



RegioTram

Our advanced rail scheme
for the Kassel region





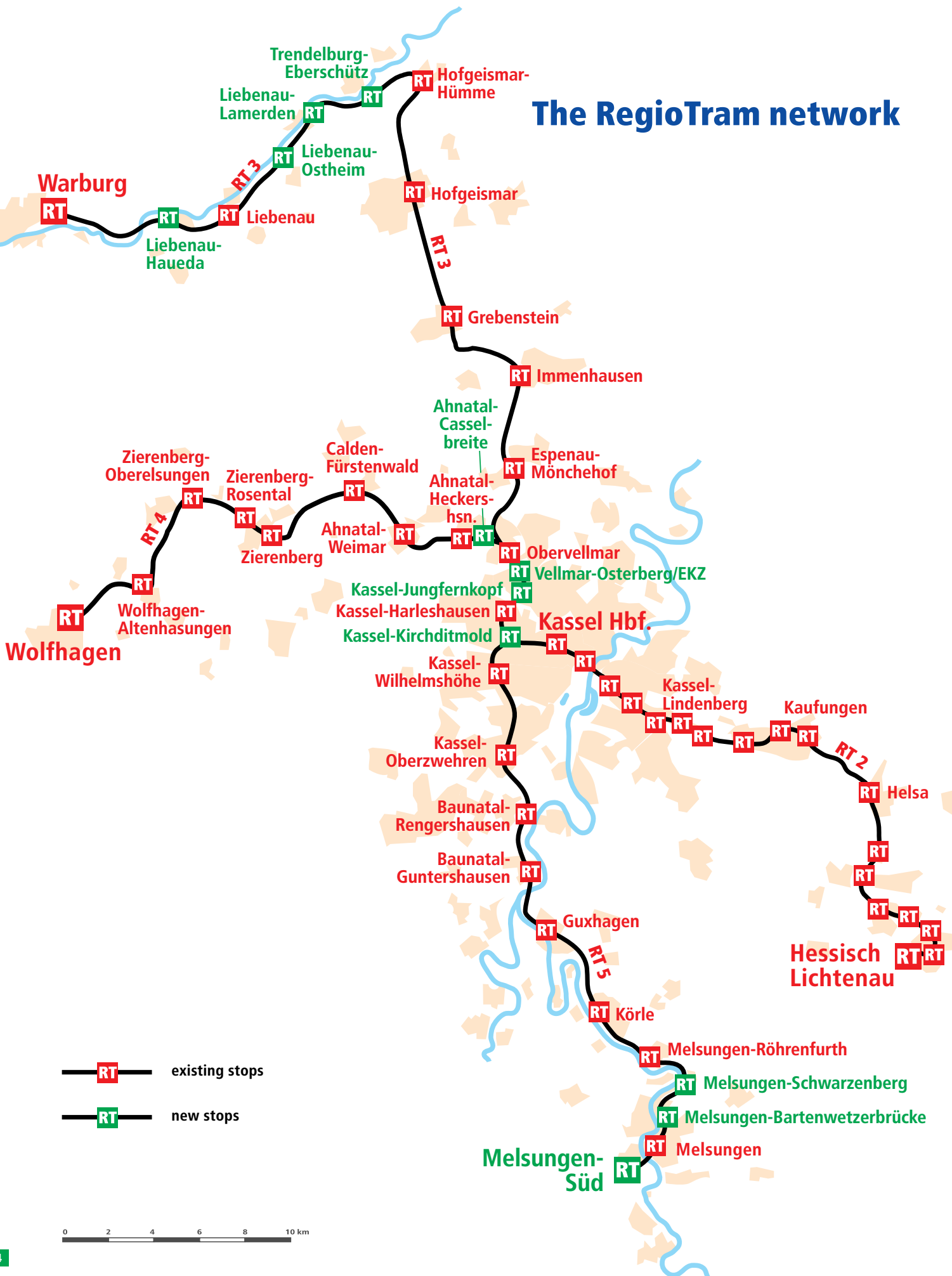


Commitment to Public Mobility

In our society mobility is regarded as an indispensable need. It is the pivot of our daily work. With efficient transport systems we can create a regional network to connect cities and communities, bringing them together in terms of time and space.

By establishing the RegioTram-scheme, mobility in Northern Hesse reaches new dimensions, bringing together more people more quickly and more reliably. It will provide even better connections in the region in the future – whilst respecting the environment and beauty of Northern Hesse. That's our objective.

The RegioTram network



From Vision to Reality

A sound concept

Since the inauguration of the ICE station Wilhelmshöhe, the old Kassel main station is only used for regional and local transport. Although it lost its significance for long-distance traffic, it enjoys some general popularity as the „Kulturbahnhof“ („Culture Station“). Due to its position on the edge of the city centre, it can also be reached by many bus and tram services which link to the surrounding recreational, residential and commercial areas.

Becoming the most important interface for the RegioTram, Kassel main station will be back in the focus soon. It will close the major gap and link the railway system and the tramway in one joint network, merging the two systems. The result is an improved cohesion of the whole region: Four new branch lines will connect the medium-sized regional centres of Wolfhagen, Warburg, Hessisch Lichtenau and Melsungen as well as the pedestrian zone in the city centre of Kassel - directly and without having to change. Also the RegioTram is on quite a few relations faster than the private car, offers the comfort of a suburban train system and connects all important destinations thanks to the close proximity of the stations in the city and the region to origins and destinations of the passengers.

