) environment. This ease of use has accelerated its popularity, and today, four years since the initial launch, it has been used by more than 1,800 people internally for more than 100 DX projects.

The development of Pla’cello® was initially outsourced, but later switched to in-house production. This has enabled us to respond flexibly to specification changes and to reduce development costs and time. The following two recently released applications also incorporate agile development methods and are developed completely in-house.

*Visual Data Pipeline, which enables data preparation to be performed via GUI

*Simple Dashboard, which visualizes data and shares with many people

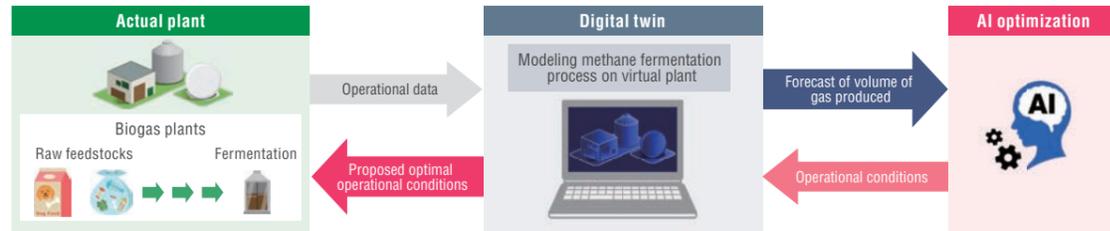
Going forward, we plan to look beyond plant time-series data and incorporate IT data like internal accounting systems. We will make maximum use of Pla’cello® to accelerate the company’s DX Promotion.



Transforming existing businesses

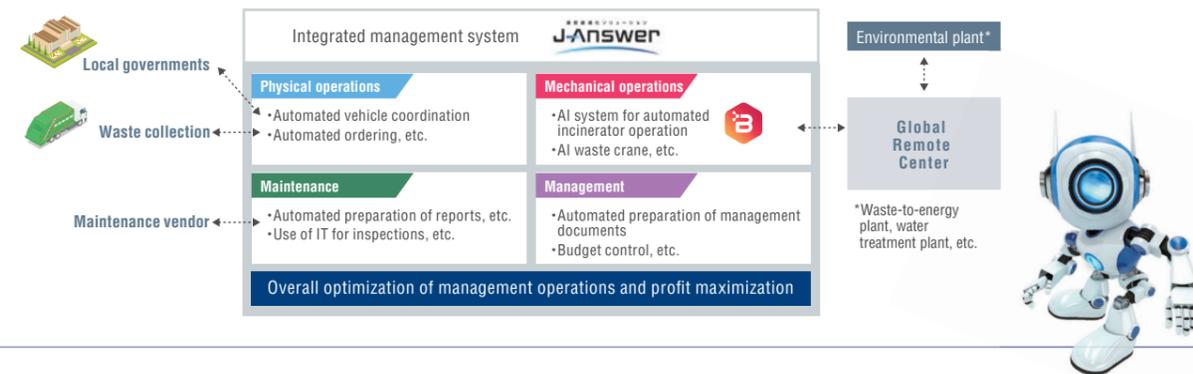
Optimizing plant operations using digital twin

JFE Engineering is using a digital twin to make plant operation more efficient. Biogas plants use food waste as raw feedstocks to produce methane gas through fermentation by micro-organisms and generate electric power with gas engines. Because a wide variety of food waste is used, it is important to know the concentration of the substrate and the micro-organisms in the fermentation tank in detail to maintain stable operation. We developed a digital twin with “data assimilation” technology, which integrates the physical model of the anaerobic digestion reactor with real operational big data. This makes it possible to know the details of the real fermentation tank and to operate the virtual fermentation tank accurately. AI-optimized operational conditions using a digital twin realizes stable and efficient operations.



“J-Answer” environmental plant integrated management system

Waste-to-energy (WtE) plants used to be operated manually by skilled operators who relied on their experience and expertise because the condition of the waste used as fuel changes in a variety of ways. JFE Engineering has developed BRA-ING, which aims for fully unmanned operations using AI that is a combination of image analysis of the combustion condition and machine learning from manual operations by skilled operators. As of the end of fiscal 2022, BRA-ING has been rolled out to 12 facilities. In addition to incinerator operations, the company has developed and is rolling out the “J-Answer” plant integrated management system in order to share and analyze data of plant operations and maintenance. We will continue to optimize overall plant management and operations by developing new systems using AI technologies, with the aim of further unmanned operation of WtE plants.

