

On Track for More

Snapshots of Jernbaneverket's activities in 2007

**Work for
Jernbaneverket?**

**Now's your
chance!**



Jernbaneverket

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Norwegian railway history – a brief outline

1854	Norway's first railway line opens, linking Kristiania (now Oslo) with Eidsvoll.
1890-1910	Railway lines totalling 1 419 km are built in Norway.
1909	The Oslo–Bergen line is completed, at a cost equivalent to the entire national budget.
1938	The Sørland line to Kristiansand opens.
1940-1945	The German occupation forces are in control of Norwegian railways. Restrictions on energy consumption mean that rail has a near monopoly on transport. The network is expanded by 450 km using prisoners of war as forced labour.
1952	In a drive to end steam train operation, the government makes funding available to electrify the network.
1969/70	The 1952 electrification plan is completed.
1996	Norwegian State Railways (NSB) is split into a train operating company, NSB BA, and an infrastructure manager, Jernbaneverket. The Norwegian Railway Inspectorate (Statens jernbanetilsyn) is also established.
1999	Norway's first high-speed line, from Oslo to Gardermoen airport, enters service with great success.
2000	The tragic accident at Åsta, Norway's third major rail accident in 50 years, overshadows the start of the new millennium on the railways.
2004	NSB and Jernbaneverket jointly celebrate 150 years of Norwegian railways.
2005	Norway's largest onshore construction project, the new double-track line between Sandvika and Asker, opens to traffic.
2006	The railway enjoys growth in both freight and passenger traffic and increases its market share. Jernbaneverket celebrates 10 years as a dedicated infrastructure manager since the 1996 restructuring.
2007	At year end, Jernbaneverket has 2 921 permanent employees with expertise in a wide range of specialist areas.

Key figures

Scope of the Norwegian rail network on 31 December 2007

Route-km	4 114
Electrified lines (km)	2 552
Single-track lines (km)	3 887
Double-track lines (km)	227
Tunnels	706
Bridges	2 523
Freight terminals (all 4 types)	40
Level crossings	3 761

For more key figures, definitions and explanations, please see our annual Railway Statistics publication (Jernbanestatistikk), available at www.jernbaneverket.no

Jernbaneverket – the workplace for you?

This publication takes a look back at the year 2007 on Norwegian railways. We also want to give you an idea of the many exciting career options that we offer. Jernbaneverket is always looking for deft hands and sharp minds. In return, we can offer fascinating challenges in a variety of fields including telecommunications, electrical and construction trades, socioeconomic planning, scheduling and traffic management. Our website contains more information about our business and a listing of job vacancies and apprenticeship opportunities.



Steinar Killi, Director General

The railways were in the news a lot in 2007. Some of the coverage was positive, some less so. Major projects were completed or progressed, and a 20% budget increase enabled us to step up our efforts to tackle the worst traffic bottlenecks. Greater Oslo is one such region, and unfortunately many passengers have experienced delays and cancellations in recent months. Renewal work in this critical region is now top of our agenda. As directed by the Ministry of Transport and Communications, we have launched a dedicated renewal project in partnership with the main train companies. The results of these efforts will be seen as early as 2008.

Increased maintenance of existing infrastructure will be Jernbaneverket's priority going forward. The context for this is increased traffic, a maintenance backlog and a requirement for higher standards of reliability and quality. This was our message to the policy makers in our submission on the National Transport Plan 2010–19, presented in January 2008.

Interest in rail is increasing, and the encouraging growth in both passenger and freight traffic continued in 2007. This is good news not only for Jernbaneverket and the train companies but also for the environment. Jernbaneverket last year signed an agreement to buy green-certified electricity in accordance with European standards. Green certificates guarantee that the electricity purchased by Jernbaneverket is generated using hydroelectric power, which means that electric trains in Norway run solely on renewable energy.

The entire transport sector is climate-sensitive and needs to adapt to climate change. Jernbaneverket is devoting considerable resources to landslide alerts and prevention. The derailment on the Oslo–Bergen line in February 2007 was a powerful reminder of our vulnerability to the forces of nature.

Secure communication and safe train operation are essential if accidents are to be avoided. The introduction of the new GSM-R communications system, which became operational across the entire rail network in November, was an important milestone. We can justly claim that Norwegian railways are safer than ever, as international statistics confirm. In 2006, Norway was ranked second best in Europe for rail safety, with only Ireland ahead of us.

The debate on high-speed rail gained momentum in 2007. On behalf of the Ministry of Transport and Communications, Jernbaneverket commissioned a study of the potential for high-speed trains, and the report was presented last autumn. A great deal of further study is required before any decisions can be made, but an important debate on the future of Norwegian railways is under way.

Steinar Killi
Director General



Jernbaneverket in brief

Jernbaneverket provides train companies in Norway with a safe and efficient transport system. We plan, construct and maintain the rail network, including stations and freight terminals. We are also responsible for day-to-day traffic management.

Jernbaneverket's product

Jernbaneverket's principal task is to provide train companies with track capacity to run the desired number of trains on the most appropriate possible schedule.

With almost 57 million passenger journeys annually, and the carriage of substantial quantities of freight over long distances, rail offers an efficient and environmentally friendly transport solution. Jernbaneverket's staff has expertise in a range of specialist areas, including civil and electrical engineering, telecommunications, social planning, scheduling and traffic management.

Jernbaneverket is a government agency reporting to the Ministry of Transport and Communications.

The Norwegian parliament sets out long-term plans for developing the rail network in the National Transport Plan (NTP), as well as approving Jernbaneverket's annual budget.

Organizational structure

Jernbaneverket comprises the following main divisions:

The Director General and his staff, Traffic Management, Infrastructure Management and Infrastructure Construction.

Targets for the rail sector

The Ministry of Transport and Communications sets specific targets for how Jernbaneverket should manage the resources made available to it. Our performance in relation to targets for the 2007 fiscal year, in four specific focus areas, is detailed in the Annual Report for 2007 (Årsrapport 2007), available at

www.jernbaneverket.no



Skøyen station: A modern, efficient station.

Financial highlights

	2007	2006	2005
Restructuring funds	10.6	40.4	101.6
Operations and maintenance	3 302.9	3 206.3	2 850.8
Operations and maintenance, airport line	67.2	80.4	68.1
Investment in new infrastructure	2 290.8	1 444.7	1 545.1
Grant-funded expenditure	5 671,5	4 771,8	4 565,6
Track access charges	100.1	106.6	100.1
Sale of electricity for train operations	181.2	247.5	171.9
Other revenue	223.8	218.3	282.8
Revenue to state accounts	505,1	572,4	554,7
Total operating revenue	3 525.7	3 521.9	3 186.4
Total operating expenses	3 814.0	3 429.9	3 234.4
Total interest and other items	(1.2)	119.1	(1.9)
Result for the year	(287.1)	(27.0)	(46.1)
Grant coverage (%)	84.9	83.4	83.0
Payroll as % of operating expenses	43.6	46.7	50.9
Full-time equivalent employees	2 856	2 874	2 853

The state accounts are based on the cash principle and the allocations set out in the national budget. The result for the year is calculated using the accrual principle.

For more information on Jernbaneverket's budget, operating expenses and capital expenditure, see page 22.

Did you know...

- 12 train companies are licensed to operate on all or part of the Norwegian rail network.
- In a normal day, over 1 450 trains run on the Norwegian rail network.
- Over 800 trains a day use Oslo central station.
- Around 600 trains run through the Oslo tunnel daily.
- The network includes over 350 passenger stations and halts and 40 freight terminals.



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1. Jernbaneverket systematically maps the landslide and avalanche risk on all lines with the aid of geologists.

2. The Vestfold and Sørland lines are closed to traffic for much of the day on 14 January because of fallen trees and power outages following a powerful storm over Scandinavia.



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3. On 21 February, a train collides with an avalanche and derails between Myrdal and Hallingskeid on the Bergen line, which has to close for five days.

4. The new office to manage apprenticeship programs in the rail sector is formally established at the end of March.

5. In early May, GSM-R is fully operational as a train radio system on the trial section, Hamar–Røros. The system is already in use nationwide as an emergency communication system.



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6. In June, Jernbaneverket carries out the annual ultrasound inspection of the rails to identify possible weaknesses.

7. Liv Signe Navarsete, Minister of Transport and Communications, fires the first salvo of dynamite in the construction of the first rail tunnel between Lysaker and Sandvika on 26 June. This marks the start of the final stage of the major double-track expansion of the suburban corridor west of Oslo, scheduled for completion in 2011.



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8. A ceremony on the mountain section in October marks the 100th anniversary of the Bergen line's opening.

9. On 30 December the last freight train departs from the old Paradis terminal in Stavanger. On 2 January 2008 the modern Ganddal terminal near Sandnes takes over, after two years under construction.

Why work for Jernbaneverket?

Jernbaneverket aims to be an attractive workplace – which means a good working environment, good opportunities for career development, meaningful duties, and responsible and inspirational co-workers and managers.

Working environment and expertise

Jernbaneverket has around 3 000 co-workers engaged in a wide variety of tasks in many locations on Norway's 4 000-km rail network. The rate of absenteeism in 2007 was 4.9%, and the average age of the workforce was 48.

Our working environment is good. Annual working environment surveys show that our co-workers are helpful and supportive of one another in their work. We also work constantly to devise and implement customized management development and process improvement programs.

Jernbaneverket is increasingly a high-tech business and leads the field in many areas with respect to technological systems and solutions. At a European level, for instance, we are working with our counterparts on advanced international traffic management and train control.

In future our business will need access to high-tech expertise. The challenge for us is to hire people with the right skills as we renew our workforce, and to provide our human resources with skills updates and further training at the right time and place.

