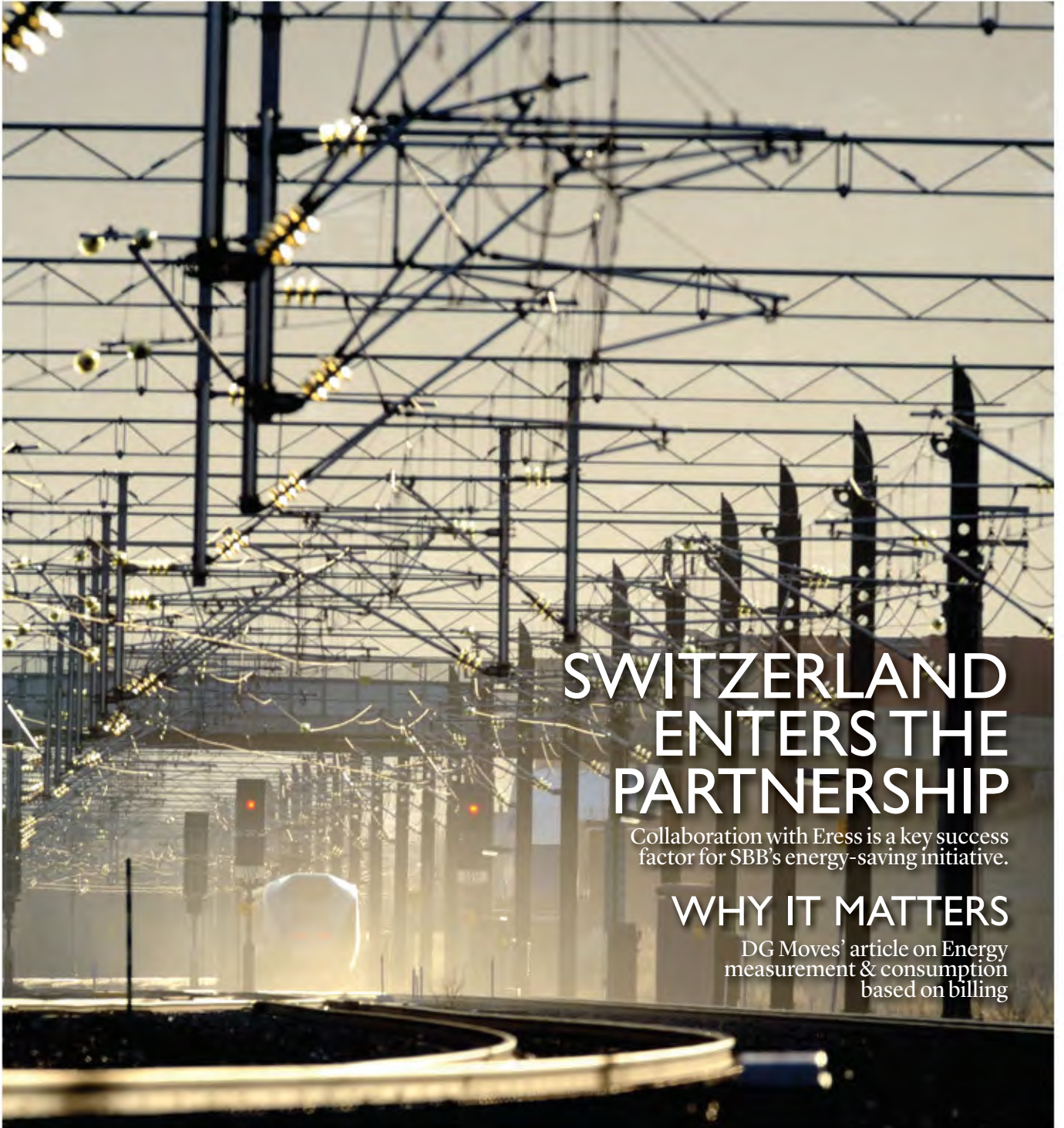




# Eress

ANNUAL MAGAZINE 2014



## SWITZERLAND ENTERS THE PARTNERSHIP

Collaboration with Eress is a key success factor for SBB's energy-saving initiative.