All in all the RegioTram is the most ambitious project which the NVV, along with its partners, has embarked upon in the years since its inception.

Being a real cooperation project it will show out significant benefits for the region. It deserves therefore having a look on its development stages.

Thoughts and Decisions

The idea to connect the rail networks of Deutsche Bahn (DB) and Kasseler Verkehrs-Gesellschaft (KVG) within a RegioTram-scheme was discussed first in the „Schiene 21“ system study, which was commissioned by the Nordhessischer VerkehrsVerbund (Passenger Transport Authority of Northern Hesse, NVV) and delivered by Verkehrs-Consulting Kassel (KVC) and Transport-Technologie-Consult Karlsruhe (TTK) in 1999.

In a next phase in-depth studies and the detailed design of facilities were assigned to KVC. This included also a detailed investigation of variants for the link between railway and tramway network in the Kassel main station area. A tunnel-option to underpass the station building and possibly using the ramp to Kassel's only underground tram stop – an ugly reminder of the seventies – was favoured already in this early stage.

In the year 2000 a project group involving representatives of Kassel's municipality, NVV, the State Road and Transport Authority (Hessisches Amt für Straßen- und Verkehrswesen), KVG, DB Regio (the DB operating company), DB Netz (the DB network infrastructure company) and DB Station & Service (a separate DB unit

responsible for station infrastructure) compared a number of short-listed options regarding feasibility and costs.

After intensive, controversial discussions regarding the different options both in the project group and in public meetings the tunnel-option was finally preferred. Main feature of this option was to create a tunnel under the Southern wing of the station building, to establish the (underground) RegioTram stop in the corridor of today's tracks 1-3 and to link the tunnel tracks then to the urban network two ways: via Rudolf-Schwander-Straße on one hand and via Ständeplatz on the other.

To allow a proper dealing with the further planning process in 2002 a „project contract“ was signed by the local authorities involved: Kassel's municipality, Kassel County (Landkreis), Schwalm-Eder County and Werra-Meißner County, as well as NVV and KVG to examine the chosen variant in more detail. Issues like monument protection (the station building being a listed building!), alignment (curvature, gradients etc.), construction and maintenance costs as well as the feasibility of integrating the signalling system into the existing DB control centre were evaluated. As a result the former decision was then altered towards a straight tunnel under the station building with the RegioTram stop being located in the track 4-6 corridor (see also „Interface: Main Station Kassel“).

Networked aims, networked success

NVV's task is to ensure and improve the regional public transport quality in co-operation with its partners. The target is to provide optimum connections for the customers – between home and school, sports and training locations, workplaces, shopping centres and recreation areas. For this purpose the different traffic systems must interact so that a sustainable mobility is guaranteed for all population groups – safely, comfortably, reliably and economically.

The RegioTram plays an important role to achieve these targets.

With less than 10 kilometres of new tracks it becomes possible to create a completely new traffic system with a network length of 122 km. RegioTram vehicles operate both on the extensive DB network in the region and on the tramway network of the city of Kassel.

Not only an advantage for the customer, but also in view of the economics: The higher revenues achieved by a joint network with better response to demand allow other investments in public transport improvement elsewhere in the Kassel region.

Existing railway stops need to be modernized and adapted. New, additional stops are also needed to follow the network's expansion and to improve the accessibility of the system. Increasing the capacity of existing railway routes requires especially the modernisation of the signalling equipment. Otherwise the basic 30 minute headway on the



RegioTram routes would not be feasible and this is a real must to offer passengers reasonably attractive conditions and better, safer and faster connections.

The chosen operational concept for the RegioTram shows another advantage: while the RegioTram is substituting the former DB stopping trains (the „Regionalbahn“ in DB's train hierarchy), the „Regionalexpress“ trains will not only remain, but their role even will be strengthened. This is achieved by serving only some interchange (hub) stations with these trains and thus allowing faster travel times. The availability of a mix of fast trains between hubs and RegioTrams caring for all stops will make rail services within NVV even more

attractive and this also for convinced non-users. Demand models have shown passenger number increases of more than 50% compared to today.

Already the Lossetalbahn reactivation in recent years has made apparent the attractiveness of such a concept: In just two years after opening of the Kassel-Kaufungen-Helsa service demand increased by about 50%.

But one might argue about investment costs! However, with a total of 180 Mio. €, the investments for such an ambitious project like the RegioTram remain still manageable (see also: „Financial spread“). And compared to the overall benefit for the region the expenditures seem rather small!



Hessisch Lichtenau



RegioTram's successful career actually started already in 1998 when the reactivation of „Lossetalbahn“ from Kassel via Kaufungen to Helsa began. Formerly known as „Waldkappeler Bahn“, the railway route had been closed for passenger traffic since May 1985. Reactivation took place in three sections: from Kassel to Kaufungen-Papierfabrik in 1998, further to Helsa in 2001 and now since February 2006 to Hessisch-Lichtenau. KVG's tramway line 4 operates on the line, but from February 2006 also the RegioTram joined. Kassel city will be reached from Hessisch Lichtenau in 49 minutes, from Helsa in 38 minutes and from Oberkaufungen in 31 minutes. In peak periods the line is operated with a 30 minutes frequency, from Helsa even every 15 minutes.