Jernbaneverket is committed to career and skills development. Many of our current co-workers have climbed the internal career ladder, developing their skills and gaining new responsibilities along the way. Others obtained advanced qualifications in a specialist field before joining us. Jernbaneverket wishes to be known as a workplace that offers a diverse variety of tasks, and we do our

best to provide challenging, responsible duties suited to the particular skills of each co-worker.

Management trainee scheme

Jernbaneverket deliberately sets out to recruit new leadership material. Our new management trainee scheme is an important tool for recruiting future leaders at various levels to our engineering projects. The management trainee program lasts two years and comprises a series of modules, in which candidates acquire new knowledge, insight and experience through alternating periods of theory and practice. The objective is that candidates who have completed the program will be qualified to take on leadership roles at various levels in our engineering projects.

Apprenticeships

Jernbaneverket is an approved provider of apprenticeships for signal, track, power and telecommunications technicians and for electricians. The duration of the apprenticeship ranges from two to two-and-a-half years, after which you are qualified for a responsible job. Traffic safety is our top-priority area, so working in a skilled trade with Jernbaneverket is a responsible position.

Vocational training at the Norwegian Railway School

In 2005, Jernbaneverket set up the Norwegian Railway School (Norsk jernbaneskole) to provide training in railway-related occupations to the entire rail sector. The school trains drivers, controllers and dispatchers. It also offers vocational training in signal and track engineering, and safety courses that are fundamental to all activity on and near railway lines.



Job satisfaction: Frode Tomta and Anita Brown want to manage train movements, so they trained as dispatchers.



Veronika – dispatcher



Name: Veronika Mari Munkvold

Age: 35

Training to be: Dispatcher

Joined Jernbaneverket: September 2007

Why did you join Jernbaneverket?

"I used to work in a shop, but found myself wanting a change. Then I saw an ad in the newspaper and thought it sounded interesting."

What kind of background do you need to be a dispatcher?

"You have to train at the Norwegian Railway School, which takes just under a year."

What does a dispatcher do?

"The dispatcher controls and monitors train traffic at stations that are not centrally controlled."

What have you enjoyed most about the past year?

"The welcome I received when I joined Jernbaneverket. You feel welcome throughout the organization."

What are you looking forward to in 2008?

"Taking my final exam!"



Marit – signal engineer

Name: Marit Jordet Langhammer

Age: 27

Education: Masters in cybernetic engineering

Job: Signal engineer

Joined Jernbaneverket: Autumn 2006

Why did you choose to join Jernbaneverket?

"I had heard a lot of good things from a university friend who got a job here. It sounded interesting!"

What does a signal engineer do, and what kind of background do you need?

"Signal engineers plan and design signalling systems. You need a technical background in electronics. As new graduates, we are receiving on-the-job training in signal engineering, which isn't available as an academic subject in Norway."

What have you enjoyed most about the past year?

"I've been on several inspections out in the field, which was fun both professionally and socially. I learn a lot from being out there and looking at the systems, and it adds variety and interest to the job."

What's the most interesting part of your job?

"I work with lots of different people, so it's not a lonely job. I also have a wide variety of tasks."

What are you most looking forward to working on in 2008?

"I'm eagerly awaiting the start of excavation and construction work at Alnabru freight terminal this summer. It's great to see a project that I was involved in designing become reality."





Safety: Signals at night.

Nadeem – apprentice signal technician



Name: Nadeem Hussain

Education: 2 years upper secondary, now apprentice signal technician (qualifying 2009)

Age: 23

Joined Jernbaneverket: January 2007

Why did you choose to join Jernbaneverket?

"I was looking for electrical jobs online and eventually found that Jernbaneverket was advertising for apprentices on its website."

What does a signal technician do, and what kind of background do you need?

"Signal technicians perform many tasks, both mechanical and diagnostic, relating to the railway's signalling systems. Before becoming an apprentice, you need two years' upper-secondary education as an electrician."

What is the most interesting part of your job?

"Replacing old motors in track switches with new ones is fun. So is going out with colleagues to trace faults. I also like the working environment at Jernbaneverket."

What are you most looking forward to working on in 2008?

"Investigating the opportunities to learn more railway-related trades. I think that would be an advantage."

Railway construction worth billions

In 2007, Jernbaneverket undertook around 100 engineering projects, with a total value of NOK 2.2bn, ranging from major upgrades worth billions to small schemes costing a few million kroner.

Jernbaneverket's Infrastructure Construction division is responsible for planning, designing and constructing new rail infrastructure. The division employs around 300 people. It also hires in 100 consultants from various firms for specific project tasks. The actual construction work is put out to tender to major contracting companies and suppliers of railway equipment such as overhead line equipment, signalling systems and track components. The Infrastructure Construction division manages the engineering projects and ensures that the contractors and other companies are performing the work as agreed.

In line with policy decisions, the largest railway engineering projects are taking place in and around Norway's main cities, especially Oslo and Stavanger. New passing loops are also being installed on main lines to aid freight traffic.

Multi-billion-kroner project in Bærum

A new double-track line to increase capacity on the Oslo–Drammen route has been taking shape between Skøyen and Asker over the past few years. Currently a new station is under construction at Lysaker, at a cost of NOK 1.1bn, and a new double-track section from Lysaker to Sandvika, costed NOK 2.9bn. Lysaker station is scheduled for completion in 2009, and the new line to Sandvika in 2011.

In the Jæren region of southwest Norway, a new freight terminal at Ganddal near Sandnes was completed in December 2007 after two years under construction at a cost of NOK 500m. Meanwhile, double-tracking of the line between Sandnes and Stavanger, at a cost of NOK 2bn, is well under way. This project, which is essential to expand local passenger services on the Jæren line, is due to be completed in 2010.



“Investing in rail freight is an investment in the environment, the economy and safety.”

*Liv Signe Navarsete
Minister of Transport and
Communications*

*Ganddal freight terminal:
The terminal near Sandnes was
completed in December 2007.*





Drilling rig: Ten metres below the gardens of Bærum, the last part of the Lysaker–Sandvika double-track tunnel is being bored.

Dedicated mobile network

In 2007, Jernbaneverket completed construction of the new private mobile phone network for Norwegian railways, GSM-R. As a result of the NOK 1.7bn project, Norway is one of the first countries in Europe to have full GSM-R coverage across its entire rail network. GSM-R is now in use as a secure means of communication between train drivers and controllers. The system is crucial to improving rail safety. In future it will also be used as a mobile phone network for many different railway functions and for wireless data transmission, for instance in centralized traffic control (CTC) systems.

On the Nordland line, CTC is being extended northward from Grong to Bodø. This entails the installation of new signalling systems at all stations, which will be interconnected so that the entire line can be centrally controlled from Trondheim. The final cost for this project when it is completed in 2009 is budgeted at NOK 850m.

Small-scale projects

In addition, Jernbaneverket spent some NOK 300m on numerous small-scale projects to improve safety, increase capacity and modernize stations. These included the removal of level crossings and the construction of new passing loops and station platforms.

Ambitious plans

Jernbaneverket is planning to build new double-track sections on the Østfold, Vestfold and Eidsvoll–Hamar lines. There are also plans to expand the Arna–Bergen tunnel and build a new line between Oslo and Hønefoss, known as the Ringerike line. These projects will come to fruition as the Norwegian parliament makes funding available through the national budget in the years ahead.

Project expertise – a focus area

Jernbaneverket's Infrastructure Construction division is the developer for one of Norway's largest onshore capital projects. Between now and 2011, over NOK 8bn is to be invested in new tracks between Lysaker and Asker. Building a new railway through one of the most densely populated areas of Norway is a challenging task for all the co-workers from the various trades and professions involved in the project.

Jernbaneverket offers young, newly qualified people the chance to tackle major professional challenges in large and small-scale projects across Norway.

Did you know...

- The newly opened Ganddal freight terminal near Stavanger will handle the same volume of freight in its first year as 50 000 tractor-trailers on the roads.
- The total volume of freight transported in Norway has increased by more than 10% in the past year (source: Statistics Norway).
- Road transport was responsible for one fifth of greenhouse gas emissions in 2006 (source: Statistics Norway).
- Jernbaneverket's objective is to double the freight capacity of the rail network by 2020.

Oslo region: Oslo's rail network is being modernized at a fast pace.



ENGINEERING PROJECTS



Firmly anchored: Ice is scraped away to find anchor points for the bolts securing the rock cutting alongside Engervannet lake in Bærum.



Capacity: The double track between Lysaker and Asker will double the capacity of the Skøyen–Asker section.

Sørland line: Catenary upgrading is necessary to supply sufficient electricity for train operations.

Lysaker – Sandvika: Linda Nesje is the inspecting engineer for the Blommenholm tunnel.



“I have great pleasure in seeing the station take shape.”

Anne Braaten,
Construction manager,
Lysaker



Ground-breaking ceremony, October 2006: Liv Signe Navarsete, Minister of Transport and Communications, signals the start of construction work on the Sandnes–Stavanger double track. The first section was completed in January 2008.

Lysaker: The new double track between Lysaker and Sandvika will be completed in 2011.





Inspection: Mosye Abraham and Stine Marie Røyrvik check the operation and monitoring systems for GSM-R at Marienborg operations centre.

Secure communication across Norway's rail network

You can now be more confident than ever that important messages will get through in the event of an accident. The new GSM-R communications system provides coverage for trains across the entire Norwegian rail network.

GSM-R

In the past, some sections of line and the vast majority of tunnels were without radio coverage. On the Nordland line, for example, the old analogue radio system was never installed. Here, train crews had to make do with the conventional mobile phone network, with all the associated limitations. In some places, trains were completely out of reach. However, GSM-R has been developed specifically for railway operations and provides coverage across the entire network, including tunnels.

Feel safer

The new system became fully operational in November 2007.

"The feedback so far indicates that train crews feel much safer," says Terje Langaas of Jernbaneverket. "Needless to say, we've

had a few teething troubles as everyone gets to grips with the new technology, but I think these are overshadowed by the gains."

