ERESS ENERGY METERING HELPS OPERATORS KEEP BILLS DOWN

BY INTRODUCING NEW TECHNICAL SOLUTIONS AND PRINCIPLES, EUROPEAN RAILWAY ENERGY SETTLEMENT SYSTEM (ERESS*) CUSTOMERS HAVE REDUCED THEIR RAILWAY ENERGY CONSUMPTION AND COSTS BY UP TO 15%. BY DOING SO THEY HAVE ALSO STRENGTHENED BOTH THEIR COMPETITIVENESS AND ENVIRONMENTAL PROFILE. AT THE SAME TIME, ERESS ENABLES RAILWAY INFRASTRUCTURE MANGERS TO FULFILL REQUIREMENTS FOR ACCURATE, NEUTRAL AND NON-DISCRIMINATORY SERVICES IN TODAY'S INCREASINGLY LIBERALISED RAIL AND ENERGY MARKETS.

This article describes the energy metering, settlement and billing service that is forging the way to a common European solution.

Deregulation of transport and energy sectors, driven by European Union directives and interoperability needs, represents one of the many challenges the railway industry faces. Without the appropriate tools, infrastructure managers cannot offer services that are truly neutral, transparent and non-discriminatory; cannot exchange data between themselves while respecting the confidentiality of commercially sensitive details; cannot provide relevant information to railway undertakings for a more efficient and competitive railway; and cannot maintain an eco-friendly and competitive edge.

In view of this situation, the three Nordic infrastructure managers Norwegian National Rail Administration (Jernbaneverket), Swedish National Rail Administration (Banverket) and Danish National Railway Agency (Banedanmark) decided to overcome their national interests in order to work together. Their goal? To provide a common software system for settling energy supply to trains. In 2007 the first bills based on real energy consumption were produced and sent via the system to the train operators. This change heralded the beginning of a new era where the use of metered energy data takes preference over the gross tonne kilometre.
In 2008 the partnership became truly European when Belgian rail infrastructure manager Infrabel joined the group. No longer 100% Nordic, the quartet was renamed the European Railway Energy Settlement System.

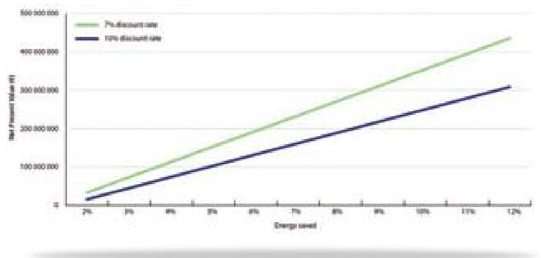
ERESS – A HIGHLY PROFITABLE PROJECT

The ERESS is a highly profitable project. Assuming a modest savings level of 10%, based on an annual energy cost of €250 million, the net present value of ERESS with a discount rate of 7% is €355 million. This is achieved by the ERESS customers; the train operators. The net present value calculation is based on realistic investments and operating costs for all four partners.

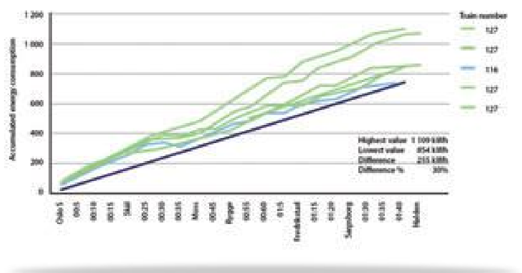
The basic philosophy behind ERESS is:
"You can only manage what you can control and control is worthless without measurement".
A documented example is the case of Jernbaneverket. The introduction of ERESS and installation of advanced energy meters incited the operator to launch a five-year energy management and savings project in 2005. With the same level of activity, a target potential of saving 15% energy was set. To reach this goal, three opportunities were identified:

- Eco-driving
- Heating, ventilation and climate control on-board
- Stationary traction unit heating

CargoNet AS uses metered energy data to calculate energy billing for their EL16 locomotives



Net Present Value ERESS (EUR)



Train 73-04 from Oslo to Halden, May 2006. Journey time 1hr 45, distance 136.6km

The project highlights how railway energy consumption can vary by up to 30% with the same train, journey, conditions and running time (no delays), but a different driver. "The human factor plays an important role in energy saving projects," explained Jan Vetle Moen, energy advisor at Jernbaneverket, "but the effectiveness of energy management also depends on the accessibility of energy consumption."

