Transportation

Shinkansen Bullet Train Network

OVERVIEW

JR East operates a five-route Shinkansen network, comprising the Tohoku, Joetsu and Nagano Shinkansen lines and the Yamagata and Akita hybrid Shinkansen lines, with through service to conventional lines (see map).

The 535.3-kilometer Tohoku Shinkansen runs between Tokyo and Morioka. The fastest train on this line covers the distance in 2 hours and 21 minutes. The 303.6-kilometer Joetsu Shinkansen links Omiya and Niigata. Minimum time between Tokyo and Niigata (333.9 kilometers) is 1 hour and 37 minutes. The 117.4-kilometer Nagano Shinkansen extends from Takasaki to Nagano. This service cuts travel time between Tokyo and Nagano to 1 hour and 19 minutes. Yamagata hybrid Shinkansen (through service to conventional lines) covers 421.4 kilometers between Tokyo and Shinjo, and its shortest travel time is 3 hours and 7 minutes. Akita hybrid Shinkansen (through service to conventional lines) covers 662.6 kilometers between Tokyo and Akita, and its shortest travel time is 3 hours and 49 minutes.

JR East tries to make its Shinkansen lines as appealing and accessible as possible to a broad range of passengers. Higher speeds, through service to conventional lines and added capacity within a radius of about 100 kilometers of Tokyo are notable areas of progress.

Revenues from the widened conventional line sectors of hybrid Shinkansen services are credited to intercity and regional networks.

JR East's five-route Shinkansen network

The improved type E2 series trains to be introduced on Tohoku Shinkansen

The operation of Shinkansen is very accurate for the total 88,000 kilometers travelled by 304 trains per day in JR East's operational areas. The average delay per train since the inception of JR East more than 14 years ago is about 0.5 minutes. The maximum speed is 275 kilometers per hour on the fastest train.

OPERATIONAL HIGHLIGHTS

Passenger Number on Yamagata Hybrid Shinkansen Grows

In December 1999, the conventional line sector of the Yamagata hybrid Shinkansen was extended beyond Yamagata to Shinjo, a distance of 61.5 kilometers, and through service between Tokyo and Shinjo began. The average travel time between Tokyo and Shinjo is now 3 hours and 25 minutes, a reduction of roughly 30 minutes. Interest-free loans from an organization backed by local public-sector entities provided all of the funding for the construction costs between Yamagata and Shinjo. In addition, local governments provided large-scale free parking areas ("park & ride" parking facilities) holding a total of about 2,800 cars at five stations. Making this service even more attractive, JR East conducted effective marketing campaigns and offered a variety of promotional tickets. As a result, passengers on the Yamagata-Shinjo sector increased 90% during the new service's first year, compared to the same period prior to the start of this new service.

Providing More Seats

The number of Shinkansen commuters has grown steadily. Since JR East's inception in 1987, Shinkansen commuter-pass revenues have increased by approximately 13 times. To serve the rising number of Shinkansen commuters, JR East has been implementing gradually the introduction of *Max* all-double-decker E4 series trains after the timetable revision in December 2000. Because of this, the number of seats increased during the morning commuting hours by about 150 seats per day on Tohoku Shinkansen and about 460 seats per day on Joetsu Shinkansen, respectively.

Tohoku Shinkansen to be Extended to Hachinohe

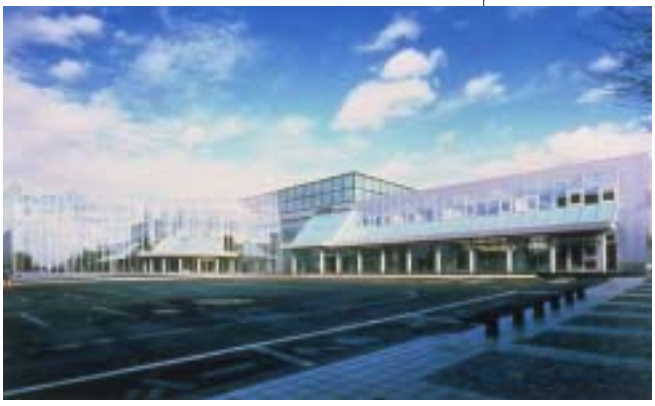
JR East is preparing for the extension of Tohoku Shinkansen by 96.6 kilometers between Morioka and Hachinohe with an expected launch at the end of 2002. The travel time between Tokyo and Hachinohe will be shortened by approximately 40 minutes to about 3 hours because of the extension.

JR East will gradually introduce improved E2 series trains from the start of the operation in Hachinohe. Active suspension that restricts horizontal movement of trains will be introduced for this new type of train for the first time in the world on a commercial basis. This will improve the comfort level. LED displays in the trains will show information of the operation of trains by introducing information technology. In parallel with this, JR East plans to utilize information gathered from passengers entering through the automatic fare collecting gate, and provide more relaxation within the trains by simplifying ticket inspection inside the train.

