The Tram Rides a Wave of Popularity

Modern tramways offer local public transport in the best sense of the word: They make dense urban areas accessible; they are more efficient than buses and cheaper than underground and suburban railways; they are silent, convenient and eco-friendly. Up-to-date tram systems contribute towards good urban design and give fresh impetus to urban development. Last but not least, passengers perceive the tram as a pleasant means of transport - it is simply enjoyable to calmly glide along and watch the city life.

In view of the international boom in tram expansion, Dresden's decision to preserve and further develop its tram system has proven to be far-sighted indeed.

For the tram to make use of its economic and environmental advantages, it needs to operate on routes that offer speed advantages with comfortable vehicles and a high concentration of demand. To achieve this, transport providers need political support. Because infrastructure and fleet investments are capital-intensive and long-term in nature, they should not be at the mercy of economic cycles. Neither the mistakes made by West Germany, where entire networks were abandoned, nor the East German habit of running infrastructure into the ground, should be repeated. The potential of Dresden's tram should be recognised, and its preservation and extension needs continued support.

This brochure summarises the successes, goals, plans and visions of Dresden's tramway. A few examples of the global tram revival will serve to put this issue into context.

The Worldwide Boom of the Tram

Many New Tram Systems

Trams are making a great comeback at the moment. This mode of transport, which had been abandoned in many parts of the world, is once again playing an important role in many European and North American cities - for developmental, environmental, economic and aesthetic reasons. From only about 300 cities worldwide with trams in the year 1980, the number has increased to almost 400 today. Another 100 tram systems are under construction or in the planning stage. This revival has been most pronounced in France, Spain, Portugal and Britain, but has also been evident in North America and Australia, which have seen numerous new systems in the last 30 years.

Thanks to several newly opened routes, the number of passengers increased by 45 % to almost 4 million in Alicante (Spain) in 2008. Further new routes are under construction.

New tramcars in the Southern French seaport of Marseille - blue-tinted windows and wood evoke images of boats made of glass.

Paris: The Tram as a Symbol of the Future

After an absence of 70 years, the French capital Paris reintroduced trams in 2006, representing a change of direction in the traffic policy. Priority for public transport, bicycles and pedestrians is the new maxim. The new ring-shaped tram route on the southern periphery of the city is now about eight kilometres long and will be extended further. Trams leave every four minutes at peak times and about 100,000 passengers use the lines daily. Altogether, three new tram lines have now been built in the Paris region.

Reversal of Paris traffic policy - new trams replace the old Metró

Examples of New Tram Systems

City	Country	Tram since
Strasbourg	France	1994
Saarbrucken	Germany	1997
Montpellier	France	2000
Lyon	France	2000
Alicante	Spain	2003
Barcelona	Spain	2004
Nottingham	Britain	2004
Houston	USA	2004
Minneapolis	USA	2004
Nice	France	2007
Marseille	France	2007
Santa Cruz	Spain/ Tenerife	2007

Preserving the Tram

In Germany, Austria, Switzerland and parts of Eastern Europe, existing networks are being extended and modernised.

Munich: The “Trambahn” Is Growing in Popularity

The Munich tram network had already shrunk to 70 kilometres when the tide turned in 1991: Since then, the network of the Munich “Trambahn” has been greatly modernised and extended. New lines came into operation in 1996 and 1997. Another new three kilometre line was opened in autumn 2009, and there are firm plans for two expansion projects.

Toronto plans to extend its tram network by 120 kilometres.

Munich has been breathing new life into its “Trambahn” since 1991.

Further examples for the modernisation and extension of existing tram networks can be found in Prague (Czech Republic), Zurich (Switzerland), Innsbruck (Austria), Lisbon (Portugal), Melbourne and Adelaide (Australia).

The Boom Continues

Many new tram systems are under construction or at the planning stage, for example in Palermo and Florence (Italy), Toulon, Toulouse and Tours (France), Bergen (Norway), Palma de Mallorca (Spain), Edinburgh (Britain) and Toronto (Canada).

A perfect integration of city and tram - the modern tram in Brussels.

Modern trams are strong competitors in the Spanish city of Valencia.

What Makes a Modern Light Rail System?

- A traditional tram in mixed traffic is subject to the movement of other vehicles and uncontrollable delays.
- Modern light rail is fast, reliable, quiet and convenient. It travels mostly on exclusive lanes or rights-of-way - under ideal conditions, it only has to stop for passengers to get on and off and can move freely in between. That way, light rail can fully prove its strengths in terms of economic and environmental performance.

