

LNVG embraces innovation in regional rail

By taking a progressive approach to the procurement of operating contracts, acquiring its own vehicles, and actively exploring the potential uses of new technologies, Lower Saxony Transport Authority (LNVG) has blazed a trail for innovation in regional rail. LNVG managing director **Carmen Schwabl** tells **Keith Barrow** how its development strategy has cut operating costs, improved services and driven up ridership.

STRETCHING from the North Sea to the Harz mountains, Lower Saxony is Germany's second-largest state by land area (after Bavaria), but with 8 million people spread across 48,000km², only 11th in terms of population density. This is reflected in the regional rail system, with a mixture of high-density routes feeding into cities such as Hannover, Bremen and Hamburg, and a patchwork of secondary lines linking smaller towns to the core network.

Since the liberalisation of the regional rail market in Germany 20 years ago, Lower Saxony Transport (LNVG) has actively encouraged competition in operating tenders and today 11 train operators run regional services in the state.

"Coordination between transport authorities is a challenge in the competitive tending of transport networks as in most cases an increasing number of authorities are involved in the process," explains LNVG managing director, Mrs Carmen Schwabl. "We are among the transport authorities that have set the pace right from the start and advertised our rail tenders throughout Europe. As a

result, we have always achieved a better deal for passengers while at the same time significantly reducing our payments to train operators."

According to LNVG, 72% of regional train services in Lower Saxony in the 2016 timetable were operated by companies that have entered the market since regionalisation, a figure far higher than the average for Germany's 16 states. Incumbent DB Regio remains the largest player with a market share (by train-km) of 28% but other operators are not far behind: North West Railway (NWB) has 27% while Metronom has 21%.

LNVG says competition has succeeded in transforming the economics of marginal routes, boosting the price/performance ratio in terms of rolling stock, timetables and customer orientation, and improving the image of rail transport in the state. Supply increased from 29 million train-km a year in 1997-98 to 37 million in 2015 and today more than 90% of rail journeys in the state are made on trains built since 2000. According to the German Federal Statistics Office, regional rail traffic in Lower Saxony climbed from 2.7 billion passenger-km

in 2004 to 4.3 billion in 2016.

Improvements to secondary lines have been a particular success story, and significant gains have been achieved though a combination of relatively modest investments in infrastructure, improved stations, attractive timetables, and modern rolling stock. For example, passenger numbers have almost doubled on the Oldenburg - Osnabrück line since the completion of an upgrading project that was partially-funded by LNVG.

Growth has not been achieved without challenges and Schwabl says accommodating rising demand is becoming increasingly difficult on core sections of the network. "Infrastructure is now heavily used or overloaded on many routes and important junctions," she says "We also have a lot of engineering work taking place on the network, which aggravates this situation even further. Additional improvements to the offer on the main routes will not be possible without an expansion of the infrastructure."

Human resources are another challenge for Lower Saxony's growing railway. "The lack of suitable personnel, especially locomotive

Two prototype Alstom Coradia iLint hydrogen fuel cell multiple units will enter passenger service in Lower Saxony this month. Photo: Alstom





Erixx services call at Vienenburg on the Braunschweig - Bad Harzburg/Goslar line. Photo: Alstom

drivers, is another structural problem in Germany," Schwabl explains. "This often leads to delays and cancellations."

Despite these challenges, Lower Saxony maintains its policy of promoting greater use of regional trains and LNVG continues its drive to align services more closely with the mobility needs of the population.

For many years, LNVG has sought to improve the intermodal interface at

stations with investment in bus stops, park & ride and bike & ride facilities and Schwabl says the authority is also focussing on barrier-free access to bus stops and railway stations to improve public transport for passengers with reduced mobility. Lower Saxony is also investing in real-time passenger information to make the travel experience "seamless," and providing financial support for bus services that

feed regional railway stations. "All this ensures much better connections between the different modes of transport," Schwabl.

The fares system is also a target for greater intermodal integration. "We want to give people easier access to mobility," Schwabl explains. "This means you no longer have to know the different fares for each mode of transport to use the train and bus. That's too complicated." At the end of the year, LNVG will introduce a new ticket which combines the train fare with local public transport at the beginning and end of the journey.

"We see that mobility is fundamentally changing," Schwabl says. "This applies to new mobility concepts such as ride sharing currently being tested in Hannover, new traction concepts such as hydrogen, and digitalisation of public transport. This begins with the ability to plan and pay for journeys on a smartphone as well as timetable information, which needs to be more reliable and more real-time."

LNVG recently established a Mobility Management department to help districts and municipalities improve the attractiveness of public transport,



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particularly in rural areas, and advise them on how to make best use of the funding allocated by the state of Lower Saxony for this purpose. The department also helps to co-ordinate projects that span multiple districts.

LNVG was an early proponent of competitive tendering for regional train services, and it continually adapts its procurement processes to take advantage of the lessons learned in previous contests. "We have recently introduced a new evaluation criterion for information management in our Europe-wide competitions," Schwabl explains. "Bidders must develop practical concepts for keeping passengers informed in the event of disruption. We also have a personnel concept, which requires bidders to demonstrate their staff requirements and the plausibility of their plans for the workforce. We expect reserve staff to be available at the morning start points for trains, so they can step in to substitute for short-term traincrew loss. We have also introduced a binding quota for the training of new train drivers for each year of the contract,

and this takes into account the need to train drivers to work on routes beyond the individual network."

Vehicle pool

Schwabl says the availability of high-quality rolling stock is essential both for ensuring strong competition in tenders and encouraging ridership growth. Since liberalisation of the regional rail market in 1996, the state of Lower Saxony has invested more than €1bn in new rolling stock, in addition to the funds committed to fleet modernisation by the train operators.