What is the difference between the tram and the RegioTram operation on Lossetalbahn? RegioTram operates faster (~ 8 minutes) than the Tram service and this is achieved by using the original straight railway alignment between Niederkaufungen to Oberkaufungen, while the tramway uses the newly built „deviation“ towards the village centre of Kaufungen with several stops.

Certainly the old railway line was not in a condition which would have allowed a re-introduction of passenger services without major

refurbishment. Modernisation measures alongside the route did comprise signalling equipment and safety measures at level crossings. The original railway route having been mainly single track with only few passing stations, the refurbishment and modernisation did also include double track sections between Kassel Hallenbad-Ost to Oberkaufungen in order to allow the denser frequencies and competitive travel times.

Near Fürstenhagen special elevated sleepers have been used for environmental reasons: the greater crested newt, a listed amphibian, is so able to cross the track without being endangered. Along the whole line to Hessisch-Lichtenau new stops have been established to facilitate access to the RegioTram for the residents and commuters.

All stations, platforms and facilities are in compliance with NVV's modern standards. Some of the stops show real „hardcore“ pieces of railway engineering with up to six parallel rails in stop areas, the reason being that the tracks for the 2.4 m wide, single-ended tramway vehicles (doors only on one side!) are separated from the heavy rail track (still being in use by freight trains!) in order to allow level access platforms for tram passengers outside of the heavy rail clearance in both directions.

Kaufungen-Niederkaufungen,
Helsa-Eschenstruth,
Hessisch Lichtenau-Orthop. Klinik,
Hessisch Lichtenau City

Direct Line: Melsungen – Kassel



Artist impression of new stop Melsungen-Bartenwetterbrücke

The cities of Kassel and Melsungen today are connected by both „Regionalexpress“ (RE) and „Regionalbahn“ line R5. While the latter stopping train will be substituted by the RegioTram, the RE-services will be accelerated.

As described before this is the general operational principle on all RegioTram corridors. Thanks to a denser frequency the RegioTram will offer more frequent travel possibilities and also better accessibility through new stops Melsungen-Bartenwetterbrücke, Melsungen-Schwarzenberg and Melsungen-Süd. It is one of the advantages of the RegioTram operation to allow an increased use of route capacity and this even with more stops – thanks to the performance of the modern rolling stock.

A 30-minute frequency is offered Monday – Friday and on Saturday morning for all RegioTram stops. An hourly service is offered on Saturday afternoons, Sundays and holidays. The RE-trains will not stop between Melsungen and Kassel and thus offer a fast link here, but will serve all stops between Bebra and Melsungen taking over the stopping train role on this section.

Coordinated feeder bus services will link the city quarters of Melsungen and also a number of towns and villages in Schwalm-Eder County to the RegioTram. A fast interchange is achieved by a new bus terminal on the modernised station square of Melsungen – a real door-to-door transfer.

An important task within the infrastructure measures in this corridor, but more generally in all RegioTram corridors is to improve access to the existing stations and to adjust the platform and vehicle entrance to achieve level boarding quality. With several additional stops in Melsungen, further to those mentioned above the planned terminal station Melsungen-Süd will follow in 2008, the catchment area will be increased and more customers reached. Melsungen station will get an important role as one of the hub stations within the RegioTram network with interchanges between faster regional RE-train, RegioTram and bus.



Kassel-Wilhelmshöhe,
Baunatal-Gunttershausen,
Melsungen,
Melsungen-Süd

Learning from a trial operation: Warburg – Kassel



Immenhausen,
Hofgeismar,
Hofgeismar-Hümme,
Warburg

Already since 2001 the flavour of Tram-Train-operation was tested on this railway route with leased Saarbrücken rolling stock. This has now been replaced when the „real“ RegioTram became available. For the time being the trains start and terminate at Kassel main station. Travel time from Warburg with the RegioTram is 50 minutes, the faster RE-trains need 38 minutes. Again we see here the operational scheme combining the RegioTram as a stopping train with faster train services. To achieve significant passenger number increase three more stops will be added in the densely populated Harleshäuser Kurve area (see also „Jointly used“), still a sub-urban quarter of Kassel – 17 stops are served in total. Travel time from Warburg to Kassel main station will then face a slight increase, but the direct link to the city centre will compensate this easily.

Passenger demand forecasts for the section Kassel-Hümme have recommended a 30 minute frequency as the

„normal“ frequency, which means the operational concept is similar as on other RegioTram corridors. Direct RegioTram services to Warburg are offered only every two hours on all days but additional travel options on this relation are offered by regional and longer distance trains (IC/ICE) which also operate in an two-hourly schedule, thus resulting in hourly travel options from Warburg. Coordinated feeder bus services also in this corridor will link towns and communities to the RegioTram.