The Pilot Line 2

In 1994, a pilot project of Dresden's public transport provider DVB AG started to convert the line 2 between the districts of Prohlis and Gorbitz into modern light rail. This 17 kilometres long East-West connection was equipped with

- **reserved right-of-way,**
- **grass between the rails,**
- **fully accessible stops and dynamic passenger information** and
- **traffic signal priority.**

The conversion of the entire route is almost complete, except for a section on Pennricher St. in the district of Cotta. As a result, travel time was reduced by several minutes and service reliability markedly improved.

Public Transport as a Location Factor

Fakt

Unrivalled Performance

Many other German cities can only dream of such public transport service: Dresden's trams run

- **daily around the clock**
- **every 10 minutes Monday to Friday until 7 p.m.**
- **every 10 minutes on Saturdays until 7 p.m. on important lines**
- every 15 minutes on Sundays and public holidays between 10 a.m. and 11 p.m.
- every 15 minutes evenings until 11 p.m.
- every 30 minutes in night service until 2 a.m., after that every 70 minutes.

Shopping in Dresden's city centre - hard to imagine without the tram.

The central public transport interchange "Dresdner Postplatz"

Our service never stops. Daily. Around the clock.

Businesses Regard Public Transport as a Key Location Factor

All businesses attach great importance to an attractive public transport service. Above all, investors take this to include:

- **stops within easy reach,**
- **buses and trams on time** and
- **a simple connection to the main railway station,** which ensures access to long-distance trains.

In general, access to public transport as a location factor is considered more important than other criteria such as availability of parking or proximity to an airport or main station. Public transport is therefore a critically important element of any urban development policy.

"Job-Ticket" and Corporate Mobility Management

DVB AG is a dependable partner for ensuring corporate mobility management and is committed to the following options:

- **adjusting timetables to shift changes,**
- **placing stops in the vicinity of the workplace** and
- **offering travel advice to indiviual employees.**

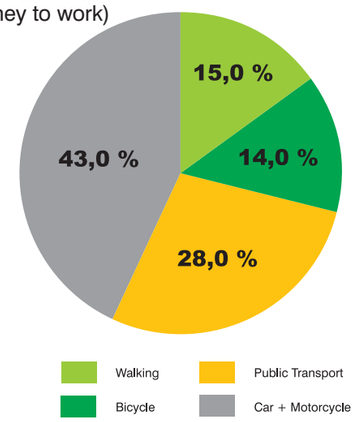
Since 2005, an inexpensive "job-ticket" has been available from DVB AG and its associated partners. More than 23 of Dresden's major employers have opted for the corporate ticket, including DREWAG (municipal works), WOBA (housing authority), GloFo (AMD), the university hospital and the municipal administration.

Many Dresdeners Use Public Transport to Go to Work

28 per cent of Dresdeners go to work by tram or bus.

- More than half of all employees of the city administration use public transport for their journey to work. Among those working in the town hall at Dr.-Kürz-Ring, the proportion is even higher, with two thirds prefering public transport due to the city location and the lack of parking spaces.
- 38 per cent of an estimated total of 3,850 employees at the university hospital in Johannstadt go to work by public transport. With two tram lines and two bus lines, the complex is ideally integrated into the transport system.

Modal split of transport in Dresden (journey to work)



Fast and Favourable

Dresden Needs Fast Public Transport

The faster trams and buses get through,

- the more attractive public transport becomes and the more customers will use it,
- the less dependent we are on cars, the more cost-effective public transport becomes.

The Tram Needs to Catch Up

- A tram in Dresden loses an average of 12 minutes per round trip due to delays at traffic lights, congestion or other obstacles. This **time loss results in additional operating expenses of 4.6 million Euros a year.**
- The **commercial speed of trams** has remained at **19 kilometres per hour** since 1995. In 2004 and 2005, the tram temporarily reached 20 kilometres per hour but could not maintain this level.
- Over the same period, the **average speed of cars** has increased to **27 kilometres per hour.**
- Saxony's capital Dresden **plans to increase tram speeds to 21.4 kilometres per hour.**

Controlling Traffic Lights Intelligently

Reliability of the transport services is just as important as speed. In this regard, there is still room for improvement.

- 98 per cent of all traffic lights are equipped with a traffic-actuated control.
- Yet, many signal programs do not manage the traffic in the best possible way. To get things rolling for everyone, specialists from the Dresden Technical University, the Road Construction and Civil Engineering Office, and DVB are working on integrating public transport and road traffic guidance systems, and improving traffic light controls.