### WHY IT MATTERS

DG Moves' article on Energy measurement & consumption based on billing



# Welcome!



We hope you will enjoy the first issue of Eress Annual Magazine, a publication that reflects Eress spirit; broader and more open to new partners, users and voices.

In this first issue, we are proud to present an article written by Frank Jost (European Commission, DG Move), explaining the importance of measuring traction energy consumption in Europe. Also included here, there is an article by SBB, who uses Erex system as part of its ambitious energy strategy.

Eress aspires to work with all infrastructure managers and train operators in Europe. Why? Because working together is the only way to open up national boundaries, and enable a truly competitive railway transport in Europe. Railway transport and competition can go hand in hand, and since we are a part of the railway world, it is our responsibility to make it happen.

*Claudia van Diermen Jacobsen*  
*Marketing and Partner Manager*  
*Eress*

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SOURCE: CAROLINE ROKA



SOURCE: GETTY IMAGES



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SOURCE: SBB AG

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# A CROSS-BORDER COOPERATION

**The idea of cooperation across borders is making Erex a leading system in the European railway sector. Eress wants more partners, explains Director Dyre Martin Gulbrandsen.**

**E**ress is organised in quite a unique manner. It is a partnership which is owned jointly by a number of railway infrastructure managers. These owners have committed themselves through a cooperation agreement.

All new partners enter into the agreement by signing an accession letter. When that is done, they receive a stake in the partnership. The agreement entails both rights and duties. They can, among other things, utilise everything developed in the Erex system to date, free of cost, but they will have to make the necessary adjustments needed in their own countries to utilise the system, says Dyre Martin Gulbrandsen, Director of Eress.

Eress is presently comprised of railway infrastructure managers in Belgium, Denmark, Finland, Norway, Sweden and Switzerland.

In 2012, the decision was made to remove the entrance fee for membership in Eress. This means that it is free to join as a new partner. Eress wants more partners.

There is great value in being many countries. The higher the number of countries and trains, the better economies of scale. This way our expenses decrease and the volume increases. Our bills decrease as there are more of us sharing the cost. In addition, we want to establish our system as the common solution.

Dyre Martin Gulbrandsen also emphasises that the level of proficiency increases with each new partner.

– Sharing expertise is an important part of the cooperation. What we have noticed is that we are continually gaining new leading expertise in different areas. A good

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**“Each partner has one representative on the board. This is an important equality principle for us: Each country has one vote.”**

solution in one place is usually a good solution another place.

When joining as a partner one automatically receives a seat in the Eress board.

– Each partner has one representative in the board. This is an important equality principle for us: Each country has one vote. This is independent of how many trains they may have. In an organisation such as ours, where everyone participates on a voluntary basis, we are seeking a consensus.

It is the owners who decide Eress' course of action. They meet at least four times a year. The chairman is elected by the board for a two year term.

Eress has been a partnership from the very beginning.

– In 2003 we saw the need for higher accuracy when billing the trains' use of electricity. But since trains often cross international borders, and move through several price areas and network areas, it hit us: Sweden and Denmark are facing the same challenges. Can we do this together? If so, we might only need to invest a third instead of everything. In other words, the concept economies of scale has been with us from the very beginning. As has the principle that Eress does not intend to make a profit.

– But what does that mean? Does it mean that efficient operations are irrelevant? No, of course not. It means that Eress does not keep the profit. Instead, it is returned to the owners. They are the ones who finance our operations. We do not receive more than exactly what we spend, and that is our budget. No hidden margins.

Dyre Martin Gulbrandsen's objective for the coming years is naturally to keep growing.

– We need to become stronger and add to our numbers. One year ago the board said that we needed to grow twice as large in the next five years. I am certain we can accomplish that. Eress is now making good progress.

Dyre Martin Gulbrandsen, Director of Eress, wants to establish Erex system as the common solution.