The extended section is being constructed by Japan Railway Construction Public Corporation as part of Seibi Shinkansen lines. JR East has made an agreement with the government to pay usage fees corresponding to benefits arising from the start of operation in this section(see page 29). The precise amount of the usage fees will be decided by negotiation before the start of operation.

Shinjo station of Yamagata hybrid Shinkansen (Below, left)
Shinjo station, which was renovated when the extension between Yamagata and Shinjo was launched, has community space and is very popular among local people as a regional information distribution center and for communication.

***Max* all-double-decker Shinkansen E4 series train** (Below, right)
This 16-car, *Max* with 1,634 seats, boasts the largest capacity in the world for high-speed train services.



Tokyo Metropolitan Area Network

OVERVIEW

This network consists of 1,117.4 operating kilometers that link central Tokyo with surrounding areas. Most of these lines are within a radius of about 100 kilometers from Tokyo station. JR East claims nearly half of the Tokyo metropolitan area rail transportation market, which is both immense and profitable, in terms of both passenger-kilometers and operating revenues.

By increasing frequency, lengthening trains and taking other steps to use existing facilities effectively, JR East has boosted capacity with small capital outlays. The Company has never raised fares since its inception, except to reflect the introduction and revision of the consumption tax. Faced with sizable investments needed to boost capacity, most of the other major private railways have been compelled to raise fares repeatedly on most of their lines during the same period. Thus JR East's relative competitiveness has risen.

Upgrading commuter services is a primary objective in this sector. The Company is taking many steps to increase capacity and relieve congestion, as well as to raise train speeds and operate commuter trains, which provide guaranteed-seat service.

Morning rush hour in a Tokyo metropolitan area station
During peak times, some of JR East's Tokyo metropolitan area network trains run at 120-second intervals.

OPERATIONAL HIGHLIGHTS

Yamanote Line, Keystone of Tokyo's Commuter Network

With a population of about 33 million, the Tokyo metropolitan area generates enormous demand for railway transportation, particularly among commuters. JR East lines extend outward from the Tokyo area in five directions, serving huge numbers of commuters from the suburbs of Tokyo. Every day, over 2.5 million passengers change from suburban commuter trains to Yamanote line encircling central Tokyo.

Increasing High-Tech Trains in the Tokyo Metropolitan Area

Between March 2000 and July 2001, JR East introduced 655 cars of the E231 series commuter trains in the Tokyo metropolitan area. All cars on these trains are computer-controlled. Interior temperatures are automatically adjusted according to outdoor conditions and the number of passengers. This control system also smoothes acceleration and deceleration.

Among other improvements to passenger services is a reduction of passenger conjestion by introducing wide-body cars and easing wheel chair access by minimizing the height difference between cars and platforms. Further, each piece of equipment of the trains is connected to a network, and information from the equipment is shown on the driver's control panel. This has made a substantial improvement in efficiency by halving the previous time of 30 minutes needed for rolling stock inspection before the start of operation. Energy consumed for operation and the maintenance cost for

New automatic fare collecting system using IC cards
The new IC card fare collecting system has enabled the ticketless and cashless use of the railways.

E231 series trains are 47% and 50%, respectively, compared with 103 series trains, and the price of new rolling stock is 30% lower compared to 209 series trains.

New operational routes

E231 series commuter trains
In 852 cars of a new type, which are expected to be introduced on Joban line and Yamanote line, information relating to transport operations will be provided on LCD or LED panels inside the trains.

Preparing to Introduce Automatic Fare Collecting System Using IC Cards

JR East is currently working toward the end of 2001 for introduction of a new automatic fare collecting system using a contactless IC card, *Suica*, (*Super Urban Intelligent Card)* (see page 23). This system enables smooth passage through the gate merely by touching the automatic fare collecting machine lightly with *Suica*, and it will settle fare payment automatically by unifying commuter pass and prepaid card functions. Passengers are therefore able to go through smoothly, without tickets or additional cash for ticket purchase.

For JR East, the IC card system means improvements in station operations and lower expenses. JR East will also shift the sales of commuter passes and long-distance tickets from counters to vending machines by promoting the preparation of easy-to-use equipment for passengers.

New Operational Routes Open

JR East will open new operational routes in order to cope with competition from the subway network and major private railways in the Tokyo metropolitan area where improvements have been made. A through train service linking Omiya and Yokohama directions via Shinjuku will start in the end of 2001 for daytime service and in 2004 for all day service. Mutual through train service on Saikyo line and Rinkaifukutoshin line will start full service in the end of 2002. No major capital investment will be required because existing facilities can be used for both. JR East intends to improve transport service and create new demand to increase the convenience of passengers for a small investment (see map).