Smart traffic light controls get things rolling for everyone.

Digital Radio, Wireless LAN and Electronic Timetable Displays

DVB AG plans to move its computer-aided control system (CAC) to the next level by the end of 2011. Over the same period, a link will be established to the future CAC of the regional transport network and to the control system of the railway service. Under the title "RBL Oberelbe", it will ensure inter-operator passenger information and seamless connections.

Main Goals of the DVB Project at a Glance:

- **Setting up the company's own digital trunking network** for full coverage of DVB AG's service area
- **New on-board computers for all vehicles,** with more information for the driver and integrated ticket machines in the on-board computers of buses
- **Extension of the control centre**
- **Data supply for vehicles via wireless LAN at the depots** will allow for daily update of passenger information and replacement of manual operations
- **Expansion of electronic passenger information at stops and in vehicles**
  Supplying stops with real-time data via digital radio, electronic timetable displays, and real-time information on connections via monitors in the vehicles

Updating DVB AG's CAC will cost more than ten million Euros; 75% of which is funded by the state of Saxony.

More information for the driver: On-board computers in the driver's cab of trams and busses are constantly updated.

Going by Tram is Climate Protection

Fakt

Environmental friendliness

Ecological

In terms of energy consumption and air emissions, trams are far superior to other modes of transport.

Clean

Trams do not emit pollutants. Emissions occur only during power generation.

Silent

The electric drives of trams are pleasantly quiet.

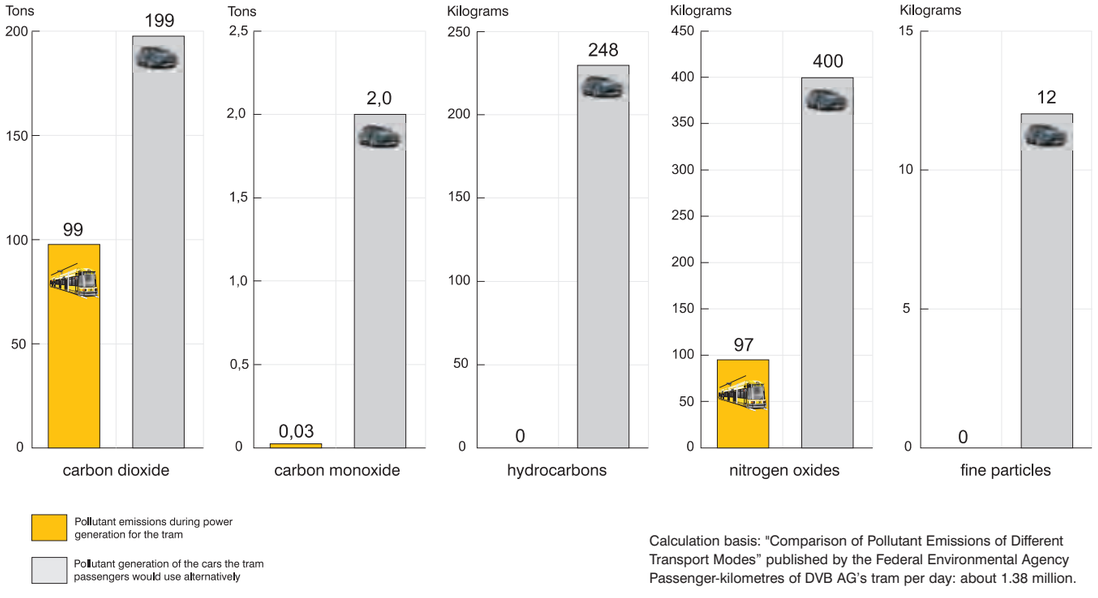
Going by Tram is Climate Protection

Trams Improve the City's Climate

- **A tram** can transport up to 260 people. This **equals approximately 200 cars.**
- Thanks to tram passengers, about **200,000 car trips can be avoided every day** in Dresden. Together with DVB AG's eco-friendly buses, the number rises to 300,000 car trips.
- On average, a tram passenger **produces 50 per cent less carbon dioxide than a car driver.** During rush hours it is up to 90 per cent.
- In total, DVB's passengers **reduce emissions by more than 140 tons a day.**
- **Grass-laid tracks** contribute to a better climate in the city by reducing dust and noise.

Dresden's trams run on electric energy provided by the DREWAG, 70% of which is produced by eco-friendly combined heat and power generation.