SOURCE: CAROLINE NOKA



# Why it matters

**Energy measurement and consumption based on billing are important milestones to a more energy efficient rail transport, says Frank Jost in European Commission.**



**Frank Jost**  
*European Commission  
 Mobility and Transport  
 Single European  
 Rail Area*

In recent years, European industry and consumers became accustomed to being able to choose their electricity supplier, thus benefitting from better offers and lower prices. Paying on the basis of measured consumption has long been a standard practice in the electricity market. Car or truck drivers can easily check their level of fuel consumption. Comparing it with that of other drivers can tell them if their driving style is fuel-efficient, or if they ought to drive in a more energy-efficient manner, thus saving money. The EU Commission and the European Railway Agency are trying to make this a reality also for railway companies and train drivers. According to the Commission's White Paper 2011 "Moving to a single European Transport Area", 30% of road freight over 300km should shift to rail or waterborne transport by 2030, all core sea ports should be connected to rail freight by 2050 and a majority of medium-distance passenger transport should go by rail by 2050.

The EU Commission developed a legal framework, which will ensure that locomotives can communicate consumption data with the trackside and that train operators are invoiced on the basis of measured consumption. Industry has adopted standards for on-board meters providing not only the consumption data but also the location and the time of consumption. In addition, they are now preparing an European standard for an interface between the moving train and the trackside to communicate the data. Is this sufficient in achieving the goals of cheap electricity and reduced consumption? Not quite ....

**“Eress offers specialised clearing services to railways and electricity suppliers.”**

Trains are not only different from all other electricity consumers by way of their mobility, but also due to the fact that different companies all take electricity from the same overhead wire, whereby some of them regenerate electricity that other locomotives in the proximity can use. This situation would make it impossible to measure how much is consumed. However, there is another rule coming into play: All electricity fed into a network

equals the amount that is taken out in any given period of time. This rule ensures not only that somebody pays all electricity, but it also helps to determine which producer supplied how much power to which consumer. This is the basis for supply contracts and for eco-efficient driving. Or perhaps not quite...

What is missing here is a clearinghouse to settle millions of individual consumption incidents. A clearinghouse is a neutral body that collects and manages large amounts of data, which altogether form the basis for invoicing and paying the bills. The task is not simple: Consumption of traction electricity peaks when the train accelerates and fades away to zero the next second. Electric systems also have losses, the costs of which must be covered. Energy costs also provide the basis for charges for the electric supply equipment, the energy distribution, certain taxes and permits, all of which pre-suppose precise measurement data of traction current. Eress offers such specialised clearing services to railways and electricity suppliers.

The 'user pays' and the 'polluter pays' have been long standing principles of the Common Transport Policy. Energy measurement and consumption based on billing are important milestones to a more energy efficient rail transport.

Energy measurement and consumption based billing are important milestones to a more energy efficient rail transport.



SOURCE: CAROLINE ROKA

## ERESS ADVISES THE EU

■ – It is very rewarding to confirm that the EU has come to see the value of the work we have done, says Terje Stømer, Chairman of Eress.

Parallel to the development of Erex, Eress has for several years contributed to the development of necessary regulations through actively participating in working groups at International Union of Railways (UIC), the European Railway Agency (ERA) and the standardising body CENELEC. Stømer mentions that legislation often corresponds with what Eress has designed and accomplished. Eress is, in other words, often at the forefront of developments.

– If we see a development in the direction of a new requirement, we examine whether Erex's work corresponds with it. In this manner we are continually updating our systems & services. We are therefore a focal point in this field of expertise, concludes Stømer.

**“It is very rewarding to confirm that the EU has come to see the value of the work we have done.”**

# Eress FORUM

**18th of June politicians, researchers, journalists and railway leaders from across Europe will meet in Antwerp for what is considered to be one of the most relevant meeting places in the European railway energy sector.**



■ “Eress Forum provides a good opportunity to meet and discuss issues with people in the sector who are interested in the field of energy management. It is also a good forum for presenting the latest advances and state of the art of technologies related to energy management.

Here we can also get the most recent updates regarding EU legislation of energy metering.”