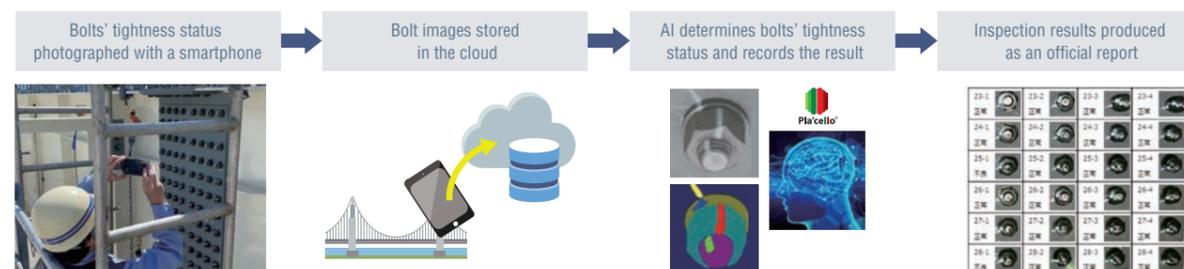


Innovative productivity enhancements

Bolt tightness inspection system using AI image recognition technology

Steel bridges are constructed by connecting 10-meter-long segments with high-strength bolts. Normally, several hundred of these bolts are installed in a bridge, and visual inspection and recording the results requires a huge amount of manpower. JFE Engineering has therefore developed a bolt inspection system that uses AI to reduce the time required for the inspection and recording operations. We could achieve a 50% time reduction using this system. Inspection can be performed with one smartphone. By uploading images of installed bolts taken with its camera to the cloud, AI determines the bolts’ tightness status and returns them to the smartphone. We will continue to raise construction efficiency using AI going forward.

Operational time reduced by **50%!**

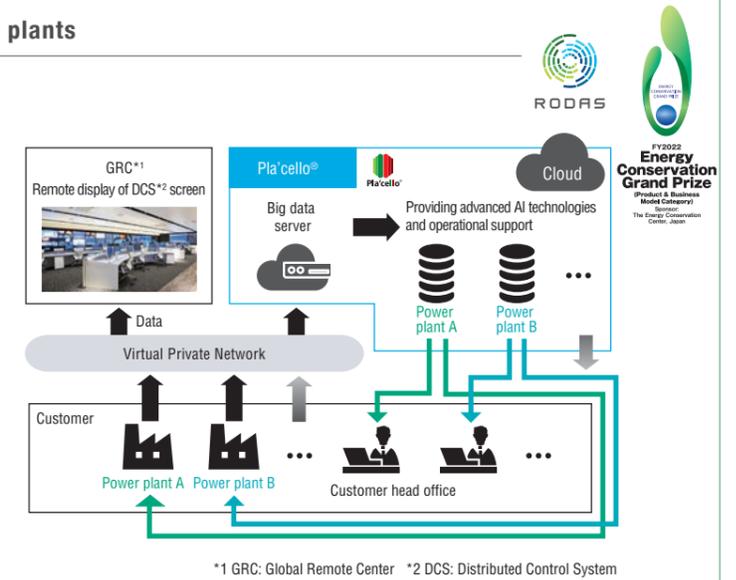


Creating new businesses

“RODAS” DX service package for boiler power plants

JFE Engineering is doing optimization and labor saving in plant operation using its Global Remote Center and Pla'cello® proprietary data analytics platform. We received an order from the erex group for the RODAS DX service package, which was developed for biomass power plants using big data. The system is installed in three locations: erex's headquarters and its Buzen and Nakagusuku biomass power plants.

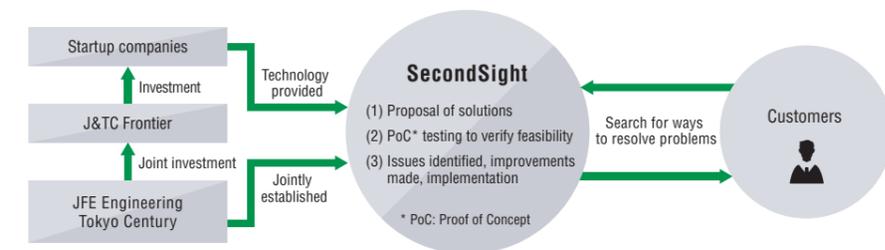
The services provided this time are data collection and utilization service, visualization and analytics tools and remote support. Going forward, JFE Engineering will expand the RODAS service menu to simplify managing and analyzing huge amounts of plant operation data, while also creating greater data linkage across sites. We will provide solutions to better meet plant operators’ needs with RODAS package.



FY2022 Energy Conservation Grand Prize
Minister of Economy, Trade and Industry Award
Product & Business Model Category
The Energy Conservation Center, Japan

Establishing new company to provide diagnostic solutions integrating latest technologies

In June 2022, JFE Engineering and Tokyo Century Corporation jointly established the operating company SecondSight Inc. to provide diagnostic solutions that integrate startup technologies. SecondSight was set up to provide one-stop diagnostic solutions from consulting to implementation, integrating AI sensing technologies that replace the five human senses, including image, sound, and smell recognition, from among many startups in which JFE Engineering and Tokyo Century invest via J&TC Frontier. As a “bridge” between startups and customers, SecondSight will promote diagnostic innovation.



Launching “5G Innovation Plant” digital solution verification facility for plants

This verification facility was established on March 30, 2022, and commenced operations in June, to accelerate the creation of digital solutions for plants together with startups and others that possess the latest digital technologies.

The facility is an actual-size plant with high-speed wireless equipment including Private 5G, a mobile carrier’s (NTT DOCOMO) 5G, and Wi-Fi 6 installed. The facility has received many inquiries since commencing operations, and is carrying out a wide range of verification testing (remote operations and support, fault prediction, safety and security, etc.).

We will continue to utilize this facility as a place for open collaborative creation of new value and digital solutions.

MPC Award 2022
Encouragement Prize, Services and Solutions Division
Mobile Computing Promotion Consortium