Daily Emissions of Trams Compared to Cars



Calculation basis: "Comparison of Pollutant Emissions of Different Transport Modes" published by the Federal Environmental Agency
Passenger-kilometres of DVB AG's tram per day: about 1.38 million.

Our Ecological Depot in Reick

Our depot in Reick is ecologically equipped and designed in a city-friendly manner:

- unheated storage building for trams, complete with green roof
- closed water circuit with treatment plant
- washing of trams with grey water (no usage of freshwater)
- rainwater seeps into blind drains
- plants and biotopes for a better microclimate

Urban Goods Movement on Rails

Every trip provided by DVB AG's freight trams relieves the inner city of three heavy trucks, as they use the existing rail network.

Trams Save Energy

- Modern trams **recover braking energy** and use it for acceleration and heating. They need **15 per cent less energy** than conventional models.
- In commuter traffic, a **public transport passenger's fuel consumption is as low as 0.5 litres per 100 kilometres**.

Modern Vehicles and Infrastructure

Convenient, Silent and Aesthetically Pleasing

Modern low-floor trams have been part of Dresden's cityscape for more than ten years; the old Tatra models have been almost completely replaced.

Green Alternative

Instead of concrete, asphalt or gravel, DVB prefers to place grass between the tracks. It looks good, reduces the noise from the trams and minimises dust and fine particles.

Comfort on Tracks

World Leadership Has a Long Tradition in Dresden

In the 1930s, Dresden's “Hechtwagen” introduced a new generation of trams. At the time they were considered to be the most modern vehicles of their type worldwide.

Since 1967, the Czechoslovak Tatra trams were tested in Dresden for use in all of East Germany. To this day, they characterise the street scene of many Eastern European cities. Dresden’s Tatra trams were modernised after 1991 and some of them are still in operation, but were phased out of scheduled service in 2010.

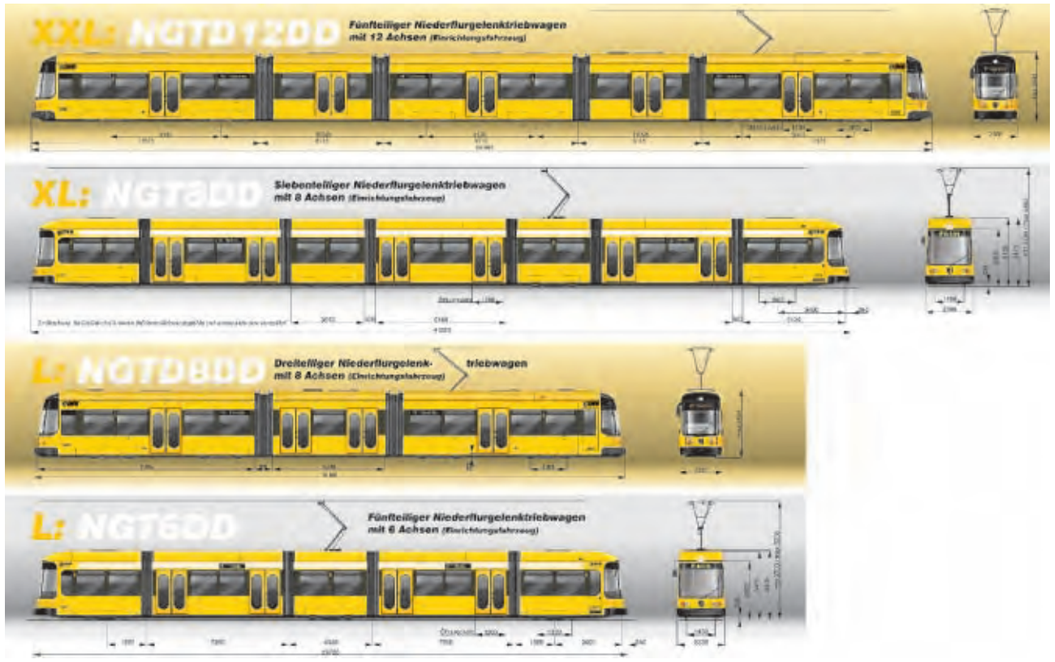
Modern Trams made in Bautzen

Since 1996, the modern low-floor trams manufactured by Bombardier Transportation in Bautzen have been setting world standards. They feature

- **step-free access,**
- **audible stop information,**
- **visual stop information,**
- **intercom system** for contacting the driver,
- **video surveillance** and
- **an award-winning design.**

With its impressive length of 45 metres, the NGT D12 DD model is one of the longest trams in the world.