*Enrique Vila, Energy Management Sales Manager, Bombardier Transportation*



■ “I think that pioneer and innovative ideas are the ones with the highest probability of success. I started working with some pioneers of “Energy Billing in railways” in 2005 and then I realised that those pioneers had created an innovative system called Erex. This system is now a reality. The reason why I am coming to the Forum is to offer my contribution and help to spread and help towards a wider dissemination of Eress principles throughout Europe over the next years.”

*Raimondo Orsini, Director, Sustainable Development Foundation*





### RECORD NUMBER OF PARTICIPANTS

130 took part in last years Eress Forum.

■ Eress Forum 2013 was held on 15 May in Vienna with a total of 24 speakers from 19 countries, including politicians, researchers and staff from companies and organisations in the railway and energy industries. Numerous crucial topics were discussed. The working groups discussed how to reduce railway energy consumption, as well as standardising and regulating energy pricing. There were 130 participants last year – the highest ever. The Forum was carried out in cooperation with the Austrian Federal Railways, ÖBB, who were responsible for finding facilities, taking participants on a tour of Vienna and hosting a dinner in Prater Park on the eve of the Forum.



SOURCE: GETTY IMAGES

### ERESS PROGRAMME HIGHLIGHTS

The European Commission opening Eress Forum 2014

■ Two representatives from the European Commission (DG Move & DG Energy) open Eress Forum and give an update from their directorates. After the break there will be a series of presentations on the benefits of energy measurement in the battle to reduce energy consumption. Towards the end of the day we will divide into working groups to discuss standardisation of energy billing and technical innovations in energy measurement.



### MAKING THE POINT

Eress Forum works together with the UIC Energy Efficiency Days conference

■ – The conference represents an important appointment for us and our members. After 4 years, the last one in Tours, France, we will meet again to make the point on the state of the art of implementation of energy efficiency in railways, says Veronica Aneris, Senior Advisor for Energy & Environment in UIC. The conference includes 13 workshops with topics such as driving advisory systems, ground to board communication and energy efficient rolling stock.



### PREVIOUS CITIES AND NUMBER OF PARTICIPANTS:

- 2013:** Vienna, 130 participants
- 2012:** Prague, 120 participants
- 2011:** Brussels, 100 participants
- 2010:** Copenhagen, 80 participants
- 2009:** Brussels, 70 participants
- 2008:** Stockholm, 60 participants
- 2007:** Oslo, 50 participants
- 2006:** Copenhagen, 30 participants

### EXPECTED NUMBERS 2014

ANTWERPEN, 16<sup>TH</sup> – 19<sup>TH</sup> JUNE

**+200 PARTICIPANTS**  
**60 SPEAKERS**  
**22 COUNTRIES**

UIC ENERGY EFFICIENCY DAYS /  
 MERLIN MIDTERM CONFERENCE /  
 ERESS FORUM

# TECHNOLOGY AT THE FOREFRONT

**Eress understood early the need for precise energy measurements and readouts. It has maintained this advantage.**

**W**e have succeeded in something which many have attempted, but few have managed.

System Administrator Gunn-Helene Krogstad has worked with Erex since 2008. During this period the system has established itself as the leading European system in terms of accurate metering & billing the precise energy consumption of trains. Why did Eress succeed where so many others failed?

– We are not going to get on our high horse, but this has been a collaborative effort to create a good product, and we have quality-conscious leaders who enjoy working with and accomplishing new challenges, replies Krogstad.

– Erex has always viewed measurement of consumption as the key, says Settlement Expert Alf Olevik Ulvan.

– Others who have developed similar systems have probably been more concerned with estimations rather than measurements. Say you have a train travelling from Oslo to Hamar in Norway which weighed so and so much, it took so

and so long, the temperature was such and such. Based on these factors you can roughly estimate consumption. But with a meter on board, and with an accurate calculation system, you know exactly how much is consumed. This makes it easier for train companies to obtain answers as to where they can save on energy consumption.

**“Others who have developed similar systems have probably been more concerned with estimations rather than measurements.”**

Moreover, Eress was a trailblazer. This has resulted in their current standing ahead of the rest, which in turn means that Eress is frequently consulted by Energy Metering Suppliers adapting to the new standards.