The RegioTram stops on this route face similar improvements then we have seen for other corridors. Some specific measures include: the installation of elevators in Warburg and Hofgeismar to achieve agreeable conditions for the mobility-impaired, Espenau sees the replacement of the old island platform by new platforms on the outer side of the tracks, which will make the crossing of the tracks obsolete and both Immenhausen and Liebenau will get Park & Ride facilities.



Easy and convenient interchange Bus-RegioTram at refurbished Grebenstein stop

Short service intervals by Dieseltram: Wolfhagen – Kassel

Kassel and Wolfhagen are today linked by the „Regionalbahn“ (RB) and the „Regionalexpress“ (RE) stopping train service R4 which requires between 33 (RE) and 47 (RB) minutes for the journey. In the future the RegioTram, which substitutes the R4 service, will serve 15 stops in total, compared to 10 today and need 46 minutes for the journey to Kassel main station, the big advantage however will become the direct link into the city centre without inter-changing.

The overlay of two hourly services of the RegioTram and of the RE-service Kassel – Korbach results in a 30 minutes frequency between Wolfhagen and Kassel. On the section Kassel – Zierenberg (the „more urban“ part of this rural railway route) the RegioTram is operated according to the general operational concept in a 30 minute frequency on weekdays including Saturday mornings. The RE-service offers one more fast travel option per hour.

The RegioTram line to Wolfhagen shows a particular organisational feature as the railway route being used is part of the Kurhessenbahn network. Kurhessenbahn is one of the regional networks („RegioNetze“) which DB has created to better compete with, in general, more locally organised private railways. Kurhessenbahn as the infrastructure owner intends to modernize the complete line. Besides the refurbishment of the train protection system this will comprise the removal of a number of obsolete level crossings. All these measures of the Kurhessenbahn concept are not part of the

RegioTram project as such, but certainly RegioTram is benefiting and partly requiring these measures for its operation. An increased maximum speed on the line is one major result which will enable the 30 minutes frequency of the RegioTram.

A second technical particularity is the fact that this railway route is and will stay un-electrified. The reason for not electrifying the line for RegioTram operation (which would have allowed concentrating on AC/DC dual mode rolling stock!) is the Zierenberg tunnel, which has been designed long time ago for steam operation and thus reshaping of this tunnel for electrification would have resulted in major additional infrastructure costs. The Wolfhagen line is therefore the reason for ordering a second type of RegioTram rolling stock, the „Dieseltram“, which operates with an on-board Diesel power source on the un-electrified parts of the route and with tramway overhead power supply in the city network. Within the „TramTrain revolution“ as such the Dieseltram is well a revolution in itself!

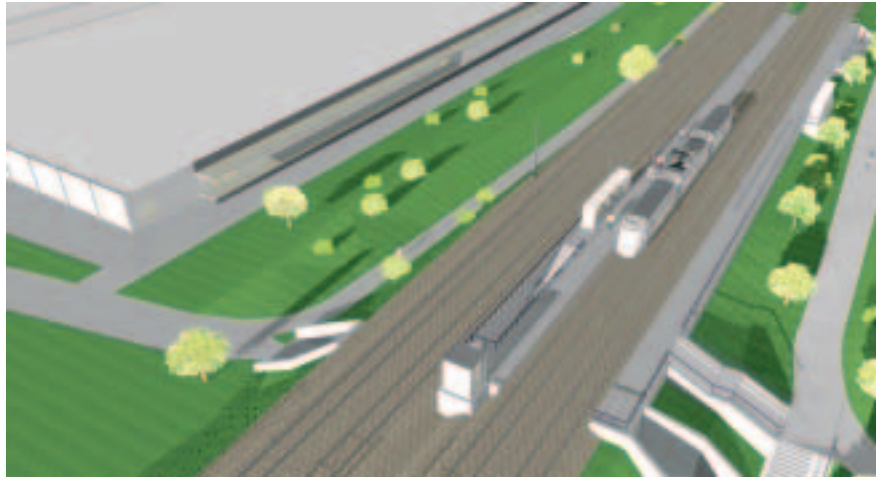
Additional measures on this line belonging to the RegioTram project are concentrating on the stations/stops. This includes general modernisation, adaptation of platforms to enable use with different types of rolling stock, new stops (Ahnatal-Casselbreite; to better connect a growing suburb). Wolfhagen will see a new terminal environment with a separate RegioTram track and platform directly linked to a new bus stop to deliver perfect interchange quality.



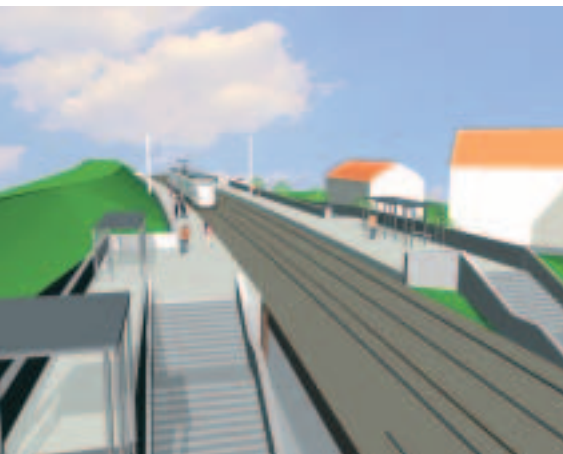
Ahnatal-Weimar,
Zierenberg,
Zierenberg-Oberelsungen,
Wolfhagen