By using a web-based approach, Jernbaneverket can distribute analysed energy consumption data to all divisions of the organisation – from driver to top management. The results of this project have so far has exceeded the initial target levels. The operator scored an improvement of 17.5% in energy efficiency between 2005 and 2008. For 2008 this represented a reduction in energy costs of €3 million. In addition, a 12% improvement in efficiency is expected by 2012 with the introduction of new, energy efficient rolling stock.

STATE-OF-THE-ART ENERGY SOLUTIONS

The aim of the ERESS partnership is to develop, offer and supply energy settlement and calculation systems for trains. A secondary goal is to make train consumption data accessible, both for infrastructure owners and their customers, the train operators.
By using the ERESS solution, infrastructure managers meet the requirements for neutral, transparent and non-discriminatory operations, and thereby contribute to maintaining a competitive market between operators. The infrastructure managers lay down a charging principle for the use of their services:

"The cost of offering a service is to be charged to the users of that service".
For the train operators, the energy consumption information provided offers the chance to reduce energy consumption, adopt efficient eco-driving and thereby enhance rail as the most environmentally-friendly mode of transport today. The system also anticipates the future needs of train operators by facilitating the purchase of energy by individual operators on the open energy market.
By using ERESS, infrastructure managers can optimise their cost and performance, as well as promoting the development of effective and accurate rail traffic solutions, not only at home but abroad too. With this tool, infrastructure managers and operators can solve a certain number of railways issues, such as:

- Exchange of energy consumption between infrastructure managers
- Introduction of new services like clearing systems and a clearing office
- Opportunities for train operators to realise data analysis for eco-driving and carry out energy saving projects
- Cross-border train traffic
- Different grid and price areas within the same consumption area/country and where energy prices are dynamic
- Train consumption, time and position linked to the relevant market price
- Reduce the number of contact points for cross-border operators

Advanced energy measurement unit retrofitted in Tp69 traction unit

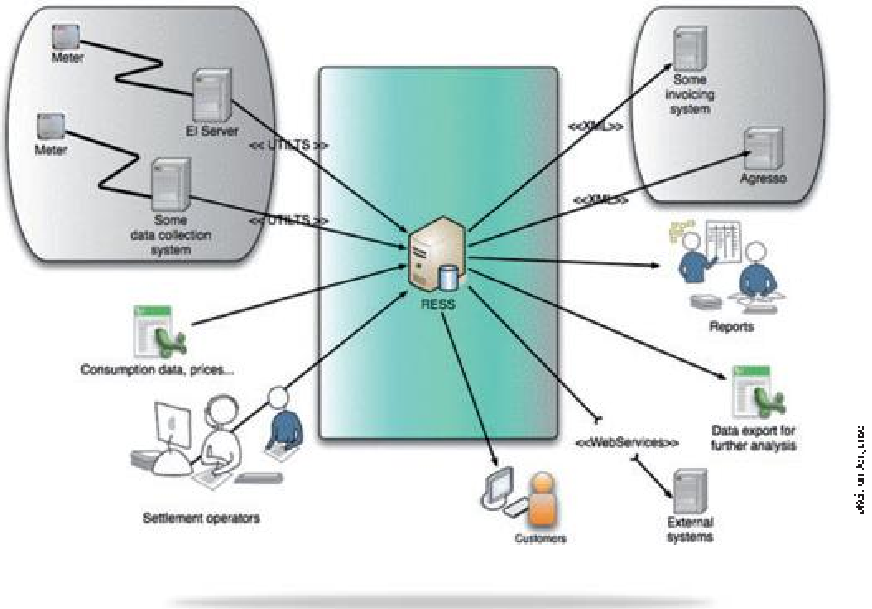
- Develop an equal basic tariff and invoice rules
- Advanced use of profiles for non- metered consumption
- Consistent treatment of energy loss distribution and settlement
- Deadline for reporting energy consumption to customer and market
- Reduction of financial risks