In 1997, LNVG decided to establish its own lease pool of rail vehicles with the aim of creating a level playing field between operators and ensuring that new rolling stock could be delivered in time for the start of a new contract. At this time, orders for DB - the dominant player in the regional market - consumed much of the production capacity of the main vehicle suppliers, and LNVG felt that the conditions for the procurement of new rolling stock were therefore heavily weighted in

favour of the incumbent.

Furthermore, private rolling stock leasing companies were still in their infancy in Germany at this time and the lack of experience of competitive tendering meant transport authorities were reluctant to let long-term contracts, which operators would need if they were to leverage private finance for the acquisition of new trains.

LNVG says the vehicle pool has generated a number of financial benefits, including:

- lower interest advantages - access to public financing through regionalisation funds means no interest on capital
- ability to combine rolling stock orders for several networks into a single order, resulting in a lower unit price for new vehicles
- additional revenue from passengers attracted to rail by new trains
- lower prices in bids for operating contracts - no risk to the bidder from uncertainty over the use of vehicles beyond the end of the contract term, and
- lowering barriers for new entrants, increasing competition for contracts.

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accountancy firm commissioned in 2005 concluded that LNVG's vehicle pool had generated a total monetary benefit of more than €100m compared with other forms of financing or procurement.

LNVG's vehicle pool set a precedent which has since been followed by other German transport authorities - notably for the supply and whole-life maintenance of 82 Siemens Desiro HC EMUs for the Rhine-Ruhr Express network - yet it still remains something of an exception.

LNVG's pool currently comprises 383 vehicles including locomotives, coaches and DMUs, with further expansion planned. On August 14 LNVG published a tender notice in the Official Journal of the European Union for a new fleet of 160km/h double-deck EMUs, which will be used on the so-called Express Cross Bremen/Lower Saxony network. This comprises regional express services on the Norddeich Mole - Bremen - Hannover, Wilhelmshaven - Bremen and Bremerhaven - Bremen - Hannover/Osnabrück routes.

The tender calls for the supply of around 30 fully or partially double-deck trains, which will be maintained by the supplier at a purpose-built depot for the anticipated 30-year life of the fleet. Each set will be formed of between three and six vehicles, and the trains will be equipped for multiple operation.

The contract will be awarded in autumn 2019 and deliveries will be completed in the second half of 2023. LNVG will make the fleet available to the operator of these services, and tendering for the operating contract is due to start in early 2020, with the new trains entering service when the contract begins in December 2023.

A key feature of the new contract will be the launch of two-hourly Hannover - Wilhelmshaven regional express services, the first direct connection between the two cities. Schwabl says the service will be "a clear plus" for tourism around the Jade Bight on the North Sea coast.

Hydrogen

A notable forthcoming addition to the vehicle pool is a fleet of hydrogen fuel-cell multiple units, the first commercial application of this technology on the German main line network.

In November 2017, LNVG awarded Alstom and gas supplier Linde Group a contract to supply 14 Coradia iLint fuel-cell trains, with the aid of €81.3m from the state of Lower Saxony.

The contract - the first order for the



LNVG's vehicle pool includes a fleet of Bombardier double-deck coaches. Photo: InterCityImpress

iLint - includes 30 years' maintenance and energy supplies for the fleet. Linde will install dedicated hydrogen refuelling facilities for the fleet, which will enter commercial operation with Elbe-Weser Transport Company (EVB) on services from Cuxhaven to Bremerhaven, Bremervörde, and Buxtehude from December 2021.

Maintenance will be carried out by Alstom at EVB's depot in Bremervörde, which will be extended to service the new trains. A €10m hydrogen refuelling facility at Bremervörde is being funded with the aid of a €8.4m grant from the federal government's National Innovation Programme for Hydrogen and Fuel Cell Technology. In a later phase of the project, hydrogen will be produced at Bremervörde using electrolysis, with a wind turbine providing power for the production process.

The Federal Railway Authority (EBA) granted an Authorisation to Place in Service (APS) for the iLint prototypes in July, and two of the trains are due to enter commercial service with EVB on September 17.

Alstom says timely authorisation of the trains was achieved by working closely with the EBA throughout the development process. "The EBA was involved in all steps of the train design from 2012 onwards and that was a key factor for success," explains Mr Jens Sprotte, urban transport and systems director for Alstom Germany.

Sprotte says a key objective of iLint is to match the operational performance of modern DMUs. The result is a 140km/h train with a range of up to 1000km and fuelling cycles of around 15 minutes.

"The cost of diesel is currently quite

low in Germany, but we expect it to increase, and breakeven on lifecycle costs will therefore come much earlier," he says. "A more important consideration is that we can replace diesels with a zero-emissions train, and this is a unique selling point for us."

If this initial deployment is successful, hydrogen fuel-cell trains could replace DMUs on other lines in Lower Saxony. "This is about proving the functionality and everyday usability of the new vehicles," Schwabl says. "We are gaining a lot of valuable experience with this first project. If these experiences are good, fuel cell trains will be a real alternative for diesel trains and we will consider whether to buy more trains if necessary."

So could hydrogen trains and the increasing viability of other alternative traction concepts such as batteries (p70) enable Lower Saxony to eradicate diesel operation of passenger services?

"Technically, this is certainly possible," Schwabl says. "Economically, it will be difficult to replace all diesel trains with vehicles with alternative drive systems in the medium-term because many of the diesel trains currently in use are quite new. "That means, their useful life will continue until 2035 and beyond."

By embracing innovations such as the vehicle pool and alternative traction, fostering links with other modes, and continually developing and refining its procurement processes for operating contracts, LNVG has succeeded in making public-service-obligation train services in Lower Saxony less burdensome on the state, kinder to the environment, and a more attractive travel option for passengers. **IRJ**