– We receive early information on what could become new regulations. Then we can adapt the system if necessary, which is simple, as Erex is a flexible system, says Ulvan.

International Relations Manager Bjørn Lysne emphasises that Eress is always searching for good partners to enhance Eress.

– They bring new challenges, meaning that Erex must continually improve in order to adjust to new countries that have joined. This means that the services and the system are constantly developing.

And the development rolls on.

– Our latest project is to expand Erex in order to manage third-party access for the provision of electricity, so that you can choose your own electric supplying company. In the future it could also serve the train companies as a one stop shop, meaning one settlement process, regardless of where you are driving, with complete freedom to choose between the various measurement systems on the market - the data is delivered to the market anyway, concludes Lysne.

## ENORMOUS AMOUNTS OF DATA

The Erex system receives an enormous amount of data. Every five minutes, each meter produces information regarding a

ENERGY:

**4 581 000**

MW/h SETTLED PR. YEAR

RELIABILITY:

**99,9%**

UPTIME

MEASUREMENTS:

**312 768**

HANDLED PER DAY

train's energy consumption and geographic data – altogether 12 different “observations” when they are divided up. We can then set up the following calculation:

12 values x 288 measurements per day  
 x 365 days x 400 meters = 504 000 000  
 values produced just by meters onboard the  
 Norwegian rolling stock during one year.

**“12 measurements x 288  
 measurements per day x  
 365 days x 400 meters =  
 504 000 000 values produced  
 just by meters onboard the  
 Norwegian rolling stock  
 during one year.”**

**CONTROL THROUGH OPEN SOURCE**

Erex is based on open source development. This strategic choice has a number of advantages. Eress has full control over the software and is not dependent on a standard product that may be difficult to adapt to specific needs.

Open source development has a large community of technical know-how, which promotes confidence. Hence Eress is not locked to a particular software provider. Also there are no software licenses costs when using open source. Instead the money can be used to develop new functionality.



System Administrator,  
 Gunn-Helene Krogstad



Settlement Expert, Alf Olevik Ulvan



International Relations Manager, Bjørn Lysne

# THE WORLD'S MOST IMPORTANT DEADLINE

**Precise measurement and calculation is decisive in the race to achieve the EU's climate goals.**



In 2007, the EU adopted the so-called 20-20-20 targets for climate and energy policy: 20 percent reduction in greenhouse gas emissions, 20 percent reduction in energy consumption and a 20 percent increase in renewable energy by 2020. The internal market is an important element in the Europe 2020 strategy and will contribute to building smart, sustainable and inclusive growth.

The strategy defines five priority areas, including energy efficiency and a well-

functioning, integrated energy market. Additional attention is devoted to sectors in which the efficiency potential is the greatest, and one of these is the transportation sector. Last year, the European Commission proposed that all domestic passenger railways are to be opened up to new entrants and services by December 2019. The idea is that this will lead to more energy-conscious railways, as saving energy leads to better cost control. To ensure this, train companies are dependent on precise measurements which result in accurate billing.

**2020:**

- 20 % Greenhouse gas emissions
- 20 % Energy consumption
- + 20 % Renewable energy

SOURCE: SVEIN ULVUND



## NSB CUT EMISSIONS BY 25 PERCENT

■ From 2012 to 2013, the largest norwegian train operator (NSB) cut its emissions from freight trains from 21 080 tons to 15 600 tons. That amounts to a 25 percent emissions reduction in just one year. This is a part of the trend that NSB has already been following for several years.

NSB's trains are equipped with meters and GPS-antennas. The meters readout data every five minutes, on consumption, regeneration and the location of the train. NSB therefore receives bills which indicate times and locations of the trains, as well as the price of electricity in the areas through which they have driven. The submitted data is validated and approved by the Norwegian National Rail Administration, and forms the

basis for the billing. The data is also used to find measures which can reduce the energy consumption. Between 2004 and 2013, NSB cut its energy consumption by 23 percent.