FROM ENERGY MEASUREMENT TO BILLING

From a system point of view, ERESS is a complete solution that covers on-board, energy measuring equipment to billing of energy costs. The main components are the energy measurement units (EMU), data collection and energy settlement systems.

Each traction unit is equipped with an EMU in accordance with European standards in force. The EMU used is an advanced, energy measuring unit that records consumption, time and position, using GPS, every five minutes. Energy data from on-board equipment is gathered by collection systems and transferred to the Railway Energy Settlement System (RESS) in UTILTS format. The RESS supports any type of data collection or train management system, whether they have an integrated validation module or not. This flexibility is possible thanks to the use of standard interfaces and the implementation of an international validation, splitting and distribution module in accordance with UIC leaflet 930 'Exchange of data for

ERESS concept overview



cross-border railway energy settlement' published in autumn 2009.
As access to train consumption data is subject to commercial confidentiality, railway undertakings can only consult the raw and settled billing data concerning their trains; whereas infrastructure managers can access the whole dataset of train operating companies using their grid areas. Both have access to the data through an internet user interface. Add-ons like a web service have been developed to provide a better service to operators using high resolution, measured data in their internal energy management processes.

The RESS – a state-of-the-art, energy settlement solution and system for traction units in Europe – was built together with the world's leading experts in the fields concerned. It is the only such system in use that meets the European Union's liberalised energy and railway market requirements for national and international traffic.

OPEN PARTNERSHIP ON EQUAL TERMS

Banedanmark, Banverket, Infrabel and Jernbaneverket are keen to welcome new partners and see the solution used in more European countries.

"The partnership welcomes new partners on equal terms and based on a non-profit agreement, whereby both existing and future parties enjoy the same rights."

By signing the cooperation agreement, infrastructure manager members commit to developing and establishing a common energy settlement system. The partnership holds joint ownership rights to the settlement system and each infrastructure manager has unilateral rights to its data.

ORGANISATION AND COSTS

The steering group is made up of representatives from the member infrastructure managers. This group is responsible for the overall strategy and budget, and takes decisions regarding further development and use of ERESS. Furthermore, in order to ensure maximum efficiency, a joint management and operational organisation is headed by Jernbaneverket Bane Energi, the energy department of Jernbaneverket.
Each new member covers its own expenses for any implementation and adaptation steps needed to accommodate the functions it has chosen. Nevertheless if the incurred costs of the specific adaptation are of interest to all members they will be split equally between them, even if this concerns a new function.
New infrastructure managers also pay a partnership entry fee based on the new partners' share of the total costs existing partners have invested in ERESS, calculated on a non-profit basis. When further development to the system is agreed upon by the steering group, the resulting costs are shared equally between partners and added to the partnership fee for new members. The latter is later forwarded in equal shares to the partners.

TRIAL PERIOD

Limited membership gives interested parties an opportunity to test a complete energy metering and energy settlement system at a low cost, without becoming a full ERESS partner. After the test period, participants can decide whether to join or not.

NEW SOLUTION FOR EUROPE

One of the long-term objectives of ERESS is to become a European solution. Hence the partnership will continue to play an active role in all related work headed by European and international organisations such as the UIC, ERA, CENELEC, EIM and eBIX.
Energy saving and interoperability is vital if operators and the railway sector as a whole wants to remain competitive in today's changing market. And more efficient rail is good news for the European Union too! ■

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director, ERESS

**for more information visit www.eress.eu*