By 2010, DVB AG - with financial support by the state of Saxony - has invested 370 million Euros in new vehicles.



	NGT6DD	NGT8DD	NGTD8DD	NGTD12DD
Vendor	Consortium SachsenTram: SIEMENS; Bombardier Transportation, Bautzen	Bombardier Transportation, Bautzen	Bombardier Transportation, Bautzen	Bombardier Transportation, Bautzen
DVB AG fleet	60	23	40	43
Year of delivery	1995 - 1998	2000 - 2002	2006 - 2009	2003 - 2010

Measuring for the Tram of the Future

Scientists at the Dresden Technical University, industrial partners and DVB AG jointly developed a measuring tram. The production vehicle by Bombardier Transportation in Bautzen is used for regular service. Over a period of five years, its measuring instruments deliver

- mechanical values for the development of more comfortable and quieter trams and
- electrical values for the development of more energy-efficient vehicles and driving practices.

In addition the measuring tram is used for training purposes.

Wider Vehicles for More Comfort

Wider vehicle bodies for a comfortable two-plus-two seating - the next generation of Dresden's vehicles will have more interior space. The required clearance of at least three metres is already accounted for in all extension and construction projects. Today more than 60 per cent of DVB routes meet this standard. The remaining 40 per cent consist of track sections that will have to be converted in the coming years.

Stops and More

Interchange Points for Tram & Bus

Zwinglistrasse, Pirnaischer Platz, Prager Strasse, Postplatz, Karl-Marx-Strasse, Gompitzer Höhe – since 1999, DVB AG has created combined stops for trams and buses. By now, there are 66 modern interchange points in Dresden.

Thanks to the patented Dresden Combibord, trams and buses can use the same platform.

- **making transfers easier,**
- **increasing safety** and
- **speeding up public transport.**

The central public transport interchange "Dresdner Postplatz"

Pirnaischer Platz is one of the major interchanges of Dresden's public transport network. About 44,000 passengers get on or off here on a typical week day.

Close to Customers: DVB Service Centres

DVB AG's modern service centres are located at the five most important interchanges in the innercentral city. In a pleasant atmosphere and with the help of the latest technology, our service staff sells tickets and gives customers advice on all issues concerning public transport in Dresden.

Friendly and competent: DVB AG's service staff

Close to Customers: DVB service centre at the "Prager Strasse" stop

Attractive Routes for the Tram

There are city-friendly alternatives to asphalt and gravel:

- **Grass tracks** look good, reduce the noise from the trams and bind fine particles. 24 kilometres of track have been planted with grass in Dresden, representing 18 per cent of the entire network.
- Tracks fitted with **high-quality natural stone paving** blend harmonically in the historical inner city.

Pleasantly green: Grass track in Zschertnitz

Blends harmonically into the historical inner city: Natural stone paving at Sophienstrasse

