

Railway Operators in Japan 9

The Central Highlands and Hokuriku Regions

1. The Central Highlands

Yuichiro Kishi

Yamanashi and Nagano are mountainous prefectures in the middle of Honshu, the main island of Japan. The region is called the Central Highlands, because there are many peaks above 2000 m. The population is generally concentrated in the lower regions, especially Zenkoji, Matsumoto, Kofu and Suwa. Nagano City is the capital of Nagano Prefecture and has a population of about 360,000, while Matsumoto is a regional centre of 210,000. Kofu is the capital of Yamanashi Prefecture and has a population of 190,000. Both Matsumoto and Kofu were flourishing castle towns and the famous Buddhist temple of Zenkoji in Nagano City attracted many people.

The Central Highlands are adjacent to the Kanto region, which has been Japan's economic centre since the Edo period (1603–1868). However, high mountain passes at Usui (near Karuizawa) and Sasago (near Kofu) were a formidable barrier to easy passage between Kanto and the Central Highlands. The *Tozando* road was built through the Central Highlands much earlier in the Nara period (710–794) to link east and west Japan and it was as important as the old *Tokaido* highway along the Pacific Ocean coast. In the Edo period, the *Tozando* was upgraded and became the *Nakasendo*, one of Japan's five most important highways. It was a major route for people travelling between Kyoto and Edo (today's Tokyo) or going to visit Zenkoji temple. The *Nakasendo* began at Nihombashi in central Edo, ran north-west through the Kanto Plain and today's Yamanashi and Nagano prefectures, and then turned south-west to Kyoto and Osaka. The route was favoured because travellers did not have

to cross wide flooding rivers, unlike the Tokaido highway.

Japan's famous Mt Fuji (3776 m) is located in the region along with many other peaks in the Northern, Central and Southern Alps reaching up to 3000 m. Due to the region's natural beauty, there are many national parks and reserves that attract hikers in summer and skiers in winter. The region's many hot springs have been popular for centuries and Shingen Takeda (1521–73), the local feudal lord, is said to have visited many springs in present-day Yamanashi Prefecture. Stories about these 'secret spas of Shingen' are still told over cups of hot sake rice wine.

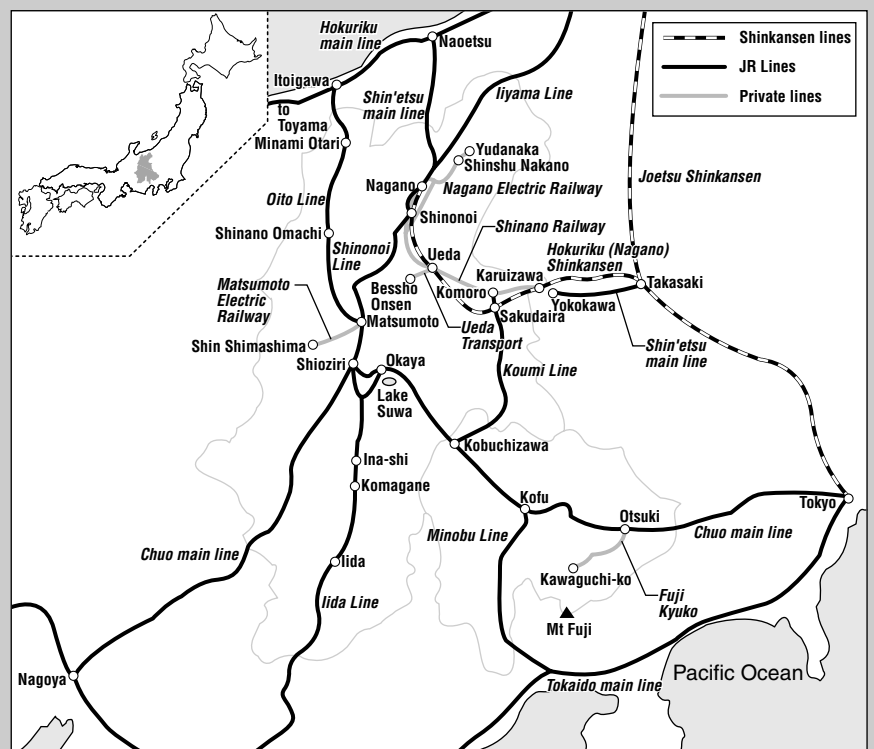
This rest of this article describes the

railway network in Nagano and Yamanashi prefectures.

Rail Network

When the government decided in 1869 to build a railway between Tokyo and Kobe via Kyoto and Osaka, there were two candidate routes: parallel to the Tokaido highway or following the course of the Nakasendo highway through the Central Highlands. Some government officials argued in favour of the Nakasendo route because it would stimulate the economy of the poorer interior, but the Tokaido route was chosen because construction was easier and it offered a better return on the initial huge capital investment. As a consequence, railways did not reach Nagano or Yamanashi until much later when the government railway's Shin'etsu

Railway Lines in Central Highlands



Size and Financial Status of Railways in Central Highlands Region

	Headquarters	Route-km	Capital (¥million)	Operating Revenues (¥million)		Operating Expenses (¥million)		Operating Profits/Losses (¥million)		Ordinary Profits/ Losses (¥million)
				Railway	Non-railway	Railway	Non-railway	Railway	Non-railway	
JR East	Tokyo	7538.1	200,000	1,841,800	60,200	1,588,000	34,500	253,800	25,700	279,500
JR Central	Aichi	1977.8	112,000	851,100	18,600	763,200	7,000	87,900	11,600	99,500
JR West	Osaka	5078.4	100,000	1,120,200	8,300	765,800	5,700	354,400	2,600	357,000
Nagano Electric Railway	Nagano	57.6	550	280	3,557	3,018	2,675	-221	882	661
Ueda Transport	Nagano	11.6	160	306	1,247	324	1,077	-18	170	152
Matsumoto Electric Railway	Nagano	14.4	432	408	7,080	413	6,664	-5	415	410
Shinano Railway	Nagano	65.1	2,300	2,541	0	3,474	0	-933	0	-933
Fuji Kyuko	Yamanashi	26.6	9,126	1,276	22,509	1,179	20,209	97	2,300	2,397

Sources: 2002 Company directories of each JR companies, *Tetsudo tokei nempo* (Railway Annual Statistics), Ministry of Transport Railway Bureau, 2000, and *Tetsudo yoran* (Railway Directory), Ministry of Land, Infrastructure and Transport, 2002