Easier communication

GSM-R uses GSM technology, familiar to most people from their mobile phones. The R for "railway" indicates the presence of extra functions to aid traffic management. For instance, the system makes it possible to give higher priority to certain types of call, with emergency calls having the highest priority. In an emergency, vital messages will take precedence over all other calls on the network.

The new system also allows group calling. In this mode, it works rather like a high-tech police radio, transmitting messages over the network to multiple recipients at the same time. In the event

of an accident, for example, emergency teams, other trains and anyone else who needs to know can be notified all at once.

Data transmission capabilities

The system also has data transmission capabilities. In the future, this will facilitate much more advanced functions such as monitoring, remote evacuation and passenger information. GSM-R will also be an integral part of the planned ERTMS signalling system. When this is introduced, starting in 2012, train drivers will receive all essential information via the on-board control panel.

On the whole, passengers will not notice any sign of the changeover, but faster communication in an emergency will be one benefit.

Wireless communication signals the future

The much maligned colour-light signals, the cause of many delays in 2007, will be consigned to history in a few years' time. Beginning in 2012, train drivers on the eastern part of the Østfold line will be the first to receive all essential information direct to the instrument panel in their cab. Then they will no longer need to pay attention to exterior signals.

New ERTMS signalling system

Late-running trains were the cause of much aggravation in 2007. Signal failures were often the culprit. The current system provides drivers with vital traffic information using standard colour-light signals. In other words, drivers must have an "all clear" signal (green light) before proceeding at various locations on the line. As a result, if just one component fails, the system breaks down and no train is allowed to proceed.

Safe, accurate and efficient

However, this weakness will be consigned to history when the new European Rail Traffic Management System (ERTMS) is introduced in Norway. Under the new system, all communication with trains will be conducted wirelessly using GSM-R technology, and drivers will no longer have to pay attention to exterior signals. The system will therefore eliminate many of the current sources of failure. Continuous communication with trains also allows traffic to be controlled with greater safety, accuracy and efficiency.

"Under the new system, it will be possible to run trains on the same line at 90-second intervals," explains Geir Hansen, ERTMS project manager at Jernbaneverket. "That will give us a substantial increase in capacity on double-track lines."

European standard

ERTMS is a standard system introduced by the European Union to which Norway is also committed. The background to the EU initiative is a desire for greater efficiency and competition in European rail traffic. The common technological

standard will allow locomotives and rolling stock to operate throughout the European Economic Area. Train companies will therefore be able to operate across national borders, using rolling stock from various European countries. Do you dream of taking a non-stop train ride from Oslo to Rome? In a few years' time, that might be a reality if there is sufficient market demand.

The system will be operational from 2012 onward. In the first instance it will be used only in Østfold, where operational experience will be gathered over a three-year period. It will then be extended to the rest of Norway in stages from 2015, with nationwide coverage expected by 2030.

Much needed renewal

The system comes with an estimated price tag of NOK 14.3bn. Spread over a 15-year implementation period, that means an annual cost of NOK 900m. This may sound expensive, but Jernbaneverket's calculations show that upgrading the present colour-light signals would be even more costly.

"Sixty per cent of Norway's rail infrastructure is over 40 years old and needs to be replaced anyway. Financially, this presents some tough challenges for Jernbaneverket and the train companies," says Geir Hansen.

Anyone who has stood on the platform at Oslo central station on a cold November morning waiting for a late-running train will probably agree that renewal of the signalling system is necessary.



Colour-light signal with location code: 4 400 colour-light signals on the network will be dispensed with when ERTMS takes over.

New technology – new possibilities



Name: Jens Melsom

Job title: Technical director

Why does Jernbaneverket need to invest in ERTMS? In other words: What advantages does the ERTMS model we have opted for have over our current systems?

"Firstly, Jernbaneverket has to adopt signalling systems that meet the requirements of European regulations, and ERTMS/ETCS is the only signalling and speed-control system that does so.

"Secondly, ERTMS has the advantage of reducing train headways to an absolute minimum. In practice, this means we can have a 90-second interval between trains, assuming a train length of 300 metres. We also envisage more efficient and substantially cheaper solutions for level crossings courtesy of ERTMS, since it will enable us to reduce the number of cables running alongside the tracks. It will allow us to give road traffic the same amount of warning time irrespective of the train's speed – something that isn't possible with the current system. ERTMS uses GSM-R as a communication channel between train and track, which is what makes all this possible.

"What's more, the interlockings in Norway have now reached the age where they will need to be replaced in the next 10–20 years anyway."

What effects of ERTMS will I notice as a passenger?

"The extent to which passengers will notice the effects of ERTMS depends very much on how the railway in Norway makes use of the possibilities inherent in the technology. The effects differ between single-track and double-track infrastructure. In urban areas with double track, passengers may enjoy a more frequent service as headways are reduced. Tailbacks will also clear more easily, since the on-board signalling will be updated irrespective of the train's location on the line. This means a train that has been told to stop before the next signal may at any time be told the situation has changed and can pick up speed again.

"On single-track lines, trains can also run at more frequent intervals, but only in the same direction of course. Nevertheless, ERTMS will increase capacity for passenger and freight services alike."

Effects: According to technical director Jens Melsom, new technology will mean more efficient train operation.

Think green – think rail

Society's need for transport is growing. Rail plays an important role in an environmentally friendly transport system.

As a result of climate change and global warming, more and more people are demanding more environmentally friendly forms of transport. The biggest environmental gain comes from moving traffic from the roads and the skies to electrified railways.

Rail transport is highly energy-efficient. Regenerative braking (the energy used in braking is transferred to the overhead wires for use by other trains) and low friction between wheels and rails help reduce rail's energy consumption.

What is more, with effect from 1 July 2007, Jernbaneverket signed an agreement to buy green-certified electricity in accordance with European standards. Green certificates guarantee that the electricity purchased by Jernbaneverket for train operations and internal consumption is generated using hydroelectric power (CO₂-neutral). Schemes such as this help promote environmentally friendly power generation. Electric trains are thus the only form of transport that can take passengers and freight from A to Z without emitting carbon dioxide, a greenhouse gas.

Although rail is one of the most energy-efficient forms of transport, there is still scope for energy conservation. Since 2003, Jernbaneverket has implemented a number of energy conservation measures and achieved significant savings.

Speed, frequency, punctuality and price are the key factors if rail is to compete effectively with road and air. We therefore need to combine a wide variety of

initiatives to make rail the first choice of travellers and shippers.

Environmental challenges

In common with other sectors of the transport industry, Jernbaneverket faces various environmental challenges. By means of effective management, we aim to put in place a systematic program to promote Jernbaneverket's agreed environmental policy and targets. Jernbaneverket's environmental management system incorporates the tenets of the wider "Green Government" (Grønn stat) initiative for the Norwegian public sector, and the key focus areas are set out in Jernbaneverket's Environmental Plan (Miljøplan) for the 2006–09 period. Our principal environmental objective is to reinforce the environmental benefits of rail.

Noise affecting people living close to railway lines is one of rail's biggest environmental challenges. The increase in freight traffic has many positive aspects, in terms of both safety and greenhouse gas emissions, but overnight freight trains may disturb the sleep of nearby residents. In 2007 the Norwegian Institute of Public Health (Nasjonalt folkehelseinstitutt) conducted a study of noise nuisance and sleep disturbance caused by trains. The institute will publish its report in 2008. Jernbaneverket has also charted noise levels alongside the railway in Oslo and large parts of the Akershus region. Maps showing the noise profile along the sections charted are available on our website. The report will provide a basis for formulating a noise action plan.

“If we provide infrastructure for line speeds of 200 km/h and use modern rolling stock, we can achieve big savings for the environment.”

**Veronica Valderhaug,
Section manager
Jernbaneverket**

Green: CO₂ emissions can be reduced almost to zero by switching traffic from road and air to electrified railways.





Animal collisions: A stressful experience for train drivers and a tragedy for wildlife.

Collisions with animals are another major problem for Jernbaneverket. In both 2006 and 2007, the number of animals hit by trains increased markedly. Jernbaneverket's target is to reduce the number of animal collisions by 25% of the 2003 figure by 2009. However, the number of collisions in 2007 was higher than the previous peak in 2003.

The 2008 budget earmarks NOK 20m for vegetation clearance along railway lines, to improve safety and reduce the number of trees and branches falling on the overhead wires. Research has shown that this program will likely also reduce the number of collisions with wildlife.

The now discontinued process of impregnating wooden sleepers (ties) with creosote resulted in soil pollution. Jernbaneverket is responsible for cleaning up contaminated land. In 2007 a risk assessment, including proposed clean-up options, was carried out in two polluted locations in the district of Malvik.

Details of Jernbaneverket's environmental policies and the status of environmental programs can be found in our Environmental Report for 2007 (Miljørapport 2007), available in Norwegian at

www.jernbaneverket.no

Did you know...

- By buying green certificates, Jernbaneverket has ensured it uses only renewable energy.
- Electric trains are the most energy-efficient and least polluting form of transport.
- Karl Georg Høy, a professor of environmental technology, has said that rail use in Norway needs to triple if the transport sector is to become more sustainable.
- Scandinavia is leading Europe in introducing cross-border energy metering. The system has the potential to cut the energy consumption of trains by 10%, resulting in large cost savings for operators.

Environmentally friendly: A newly developed system for directly measuring trains' energy consumption has been in use in Scandinavia since 2007. The initiative came from Bane Energi, Jernbaneverket's in-house power supplier.



Fewer trucks: A freight train can transport the same volume of goods as 24 fully loaded tractor-trailers.

Noise: Road traffic accounted for 79% of recorded noise nuisances in Norway in 2006, while rail accounted for 4%.