Intercity and Regional Networks

OVERVIEW

Made up of 5,464.4 operating kilometers, intercity and regional networks represent over 70% of JR East's total network. They provide non-Shinkansen intercity services and regional services not included in the Tokyo metropolitan area network. The main service of the intercity network are the limited express trains. JR East continues to upgrade services with new rolling stock, more frequent departures and more convenient connections to Shinkansen lines. On the regional network, the Company is striving to raise efficiency. This primarily involves efforts to keep schedules closely in line with demand and the use of railway cars that require only a single operator.

OPERATIONAL HIGHLIGHTS

Introduction of New Types of Limited Express Trains

JR East will introduce new types of trains for limited express services, *Azusa* and *Kaiji* on Chuo line, which connects the Tokyo area and Kofu and Matsumoto, in December 2001. Because Chuo line runs through a section with rigid geographical features, the comfort of this new type of train has been improved by lowering the center of balance and controlling the entire train by computers. Larger windows are fitted for the enjoyment of magnificent landscapes along the lines. In addition, the image has been renewed by making interiors colorful.

Introducing new types of limited express trains
JR East is trying to increase the attractiveness of its railways and strengthen the competitiveness of intercity transport by introducing new types of trains.

Travel Agency Services

OVERVIEW

JR East conducts sales of travel packages mainly in the *View Plaza* chain (travel agency), which has outlets at stations. In particular, JR East will implement customer-friendly measures on the basis of market research and planning of packages attractive to target customers by using its railway network. JR East also distributes information regarding attractive travel packages using railways by utilizing various media such as mass media and the Internet.

OPERATIONAL HIGHLIGHTS

Enhancing Product Planning

JR East started a campaign, *Nombiri Komachi*, or "refreshing tours for young women" in February 2001. In this campaign working women from 25 to 29 years old, whose generation comprises a large segment of the population that is highly inclined to travel, are targeted and travel to relieve everyday stress is proposed. *Megri Hime*, or "touring princess" campaign is targeted at housewives without small children, and the package has been used by more than 290,000 customers as of June 2001 since its launch in January 1999. The product was made on the basis of detailed market research coupled with a successful advertising campaign. Furthermore, as regards the very reasonable travel packages which started to be sold in November 2000, *Odorokidane*, or "What a price!," is trying to tap a new source of demand by combining the trains with low use ratios and hotel accommodation tickets in one set and increase the use ratio of the trains at the same time.

***Nombiri Komachi* campaign**
Refreshing travel is aimed at working women with a basic concept of "Taking a rest from my work and returning to myself through railway travel."

***View Plaza* provides a broad range of travel packages**
JR East operates about 160 *View Plaza* outlets within its service area, selling a variety of domestic and international travel packages.

Merchandise Sales

Retailing and Restaurants

Dining Court (Above, left)
Four restaurants were opened inside Tokyo station, which serves about 750,000 passengers every day, and many customers use them in groups or with their families.

UNIQLO KIOSK (Above, right)
This store of about 250 m² at Shinjuku station, which serves about 1.51 million passengers every day, is very popular among a wide range of customer groups, especially young people.

OVERVIEW

JR East's retailing and restaurants sector targets the over 16 million people who ride JR East trains every day. In addition to the Kiosk, *JC* convenience stores, and *Mini-convenience store* formats at or near stations, JR East operates stores specializing in books, CDs and other types of merchandise, as well as restaurants. The Company will identify the optimal placement of businesses for each of its stations—the most valuable management resource to realize its full potential from the perspective of customers as a part of *Station Renaissance* (see next page).

OPERATIONAL HIGHLIGHTS

A New Space is Created in Tokyo Station

JR East has about 220 stations that serve in excess of 30,000 people each in a single day. Based on a blueprint called *Sunflower Plan*, JR East is proceeding with numerous developments to utilize space at suitable stations opened up by the alteration of station facility layouts for commercial purposes at or around stations.

These projects show how the effective use of relatively small investments can generate returns within a short period of time.

At Tokyo station, JR East opened *Dining Court* in July 2000, and *Media Court* in December 2000, by making effective use of space where construction materials had previously been stored. In *Dining Court*, four restaurants are operating in an area of about 1,000 m² where Japanese, Italian and Chinese foods can be enjoyed. *Media Court*, about the same size, contains an information distribution space, a reception counter, a bookstore and a grocery store.