### NSB'S ENERGY CONSUMPTION 2004-2013

Year	Wh	Wh/BTKm
2004	310 616 189 654	61.53
2005	308 732 296 090	56.79
2006	277 407 569 122	52.13
2007	277 033 000 000	51.40
2008	275 363 000 000	49.01
2009	276 672 000 000	49.99
2010	287 807 000 000	50.33
2011	276 538 000 000	48.75
2012	288 593 270 000	49.35
2013	315 335 706 256	47.36

## NSB's three measures to reduce energy consumption:

# 1

Energy-saving driving techniques.

# 2

Efficient temperature regulation in the trains.

# 3

Energy optimisation in parked trains.

# AROUND THE WORLD

## SOUTH AFRICAN RAILWAY LUXURY

Rovos Rail is considered to be one of the most luxurious train companies in the world. The trains – which may be hauled by steam, diesel or electric locomotives at various stages of the journey – carry a maximum of 72 passengers. In the wood-panelled coaches, classics remodelled and refurbished to mint condition, the passengers can enjoy fine cuisine in five-star luxury. The days are spent in luxurious lounge cars, and the nights in extravagant suites with Victorian baths and separate shower.



SOURCE: ROVOS RAIL



## RECORD INTERNATIONAL TRAFFIC ON EUROSTAR

■ In 2013, Eurostar set a new record for number of passengers. For the first time, Eurostar carried more than 10 million passengers in a single year.

Source: Eurostar



## THE BRITISH ARE TRAVELLING MORE BY TRAIN

■ Over the past twenty years the number of journeys made on Britain's rail network has doubled. In the past decade, that growth rate has averaged over more five per cent per year, even during the economic downturn. Passenger and freight demand is predicted to increase by over 30% over the next decade. Opening the railway market has shown results

Source: HS2 Ltd.

**BANEDANMARK  
(RAIL NET DENMARK)  
ELECTRIFICATION**

■ This year, banedanmark begins the work of upgrading and electrifying the railway between Ringsted and Rødbyhavn. The new line will have more tracks and can increase the speed from 120 and 160 km/h to 200 km/h. The upgrade is being made in connection with the bridge being constructed by Denmark and Germany for railway and cars, across the 18 kilometer wide Femernstredet.

Source: BaneDanmark



SOURCE: ACHIM SCHEIL

**SIEMENS DELIVERS  
NEW FLEET OF TRAINS**

■ In 2009, Eurostar, which operates trains between London and Paris/Brussels, announced that it would spend 700 million pounds on upgrades, of which 550 would be spent on a new fleet of trains. The German company Siemens won the bid, and the new trains, which have a top speed of 320 km/h, arrived in Great Britain in January. They will be used when Eurostar launches a new service to Amsterdam in 2016.

**BUSY STATIONS**

■ Gare du Nord in Paris is Europe's busiest station by in terms of total number of passengers. The station handles around 180 million passengers per year.



■ The world's busiest passenger station, in terms of daily passengers is Shinjuku Station in Tokyo. The station was used by an average of 3.64 million people per day in 2012.

■ The busiest underground station in Europe is Châtelet-Les Halles, in the center centre of Paris. Approximately 750,000 passengers pass through it every single day.



**1807**

The first railway station in the world was built in the UK, Swansea, Wales. It began passenger service in 1807.



**501**

The fastest train in the world in commercial operation in 2014 runs in Japan, the Maglev Train (501 km/h).



**9,289**

The largest train route (by distance, 9,289 km) goes from Moscow to Vladivostok.



# A STRONG AND DIRECT COOPERATION

**Schweizerische Bundesbahnen (SBB) uses Erex system to reach its ambitious energy saving goals.**







SOURCE: SBB AG

In 2012, SBB developed a new energy strategy in response to the strategic regulations set by the Swiss government after the nuclear disaster in Fukushima. Their ambitious goal is to save annually 600 gigawatt hours of electricity and fossil fuels.

– This cannot be achieved without changing the attitudes of nearly 30,000 employees, says Arnold Trümpi, head of Business Unit Energy Management at SBB.

– SBB is therefore doing its utmost to train its staff and help them to become fully committed to energy efficiency increase.