Increased capital spending in 2007

Jernbaneverket managed a budget of NOK 5.7bn in 2007. Around 90% came from taxpayers in the form of grants approved by the Norwegian parliament, with the remainder coming from train companies and other sources of revenue.

Jernbaneverket spent NOK 3.4bn on operating and maintaining existing infrastructure in 2007.

The Norwegian parliament made NOK 2.3bn available in grant funding for new infrastructure construction last year, an increase of NOK 750bn on the 2006 figure. The largest construction projects were the new Lysaker station, the new Lysaker–Sandvika and Sandnes–Stavanger double-track sections, and the new freight terminal at Ganddal in Rogaland.

Successful projects

For some years, Jernbaneverket has pursued new technical solutions to reduce acquisition and maintenance costs. Examples include the following projects:

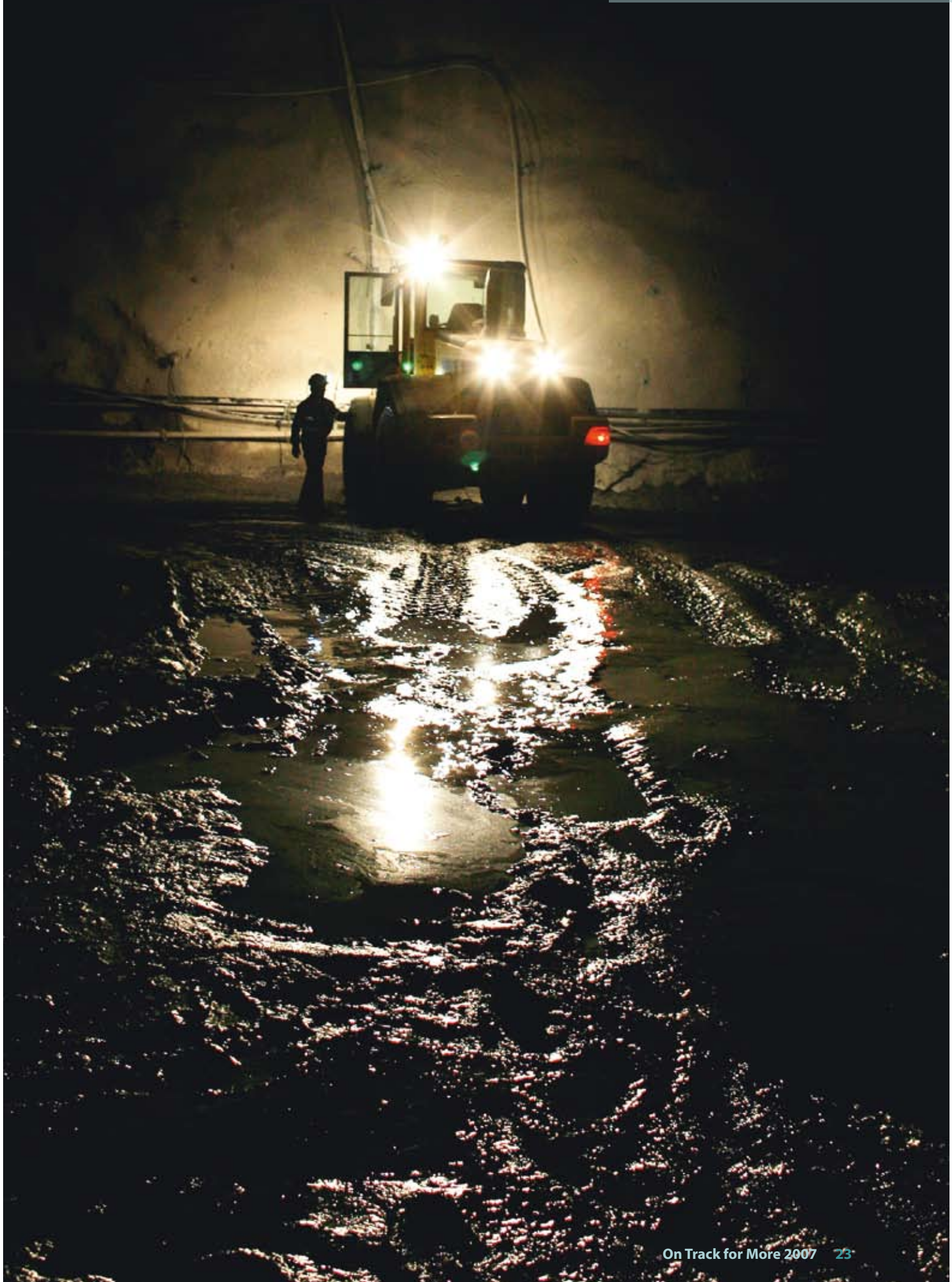
- Raising the catenary to allow taller freight wagons and double-deck passenger trains to run through tunnels. This project is complete on over 70% of the network.
- Introducing sleeper-mounted switch motors that require little or no maintenance, halving the capital cost of new track switches.

- Modifying catenary mountings to allow wider freight wagons to pass. This project is complete on 1 300 km of the network.
- Introducing LEDs in colour-light signals to reduce the cost of bulb replacement by 20–80%.

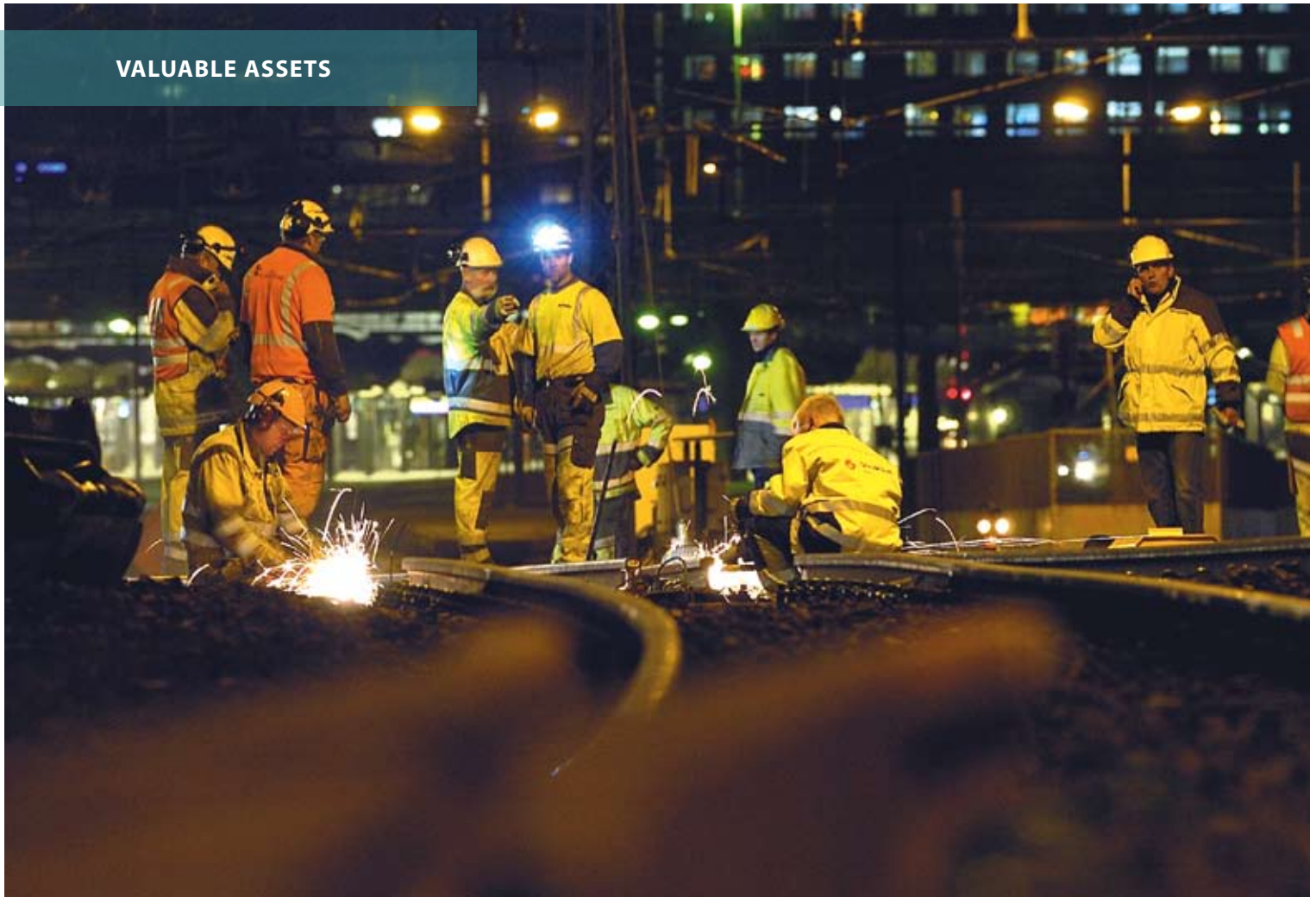
Increased productivity

In 2005 the Norwegian parliament voted to put infrastructure operation and maintenance out to competitive tender. In autumn that same year, the incoming government reversed the decision and the process was halted. The requirements laid down by the Ministry of Transport and Communications regarding efficiency and resource utilization in Jernbaneverket necessitated reorganization and skills enhancement. One of the objectives was to make more steady use of manpower throughout the year. Tools for measuring performance were developed, leading to standardization of measurement units and activity definitions. As a result of this process, Jernbaneverket can now quantify the unit costs of its operations and maintenance activities. In 2007 we began the process of putting in place similar productivity measurements and improvements in the rest of the organization.

Lysaker–Sandvika double track: The project has a budgeted cost of NOK 3 235m and is scheduled for completion in 2011. The photo shows construction machinery being cleaned in the Bærum tunnel.



VALUABLE ASSETS



Vulnerable: The backlog in rail infrastructure renewal is estimated to cost NOK 5.4bn, and the network becomes more vulnerable as you approach Oslo.