Passenger Volume and Density of Non-JR Railway Companies

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Nagano Electric Railway	No. of Passengers (1000)	12,483	12,740	12,570	12,193	11,986	12,369	12,348	12,849	11,948	11,288	10,660
	Passenger Density ¹⁾	4,563	4,638	4,585	4,463	4,368	4,474	4,487	4,641	4,267	4,025	3,813
Ueda Transport	Volume	1,651	1,752	1,745	1,746	1,713	1,712	1,772	1,762	1,681	1,519	1,389
	Density	2,112	2,240	2,224	2,193	2,155	2,132	2,117	2,186	2,082	1,894	1,755
Matsumoto Electric Railway	Volume	1,827	1,840	1,830	1,796	1,758	1,728	1,716	1,659	1,617	1,579	1,532
	Density	2,740	2,815	2,828	2,769	2,720	2,669	2,678	2,555	2,428	2,364	2,328
Shinano Railway ²⁾	Volume	-	-	-	-	-	-	-	6,471	12,351	12,142	11,855
	Density	-	-	-	-	-	-	-	9,494	8,780	8,522	8,377
Fuji Kyuko	Volume	3,946	4,058	3,894	3,816	3,713	3,573	3,614	3,479	3,198	3,079	3,021
	Density	4,058	4,238	4,149	4,160	4,105	3,924	4,105	3,946	3,619	3,533	3,519

¹⁾ Daily Passenger=Daily passenger-km/route-km

²⁾ Shinano Railway started operations from October 1997.

Source: *Tetsudo tokei nempo* (Railway Annual Statistics), Ministry of Transport Railway Bureau, 2000.

main line linking Takasaki on the Kanto Plain to the port of Naoetsu on the Sea of Japan, via Karuizawa and Nagano was opened in 1893. Trains climbed the steep grade at the Usui Pass using the Abt rack-and-pinion system. This was the first part of government railway network to be electrified.

The route was realigned with new track in 1963. Although JR East continued using the old high-power Japanese National Railways (JNR) electric locomotives over the pass when it took over the line in 1987, they were troublesome and expensive to maintain. Consequently, when the Nagano Shinkansen started operations, the Usui pass section was abandoned cutting the line into two disconnected sections. JR East finally handed ownership of the Karuizawa-Shinonoi section to Shinano Railway (a joint public-private business) in 1997.

The 422.6-km Chuo main line is another well-travelled route running generally east-west through Yamanashi Prefecture and southern Nagano Prefecture. It originates in Tokyo, runs almost due west

for 87.8 km to Otsuki and then winds its way to Kofu in Yamanashi Prefecture and on to Suwa and Shiojiri in southern Nagano Prefecture. Although it terminates at Nagoya City, there is no single train that covers the entire distance between Tokyo and Nagano. Nowadays, the line exists mainly to link the metropolises of Tokyo and Nagoya with the Central Highlands. The sections east and west of Shiojiri Station are known as Chuo-tosen (East Chuo Line) and Chuo-saisen (West Chuo Line). The highland part of the West Chuo Line runs through the Kiso district, and is famous for its steep gradients and twisting turns. The famous poet and novelist Toson Shimazaki (1872-1943) said, 'The Kiso tracks are all in the mountains.'

In Nagano Prefecture, the Shin'etsu and Chuo main lines are linked by the 66.7-km Shinonoi Line running from the central to the northern part of the prefecture. Much of the line is steeply graded single track but frequent Nagoya-Nagano express services give it the status of a secondary main line. The Chuo main line and Shinano Railway

are linked by the 78.9-km non-electrified Koumi Line, nicknamed the Yatsugatake Kogen (plateau) Line because it is the highest line in the JR group network and runs through areas of great natural beauty. (Shinano Railway operates part of the line.) The Iida and Minobu lines both belonging to JR Central are noteworthy because they run north-south through river valleys to connect the Central Highlands with the Pacific coast. They were originally constructed as private lines and then bought by the government railways in 1934, ultimately becoming part of the old JNR network. JR West and JR East jointly own the Oito Line while JR East is the sole owner of the Iiyama Line. Both are local lines connecting Nagano Prefecture to the Sea-of-Japan coast. They were built by private investors at the turn century and bought later by the government railways.

The ownership of lines in this region is complex because they were all JNR lines from 1949, but were divided between JR East, JR Central and JR West after the 1987 privatization, giving all three operators a



JR East's Koumi Line runs at the foot of the Yatsugatake Mountains. It is the highest line in the JR Group network, and uses *Kiha* Series 110 railcars. (JR East)

share of the Central Highlands network. There are also private railways operate in the region that provide Group connections to one or another of the JR lines.

Shinkansen and Express Services

The 700-km Hokuriku Shinkansen is currently under construction from Tokyo to Shin Osaka via Toyama, Kanazawa, Fukui and Obama on the Sea-of-Japan coast. The section between Takasaki in Gunma Prefecture and Nagano is

commonly called the Nagano Shinkansen, and was opened in 1997 just before the Nagano Winter Olympics. It is served by Series E2 *Asama* rolling stock, which has a maximum speed of 260 km/h. The fastest direct service from Tokyo to Nagano takes 1 hour 19 minutes, much less than the 2 hours 39 minutes taken by the former fastest limited express on the conventional line. The Nagano Shinkansen has brought economic benefits to nearby communities and more than 60 large corporate buildings have been constructed near the new Sakudaira Station. It seems that the line is attracting more passengers and causing a shift away from cars and buses. Two more sections are under construction between Nagano and Toyama (about 170 km), and between Isurugi and Kanazawa (about 25 km). The former section is scheduled to open in about 10 years with tunnels making up more than half the entire length. Although grades of up to 30% will limit maximum speeds to 260 km/h, the run between Tokyo and Toyama is expected to cut more than 1 hour off the current time of 3 hours 7 minutes. Reducing journey times on conventional lines has been a constant goal even from the early JNR days; lines have been upgraded, new sections have

been built, and tunnels have been cut to shorten routes. For example, the 5994-m Enrei Tunnel was opened in 1983 after 14 years of difficult construction, cutting about 16 km off the old winding route on the East Chuo Line between Okaya and Shiojiri. It reduces the journey time of some *Azusa* limited-express services between Shinjuku and Matsumoto by 26 minutes. Better rolling stock has also shortened journey times. After the West Chuo Line was electrified in 1972, JNR introduced tilting electric Series 381 *Shinano* limited expresses between Nagoya and Nagano, permitting faster, smoother operations through tight curves. This was the first time in the world that tilting trains had been used in commercial operations. Tilting increased the maximum speed through curves by 25 km/h, cutting 40 minutes off the time taken by older loco-hauled limited expresses between Nagoya and Nagano. The success of electrification and tilting saw later adoption of the same technology on the new Series E351 *Super Azusa* limited expresses on the East Chuo Line. These were JR East's first tilting units and they have a maximum speed of 130 km/h between Shinjuku and Matsumoto on the East Chuo Line, reducing journey times for



The Usui Pass was always a hurdle for rail transport on the Shin'etsu main line. In later days, JNR coupled two Series EF63 electric locomotives at the back to push trains up the grade until the section was abandoned in 1997. (Transportation Museum)



JR East opened the Nagano Shinkansen between Takasaki and Nagano in 1997. The Series E2 rolling stock is unique to the line. (JR East)



DC EMUs carry many tourists and hikers run on JR East's South Oito Line. (Y. Kuroda)



JR Central's two-car driver-only EMU on Iida Line. The line started driver-only operation in Nagano from March 2001. (Author)

the fastest services by more than 10 minutes to 2 hours 30 minutes.