Store Development by Tie-up

JR East is actively opening stores under new formats in association with other group companies to comply with convenience and the diversified needs of customers who use stations. *Mujirushiryohin COM KIOSK*, which sells products of *MUJI* brands, attracting a wide range of customers in association with Ryohin Keikaku Co., Ltd. inside the stations, has increased the number of stores by 20 as of June 2001 in line with good business results. JR East opened *UNIQLO KIOSK* in October 2000 in Shinjuku station with great success, in association with FAST RETAILING CO., LTD., which operates *UNIQLO*, casual clothing stores. Further, in the Tokyo area, JR East opened *Station Beef Bowl Yoshinoya* within Shibuya and Akabane stations, in association with Yoshinoya D&C Co., Ltd. in March 2001. JR East intends to further vitalize its stations by promoting similar tie-up strategies in the future.

Real Estate Leasing

Shopping Centers (Leasing space to tenants)

OVERVIEW

Stations and nearby land are highly profitable assets of JR East. Shopping centers on station land raise the value of existing assets while offering passengers the convenience of being able to do their shopping at stations. When developing these facilities, JR East is concentrating on creating a composition of tenants that reflects customers' needs, the nature of the site and the characteristics of the local market.

OPERATIONAL HIGHLIGHTS

Tenant Leasing Meeting the Needs of Customers

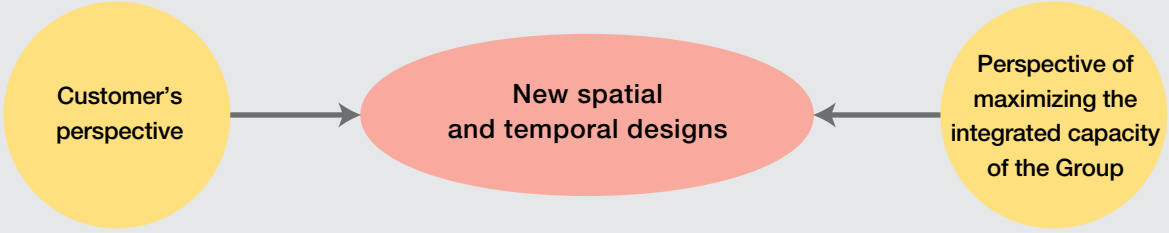
The main revenue source of JR East's real estate leasing business is rent from tenants who open stores at JR East shopping centers. JR East is attracting leading tenants, taking advantage of the outstanding customer traffic at the station locations.

Major replacement of tenants was made in the shopping center *Termina* in Kinshicho in the Tokyo area in April 2000, for example. JR East succeeded in inviting leading tenants such as *Yodobashi Camera*, a major electronic appliance retailer, and *UNIQLO*, a growing casual clothing store, by renovating the existing fashion-based stations and meeting the needs of customers. As a result, sales increased by about five times compared to those before the tenant replacement. Many other shopping centers at stations also had greater sales as a result of securing tenants with significant growth in the restaurant and retailing sectors. JR East intends to create an attractive tenant mix through active invitations and cultivation of tenants suitable for customer needs and the future age.

Zepp Sendai
In August 2000, JR East opened this live-performance hall in Sendai with a capacity of approximately 1,600 people.

Shopping centers of an everyday-living format *Ekist Tsujido*
JR East is focusing on the development of smaller shopping centers mainly at stations in the suburbs of Tokyo. These shopping centers sell groceries, books, general merchandise, fast food and other items closely tied to daily activities. One such shopping center, *Ekist Tsujido*, opened in October 2000.

Development of ***Station Renaissance***—Maximizing the Integrated Capacity of the Group



Optimal placement of businesses in each station from scratch

Showing the Group's integrated capacity through its stations

Synergizing railway operations and life-style services
Close operations between JR East and Group companies
Close cooperation among Group companies

Other Services

Hotel Operations

OVERVIEW

Hotels are a powerful vehicle for generating income from real estate holdings and are mutually beneficial with railway operations and travel agency operations. *Metropolitan Hotels* are full-service hotels located primarily in central Tokyo, prefectural capitals and cities where the Shinkansen stops. *HOTEL METS* are small-scale urban hotels serving mainly business travelers by offering quality accommodation comparable to a full-service urban hotel at lower prices. Occupancy rates have been consistently high. *JR East Hotel Chain*, which is centralizing management of these brands, better enables hotel operations to benefit from JR East's network and generate economies of scale. Among specific actions are stronger chain management, as well as joint advertising and procurement activities.

Hotel Metropolitan
A full-service hotel with 815 rooms, *Hotel Metropolitan* is the flagship of *JR East Hotel Chain*.

HOTEL METS Mizonokuchi
This hotel has 100 rooms, and, in addition to guests, many other customers use the Chinese restaurant and convenience store within the hotel.

OPERATIONAL HIGHLIGHTS

Expansion Continues at *HOTEL METS*

HOTEL METS was created to offer a new concept in hospitality for business travelers: quality accommodation comparable to a full-service urban hotel, at lower prices. In April 2000, another hotel opened in Musashi-Mizonokuchi in the suburbs of Tokyo. This addition increased the *HOTEL METS* network to 11 locations. Popular among many types of guests, *HOTEL METS* achieved an average occupancy rate of 85% during the year ended March 31, 2001.