Jointly used: The Harleshäuser Kurve in Kassel

The section Kassel – Obervellmar, the so-called Harleshäuser Kurve, is the first section used by the RegioTram after entering the DB network at Kassel main station. This section is jointly used both by RegioTrams in the direction of Wolfhagen and Warburg. Three new stops will be established in this suburban part of Kassel: Vellmar-Osterberg/EKZ, Kassel-Jungfernkopf and Kassel-Kirchditmold. Today's „Regionalbahn“ stopping trains R3 and R4 use the same tracks but stop only at Obervellmar and Harleshausen. So residents from these areas today face some inconvenience in using Public Transport, either they have to get to one of the existing railway stops, maybe even by travelling first in the opposite direction of where they want to go or they have to take a bus for the whole trip into the city and even interchange again to the tram. The RegioTram will here result in a real quantum jump improvement: 33 minutes bus ride from Vellmar-Osterberg to Kassel main station will be replaced by 12 minutes RegioTram ride! From Kassel-Jungfernkopf bus



Artist impression of new stops Vellmar-Osterberg/EKZ, Kassel-Jungfernkopf



Artist impression of new stop
Kassel-Kirchditmold

and tram with one interchange require today 21 minutes to get to the city centre, the RegioTram will require 8 minutes in the future. In view of the suburban character the „Harleshäuser Kurve“ section will see a 15 minute frequency on weekdays and Saturday mornings, and a 30 minute frequency on other days/ times.

The new stops will receive 115 m long platforms to allow the operation of RegioTram-„Trains“ consisting of three coupled vehicles.

A very important additional feature on this section is a heavily improved signalling system with short block distances to allow the dense frequencies with the additional stops.

Interface: Main Station Kassel

The main station of Kassel will become also the first city centre stop of the RegioTram. It will be established in the area of today's tracks 4-6 and will have an important role as an interchange node between the RegioTram, buses and regional trains. As already described it was finally decided to under-pass the main station building with the RegioTram alignment. Towards the city the existing ramp of the derelict underground tram stop will be used to link to the urban tramway network, the stop as such will be dismantled.

The new RegioTram stop will become part of the other ramp section on the railway side. Stairs and lifts will link from the deep end into the station building. Early in 2003 an architect's competition was initiated to get ideas for the design of the roof of the RegioTram stop. The Darmstadt architects Prof. Burkhard Pahl/Monika Weber-Pahl in co-operation with OSD engineers, also from Darmstadt, were assigned with the project, as their proposal perfectly met the functional requirements and offered a clearly structured station layout with a large-scale open appearance.

The design idea is based on the harmonic integration of a single roof element into the existing chambered roofing of the old station. This is achieved by a visually fascinating rhombic, wooden framework arching across all three platforms which is supported on both sides by a steel structure.



The new RegioTram stop at Kassel main station

The pleasant view over the platforms, the direct access to/from the station concourse via well arranged stairs and lifts easy orientation from all locations - all these features will for sure find the appreciation of the RegioTram passengers.

The station will get enough daylight from both sides, thus there is no need for artificial lighting during daytime. With twilight approaching, the roof element will be illuminated from light sources integrated in the steel structures. Furthermore facilities like elevators and stairs will receive additional illumination.

The highly attractive new architecture will become an integral part of the existing „Kassel Kulturbahnhof“ ensemble. Without any doubt the station's role as a traffic node will be assured for the future.

Entering the City



Kassel, Scheidemannplatz



Kassel, Rathaus, pedestrian area



Kassel, Obere Königsstraße, pedestrian area

RegioTrams entering the city from the railway will, after having passed the new main station stop (see before) use the ramp in Kurfürstenstraße and be back on the surface at Scheidemannplatz. This square, actually re-converted from a pure traffic node to an urban square, was completed in summer 2005. Scheidemannplatz now has regained its function as a connecting link between the main station and the city centre. The reshape includes the closure of the pedestrian subway which had accompanied the former (car) traffic function, improving both the accessibility and the urban environment.

From there one RegioTram line will turn left towards „Lutherplatz“, „Am Stern“ and further to „Leipziger Platz“. Here it will use a new-built section of the tramway network in „Rudolf-Schwander-Straße“. This section was the most complex one



RegioTram routes in the city center

- RegioTram
- Tram
- Pedestrian area

within the urban network, mainly as it meant integration of a double track tramway alignment and a new stop in a city centre street with still quite some role for car traffic. This new link also replaces the former tramway route which connected the former main station underground tram stop northwards. Other lines turn right at Scheidemannplatz and enter the pedestrian zone in Königstraße at „Rathaus“ or go on via „Frankfurter Straße“ to „Auestadion“, the Kassel football ground.

Different Stages – Step by Step

The RegioTram scheme is expected to be completed in 2007 including the city centre link in Kassel and the established basic 30-minute frequency on all lines.