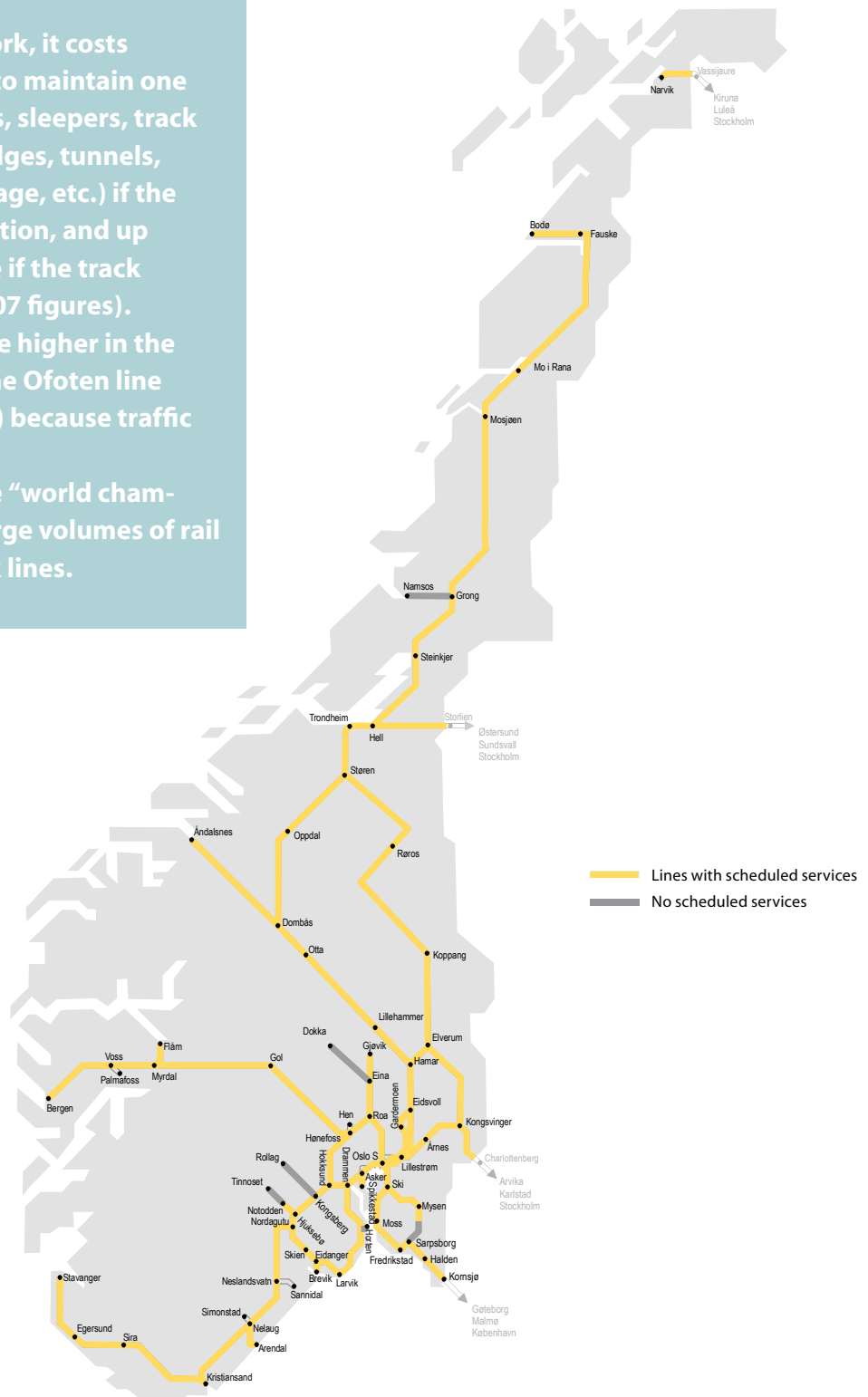
Stavanger area: Construction of the Ganddal freight terminal and the Sandnes–Stavanger double track represents combined capital expenditure of more than NOK 2bn.



The Norwegian rail network

Did you know...

- The Norwegian rail network totals 4 114 km.
- On most of the network, it costs NOK 60–75 annually to maintain one metre of railway (rails, sleepers, track switches, ballast, bridges, tunnels, embankments, drainage, etc.) if the track is in good condition, and up to NOK 120 per metre if the track condition is poor (2007 figures).
- Maintenance costs are higher in the Oslo region and on the Ofoten line (Narvik–Riksgrensen) because traffic volumes are higher.
- Jernbaneverket is the “world champion” in operating large volumes of rail traffic on single-track lines.



Improved punctuality on regional services

Definition of punctuality

Percentage of trains arriving at their destination on time

On time = 0–3 min delay for local, Airport Express and regional services

On time = 0–5 min delay for all other trains

Definition of reliability

Percentage of scheduled train services that actually operate

Punctuality target

Jernbaneverket's target is that at least 90% of all trains (95% of Oslo–Gardermoen Airport Express services) must arrive at their destination on time.

Passenger services

In comparison with 2006, punctuality in 2007 was poorer on long-distance services, while regional services showed some improvement. The Oslo–Halden and Oslo–Gjøvik lines met the punctuality target. Cross-border services also improved their punctuality, with trains via Kornsjø and Storlien meeting the target. On Oslo commuter services, only the Oslo–Jaren route achieved 90% punctuality. Other local services that met the target were Porsgrunn–Notodden, Bergen–Arna, Oppdal–Steinkjer and Bodø–Rognan.

The Oslo–Gardermoen Airport Express service maintained its good punctuality rate of 96%.

If the definition of "on time" was widened to allow delays of up to 10 minutes on passenger services, all lines apart from three long-distance routes would have met the punctuality target.

The reliability rate for passenger services was 98.2%.

Freight

Unfortunately no type of freight traffic on any route met the 90% punctuality target in 2007. Closest to target was the Nordland line (Trondheim–Bodø), with 88% overall punctuality, which met the target for six months of the year. If the definition of "on time" was widened to allow delays of up to 10 minutes, the Nordland line would have achieved 90% punctuality.

Causes of late running

A number of lines are operating at or near capacity. Jernbaneverket receives more applications for train paths than it is able to grant. This applies especially to core sections of the network such as Oslo central station, the Oslo tunnel and Skøyen.

As part of the project to build a new double-track line between Oslo and Asker, major engineering works have been under way on the Drammen line, which carries trains to and from destinations throughout the east of Norway, as well as the south and west. The Drammen line is therefore crucial to punctuality across the Norwegian rail network. The Jæren line too was affected by engineering work on the Stavanger–Sandnes double-tracking scheme.

Technical systems (especially interlockings) on some sections suffered from a disproportionate number of faults, particularly in the Oslo area. Rolling-stock faults were also prevalent at times. In the course of the year, bad weather caused a number of operating problems, including overhead line damage and power outages, flooding, landslides and derailments. To enable drivers to stop in time in an emergency, there were prolonged temporary speed restrictions, especially on the Dovre (Oslo–Trondheim) and Bergen lines.

Punctuality Report 2007

Jernbaneverket's Punctuality Report for 2007 (Punktlighetsrapport 2007) is available at www.jernbaneverket.no under "Om Jernbaneverket".



Overnight work: Rail grinding often takes place at night. The grinding train is 100 metres long and weighs 300 tonnes.

Rail grinding to increase comfort

With several million wheels a year passing over the busiest lines, the rails naturally become worn. For various reasons, corrugations can form in the rail surface, and their effect is noticeable when a train passes at full speed. If rails are allowed to remain in use in this condition for any length of time, it accelerates degrading of the steel and causes increased wear and tear on sleepers, ballast and rolling stock. Train noise also increases, and passenger comfort suffers. For all these reasons, the rails need to be reconditioned, which

is achieved by means of rail grinding. Every year Jernbaneverket rents a special train for this purpose. Multiple sets of rotating grinding discs mounted beneath this train gradually return the rail surface to its original profile. The grinding train is 100 metres long and weighs 300 tonnes, since strong pressure is needed on the grinding discs to achieve effective results. The grinding process is computer-controlled and can be monitored closely from the cab by the operator.



Oslo tunnel in need of upgrading

The Oslo tunnel is Norway's most vulnerable section of railway. Together with Oslo central station and Skøyen station, it forms the hub of the country's rail network.

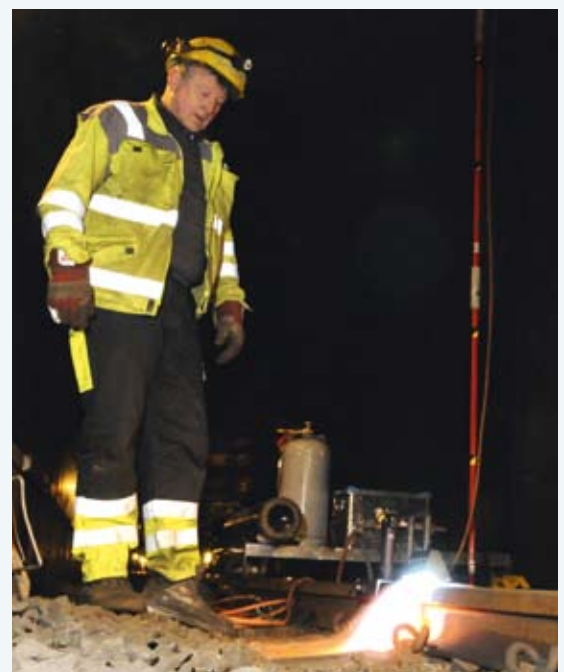
Around 600 trains run through the tunnel each day. Any faults that disrupt this traffic soon have major consequences for rail services throughout much of Norway. The tunnel is now to be upgraded to enable us to deliver the better punctuality we have promised.