More hotels are planned in the future, chiefly in the Tokyo metropolitan area, including Shibuya and Ofuna.

Advertising and Publicity

OVERVIEW

Spaces in stations and trains of JR East, whose network is used by more than 16 million passengers daily, are ideal for a broad range of advertisements. JR East is promoting advertising services by utilizing such spaces. For example, a single 11-car Yamanote line train has space for more than 1,500 individual ads, all benefitting from high readership. Efforts con-

Stickers on Automatic Fare Collection Gates
JR East has developed new advertising media using the space on automatic fare collection gates at stations in the Tokyo metropolitan area such as for Yamanote line, and advertising revenues have increased because of their outstanding customer appeal.

tinue to target the development of new advertising techniques in a manner that addresses the needs of customers and bolsters advertising revenues.

OPERATIONAL HIGHLIGHTS

New Advertising Media

JR East is developing and increasing new advertising media for use in spaces within stations and trains. Media recently developed include *Stickers on Automatic Fare Collection Gates* as advertising media, *Ad Straps* using straps in trains, *Full-wrap Store Advertisement* enveloping whole stores in stations with advertisements and *Large Signboards on the Roof of Stations* exploiting unused space on the roof of stations.

Full-wrap Store Advertisement
JR East uses entire Kiosk store in stations as advertisement media.

Card Business

OVERVIEW

JR East's credit card, *View Card*, has a growing number of cardholders, mainly people who patronize JR East stations, shopping centers and hotels. Furthermore, in April 2000, *View Card* became honored at VISA member merchants all over the world (approximately 19 million merchants at the end of March 2001), making it substantially more convenient to use. JR East plans to continue the aggressive expansion of its credit card business. Growth will enable the Company to raise the level of service to customers by coping with Japan's rising demand for cashless purchasing, as well as to generate valuable cardholder data on purchasing patterns that can be incorporated in marketing programs.

OPERATIONAL HIGHLIGHTS

Achieving 2 Million *View Card* Membership

JR East has carried out a campaign to attract members to *View Card*, launched in February 1993, and has increased the convenience level and the added value. As a result, the number of *View Card* members reached 2 million in May 2001 on an application basis. JR East intends to substantially increase the benefits to members in the future. Also, JR East will raise the convenience level by combining the contactless IC card *Suica* and credit card by the year ending March 31, 2003. By so doing, JR East expects to increase the number of members even further.

Various *View Cards* of JR East
JR East has issued a variety of *View Cards* in association with shopping centers at stations and hotels, and will continue to make them even more popular as cards that can be used at and around the stations.

Housing Development and Sales

OVERVIEW

Most housing developments are located along JR East railway lines. In addition to selling residential sites, activities focus on the development and sale of houses and condominiums, primarily in the Tokyo metropolitan area. These developments reflect three key themes at JR East. First is linking developments with railway operations. Second is supplying high-quality housing by cooperating with the development plans of local governments and entities. The third theme is creating communities that are pleasant and comfortable places to live and kind to the environment. At the same time, JR East continues to make effective use of assets that it owns.

OPERATIONAL HIGHLIGHTS

More JR East Condominium Projects

JR East condominium development projects are mainly located in the Tokyo metropolitan area. JR East launched sales of units at *View Sight Tower* and *View Park Kitayono* prior to the April 2000 opening of nearby Saitama-Shintoshin (new urban center) station in the suburbs of Tokyo.

Furthermore, *View Park Nakano Uenohara* was put on sale in Nakano located in the Tokyo area. The units at all three locations were completely sold out because their proximity to stations enhances their convenience.

View Sight Tower

View Sight Tower, a condominium high-rise of 31 stories near Saitama-Shintoshin, was completed in March 2001. All condominiums, approximately 260 units, were sold. JR East's real estate leasing business is also carried out on the lower floors (ground floor through third floor), which mainly consists of restaurants and offices.

Information Services

OVERVIEW

JR East operates a wide range of businesses relating to data information, from development and management of railway support systems to management of financial data and funds of the Group companies. In addition, JR East supports the Internet business operated by the Group.

OPERATIONAL HIGHLIGHTS

Operation of Cash Management System

Cash Management System (CMS), which is responsible for management of the combined funds of the Group, started in April 2001. Managing the investment of surplus current assets and financing that used to be separately carried out by Group companies are centralized by a Group subsidiary specializing in financial matters, JR East Management Services Co., Ltd. (JEMS). CMS is expected to enable improvement in efficient funding and reduction in interest bearing debt by approximately ¥90 billion. The Company intends to improve the financial position by introducing additional functions such as Payment Netting where settlement between the Group companies is offset, and Payment Agent where payment by Group companies is centralized under JEMS.