For instance, locomotive drivers can have a huge influence on consumption by driving in an energy-saving manner. Technical improvements can boost the efficiency of locomotive power trains. Further potential lies in optimising heating, ventilation and air conditioning in coaches and buildings. When buying new rolling stock, suppliers are also given incentives to optimise the energy efficiency of vehicles they intend to use, says Trümpi.

– A systematic consideration of energy efficiency criteria is important for determining services and achieving long-term goals. Possible approaches may include improvements to certain vehicles or to timetable processes.

The new energy strategy of SBB is built on five pillars:

- 1) Increase energy efficiency.
- 2) Renew and expand hydropower plants.
- 3) Exit from nuclear power.
- 4) Fostering renewables in order to cope with the rising demand for traction energy due to a sharp increase in railway services.
- 5) Close transmission line gaps and increase links between the public Swiss HV grid and the SBB HV grid.

– Increased energy efficiency, which conserves energy, plays a key role in SBB's energy strategy. By 2025, SBB intends to power its trains exclusively by electricity from renewable sources, says Trümpi. SBB set up an Energy Management business unit aimed at addressing increased energy efficiency, load management and the promotion of renewables. This unit identifies and assesses potential for savings, and governs the group-wide implementation of energy-saving measures. Conserving energy is not only sustainable, but it also eases the budget. Energy efficiency makes commercial sense and is highly profitable.

Trümpi says that energy efficiency will become part of the ongoing process of improvement in SBB's daily work.

– It's a new mindset for our employees. Increased energy efficiency will not stop when an energy saving program is completed. Instead, energy consumption will be considered an economic factor in strategic and investment decisions. Decisions are, and will, be based on total cost of ownership, and energy will continue to play a more vital role in the development of new railway services. This is a big project, and a number of lessons have been learned since it began.

– You need a company wide program with executive committee attention and top down targets in order to boost energy

efficiency. A program is a kind of turbo charger, meant to accelerate activities and to get the necessary people on track, says Trümpi.

– You need a dedicated team of professionals. You need to understand the railway system and you need a strong network between infrastructure managers, operators and ministries to get efficiency moving in the right direction. You need transparency in energy consumption to create incentives for energy-saving investments. The collaboration with Eress is a key success factor for SBB's energy saving initiative. Without billing of actual consumption there is no quick and real

**“Collaboration with Eress is a key success factor for SBB's energysaving initiative. Without billing of actual consumption there is no quick and real payback from energy saving investments.”**

payback from energy saving investments and this is essential.

Trümpi also points out the need for an integrated approach to all activities along the value-added chain: from strategic

planning and strategic purchasing to asset optimisation and operations, down to initiatives such as eco-driving.

– You need to align infrastructure managers and operators in their work, since the optimisation of a railway system will only function properly if it is carried out in an integrated manner.

And of course, you need innovation.

– Without innovation, without taking risks, without making investments there won't be a sustainable increase in energy efficiency. SBB is about introducing an in-house developed IT application, called adaptive control (“green wave”) enabling train drivers to avoid having to stop due to route conflicts. So route conflicts are detected in real time, route solving is calculated, and optimal cruising speed is indicated to the drivers. We expect to save at least 3% of our annual traction energy consumption, which represents huge cost savings, says Trümpi.

Last, not least, you need strong partners.

– With the support of the leading rolling stock industry, specialised engineering companies, researchers, and partners like Eress, the challenges associated with increased energy efficiency can be met. Trümpi says that the cooperation with Eress is going very well.

– We have a strong, direct cooperation focused on solutions. Our business model for energy billing is a bit different from what they're using in the Nordic countries, so there were some issues that had to be fixed, but now we're on track. We don't even have any language barriers. SBB now has a time schedule for their implementation of the Erex system.