The 3.6-km tunnel with two through tracks opened in 1980. After nearly 30 years, the track is almost life-expired

and a complete upgrade of the technical systems is needed. The tunnel is a frequent source of infrastructure faults, with knock-on effects for passenger and freight services alike.

In the course of a 24-hour period, the tunnel is traffic-free for only a short time during the night. Efficient use is made of these few hours for maintenance, replacement and inspection of technical systems and components. Despite this regular maintenance, Jernbaneverket has now concluded that the tunnel is in need of total upgrading.

For more about the Oslo region, see page 37.



Rail renewal: New rails being installed in the Oslo tunnel.



Increase in customer feedback

Jernbaneverket welcomes feedback from customers. A total of 1 770 communications were logged in 2007, an increase of 220 on the previous year.

Notices providing information on Jernbaneverket's service guarantee are posted at stations. Our responsibilities

Autumn 2007: Three in every ten passengers on local services were satisfied with the information they received when their train was delayed, according to NSB's customer satisfaction survey.

include providing accurate train information and keeping station precincts clean and tidy. In the service guarantee we encourage customers to send us feedback. Three out of every ten complaints in 2007 were about lack of information in the event of delays, while a quarter of complaints concerned stations. Some customers wished to see more sand on slippery platforms, and some wanted tidier stations. Jernbaneverket tries to follow up all good suggestions for improvements.

Capacity enhancements

Over the past few years, the Norwegian rail network has seen very encouraging growth in both passenger and freight traffic.

Freight in particular has taken off. Intermodal traffic, which makes up 85% of rail freight tonnage excluding the Ofoten line, increased by 70% from 2002 to 2007. In areas where rail already has a large market share, we expect growth to continue in the years ahead. Passenger traffic too is increasing, with 57 million journeys recorded in 2007 – an increase of 4.1% on the previous year.

However, as traffic has grown, so has the need for more network capacity, particularly at the peak times of day for passenger and freight traffic. In and around Oslo and Norway's other major cities, extensive capacity enhancements are required, and many projects are already under way or complete.

With almost 400 train movements daily, the Drammen line is the busiest in the country. Nowhere else do delays affect so many people. In 2007 a number of measures were taken to enhance passenger and freight capacity in the short and the long term:

- West of Oslo, work is under way on the new Lysaker station and the new double-track line between Lysaker and Sandvika.
- In Rogaland, double-tracking is under way between Sandnes and Stavanger, which in theory will allow a manifold increase in current service levels.
- In November 2007, construction of the Ganddal freight terminal was completed. The terminal officially opened on 21 January 2008. In the short term, this will yield a 30% increase in capacity for freight traffic on the Sørland line, but further upgrading and other freight-related measures may increase capacity by 75% compared with the old Paradis terminal in Stavanger.
- In Bergen, Jernbaneverket has begun preliminary work on double-tracking between Bergen station and Arna.
- In Oslo, planning work on the expansion of the Alnabru freight terminal is well advanced. Short-term improvements in 2007–08 are designed to increase capacity by 20%. This is necessary to strengthen Alnabru's position as Norway's rail freight hub.

Elsewhere, the introduction of centralized traffic control on the Nordland line and the remodelling of the Brattøra freight terminal in Trondheim are important steps in increasing capacity.

More passing loops

Additional and longer passing loops are one of the most effective short-term measures being pursued by Jernbaneverket to increase capacity. On the Østfold line, construction work on the Berg passing loop is well advanced and scheduled for completion in 2008. Meanwhile, we plan to lengthen passing loops on the Nordland and Gjøvik lines, and between Kristiansand and Egersund on the Sørland line. This will allow us to increase the number and length of freight trains.



Litter busters: "Stationmaster" Henning Bråtebæk (right) and senior engineer Håvard Svendsen with some of the pickings from the clean-up operation.

Transforming trashy to tidy

Last spring's clean-up operation gave many stations on the Oslo–Ski section of the Østfold line and the Asker–Spikkestad section of the Drammen line a much needed facelift after the winter. Jernbaneverket's stations and real-estate department, Greater Oslo, has day-to-day responsibility for keeping these areas clean and tidy, and three service technicians have been drafted in from the operations department to take care of this task. For two days in April 2007, six office-based colleagues joined them to lend a hand.

"The station should be clean and tidy," according to Jernbaneverket's service guarantee, and as a result of the operation many stations were cleared of litter and junk. Our customers had left behind a variety of weird and wonderful items,

and the clean-up team was able to boast of a diverse inventory after the event. Innumerable plastic sacks were filled, and the pickings included jumping skis, tents, road signs, spray paint cans and old newspapers. The gentleman who had a Viagra prescription filled at the pharmacy in Asker presumably, we hope, managed to get back on form without artificial stimulus; thanks to the clean-up team, it is now too late to go back and look for the unused package.

Henning Bråtebæk, manager of stations and real estate, Greater Oslo, is committed to raising the standard of Jernbaneverket's stations and halts. "The station provides passengers' first impression on their journey, and it's our job to ensure that their encounter with the station and its environs is a positive one," he says.

“First impressions are what count, and our goal is to make stations shine.”

*Håvard Svendsen
Senior engineer, Jernbaneverket*

Safety standards at all-time high

Although traffic has increased, safety standards on Norwegian railways have never been higher. Over the past decade, an average of 6.6 people annually have lost their lives on the railways. In 2007, two people died in rail-related accidents. Most accidents involving trains occur at level crossings where road traffic crosses the tracks.

To maintain rail's high level of safety, Jernbaneverket conducts risk surveys of the infrastructure on a line-by-line basis. These are supplemented by specific risk analysis of any modifications to technical systems, human-machine interfaces, organizational structures and anything else with implications for network safety.

Jernbaneverket is particularly focused on preventing major accidents and reducing the risk of collisions at level crossings and along the line.

ATC

Interlockings and technical barriers such as automatic train control (ATC) help to improve rail safety.

Jernbaneverket works on the principle that no one failure on its own should be enough to cause an accident. ATC is a technological system for transmitting signalling instructions from signal to train. If the train accidentally passes a stop signal, the brakes are automatically applied. ATC provides an additional safety barrier and makes train operations less dependent on human factors.

CTC – a big safety improvement

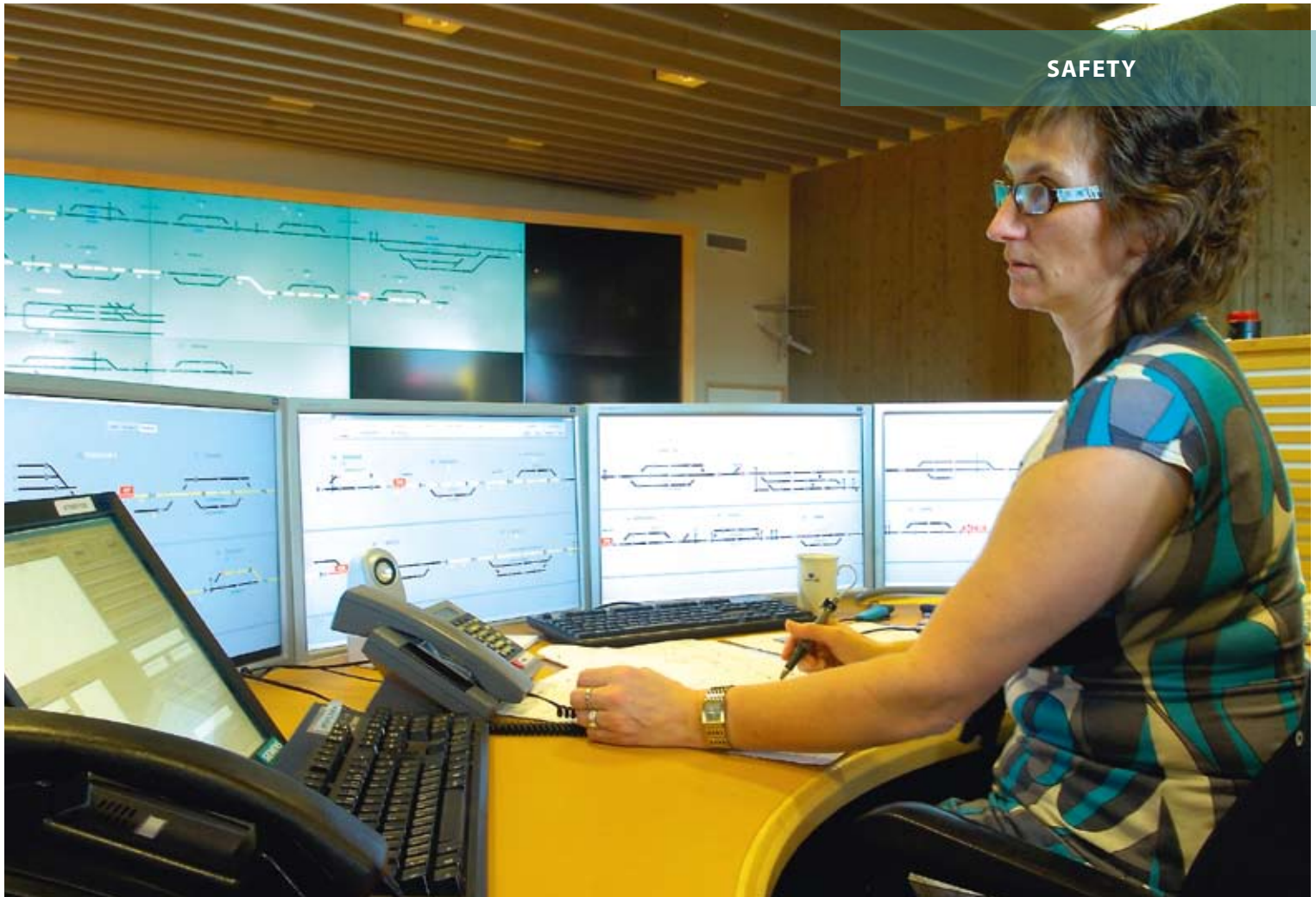
Conversion of the Nordland line to centralized traffic control (CTC) will be a major safety improvement. Two points are worth noting: This will give us a uniform operating system throughout Norway, and differences of this kind between lines will be eliminated.