Utilization of IT

Development of *Suica*

An automatic fare collecting system using a contactless IC card, *Suica*, will be introduced in the Tokyo metropolitan area at the end of 2001 (see page 16). JR East is considering extending the use of *Suica* to Shinkansen and conventional railways outside the Tokyo metropolitan area. Also, JR East is considering adapting *Suica* for use in common with other railway companies. Use of *Suica* for shopping centers and stores at stations is under consideration by unification with *View Card*, the credit card of JR East, and electronic money functions. Furthermore, JR East is considering a system whereby seat reservations, fare adjustments and ticket inspections that are now carried out by conductors on the trains will be conducted without manual effort by linking the IC chips of *Suica* and mobile phones.

Promotion of Internet Business, etc.

Operation of the Internet mall *eki-net*, through which merchandise ordered on the Internet can be picked up at stores in stations, started in April 2000. In particular, goods suitable for delivery at stations, such as books and CDs, are handled. An integrated travel site, *eki-net Travel*, was opened in *eki-net* jointly with the largest airline company in Japan, Japan Airlines Co., Ltd. and the largest travel agency in Japan, JTB Corp., in April 2001. This enables everything from obtaining tourism information to booking tickets and accommodation necessary for travel all on one site, increasing the convenience to customers and facilitating the use of the railway.

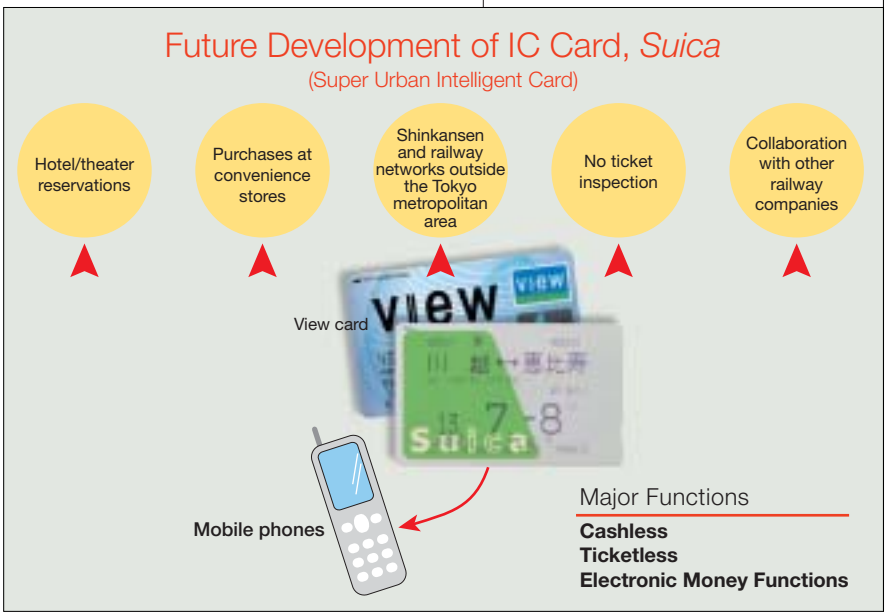
In June 2001, JR East installed multimedia terminals at major stations, and intends to carry out music distribution and image advertisement, etc.

Integrated travel site *eki-net Travel*
Visitors access services, from obtaining tourism information to booking tickets and accommodation, all on one site. (http://www.eki-net.com)

Transport Service Making Full Use of IT

JR East is promoting technical development with the aim of having a new railway system *e@train*, which provides new low cost service, to comply with diversified customer needs by increasing safety and accuracy. 'e' contains various meanings such as enjoy, environment-friendly, entertainment and economy. JR East aims to achieve *e@train* by introducing IT and mobile network technologies into various fields relating to railways such as railway support systems, sales systems and information provision for customers.

JR East also aims to have a system where fast and accurate measures can be taken such as provision of appropriate information to customers at the time of transport trouble by expanding the introduction of *ATOS (Autonomous Decentralized Transport Control System)* in the Tokyo metropolitan area (see page 24). Furthermore, JR East will manufacture prototype *AC Trains (Advanced Commuter Trains)* incorporating transmitters/receivers and LAN systems to prepare an environment within trains necessary for provision of services such as display of transport operational information and data transmission via personal mobile phones.



Safety and Technology

The Relentless Quest for Higher Goals in Safety

JR East has placed emphasis on investments and the development of technologies that target safety. During the year ended March 31, 2001, these efforts have played a major role in reducing train accidents by about 60% compared with the year ended March 31, 1988. In the year ended March 31, 2000, JR East launched *Safety Plan 21*, its third five-year safety plan. Building an even safer railway system is one objective. Another is fostering a culture of safety. Together, these actions will allow JR East to continue to provide safe and stable transportation services.