The obsolete Series 381 was replaced in 1994 when JR Central developed the Series 383. Today, all *Shinano* limited expresses on the West Chuo Line use the fast and comfortable Series 383.

The 1973 Basic Plan drawn up as a result of the Nationwide Shinkansen Development Law included a route (provisionally called the Chuo Shinkansen) through the Central Highlands from Tokyo to Osaka, via Kofu, Nagoya and Nara. It would run well inland from the existing Tokaido Shinkansen, which has almost reached saturation point. Some people have called for use of a MAGLEV and JR Central and Japan Railway Construction Public Corporation (JRCC) are presently examining the topography and geology of the area. Research is being conducted at the Yamanashi Test Line in Yamanashi Prefecture with a view to developing commercial MAGLEVs using superconducting electromagnets. The technology is still experimental but could be ready in a few years.

Competition with Expressways

Due to the difficult topography, railways in the Central Highlands enjoyed a strong competitive edge over roads for many years because railways were more reliable and faster. Even when there was a road running parallel to a railway line, it was

often an unpaved dirt surface. Other roads followed long sinuous routes and were often blocked by heavy snow.

But the steady advance of expressways with a maximum speed limit of 100 km/h changed the situation in the 1970s. A typical example is the Chuo Expressway toll road running mostly parallel to the Chuo main line. The older national highway is slowed considerably by the winding route through the Sasago Pass, while the 4.7-km long expressway tunnel under the pass quickly speeds vehicles to their destinations. As a result, soon after the expressway opened, express buses began running from Tokyo to Lake Kawaguchi at the foot of Mt Fuji and to Kofu.

Iida is a regional centre surrounded by steep mountains to the east and west in southern Nagano Prefecture. The Iida Line runs north-south through the valley and was the city's only transport route for many years. A few bus services running mostly parallel to the track were introduced around 1950 but JNR did not see them as rivals. However, construction of the Chuo Expressway through part of the valley opened it up to road traffic from Nagoya in the west and Tokyo in the east. Fearing a loss of passengers, JNR tried to prevent bus operations on the Chuo Expressway but one bus route after another was soon offering direct express services to Tokyo and Nagoya from regional cities like Iida, Komagane and Ina. For example, there are 17 daily return services between Iida and Shinjuku, with the first departure from

Iida at 05:00 and the last arrival at 23:50.

The travel time of about 4 hours and the single fare of ¥4200 are both better than the journey by rail. As a result, JNR's share of the passenger market has dropped.

Express buses are even holding their own in the Tokyo-Nagano market where the Nagano Shinkansen has made rail travel very convenient. One bus route from Ikebukuro in Tokyo to Nagano offers six daily returns during the day. Although the travel time of about 3 hours 10 minutes is at least 30 minutes longer than by Nagano Shinkansen, the buses compete by offering a fare of ¥4000—almost half the train fare. The bus route between Shinjuku and Nagano is so popular that the operator increased the number of daily returns runs from six to eight in January 2003. Express buses also link major cities within Nagano Prefecture, posing a severe challenge to railway operators. For example, buses run at 1-hour intervals between the two biggest cities of Nagano and Matsumoto and the fare is less than half the fare on JR Central's *Shinano* limited expresses. Although the train is much faster, the railway cannot match the low bus fares and rail ridership between the two cities is unfortunately suffering.

Undoubtedly, expressways will continue to extend their reach and national and prefectural highways will continue to be upgraded. In 1993, the Joshin'etsu Expressway opened between the Fujioka Interchange in Gunma Prefecture and the Saku Interchange just inside Nagano Prefecture. Its tunnels and huge bridges made it easy to traverse the



Stainless-steel Series 7200 operated by Ueda Transport Corporation on Bessho Line. The company has regularly upgraded rolling stock to improve operations but ridership continues to drop. (Author)



Some limited-express rolling stock used by Nagano Electric Railway between Nagano and Yudanaka reminds passengers of the company's early days. (S. Takashima)

difficult Usui Pass by road, and helped kill the railway line.

Local Railways

The 12.9-km Kijima Line operated by Nagano Electric Railway between Shinshu Nakano and Kijima closed on 31 March 2002, ending 77 years of operation. At closure, the ridership was less than 20% of the peak. The company found that rationalization, such as reducing services and using driver-only trains, were insufficient to keep the line in operation. At the end of 2001, Nagano Prefecture had more than 1.816 million registered motor vehicles. This is more than two vehicles per household and is the second highest per capita figure in the country. The period before the 1998 Nagano Winter Olympics saw rapid construction and upgrading of roads. As a result of this heavy dependence on motor vehicles, local railways are finding it impossible to stop the drop in passenger numbers and are suffering gravely.

Ueda Transport used to run trains on more than 50 km of tracks in Ueda City and to surrounding communities, including Sanada, Soehi and Maruko. Today, the network has been reduced to the 11.6-km Bessho Line from Bessho Onsen to Ueda, a station on the Shinano Railway. The Bessho Line runs at a deficit every year and rolling stock and facilities

have deteriorated greatly. The company is now appealing to the Ueda municipal government for support in obtaining the ¥1 billion needed over 10 years to invest in new rolling stock and infrastructure.

JR East's 96.7-km non-electrified Iiyama Line runs through the Iiyama Basin along the Chikuma River (also called the Shinano River). Part of the line runs parallel to the Kijima Line on the opposite side of the river, which was recently abandoned by Nagano Electric Railway. Like its abandoned neighbour, the Iiyama Line is in difficult financial straits but it is still in operation because it serves as a community lifeline through an area that experiences record winter snowfalls (785 cm at one station). The line is popular with train enthusiasts because Russell snowplows make practice runs before deep winter sets in. The heavy snow-clearing costs and investment in snow-related equipment are the main reason why the line is so unprofitable. When JNR owned the line, it announced a closure plan because it was so unprofitable.