Some project parts are detailed below:

Actions	Completion/in service
Adjustment of platform heights at Kassel-Wilhelmshöhe station	2005
Lossetalbahn: Section Helsa – Hessisch Lichtenau	2006
Kassel main station: new Tram-Train stop and tunnel link towards the city centre	2007
Harleshäuser Kurve: three new stations Kassel-Kirchditmold, Kassel-Jungfernkopf and Vellmar-Osterberg	2007/2008
Modification of Obervellmar station and realization of the basic 30-minute frequency on the lines to Warburg and Wolfhagen	2008/2009
Optimization of the signalling system on the line to Melsungen and basic 30-minute frequency	2008/2009



The Partners in the RegioTram



Political level:

Federal Republic of Germany

State of Hesse

Kassel, Melsungen and Vellmar municipalities

Kassel, Werra-Meißner and Schwalm-Eder counties

Administration:

Nordhessischer VerkehrsVerbund (NVV)

Infrastructure owners:

Kasseler Verkehrs-Gesellschaft AG (KVG)

DB RegioNetz Infrastruktur GmbH (Kurahessenbahn)

DB Station & Service AG

DB Netz AG

DB Energie GmbH

Rolling stock owner:

Regionalbahn Kassel (RBK)

The Federal Government and the State of Hesse are significantly involved in the funding. The counties of Kassel, Werra-Meißner and Schwalm-Eder have also a say in this topic, as well as certainly the city of Kassel.

The NVV coordinates the complete planning and implementation process as kind of a service provider of the local authorities.

All infrastructure owners are involved because the RegioTram uses their tracks and stations.

Financial spread

A total of up to 180 Mio. € is being invested in the RegioTram scheme - a sum which is shared amongst different financing partners and parts of other projects. In general the funding of the infrastructure and rolling stock is handled as follows:

Up to 90 – 95 Mio. € are invested in the infrastructure, i.e. in the reshape, modernisation and new building of stations, signalling installations and route sections. The Federal Government and the State of Hesse take over a share of up to 90 % as a subsidy according to the German funding laws and regulations (Gemeinde-Verkehrs-Finanzierungsgesetz GVFG).

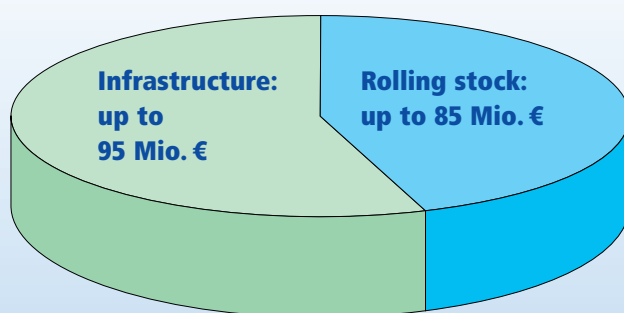
The remaining local contribution of 10 % is distributed between the local

authorities (cities, communities, counties) along the lines according to a defined and agreed formula, depending on whether the investments are necessary for the system or local benefits.

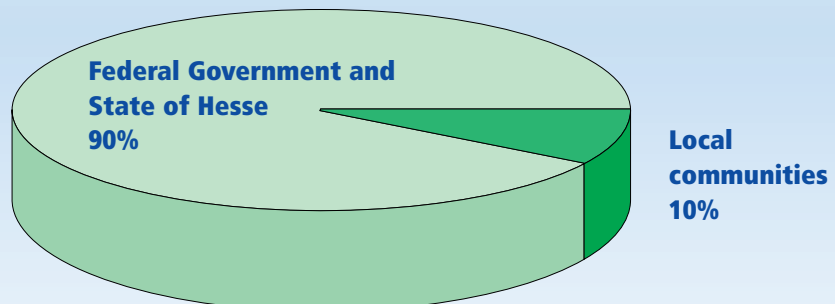
The cost sharing is different, if investments are made for the sole benefit of an individual community and its residents, as is the case e.g. for the new stop Melsungen-Bartenwetzbrücke. In this case the City of Melsungen pays the complete 10 % on its own. 90 % are again taken over by the Federal Government and the State of Hesse according to the GVFG.

The remaining other half of the investment is mainly covered by the 28 RegioTram vehicles.

Investment volume: up to 180 Mio. €, of which



Infrastructure funding according to the GVFG:



Real All-Rounders: Technology meets comfort, economy, silence and speed



An advanced rolling stock technology meeting the many specific requirements resulting from interfaces to infrastructure, power supply and safety is indispensable for the success of the RegioTram as well as for every other TramTrain-scheme.

The new RegioTram-vehicles fulfil the demanding heavy rail requirements according to the German Railway regulations (EBO) for operation in the region and the requirements according to German tramway and light rail regulations (BOStrab) for operation in the city.

For both systems the necessary rolling stock approval has now been achieved after more than a year of testing and formal procedures. With this approval for operation in Northern Hessen also a basic precondition for other project related operation in Europe is given. There is already considerable interest in trial operations in other cities and regions.

Technology

The vehicles must be able to run both on Kassel's tramway network with 600 V DC power supply and on DB infrastructure, the latter again showing different features – partly an electrified network with 15kV AC power supply, partly un-electrified infrastructure. Multi-functionality is a real requirement to allow dealing with such heterogeneous conditions.

AC/DC dual-mode technology is state of the art since the successful first application in Karlsruhe in 1991, but beyond this the RegioTram shows a new feature, or even an international innovation: the Dieseltram!