Furthermore, to secure the safety of customers on the platforms, JR East will expand the installation of train emergency stop buttons and fall-sensing mats, and implement a *Platform Campaign* to inform customers of train emergency stop buttons.

Enhancement of Reliability of Train Operations

JR East is implementing safe transport and improvement in customer services by extending the introduction of *ATOS* (*Autonomous Decentralized Transport Operation Control System*) in the main parts of the Tokyo metropolitan area. JR East plans to introduce *Digital ATC* on Keihin Tohoku line in the year ending March 31, 2004, which enables smooth deceleration and an increase in the number of trains able to operate by transmitting the position of preceding trains by digital signals.

Furthermore, JR East will develop an *ATS-Ps* type automatic train stop system for introduction in the Sendai and Niigata urban areas by the year ending March 31, 2005. The construction cost of this equipment is less than half compared to that of *ATS-P*, which has already been introduced in the Tokyo metropolitan area, and can be used to full effect in regional cities where there is sufficient distance between trains.

Among other measures to prevent operating problems, JR East will increase signal circuits and facilities for turning back to secure stable transport on Chuo line, which is the main artery of the Tokyo metropolitan area. These measures are expected to be completed in the year ending March 31, 2006 by allotting a total of ¥35.0 billion.

ATOS
ATOS enables operational control and automatic routing of conventional trains from a single operation center, eliminating the need to perform these tasks at stations. In addition, *ATOS* upgrades passenger services by automating electronic signs that provide transport information, as well as announcements.

Niitsu Rolling Stock Plant
The *Product Life Cycle* model, constructed by Niitsu Rolling Stock Plant, has contributed to the strengthening of the technologies of JR East and attracts a great deal of attention from other manufacturers.

Technological Innovation in Maintenance

JR East has continued to increase the number of E231 series rolling stock that are superior to previous models in many respects: lighter weight, lower energy consumption and a design that minimizes the need for maintenance.

Additionally, JR East has developed facilities that have an extended service life but require little or no maintenance. One example is a simple, integrated overhead wiring system that reduces maintenance costs by approximately 20%.

Manual labor has been relied on to perform a large share of the inspection and maintenance work on rolling stock and facilities such as tracks, wires and signals. JR East is adopting sophisticated machinery to replace such tasks with procedures that are automated or that rely on a computerized system. By aggressively promoting these techniques, JR East is improving safety, modernizing work practices, and raising the efficiency of maintenance activities.

Achieving Manufacture of 1,000 Cars

The actual number of rolling stock manufactured by Niitsu Rolling Stock Plant of JR East reached 1,000 in November 2000. This corresponds to about one eighth of commuter cars operated by JR East and the proportion of the new cars made in-house has reached 15%. JR East has continued to manufacture rolling stock at its own Niitsu Rolling Stock Plant since 1994 to strengthen technology and cost competitiveness throughout the life cycle of the rolling stock. In the manufacturing process of the latest E231 series rolling stock, digital design data link Niitsu Rolling Stock Plant with external designers and Ohi Plant in charge of maintenance. JR East made the

Product Life Cycle model whereby the development, manufacture, maintenance, disposal and recycling of rolling stock are managed in an integrated system. JR East established a production system whereby 250 cars can be made per annum, that is, one unit per day, in May 2001.

New Research Facilities

JR East will open Research and Development Center of JR East Group in December 2001. The presently separated research and development organizations will be centralized and strengthened with the aim of holding the top comprehensive technologies in the world with respect to the railway sector. Four research organizations, Frontier Service Development Laboratory, Advanced Railway System Development Center, Safety Research Laboratory and Technical Center, will be placed there. Development will be carried out in close association among the four research groups by having horizontally linked projects based on themes to take advantage of the benefit available from centralization of the research organizations in one place.

New Research Facilities
A six-story building for research and a two-story building for experiments will be built on land of approximately 30,000 m² owned by JR East in Omiya.

Railways in Harmony with Society and the Environment

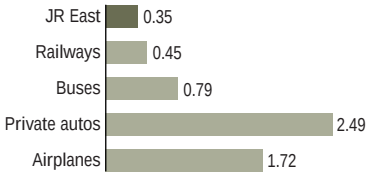
OVERVIEW

Railways account for about 30% of passenger transportation in Japan but only 7% of energy consumption. JR East plays an important role in preserving the environment. The Company is constantly striving to develop more ways to minimize its impact on the environment. JR East's three basic management policies are to ensure a quality environment for passengers and communities; to foster progress in ecological technologies; and to heighten awareness of environmental issues among employees. These policies are more than just words: among the concrete goals set in the Company's action plan for the year ending March 31, 2006 is a 15% reduction in energy consumption of train operations per passenger-kilometer compared with the year ended March 31, 1991.