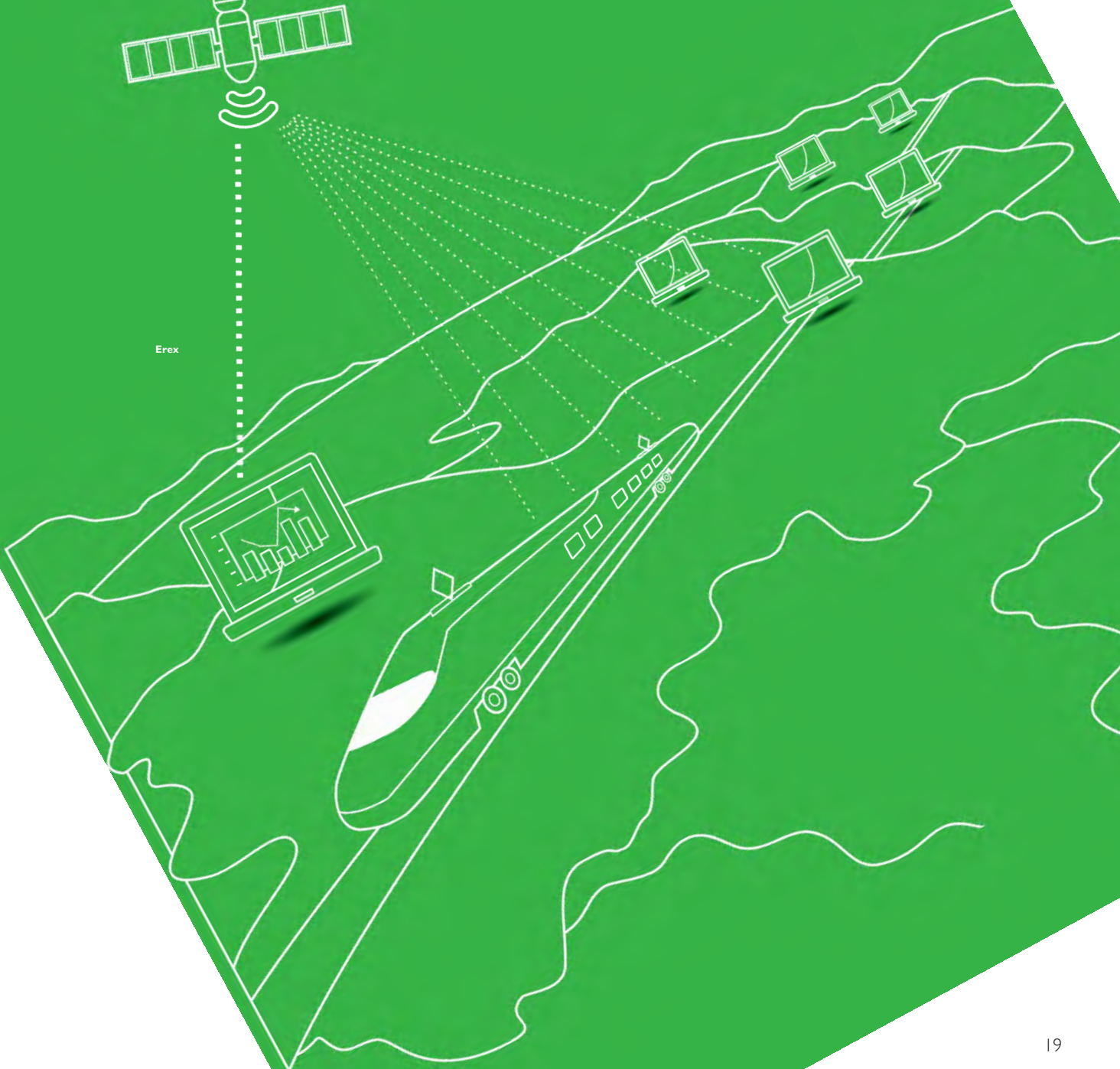
– We were very pleased when we reached our first goal in the middle of April. We were able to combine the information from our rolling stock and Erex with our own invoice system. We'll continue with more quality checks from September, over a period of six months, and we aim to begin real operations by April next year, says Trümpi.



SOURCE: SBB AG



Erex





**PARTNERS**  
SWITZERLAND  
FINLAND  
BELGIUM  
DENMARK  
SWEDEN  
NORWAY

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