To allow incorporation of the Kassel-Wolfhagen line into the RegioTram network (see also: „Short service intervals by Dieseltram“) it was necessary to go for a Diesel-hybrid vehicle, an electrification of the un-electrified line being no option with regard to existing tunnels. These hybrids can produce electric energy for the traction motor on-board with their Diesel engines, thus allowing operation both on un-electrified rural routes and under tramway overhead wires.

Out of a total of 28 RegioTrams ordered for Regionalbahn Kassel (RBK), the local rolling stock owner, 10 are Diesel/DC hybrids and 18 AC/DC dual-mode vehicles.

The Dieseltram fulfils specific requirements with both low on-board and external noise emissions and very good acceleration parameters which

are very near to those of the electrical vehicles. To achieve short „tank stops“ the vehicles have received pressure tanking equipment.

The technical equipment is very demanding for both types:

Specific features in railway operation are wide ranging safety and signalling systems. In the tramway „world“ requirements regarding short breaking distances and full accessibility are in the foreground.

The mixed operation shows a specific challenge: a quick change from one style of operation to the other during a short stop at Kassel main station. The coupling of up to four single vehicles to a 150 m „train“ in daily operations, the system change from railway to tramway and vice-versa without any significance for the passengers and a reliable wheel/rail interface in both systems are just a few examples for the variety of demands.

Apart from the traction technology both new RegioTram types are optically identical and the passengers will not find major differences.

Comfort

Wide doors and level access to a fully low-floor vehicle is a first important comfort feature for the RegioTram users. Comfortable seats, lean-on stools for shorter trips and spacious areas for luggage, bicycles, wheel-chairs and prams as well as air-conditioning contribute further to a high level of passenger comfort. With regard to the distances served by the



Kassel, Friedrichsplatz, pedestrian area

RegioTram and average travel times involved, on-board toilets haven't been specified (similar to most sub-urban rail services) which has made additional space available.

Economy

The capacity of one vehicle is 250 passengers, of which 94 can be seated. Energy consumption is much lower in comparison to standard heavy rail rolling stock, due to light-weight construction and brake-energy recuperation.

Silence and speed

Owing acceleration and deceleration parameters of a tramway vehicle, the RegioTram allows serving more stops without increasing the travel time used by today's rail services operating on the same route. And noise emissions are considerably lower than those of heavy rail trains! Thus, all in all, both passengers on-board and the neighbours of the RegioTram routes should enjoy the new generation vehicles.



Spacious RegioTram interior



Comfortable seats in NVV livery

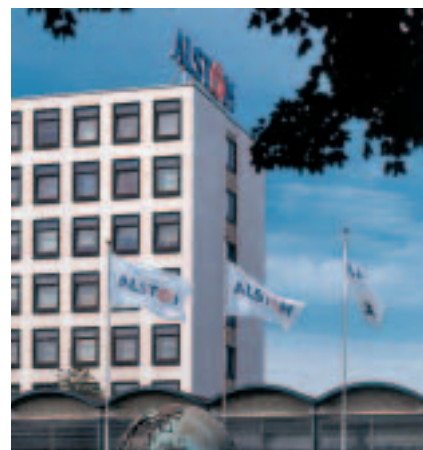
The rolling stock producer presents itself ...

Made by ALSTOM: the RegioTram for Kassel

ALSTOM is a world-leading supplier of rail products, services and systems, with 5.1 billion euros in annual sales and 28 000 employees world-wide. The 28 innovative TramTrain-vehicles for the Kassel RegioTram scheme are developed and produced in the ALSTOM site in Salzgitter, Germany.



The traditional ALSTOM site in Salzgitter



Administration building

Solutions out of one hand

ALSTOM in Salzgitter (Lower Saxony) is one of the largest and most traditional production sites for rail vehicle technology in Germany. It offers a complete range of products and services, from trams and tram trains, underground vehicles, double-deck trains to diesel and electrical multiple units, as well as tailor-made freight wagons. In the financial year 2004/2005, the company achieved a turnover of around 700 Mio. €. Key to success are the more than 2.000 highly qualified and motivated employees.

The company develops innovative and environmentally friendly solutions for passenger and freight transport on rail. ALSTOM's customers are railway authorities, municipal and private transport authorities in Germany, Europe and throughout the world from Stockholm to New Delhi.

Comfort by technology

Technical innovation is a tradition at ALSTOM. The RegioTrams are characterized by their almost continuous low-floor design. ALSTOM's engineers developed this unique technology by positioning the main traction equipment on the vehicle's roof instead of under the floor. This means higher riding comfort and no barriers for the passengers inside the vehicles.



A look into production: Here the new Regio CITADIS for Kassel is built

Quality on the whole line

Quality is a major priority for ALSTOM. State-of-the-art technologies are used in the production of rolling stock and high quality standards are achieved.

The RegioTrams are made of high-quality steel. Thanks to the lightweight steel construction developed and patented by ALSTOM, the carshells of the trains are particularly light, energy-saving and environmentally friendly. The steels are laser-cut and welded, which leads to the highest precision. All in all, around 250 employees of the design, production and testing departments have participated in developing and manufacturing the RegioTram project.