Niitsu Rolling Stock Plant has obtained certification of ISO14001, international standards for environmental management systems, for the first time as a railway enterprise in Japan in February 1999. In addition, JR East has obtained certification of ISO14001 in the areas that place a high burden on the environment such as

Energy consumption volumes in proportion to the unit transportation volume of each means of transportation in Japan

(MJ/passenger-km)



Prepared by JR East based on the Survey on Transportation-Related Energy Consumption (2000 edition) (Results of the year ended March 31, 1999)

Eco Train 2001
JR East conducted this campaign jointly with WWF Japan for the period from March 21, 2001 to April 20, 2001 using Yamanote line. The importance of environmental issues was emphasized to passengers via designs on the car bodies and messages on posters in the trains.

power plants and maintenance facilities. JR East has emphasized its environmental management system by publicly announcing its environmental accounting, etc., in September 2000.
(For further details, see *Annual Environmental Report* at http://www.jreast.co.jp/eco)

OPERATIONAL HIGHLIGHTS

Measures for Global Environmental Protection

By using energy more efficiently, JR East is reducing the volume of CO_2 emissions resulting from its operations as one of the undertakings to contribute to concrete environmental problems. For example, the 209 and E231 series rolling stock need only 47% of the power used by the older cars they replace. As of April 2001, about 6,200 (59%) of the approximately 10,600 cars running on conventional lines had been replaced with the energy-saving cars. At its power plants, JR East is installing equipment with a higher thermal efficiency. Collectively, measures such as these have slashed CO_2 emissions resulting from JR East's operations in the year ended March 31, 2001 by 12% compared with the level recorded in the year ended March 31, 1991.

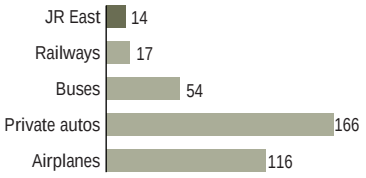
JR East undertakes recycling and promotes the formation of a recycling society. Every year, JR East passengers discard approximately 50,000 tons of trash. Trash is sorted at stations or on trains for recycling. For example, old newspapers are recycled to make copy paper for use at JR East's own offices. Efforts such as this have raised JR East's station and train general waste recycling rate to 35%, much higher than the average of 10% for all general waste in Japan.

Measures for Environmental Conservation of the Areas along Railway Lines and Social Measures

JR East has made efforts to protect the environment, such as reducing noise, vibration and waste generated by the running of trains. For example, JR East has carried out technological development and introduced noise absorbing walls and soundproof pantographs, trying to meet the standards for Shinkansen that are especially high compared to other standards in the world. Furthermore, since 1992 JR East has been carrying out tree planting activities, *Afforestation alongside Railway Tracks*. Further, JR East has *Ecology Campaign* every year to raise awareness of the importance of environmental issues in society. The implementation of *Eco Train 2001* received a very good response.

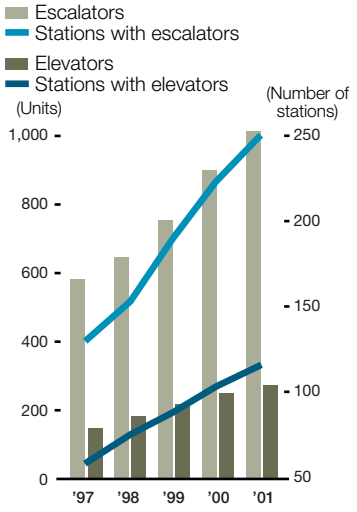
Copy paper recycled from newspapers
JR East recycles newspapers collected at stations to make copy paper, which is used at its own offices.

CO_2 emission volumes in proportion to the unit transportation volume of each means of transportation in Japan



Prepared by JR East based on the Survey on Transportation-Related Energy Consumption, 2000 edition. (Results of the year ended March 31, 1999)

Trend of the number of stations with elevators and escalators



Promotion of Barrier-Free Society

JR East will promote the construction of comfortable railways that can easily be used by not only physically disabled people but passengers that are not accustomed to using railways, in line with the trends of an aging society and international society.

JR East has positioned elevators as one of the basic facilities of barrier-free construction and will install them by 2010, in principle, at all platforms of about 390 stations that serve in excess of 5,000 passengers and which have a difference in elevation of more than five meters. Escalators will be installed, in principle, at all platforms of about 300 stations that serve more than 10,000 passengers and where there is a difference of elevation of more than five meters by 2010 (see graph).

Three-dimensional guide maps of 110 major stations are placed on JR East's Internet site along with easy-to-use information about the locations of fare collection gates and escalators. JR East will improve the design of information signs at the main stations with the use of large letters and pictures.

The Company will continue to install multi-purpose toilets that can easily be used by not only passengers in wheelchairs, but also aged people and passengers with small babies, as well as eliminating the difference between the platform level and the floor level of trains.