It will also reduce the risk of failure, since a technological system is replacing local signallers, providing a technical and organizational barrier. The advantage of a technological system is that we avoid misunderstandings in person-to-person communication, which we know from experience can occur in spite of good training and regular reviews.

CTC and ATC in combination reduce the risk of accidents significantly. What is more, CTC is an efficient operating system that pays off in business and financial terms for Jernbaneverket.

Completion of the CTC work on the Nordland line scheduled for 2007 was delayed because of a decision by Jernbaneverket centrally to redeploy signal technicians to finish work on Ganddal station near Stavanger. Nevertheless, the scheme passed a milestone when CTC came into operation on the Grong-Majavatn section. In the first half of 2008, Svenningdal and Trofors will switch to CTC, while Eiterstraum and Mosjøen will be completed in the second half of the year.

The second part of the Mosjøen-Bodø CTC scheme is also under way and is estimated to cost NOK 596m at 2008 prices. Around NOK 170m worth of work was completed in 2007. The scheme incorporates 12 interlockings and 10 fixed blocks. CTC is expected to be operational over the entire length of the Nordland line from 1 January 2010.



Monitoring: Controller Agnes Frøseth monitors traffic from the Trondheim control centre.

ATC beacons: Mounted on sleepers, these communicate with the train's ATC system and are used in signalling systems to monitor train speeds.



Mapping the landslide risk

The entire transport sector is climate-sensitive and needs to adapt to climate change. Jernbaneverket is basing its landslide prevention program on the latest available knowledge concerning the impact of climatic factors.

Jernbaneverket carries out regular inspections, as well as work to clear and secure rocks. Much of this work is labour-intensive and time-consuming, in hard-to-reach locations in mountainous terrain. The work has to be carried out in the summer months because snow hinders inspections and preventive measures in winter. More permanent landslide prevention is therefore desirable in the most vulnerable locations.

The climatic factors that have the greatest impact on rail infrastructure and operations are precipitation of various kinds, wind strength, wind direction and temperature. Individually or in combination, these factors can cause landslides and avalanches, floods and washouts, snowdrifts, heat-warped rails, and windfalls.

The following are the greatest climate-related challenges facing the rail sector:

- More frequent episodes of extreme weather require greater alertness to changes in the natural surroundings of the rail network that might lead to an incident or accident. An effective alert system can prevent trains from running into landslides, washouts, fallen trees, snowdrifts and other track damage that may endanger lives and rolling stock.
- Landslide forecasting based on historical data is no longer sufficient. Increased erosion and changes in groundwater levels may alter the stability of slopes, leading to rain and slush-induced landslides in new locations.

- Multiple landslides or floods may cause a line to be closed more frequently than in the past. A phased alert program is in place to aid decision making at times of increased risk.
- Physical measures must be implemented at an early stage to prevent damage or reduce its extent.
- When damage occurs, it must be repaired as fast as possible.
- Alternative transport must be arranged when normal service cannot be maintained.
- New guidelines must be drawn up for flood prevention, drainage and landslide/avalanche prevention.
- Construction materials must be suitable for an environment where freezing and thawing occur with increased frequency in winter.

Phased alerts

Jernbaneverket has introduced a phased procedure to raise alert levels on the basis of weather data (both forecast and reported). The risk avoidance measures that are taken include:

- Inspection/opening of drains
- Simple visual inspection of lineside terrain and watercourses
- Extra track inspections
- Temporary speed restrictions
- Line closures

In partnership with the Norwegian Meteorological Institute and STORM Weather Center AS, Jernbaneverket is constantly working to improve weather reporting services and the quality of weather data, which will benefit the alertness program.

“I find that we are leading the way in terms of landslide alerts and prevention.”

*Trond Børsting,
Section manager,
Jernbaneverket*

Inventory using GIS tools

In a joint project with the Geological Survey of Norway (NGU), the Norwegian Geotechnical Institute (NGI), the Norwegian Water Resources and Energy Directorate (NVE) and other organizations, Jernbaneverket has embarked on a nationwide inventory of landslide-prone areas, based on digital mapping material (GIS). Areas prone to rockfalls, avalanches, landslides and mudslides are all being recorded in a single mapping tool. The end product will be a useful tool for various agencies in planning and prioritizing preventive measures.

Mapping the landslide risk across the network

Jernbaneverket has begun creating an inventory of all lines using new methodology, which involves an intensive program of field studies on each line with the aid of geologists.

Overall, the combination of more thorough risk mapping, appropriate preventive measures and improved alertness to extreme weather will put rail in a better position to cope with future climate challenges.



Risk: In 2007 an inventory of the most accident-prone level crossings was drawn up.

Level crossings – a challenge to safety

Level crossings have always been one of the biggest safety challenges on Norwegian railways. For this reason, Jernbaneverket has consistently made level crossings one of the top priorities in its safety program. These efforts are paying off. The annual average number of fatalities at level crossings has been halved to 1.7 for the period 2001–07.

Behavioural research

Jernbaneverket has commissioned SINTEF to develop simulator software that will allow researchers to test and analyze the behaviour and perception ability of car drivers at level crossings.

Learning from other countries

Jernbaneverket is involved in international cooperation and is learning from the experiences of Denmark, Finland and Switzerland with new solutions for level crossings.

Numerous measures

As well as refurbishing level crossings with the highest accident risk, Jernbane-

verket plans and implements a wide range of measures of varying scope designed to prevent accidents and increase safety at level crossings.

An inventory of the most accident-prone level crossings was drawn up in 2007 to identify weaknesses in current signage, audible warnings and lighting. We evaluated various types of simple, free-standing warning system for use at some crossings. One project we are working on is a simplified warning system that displays train positions on information posts at the crossing.

We have conducted local information campaigns in various parts of the country to raise public awareness and encourage people to take care when crossing the railway, whether on foot, on a bike or in a car. One of Jernbaneverket's messages to road users is to take your time, watch out and make sure your car doesn't stop on the crossing when the barriers come down.

“Vehicle drivers approaching a level crossing have a legal obligation to give way to rail traffic.”

*Railway Act, Section 9
Road Traffic Act, Section 10*

Did you know...

- There are 3 761 level crossings on Norwegian railways: 325 on public roads and 3 436 on private roads.
- In the past five years, Jernbaneverket has removed 432 level crossings.

More freight on the railways

Jernbaneverket is seeing increased demand for rail freight, and our objective is to double capacity by 2020. More freight on the railways benefits the environment through lower carbon dioxide emissions, increases road safety and reduces congestion. Terminal expansion and additional passing loops are the main initiatives needed to meet increased demand.

Jernbaneverket is particularly committed to meeting the capacity demands of intermodal traffic – where the long-distance leg of the journey is by rail or sea, with the shortest possible feeder journeys by road.

If capacity is to be increased, additional and longer passing loops will be required, so that trains up to 600 metres in length can pass. Freight terminals will also have to be expanded to increase capacity and efficiency and optimize the loading and unloading process. This can be achieved by building additional, longer loading yards, increasing the size of depot areas and switching from forklift trucks to crane-based operation.

Improved punctuality and predictability

are also crucial to rail freight. Jernbaneverket has a punctuality target of 90%, which means that nine out of ten trains should be on time.

Increased safety

The number of accidents on Norwegian roads in which transport trucks were involved increased by 30% in the past year, according to Statistics Norway. In the first three quarters of 2007, there were 224 accidents involving tractor-trailers, resulting in 28 deaths and 313 injuries. More freight on the railways means fewer transport trucks on the roads. One freight train can carry the same volume as 24 fully-loaded tractor-trailers. On the Oslo–Bergen route, CargoNet now transports as many containers and semitrailers as 55 000 tractor-trailers annually.

Freight transport: At Alnabru freight terminal in Oslo, immediate action is in hand to increase capacity.





Viabile: In certain circumstances, high-speed trains may be socioeconomically viable.

Oslo–Bergen in 2 hours 25 minutes?

This could be a reality if Norway decides to invest in high-speed lines. A team of German experts has concluded that it would be entirely feasible to build and operate high-speed lines in Norway. In certain circumstances, it might also be socioeconomically viable. An interesting prospect, according to Jernbaneverket, which is recommending further work on the issue to determine a long-term strategy for long-distance rail traffic in Norway.

Jernbaneverket was instructed by the Ministry of Transport and Communications to commission a feasibility study of the potential for high-speed rail in Norway. The study was conducted by a German consulting group, VWI, based at the University of Stuttgart. The study was carried out in three stages between June 2006 and October 2007. The following routes were examined individually and in combination:

- Oslo–Halden (Göteborg)
- Oslo–Trondheim
- Oslo–Bergen
- Oslo–Kristiansand/Stavanger

The final report was unveiled in November 2007, and VWI's calculations showed that the Oslo–Trondheim and Oslo–Göteborg routes were potentially viable.

Further study required

Jernbaneverket reviewed the study and submitted its recommendations to the Ministry of Transport and Communications in January 2008. We concluded that the study and supporting material showed scope for developing a high-speed rail network in Norway. The VWI report shows that, in certain circumstances, a number of the routes in southern Norway are of interest in terms of potential customer base and cost. However, a great deal of further study is required before a proper basis for a decision exists.

We need to examine operating concepts, overall capacity of the rail network and the effects of such large-scale projects more closely.

Environmental benefits

Developing high-speed lines would have benefits in terms of greenhouse gas emissions. The Norwegian government has set a target of reducing greenhouse gas emissions from the transport sector by 2.5–4.0 million tonnes of carbon dioxide. Construction of high-speed lines would contribute a reduction of 0.1–0.5 million tonnes, depending on how many lines were built.