The Oito Line runs from Matsumoto through Shinano Omachi to Itoigawa in Niigata Prefecture on the Sea-of-Japan coast. JR East runs operations south of Minami Otari and JR West handles operations to the north. JR East's southern section (Oito-nansen or South Oito Line) is electrified, permitting through operations by Azusa limited expresses that

are popular with tourists from the Chuo main line. Some driver-only local operations use new rolling stock with a VVVF inverter control system. JR West's northern section (Oito-hokusen or North Oito Line) is not electrified and crosses a prefectural boundary. As a consequence, JR West only operates single diesel railcars for local traffic with very low ridership levels. Heavy rains washed away about 20 km of track in 1995 and there were fears that the line would be abandoned. Although it reopened in November 1997 after 26 months of costly reconstruction, the decline in passengers could not be stemmed so JR West cut the number of trains by 30% and removed staff from all stations except the termini in March 2002. When the Hokuriku Shinkansen opens to points further west, the North Oito Line will be severed from the JR West network, and may await a similar fate to the Hokuriku main line.

It is not the only local lines that face a difficult future. JR East sold the 65.1-km Karuizawa-Shinonoi section of the Shin'etsu main line to Shinano Railway when the Nagano Shinkansen began operating in the same corridor. The change in ownership (which the government approved) was the first case of a JR transferring ownership of a conventional line after development of a new shinkansen.

The new owners realized that the Shin'etsu main line would lose its

bread-and-butter express passengers, but the large trackside population gave them cause for optimism. They assumed that building new stations, increasing services and keeping fares stable would boost ridership and profitability. The Nagano prefectural government strongly supported the new venture, becoming the main shareholder and lending the ¥10.3 billion needed to buy the assets. But ridership continued to decline by more than 3% annually and Shinano Railway's debts exceeded its assets by FY2001. The company's situation is worse than anyone could have possibly foreseen but the company has been resolute in cutting costs, improving its image and strengthening its business. For its part, the Nagano prefectural government established a committee to examine restructuring and is offering public support, including debt forgiveness. Despite its difficulties, Shinano Railway still seems eager to operate the Shinonoi-Nagano section of the Shin'etsu main line, which it was unable to acquire when the company was founded. It also wants to take over the northern section that JR East plans to sever from its network when the new Hokuriku Shinkansen line reaches Toyama.

Railways and Tourism

The Nagano Shinkansen opened before the 1998 Nagano Winter Olympics in time to carry thousands of spectators, and contributed greatly to local tourism. Before the Games, local governments throughout the prefecture launched massive tourism promotions. The athletes, spectators and tourists from around the world created an exciting atmosphere that is still fresh in the minds of many.

The Central Highlands are rich in railway-accessible tourist attractions ranging from hot springs to historic sites to scenic

beauty spots. The region's railway operators have long played a major role in developing tourism in order to boost their ridership and the region has been so important as a tourist destination that some through services to Yudanaka ran from Ueno in Tokyo. For example, the well-known Shiga Highlands were developed into a famous tourist spot years ago by Nagano Electric Railway whose Yudanaka Station terminus is the highland gateway. During the day, the company runs limited expresses at 1-hour intervals from Nagano to Yudanaka and buses depart from Yudanaka Station for spas and other destinations in the Shiga Highlands. The company—which was originally called Kato Railway—was established to link cities on the east side of the Chikuma River, an area that has some of Nagano Prefecture's best hot springs at Yudanaka, Shibu, Andai and Kambayashi where it developed and operates the famous Kambayashi Hotel. As part of its 1929 promotion plans, the railway invited the famous Norwegian skier Olaf Helset to the area, which he described as the St Moritz of the Orient. Ueda Onsen Denki (now Ueda Transport) promoted skiing and tourism in a similar fashion. In addition to its lines carrying people to the Bessho health spa and pilgrims to the temple of the Kitamukai Kannon, it laid track to the Sugadaira ski resort, and constructed a hotel there. When it invited the famous Austrian skier, Hannes Schneider, to the slopes, he called them Japan's Black Forest. As part of its PR campaign, the railway prefixed the name of the line with Sugadaira to emphasize the attraction of the area. Schneider also visited the Nozawa Onsen ski resort near a station operated by Iiyama Railway (now part of JR East's Iiyama Line) where he demonstrated a formidable ski jump to the locals, creating sufficient excitement to provide the railway with an opportunity to attract more skiers to the area.

The private Matsumoto Electric Railway operates a 14.4-km line from Matsumoto to Shin Shimashima the gateway to Kamikochi one of Japan's most beautiful highlands. The line was built for hikers and tourists visiting the highlands and peaks in the Northern Alps. The area is so popular that during high summer Matsumoto Electric trains operate a 03:00 run to meet hikers on JR night trains.

To protect the natural vegetation and wildlife, automobile traffic is prohibited from some areas year-round. The railway company has introduced hybrid buses in an attempt to promote both rail and bus travel to the highlands, but it has not boosted ridership because many tourists prefer to go by car as far as the restricted area, then take a shuttle bus from there into the highlands. Matsumoto Electric has long hoped to build a Swiss-style mountain railway to higher elevations, but the construction costs and environmental impact will probably stop the project from ever being realized.

In Yamanashi Prefecture, Fuji Kyuko operates daily local and limited express services over a 26.6-km electrified line from Otsuki to Kawaguchi-ko (Lake Kawaguchi), one of five lakes at the foot of Mt Fuji. Passengers boarding the *Fuji-san Tokkyu* limited express pay a rapid-service surcharge. The company has always been active in many sectors, especially tourism and road transport and its railway income is now less than 10% of all group income. Its non-rail business ventures include amusement parks, hotels, and real-estate developments for summer cottages. It has also sponsored a number of speed skaters, including two Olympic bronze medallists.

Over the last few years, Fuji Kyuko has promoted tourist traffic from the Tokyo area. For example, it permits JR to operate through weekend services to Kawaguchi-ko from Tokyo and Saitama, as well as two daily commuter return runs with through services to Tokyo Station. On the other

hand, there are no through services from Kawaguchi-ko running west to Kofu, the prefectural capital, because passengers in that direction are far more likely to use Fuji Kyuko buses than trains. Finally, the area has Japan's only two

trolley bus services as one part of the Tateyama Kurobe Alpine Route connecting Nagano with Toyama in the Hokuriku region. They are described in detail in the second part of this article below. ■

with winter snowfalls of up to several meters in the mountains. Trains in the region can be delayed by heavy snowfalls and the railways have always invested heavily in snow-clearing.

2. Hokuriku Region

Makoto Aoki

Overview

Hokuriku is a small region on the Sea of Japan near the centre of the Japanese archipelago. It has three prefectures: Toyama, Ishikawa and Fukui, each comprising some 1% of Japan's area, population and personal income. This explains why Hokuriku is nicknamed 'the 1% market.'

JR West operates the generally east-west Hokuriku main line while the north-south Takayama Line is operated jointly by JR West and JR Central. JR West runs local services on the Toyama-ko, Himi, Johana, Nanao, North Etsumi and Obama lines. Private lines are run by Toyama Chiho Railway, Man'yo Line, Kamioka Railway, Hokuriku Railway, Noto Railway, Fukui Railway, etc.