On the way with ALSTOM

ALSTOM has many years of experience in the development of vehicles for public passenger transport on rail. The tram-trains for Kassel belong to ALSTOM's product family Regio CITADIS.

The Regio CITADIS represents a derivate of the modular tram family CITADIS, total sales are currently more than 80 vehicles (including single-mode vehicles). The trade name CITADIS derives from the Greek and means „through the city“. ALSTOM has already sold 750 CITADIS vehicles worldwide. From Montpellier to Melbourne, about 400 CITADIS are in operational service and run in Barcelona, Rotterdam, Dublin, Paris, Lyon and Orléans, to mention a few examples.

www.transport.alstom.com



Steel carbody production



Interior assembly



Assembly of the roof equipment

The rolling stock owner presents itself ...

Regionalbahn Kassel (RBK): we keep the RegioTram running



Automatic vehicle cleaning



Bogie exchange



Coupling with electrically elevated nose sections

Reliability, availability and safety of the vehicles are ensured through optimised maintenance and repair procedures.

All maintenance and repair activities are performed in own local workshops with specific equipment, on very high quality level and respecting all regulations, the recommendations of the producer and operational experience.

Maintenance intervals are depending on vehicle kilometres performed according to this schedule:

Task	Interval
F0	once per week (at night)
F1	every 12.500 km (at night)
F1+	every 25.000 km (during day)
F2	every 50.000 km (during day)
F2+	every 100.000 km (during day)
F3	every 500.000 km or after 6 years (during day)

In addition wheel profile abrasion is checked regularly. Necessary re-profiling measures are dealt with a locally available under-floor wheel lathe.

To achieve economic maintenance and repair a principle of „exchange parts“ is favoured. The different vehicle components (bogies, doors, front parts etc...) are arranged to allow quick exchange against stored spare parts.

The different electrical parts are also modular and arranged in so-called „component containers“. Those can be removed and exchanged easily and fast with respective devices. This allows short workshop delays and a high availability of rolling stock in daily operation. The necessary repair of components can then be dealt with outside and independent of the vehicle as such. However, the storage of different spare parts and component groups is certainly a requirement.

The intensive data transfer from the vehicles to the depot and maintenance workshop and vice versa is based on wireless WLAN. Thus important maintenance information, counting-, accounting- or passenger information data is available quickly or can be changed very fast. Additional, more specific data can be taken via laptop from several component memories.

The maintenance and repair concept has been developed and agreed with the rolling stock producer ALSTOM and is part of a 12 year life-cycle cost agreement. High vehicle availability is the target. The experience so far is confirming the expectations.

Imprint

Editor:

Nordhessischer VerkehrsVerbund
Bahnhofplatz 1
34117 Kassel
Phone: + 49 561 70949-0
Fax: + 49 561 70949-40
Service number: +49 180-234-0180
E-Mail: info@nvv.de
www.nvv.de

Text: Petra Most, Kassel
Translation: ALSTOM LHB, Salzgitter
Corrections & amendments:
Robin P. Melhuish

External quality control:
Axel Kuehn, Karlsruhe

Editorial office:
Gabriele Schulzke, NVV
for the English version

Graphical conception and design:
Mietzner GrafikDesign, Kassel

Illustrations:

- Page 4 Mietzner GrafikDesign;
- Page 9 centre top and bottom right (2) PPB Projektsservice Planen + Bauen, Hannover;
Page 9 right, third from top (1) AKP, Kassel
- Page 11 right bottom (1) Büro CAO X, Kassel
- Page 12 (3) PPB Projektsservice Planen + Bauen;
- Page 13 (1) PPB Projektsservice Planen + Bauen;
- Page 14 right top (1) Mietzner GrafikDesign;
- Page 17 (1) Mietzner GrafikDesign

Photos:

- Title top (1) Alstom; title centre (5) Mietzner GrafikDesign;
- Page 2 left (1) Mietzner GrafikDesign;
- Page 2 right (1) Alstom;
- Page 3 (2) Mietzner GrafikDesign;
- Pages 6 – 7 (1) Alstom;
- Page 8 top left (1) Mario Zgoll;
left second, third and fourth (3) Dr. Heribert Menzel;
- Page 9 right (2) Mietzner Grafik-Design;
- Page 10 left top and bottom (2) Mario Zgoll;
Page 10 second from top (1) Alstom;
Page 10 third from top (1) Dr. Heribert Menzel;
Page 10 centre bottom (1) Mietzner GrafikDesign;
- Page 11 right (2) NVV;
Page 11 right, second from top (1) Mario Zgoll;
- Page 14 left top (1) Mietzner GrafikDesign;
Page 14 left centre and bottom (2) Dr. Heribert Menzel;
- Page 15 (3) Alstom;
- Page 18 (1) Dr. Heribert Menzel;
- Page 19 right top and centre (2) Mietzner GrafikDesign;
Page 19 bottom (1) Dr. Heribert Menzel;
- Page 20 (2) Alstom;
- Page 21 (4) Alstom;
- Page 22 left top and bottom (2) Dieter Rohrbach;
Page 22 left, center (1) RBK;
- Back (3) Mietzner GrafikDesign.

Printing:
Grafische Werkstatt
von 1980 GmbH, Kassel

Version: May 2006

RegioTram