High-speed rail would be a highly efficient, high-capacity transport

Journey times

With speeds of 200–250 km/h, high-speed trains could offer much shorter journey times.

Examples

- Oslo–Bergen: 2 h 25 min (via Hallingdal)
- Oslo–Trondheim: 2 h 45 min
- Oslo–Stavanger: 2 h 25 min
- Oslo–Göteborg: 2 h 20 min

system that could run on renewable energy for the indefinite future. In a carbon-neutral society, high-speed rail would produce practically zero emissions of greenhouse gases.

Jernbaneverket believes that rail must capitalize on its competitive advantages as a mode of transport, especially speed and capacity. If rail is to become more competitive, the quality of the offering must be significantly improved. The current National Transport Plan (2006–15) does not specify any targets or visions for long-distance passenger rail services. Jernbaneverket considers it important to set out an ambition for these services. We are therefore preparing the ground for such an ambition to be adopted when the next National Transport Plan is drawn up in 2009.

Proposals for National Transport Plan 2010–19: Improved reliability and higher quality

Recent years have seen strong growth in both passenger and freight traffic. Owing to increased traffic, a maintenance backlog and a requirement for higher standards of reliability and quality, Jernbaneverket has made maintaining the existing infrastructure its priority. Consequently, a number of new infrastructure projects have had to be postponed.

As we approach the beginning of a new plan term in 2010, Norwegian railways are facing major challenges in respect of reliability, capacity and journey times. The need for both increased maintenance and new capital expenditure means that the resources required far exceed the proposed budget for the National Transport Plan (NTP) 2010–19. When the national rail, road and coastal administrations and airport operator Avinor AS submitted their NTP proposals in January 2008, Jernbaneverket recommended increasing the maintenance budget for the term of the plan by 30% compared with current levels. The bulk of the funding must go towards renewing existing infrastructure, if severe consequences for punctual and reliable train operation are to be avoided.

As a result, the capital budget for new rail projects will be severely reduced, from NOK 2.4bn under the current NTP to NOK 1.6bn annually. Within this ceiling, Jernbaneverket will give priority to increasing capacity on the Vestfold and Dovre lines. This will build on and ensure

maximum benefit from previous major engineering projects such as the Gardermoen airport line and the new Lysaker–Sandvika section. As well, station improvements and improved passenger access will enjoy much higher priority than in the past. There will be a 62% increase in station projects over the current NTP as adopted by parliament.

Rail freight is enjoying strong growth in Norway. This benefits the environment, improves road safety and reduces congestion. Jernbaneverket is working on the assumption that this growth will continue, and that the freight capacity of Norwegian railways is to double by 2020. The main initiatives will be terminal expansion and additional passing loops. Capital expenditure on freight-specific projects will increase by 115% over the current NTP as adopted by parliament.

A white paper on the NTP 2010–19 will be published at the turn of the year and will be considered by parliament in spring 2009.

What is the National Transport Plan?

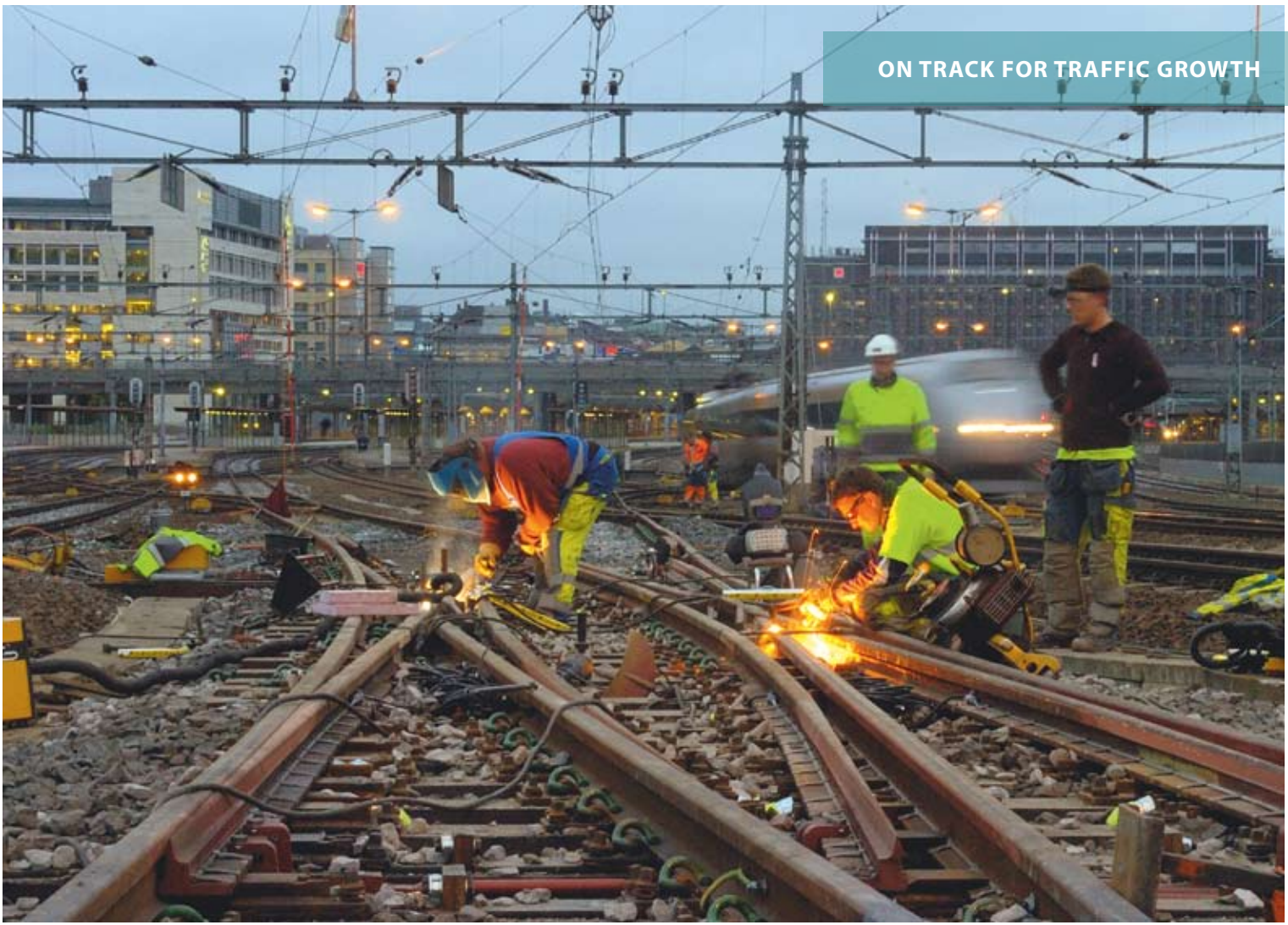
The NTP proposals are the expert recommendations of the national rail, road and coastal administrations and airport operator Avinor AS to the government in advance of its NTP white paper. The process follows guidelines established by the Ministry of Transport and Communications and the Ministry of Fisheries and Coastal Affairs. In the white paper, the government sets out its strategy for transport policy. The NTP has a 10-year term but is reviewed every four years.

The NTP 2002–11 replaced the previous long-term plans for the maritime, road, aviation and rail sectors. The NTP 2006–15 went before parliament in spring 2004. The plan has a 10-year time frame, with the emphasis on the first four years. The plan is revised every four years, so the next revision will cover the 2010–19 period.

More information at
www.ntp.dep.no

***Worth the cost:** Despite a threefold cost increase in two years, increasing capacity at Norway's largest freight terminal, Alnabru, is still likely to pay off.*





Priority: Improvements will be seen in the Oslo region as early as 2008.

Priority for Oslo region

Work on renewing the rail lines through Oslo is in full swing. In March 2008, as directed by the Ministry of Transport and Communications, Jernbaneverket launched a dedicated project in partnership with NSB AS, Flytoget AS and CargoNet AS. The mandate is to consider initiatives to improve reliability in the Oslo region. A great deal is to be achieved before the year is out, and the project is also working on a master plan for a major program of renewal work scheduled to begin in the second half of 2009.

The rail lines through Oslo have suffered several operational disruptions in recent months owing to infrastructure faults. Jernbaneverket has therefore decided that the renewal program should cover the entire section from Oslo central station, through the Oslo tunnel and Skøyen, as far as Bestum. We have drawn up a list of measures designed to improve the stability of the infrastructure in the short term, and improvements will be seen as early as 2008. In the longer term, we plan to construct a new line on the old alignments, which is scheduled for completion in 2011.

To allow this work to be carried out, it will be necessary to cancel some train services, but these cancellations will occur when traffic levels are at their lowest. We shall investigate the possibility of running a reduced service on one track while working on the other. Safety will be our prime consideration when planning the work. We shall also draw up plans to ensure that services run as smoothly as possible during the construction period.

think green think rail

Modern trains have low energy consumption. Electric trains can transport people and goods without emitting CO₂. Electrified lines in Norway run solely on renewable energy.



Jernbaneverket

Would you like to work for Jernbaneverket?

Staff benefits include:

- Membership of the Norwegian Public Service Pension Fund, with Jernbaneverket paying your contributions
- Housing loans at favourable rates from the Norwegian Public Service Pension Fund
- Affordable banking and insurance arrangements through Jernbanepersonalets bank og forsikring
- Inclusive Workplace scheme
- Generous compassionate leave entitlement
- Free train travel in Norway for employees and their children (for the time being)
- Holiday home rentals at affordable rates
- Choir and band
- Sports club offering a wide variety of activities

For current vacancies see www.jernbaneverket.no/jobb

Contact details

Jernbaneverket has offices and operating bases in various locations across Norway.

For more information, please visit our website at www.jernbaneverket.no or call our nationwide switchboard.

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