

5. Pursuing Unlimited Potential (1)

HIRAKU Pioneer

Technological innovation —Forging strategies for conserving energy and the environment, utilizing ICT (information and communication technology) and operating Shinkansen at faster speeds

JR East will tackle the challenge of technological innovation in various fields, in pursuit of its unlimited potential. Besides in-house R&D activities, we will embrace the approach of open innovation where we utilize external development capabilities and intellectual property. Meanwhile, the Technology Innovation Development Committee established internally will vigorously promote technological innovation by setting ambitious goals, clarifying issues and policies, and prioritizing R&D investment. Specifically, we will emphasize measures to establish energy and environmental strategies in light of Japan's prolonged power shortage issues, develop new railway systems utilizing ICT that are unfettered by conventional notions, and embrace the challenge of operating Shinkansen at a maximum speed of 360 km/h.

① Establishing energy and environmental strategies

(Promoting energy creation)

To ensure a steady supply of power, we will work to upgrade the facilities and improve the power generation efficiency of Kawasaki Thermal Power Station, while closely monitoring supply and demand for electricity and other trends going forward. Along with these efforts, we will upgrade our privately operated power grid. In addition, we will expand the introduction of solar power generation, while pursuing R&D activities focused on new renewable energy sources such as wind, geothermal and biomass power.

(Promoting energy conservation)

We will commercialize the *NE Train Smart Denchi Kun*, a catenary and battery-powered hybrid railcar train system, on the Karasuyama Line from the spring of 2014. Furthermore, while facilitating the effective use of regenerative electricity from the standpoint of energy management, we aim to revolutionize train operation systems by pursuing R&D directed at automatic power-saving train operation*¹ and train operation free of catenary (overhead power lines)*² utilizing high-performance storage battery systems. In other areas, besides adopting LED lights, and achieving high efficiency by replacing heating equipment and air-conditioning equipment, we will promote energy conservation throughout entire development areas in step with large-scale development projects.

*1 A train operation system that achieves more efficient and energy saving operation by exchanging information among trains and between trains and power facilities.

*2 Trains run on electricity stored in a storage battery without drawing electricity from power lines (overhead lines) on electrified rail segments.



(Introducing smart grid technology to train power systems)

Aiming to boost the efficiency of energy usage by linking energy creation with energy conservation, we will strive to introduce smart grid technology*¹ to train power systems. Besides promoting the development of technologies for "storing and using surplus electricity" and "using surplus electricity at a distant location," we will seek to implement measures to save power consumption by utilizing smart meters*² and other advances.

*1 A technology for achieving even more efficient and effective use of energy by storing surplus electricity and redirecting it to different locations through the combination of ICT and power equipment technologies.

*2 A power meter with communications functions enabling virtually real-time monitoring and automated control of power usage.

(Environmental targets)

Under a unified Group-wide environmental strategy, we will work to curb CO₂ emissions by establishing numerical targets for energy usage in railway operations and other parameters.

<Environmental Targets for FY2021>

- 1) Reduce energy usage by railway operations by 8% (compared to FY2011)
- 2) Improve the CO₂ emissions coefficient of JR East's own power plants by 30% (compared to FY1991)

② Utilizing ICT

(Improving customer service quality)

We will build information platforms encompassing not only railway-related information for the Tokyo metropolitan area, but also regional information and other data, in order to provide information tailored to individual customer needs (e.g., *Train Net**). We will also strive to develop public wireless LANs inside train stations and trains, along with measures to enhance the communication environment when Shinkansen is in motion. For example, we will address the loss of mobile phone signal strength inside tunnels.

* Information service in trains for smart mobile phones

(Transforming transportation systems)

Aiming to transform the Tokyo metropolitan area transportation system, we are preparing to implement communication-based train control (CBTC), a wireless railway car control system, on the Joban Local Line. At the same time, we seek to expand the operation of ATACS, which has been put into operation on the Senseki Line between Aobadori Station and Higashi-Shiogama Station, to railway lines in the Tokyo metropolitan area. Preparations are also being made to implement the next-generation train control and monitoring system INTEROS (INtegrated Train communication/control network for Evolvable Railway Operation System)*.

* A next-generation train control and monitoring system utilizing large-capacity, high-speed universal data transmission technology.



(Innovation in frontline operations)

By introducing mobile IT terminals to support employees engaged in frontline operations, we will drive improvements in the quality of transportation and services. We also aim to build a framework for optimizing daily maintenance and facility renewals based on monitoring of conditions by trains in service and related data analysis.

③ Operating Shinkansen at faster speeds

We will continue our R&D efforts toward achieving an operational speed of 360 km/h for Shinkansen. These efforts will be focused on improving stability during high-speed operation and reducing the environmental impact to areas along Shinkansen lines. Also, we will feed back research achievements into operation of Shinkansen at 320 km/h, in order to upgrade safety and reliability, along with expanding segments where Shinkansen is operated at 320 km/h.

④ Promoting an intellectual property strategy

Given that we will be stepping up technological innovation and participating in overseas railway projects, we will enhance our intellectual property strategy. To this end, we will nurture personnel and develop related systems.