The region can be roughly divided into three districts as follows:

- Toyama Prefecture
The prefectural capital is Toyama City (population 325,700 at October 2000) and the other major city is Takaoka (population 172,184 at October 2000) in the west. Both cities are connected to coastal industrial zones. The Chubu Sangaku National Park in the Japanese Alps straddling Toyama, Niigata, Nagano

and Gifu prefectures is known for its natural beauty.

- The Kaga and Noto districts of Ishikawa Prefecture

The Kaga (southern part of Ishikawa) has the region's major cities including the prefectural capital of Kanazawa. Kanazawa is also a business and cultural centre, and is the largest city in Hokuriku (population 456,438, at 1 October 2000).

The Noto district is hilly with most business centred on forestry and fishing. It has a lower standard of living than in Kaga, and is becoming very depopulated.

- Fukui Prefecture

Fukui Prefecture in south-west Hokuriku is divided into two parts, Reihoku (north-east) and Reinan (South-west). Reihoku is characterized by the Fukui Plain where the prefectural capital is located and the Ono Basin. The Sabae, regional city in Fukui Plain, is responsible for some 75% of Japan's production of eyeglass frames.

South-western Fukui (Reinan) is basically uplands dropping suddenly into Wakasa Bay. The isolated coastline has suited construction of several nuclear power stations.

The Hokuriku climate is hot in summer

Rail Development

The first line in the Hokuriku region was opened on 10 March 1882. It was built as two separate sections—one from Kanegasaki to the western portal of Yanagase Tunnel and the other from Yanagase to Nagahama. Another section from Nagahama to Maibara in Shiga Prefecture had opened previously as part of the Tokaido main line. The two ends at the western portal of Yanagase Tunnel and Yanagase were joined on 16 April 1884 after completion of the tunnelled section. Railway construction pushed further northeast to Fukui (opened on 15 July 1896), Kanazawa (1 April 1898), and Toyama (20 March 1899). The track was then extended as the Toyama Line and trains began operating to Tomari on 16 April 1910.

New lines were also built from Niigata Prefecture in the east and the Naoetsu-Nadachi section was opened on 1 July 1911. Trains began running all the way from Maibara to Naoetsu after the last section between Omi and Itoigawa was opened on 1 April 1913.

Construction of track known today as the Takayama Line only began in the mid-1920s. The first section from Toyama to Etchu Yatsuo was opened on 1 September 1927. The line was gradually extended, and services along the entire route between Toyama and Gifu started on 25 October 1934.

The first local line in Hokuriku was opened by the private Chuetsu Railway between Fukumitsu and Kuroda in Toyama Prefecture on 4 May 1897. (The station at Kuroda no longer exists but was located near today's Takaoka Station.) The

company opened the line northward as far as Himi on 19 September 1912, permitting made passage between Himi through Fukumitsu to Johana.

Nanao Railway opened a line between Tsubata and Nanao on the Noto Peninsula on 24 April 1898. Both the Nanao and Chuetsu railway companies were bought by the government in September 1907 and September 1920, respectively, and the lines are now known as the Nanao, Johana and Himi lines operated by JR West.

The Obama Line along Wakasa Bay was opened between Tsuruga and Shin Maizuru (now called Higashi Maizuru) on 20 December 1922. It is operated today by JR West and links the Hokuriku and San'in main lines.

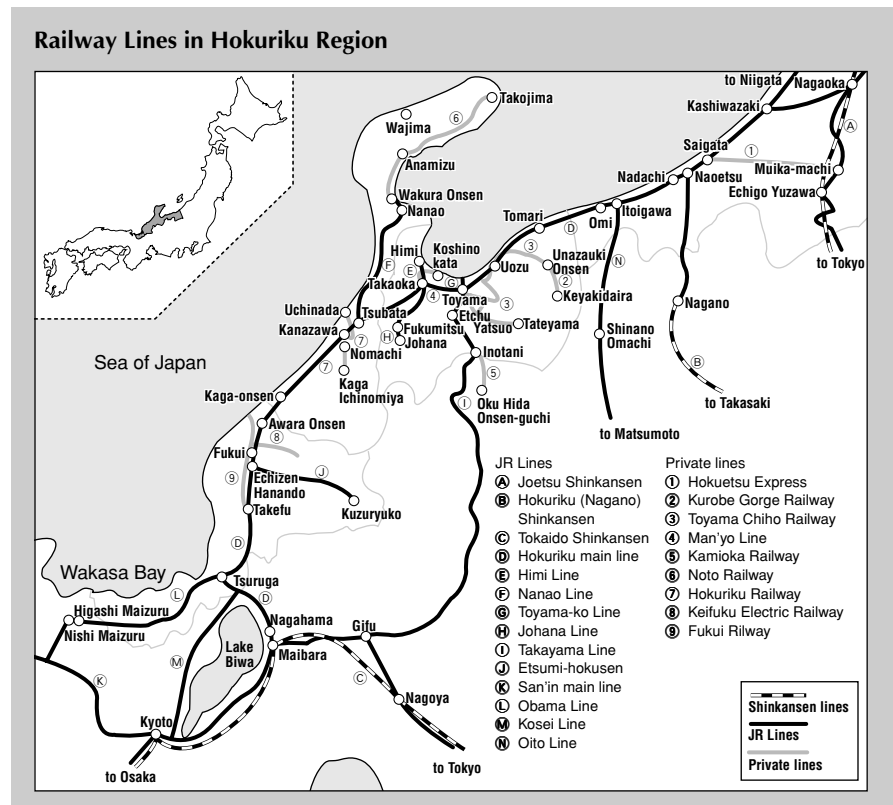
Several private companies were established in Hokuriku from the 1910s with later mergers between different groups. This trend accelerated in the 1940s and today each of the merged businesses basically serves a single district—Toyama Chiho Railway in Toyama Prefecture; Hokuriku Railway in Ishikawa Prefecture; and Fukui Railway and Keifuku Electric Railway in Fukui Prefecture.

After WWII, JNR constructed various local lines—the Noto Line (61.0-km extension from Anamizu to Takojima, opened 21 September 1964); the 20.3-km Kamioka Line from Inotani to Kamioka (opened 6 October 1966 and Kamioka Railway renamed Oku Hida Onsen-guchi in October 1984); and the 52.5-km Etsumi-hokusen (North Etsumi Line) from Echizen Hanando to Kuzuryuko (opened 15 December 1972).

Intercity Rail Transport

Intercity tracks serve local traffic between cities in Hokuriku, as well as long-distance traffic from Hokuriku to Tokyo, Osaka and Nagoya.

Hokuriku is about 400 km from Tokyo and



200 to 300 km from Nagoya and Osaka. In earlier times, Hokuriku gravitated towards Osaka because it is closer than Tokyo. However, the modern concentration of socio-economic functions in Tokyo has boosted Hokuriku-Tokyo traffic. This is especially true for Toyama Prefecture in the east. Conversely, Fukui Prefecture in the west still has strong ties to Osaka and Nagoya.

The Hokuriku main line links all three prefectural capitals of Toyama, Ishikawa and Fukui. Each city has satellites with populations ranging from 50,000 to 100,000 acting as regional centres. Passenger volumes between these cities are quite high with demand mainly from commuters, students, and business people, most of whom travel on local trains. There are also limited-express services running at intervals of about 30 minutes.

High car ownership throughout the region presents railways with an uphill struggle trying to lure people out of their cars for local trips.

However, trains still play an important role in long-distance transport between

Hokuriku and Tokyo, Osaka and Nagoya. Rail travel patterns from Hokuriku to Tokyo are basically twofold. To minimize travel time, passengers embarking east of Kanazawa prefer to take the Hokuriku main line and connections east to Echigo Yuzawa and then transfer to a southbound Joetsu Shinkansen. Those west of Kanazawa prefer to take the Hokuriku main line south towards Maibara with a transfer either at Maibara or Nagoya to an eastbound Tokaido Shinkansen.

From Kanazawa, limited expresses offer 17 daily return journeys to either Echigo Yuzawa or Nagaoka on the Joetsu Shinkansen. The fastest services (11 each day) are on the *Hakutaka* limited express. The shortest time between Kanazawa and Tokyo stations using the *Hakutaka* and Joetsu Shinkansen is 3 hours 43 minutes. The fastest travel time from Kanazawa to Tokyo via Maibara and the Tokaido Shinkansen is 4 hours 26 minutes.

Airlines are the strongest competitor in the Hokuriku-Tokyo travel market and Hokuriku has two airports—Komatsu Airport in Komatsu, about 30 km south-

Size and Financial Status of Railways in Hokuriku Region

	Route-km	No. of Employees	No. of Stations	No. of Rolling Stock	Capital (¥million)	Operating Revenues (¥million)		Operating Expenses (¥million)		Operating Profits/Losses (¥million)		Ordinary Profits/ Losses (¥million)
						Railway	Non-railway	Railway	Non-railway	Railway	Non-railway	
Kaetsuno Railway*	12.8	28	25	11	100	208	2,908	276	2,769	-67	139	-123
Kamioka Railway	19.9	14	8	5	200	90	357	122	350	-32	7	-19
Toyama Chiho Railway	99.6	251	83	75	1,558	2,671	5,637	2,793	5,808	-122	-172	-25
Kurobe Gorge Railway	20.1	205	10	367	250	2,434	1,314	2,449	1,156	-15	158	77
Hokuriku Railway	22.7	46	30	28	1,815	651	11,641	677	11,686	-26	-45	57
Fukui Railway	21.4	62	23	30	370	443	2,508	483	2,733	-40	-225	-120
Noto Railway	114.5	101	30	25	450	688	69	940	65	-252	3	811
Kansai Electric Power Co., Inc.	6.1				489,320	1,236	2,580,216	1,436	2,243,938	-200	336,278	336,078

*Kaetsuno Railway transferred its operation to Man'yo Line in April 2002

Source: *Tetsudo tokei nempo* (Railway Annual Statistics), Ministry of Transport Railway Bureau, 2000.

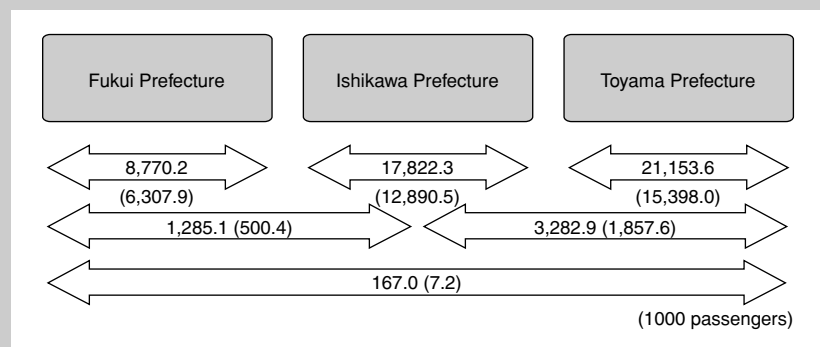
Passenger Volume and Density by Railway Company

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Kaetsuno Railway	No. of Passengers (1000)	1,452	1,371	1,446	1,371	1,403	1,385	1,222	1,157	1,084	1,033
	Passenger Density ¹⁾	1,682	1,603	1,699	1,637	1,655	1,644	1,446	1,363	1,264	1,205
Kamioka Railway	Volume	87	89	86	84	79	69	61	46	46	44
	Density	166	171	165	161	151	132	121	88	88	83
Toyama Chiho Railway	Volume	16,454	15,975	15,316	14,442	13,981	13,448	12,228	11,356	10,586	10,060
	Density	4,010	3,836	3,624	3,356	3,019	3,020	2,744	2,506	2,301	2,177
Kurobe Gorge Railway	Volume	1,569	1,641	1,570	1,733	1,074	1,565	1,613	1,457	1,509	1,560
	Density	6,072	6,364	6,471	6,906	2,735	5,760	6,124	5,384	5,541	5,665
Hokuriku Railway	Volume	3,957	3,893	3,819	3,708	3,718	3,734	3,679	3,461	3,297	3,117
	Density	3,073	3,003	2,920	2,845	2,840	2,890	2,829	2,675	2,483	2,354
Fukui Railway	Volume	2,745	2,615	2,605	2,477	2,402	2,204	2,042	1,952	1,917	1,834
	Density	3,508	3,301	3,264	3,099	2,975	2,736	2,573	2,475	2,437	2,329
Noto Railway	Volume	2,946	3,670	3,491	3,343	3,258	3,088	2,922	2,755	2,599	2,469
	Density	1,390	1,440	1,367	1,290	1,285	1,210	1,102	1,037	974	919
Kansai Electric Power Co., Inc. ²⁾	Volume	1,698	1,546	1,480	1,604	1,205	1,324	1,333	1,137	1,073	1,164
	Density	7,719	7,029	6,819	7,289	5,550	6,051	6,005	5,145	4,833	5,172

¹⁾ Daily Passenger=Daily passenger-km/route-km

²⁾ Kansai Electric Power operates between April to November (approx. 220 days) each year

JR West Rail Passengers in Three Hokuriku Prefectures (FY 1999)



Note: Numbers in parentheses () indicate passengers travelling with a commuter pass.
Source: *Survey of Local Passenger Traffic*

west of Kanazawa, and Toyama Airport in the outskirts of Toyama City. The frequent direct flights to Tokyo's Haneda Airport take little more than 1 hour, so flying to Tokyo is somewhat faster than the train even factoring in airport access times. As a result, about 75% of

passengers between Kanazawa and Tokyo travel by air. On the other hand, since travel by rail from Toyama (in eastern Hokuriku) to Tokyo takes only 3 hours 12 minutes, rail has 50.9% of this market versus 43.7% for air. Stiff rail-air competition provides an

incentive for both players to offer attractive pricing and services. JR West introduced Series 681 rolling stock for some *Hakutaka* limited-express services, increasing speeds to a maximum of 160 km/h. In addition, return-ticket holders can make use of free or cheap parking at their departure station and free travel between Tokyo Station and any final destination in Tokyo's 23 central wards.

Travel times were considerably shortened when the 59.5-km Hoku Hoku Line belonging to Hokuetsu Express was opened in 1997 between Saigata and Muika-machi in Niigata Prefecture, creating a shorter route to Tokyo by connecting with the Joetsu Shinkansen at Echigo Yuzawa. JNR actually started the construction in August 1968 but it was suspended in December 1980 as part of the JNR restructuring. Local communities along



The Series 681 *Hakutaka* connects with the Joetsu Shinkansen at Echigo Yuzawa to link Hokuriku with Tokyo. (Author)



Construction of elevated section of Hokuriku Shinkansen in Toyama Prefecture due for completion in 2012 (Author)

the proposed route joined forces with the private sector to establish Hokuetsu Express Corporation, which restarted construction. JNR's original plan was upgraded in January 1989 to permit higher speeds. Due to its priority as a high-speed main line linking Tokyo with Hokuriku via the Joetsu district of Niigata Prefecture, the track was electrified and constructed to support operations at 130 km/h. Today, the Hoku Hoku Line supports about 19 daily return local and rapid services (some trains do not cover the entire distance, but many offer direct connections beyond the line end to JR East's Echigo Yuzawa and Naoetsu stations), as well as 11 daily return limited-express services between Hokuriku and Echigo Yuzawa Station on the Joetsu Shinkansen. (Some limited expresses do not stop at any stations on the Hoku Hoku Line.)

The most important rail project now being planned for the region is the Hokuriku Shinkansen described in the first part of this article. However, construction is proceeding at a snail's pace because of declining economic growth and the government's worsening financial situation. Since the Takasaki-Nagano section opened in time for the 1998 Nagano Winter Olympics, the plan has run into one obstacle after another. In December 2000, the government agreed that the Nagano-Toyama section should be built to full shinkansen standard and completed within about 10 years.

Although the new line would cut travel times to Tokyo and might contribute to regional development, there are many problems about how the construction will be financed and possible closure of conventional parallel lines.

Trains from Hokuriku provide a vital link to Osaka. There are 25 daily return runs by the *Thunderbird* limited express between Toyama (or Uozu) and Osaka with a fastest travel time of 3 hours 9 minutes. The *Raicho* limited express links Kanazawa to Osaka with 24 daily return runs. Limited expresses also link Hokuriku and Nagoya. The *Shirasagi* offers eight daily return services between Toyama and Nagoya via the Hokuriku main line, while the *Kaetsu* (seven daily returns) from Kanazawa offers passengers a transfer at Maibara to the Tokaido Shinkansen. The *Hida* limited express has four daily return services between Toyama and Nagoya on the Takayama Line.

Struggling Local Lines

The high car ownership in Hokuriku is a major cause of low use of public transport. The situation is critical for local railway lines in areas with declining population and some private local lines were abandoned and replaced by bus services in the 1970s and early 1980s.

As part of JNR's restructuring effort in the 1980s, some local lines with average transport densities of less than 4000 passengers were abandoned and replaced by bus services. A few were turned over to public-private joint ventures.

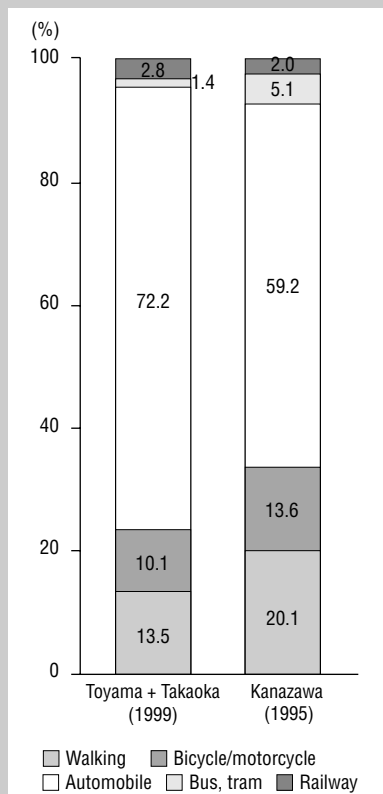
In Hokuriku, the Kamioka Line was turned over to Kamioka Railway in October 1984, which now operates the 19.9-km line from Inotani on the Takayama Line to Oku Hida Onsen-guchi. In another case, the 61.0-km section of the Noto Line between Anamizu and Takojima was transferred to Noto Railway in March

Transportation Modes between Hokuriku and Tokyo

		Toyama-Tokyo Rail: via Echigo Yuzawa Air: from Toyama Airport	Kanazawa-Tokyo Rail: via Echigo Yuzawa Air: from Komatsu Airport	Fukui-Tokyo Rail: via Maibara Air: from Komatsu Airport
Rail	Travel time	3 hours 12 minutes	3 hours 43 minutes	3 hours 7minutes
	Number of trains daily	17	17	15
Air	Travel time	1 hour 5 minutes	1 hour 5 minutes	1hour 5 minutes
	Number of flights daily	8	11	11
Percentage share (rail : air)		49.5: 42.6	20.3: 73.8	-

Notes: Data valid as of December 2002 except for percentage shares, which are based on fiscal 1999 data. Percentage shares do not add up to 100% because motor vehicle transportation is not listed. Share percentages indicate rail passengers travelling from stations in Hokuriku to Tokyo, and air passengers travelling from Hokuriku airports to Haneda Airport (Tokyo). Air travel times do not include ground transportation to airport.

Transportation Modes in Toyama & Takaoka, and Kanazawa Urban Areas



Source: Person Trip Survey

1988. When JR West subsequently electrified the Tsubata–Wakura Onsen section of the Nanao Line, Noto Railway took over the northern 53.5-km Nanao–Wajima section. JR West and Noto Railway both operate trains on the electrified Nanao–Wakura Onsen section (5.1 km).

Noto Railway’s track is located in the northern part of the depopulated Noto Peninsula. Falling passenger levels caused the company to abandon the 20.4-km section from Anamizu to Wajima on 1 April 2001 and replace it with a bus service. The prefectural government and local municipalities have supported Noto Railway’s operations by subsidizing its various discount ticket schemes.

In Toyama Prefecture, one year after suffering an operating loss of ¥64 million in 2001, Kaetsuno Railway transferred the 12.8-km Man’yo Line from Takaoka to

Koshinokata (in Shin Minato City) to the Man’yo Line Corporation, a new public–private business financed by local municipalities and corporations.

In Fukui Prefecture, Keifuku Electric Railway faced a similarly deteriorating situation for many years on its 59.2 km of tracks from Fukui to Mikuni-minato, and from Fukui to the Katsuyama district in the Ono Basin. More seriously, two separate fatal train crashes in 2000 and 2001 caused the then Ministry of Transport to order the company to raise its safety standards. The company responded by suspending operations, and subsequently notified the government that it was abandoning its rail operations. The prefectural government and local municipalities spearheaded establishment of Echizen Railway, a new public–private company and services are scheduled to restart in July 2003.

Toyama Chiho Railway operates 93.2 km of lines to famous tourist spots, such as hot springs at Unazuki and the mountainous region of Tateyama. Even so, ridership is declining and the company’s financial situation is poor. This has prompted the company to introduce driver-only local trains and other rationalization schemes.

Fukui Railway operates a 21.4-km line from Fukui to Takefu. It is trying to boost ridership and has involved local municipalities in the formation of a council to discuss ways to revitalize business.

JR West’s local lines have also experienced a rapid decline in passenger numbers over the last few years. The company has responded by using unstaffed stations, driver-only trains, and reduced timetables in non-peak hours. For example, in daytime hours, the Toyama-ko Line, which had been operated by three-car EMU train sets, introduced driver-only one- or two-car diesel train sets on March 2001. The number of trains in daytime hours was also reduced from two trains per hour to one train.

Against this backdrop, Advisory Councils for Rail Revitalization have been established in different parts of the region to act as a forum for local communities and railway companies. In addition, the railways have begun organizing events, constructing parking lots at stations for Park and Ride, building new stations, and taking other steps to boost passenger levels.

The 84.3-km Obama Line from Tsuruga to Higashi Maizuru began electrified services on 15 March 2003 and it is hoped that this will encourage more residents to travel by train.

Another plan calls for a change from AC to DC locomotive operations on the Hokuriku main line as far north as Tsuruga. This project is expected to encourage workers and students to commute over a wider area and attract more tourists, thereby boosting ridership.

Urban Transit

Despite still having tramways, the three regional main cities of Toyama, Takaoka and Fukui face an urgent need to reduce urban rush hour congestion. As an experiment to reduce road traffic and increase access for urban transit, in October and November 2001, Fukui conducted a Transit Mall Trial by reserving some streets in the city centre for pedestrians and public transport only. Toyama has announced a Light Rail Transit (LRT) corridor concept that is an extension of the existing city tramway, connecting the tramway and JR West’s Toyama-ko Line to operate through services.

In another development, Hokuriku Railway has recently upgraded services on its 6.8-km Asanogawa Line from Hokutetsu Kanazawa to Uchinada, and on its 15.9-km Ishikawa Line from Nomachi to Kaga Ichinomiya. Improvements include more frequent train services at intervals of 30 minutes during the day, new rolling stock, and better



Series 8800 of Hokuriku Railway on Asanogawa Line in a Kanagawa suburb. Services are being upgraded with used rolling stock purchased from large private railways. (Author)



The 80-minute ride on the Kurobe Gorge Railway is part of a popular summer day trip for tourists. (Author)

equipment. To facilitate bus–train transfers for better access to central Kanazawa, the company opened a new junction terminal at Nomachi Station on the Ishikawa Line in November 1987. In March 2001, it completed relocation of Hokutetsu Kanazawa Station on the Asanogawa Line to an underground site. A study is now being conducted with a view to developing a new transit system for central Kanazawa.

Railways and Tourism

Japan has many hot springs and a popular leisure activity is visiting a spring with family members, friends and co-workers. Hokuriku has many spa towns including Awara, Yamanaka, Yamashiro, Katayamaz, Wakura and Unazuki, which are visited by people from as far away as Tokyo, Osaka and Nagoya. Many limited expresses stop close to the spas. For example, about 35 limited expresses stop each day at Kaga Onsen Station on the Hokuriku main line.

Toyama Chiho Railway runs limited expresses mainly on weekends and holidays to Unazuki Onsen.

The Tateyama range of mountains in eastern Toyama Prefecture is one of Japan's most popular highland tourist areas. Tateyama Kaihatsu Railway was established in April 1952 as a joint venture by Toyama Chiho Railway, Kansai Electric Power and Hokuriku Electric Power to develop tourism. However, the steep terrain and heavy winter snowfalls slowed construction and infighting between the different management groups created one obstacle after another. The line was finally opened as the Tateyama Kurobe Alpine Route in June 1971 as a link between Toyama and Omachi in Nagano Prefecture. The high-elevation route involves transfers from one mode to another, including cable car, bus, ropeway and trolley bus. It offers an excellent opportunity for people to see ptarmigan snow grouse, alpine flowers, and stupendous panoramic views. Because of heavy winter snows, the route is only open from mid-April to late November.

The area attracts hordes of tourists and there were over 1 million visitors in 1999.

The only trolley bus services in Japan are located here. One is a 6.1-km route from Ogisawa to Kurobe Dam, the other is through a 3.7-km road tunnel under the Tateyama mountains from Murodo to Daikanbo stations. The routes are operated by Kansai Electric Power and Tateyama Kurobe Kanko, respectively.

The electric power company laid its own track through the gorge to facilitate construction of the dam and power plant. Although the line was only for company, the natural beauty of the Kurobe Gorge attracted a growing number of tourists and local communities requested that the line be opened to the public. Today, the passenger rolling stock resembling freight wagons is hauled up the 20.1-km track from Unazuki to Keyakidaira, taking 80 minutes one way. The service is operated from mid-April to November by Kurobe Gorge Railway, a subsidiary of Kansai Electric Power. In fiscal 2000, 1.56 million passengers made the journey. ■



Yuichiro Kishi

Mr Kishi is Curator of the Transportation Museum, Tokyo. He obtained a Masters degree in 2000 from Tokyo Gakugei University. His main research interests are the management history of local private railways and the history of museum development. He is co-author of *Zenkoku torokko ressha* (Trolley Trains in Japan) published by the JTB.



Makoto Aoki

Mr Aoki is Associate Professor in the Faculty of Business Administration at Tokyo Keizai University. He has published articles on management of private railways and transportation policy in local cities and holds a Master's degree in business and commerce from Keio University.