The Tram Network Keeps Growing

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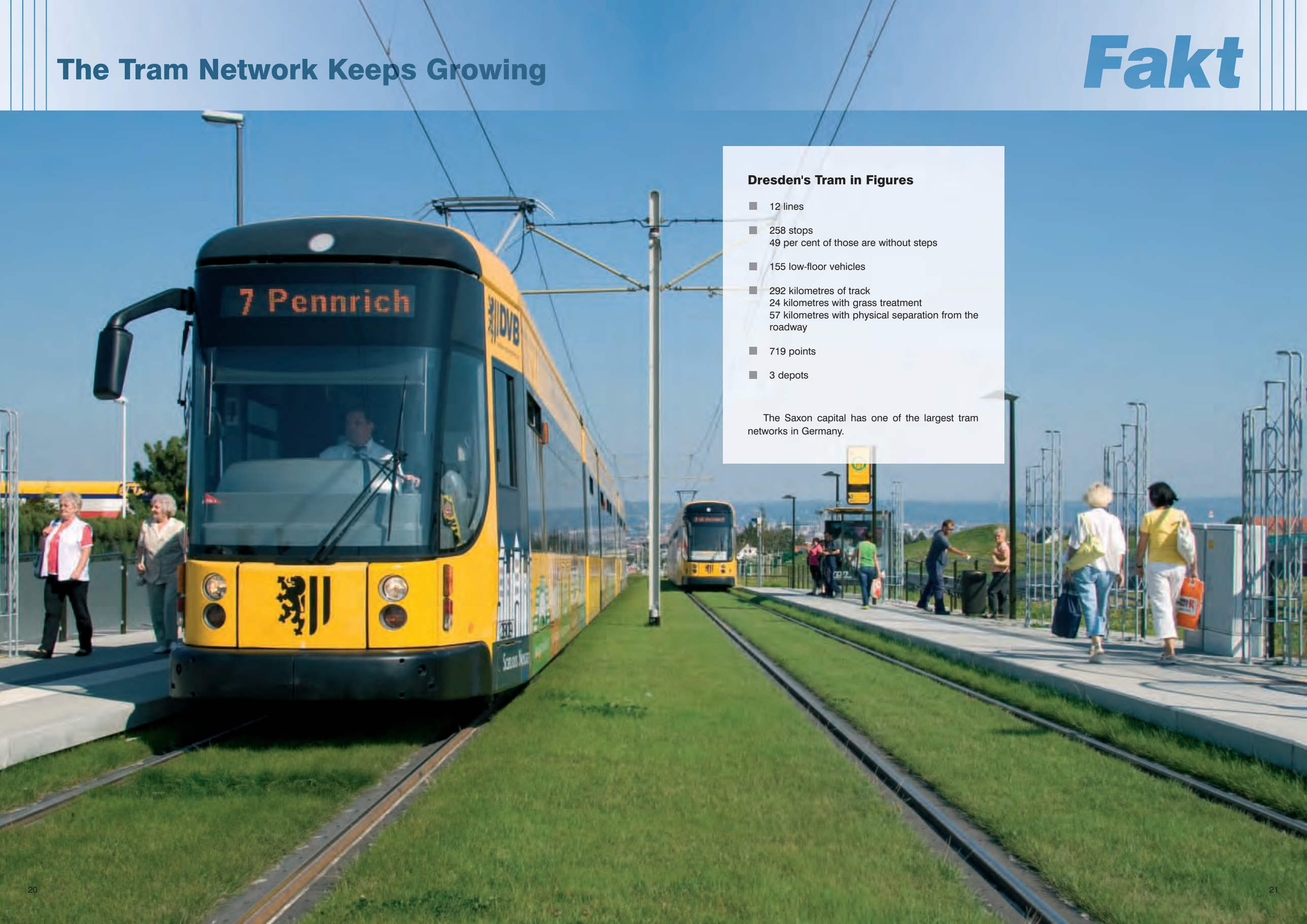


Dresden's Tram in Figures

- 12 lines
- 258 stops
  49 per cent of those are without steps
- 155 low-floor vehicles
- 292 kilometres of track
  24 kilometres with grass treatment
  57 kilometres with physical separation from the roadway
- 719 points
- 3 depots

The Saxon capital has one of the largest tram networks in Germany.

Dresden’s Public Transport Network

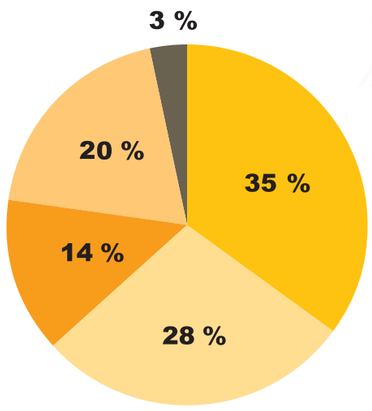
The Tram as the Public Transport Backbone

- Dresden’s **Trams** make the city accessible on a broad scale and create fast, efficient connections between the city districts and the city centre as well as between the individual sub-centres.
- **Bus lines** complement the tram network. They primarily connect peripheral regions and areas where the tram does not yet operate, often for topographical or structural reasons.
- The **suburban railway** functions mainly as a regional connection within the industrial area of the Dresden Elbe Valley stretching from Meissen to Pirna with a total population of about 650,000.

Close to Customers

The Saxon capital is quite easily accessible by public transport. 97 per cent of all Dresdeners can reach one of DVB AG’s tram or bus stops within 300 metres of their home. Almost two thirds live in a city district having a tram connection.

Percentage of Dresdeners with access to:



The tram as the main transport mode of Saxony’s capital Dresden.

Dresden’s Tram Network

Potential Development in Historic City Districts

Trams have their greatest potential in the historic city districts, some of them situated close to the inner city like Johannstadt-Nord, Western Südvorstadt/ Plauen, Löbtau-Süd, Leubnitz, but also parts of Striesen/ Blasewitz and Seidnitz/ Tolkewitz. After 1945, numerous tracks had to be abandoned because of extensive war damage.

Goals of the Tram

- Better access and interconnection of densely populated areas close to the inner city (e.g. Johannstadt)
- Access to large residential and business areas at the outskirts of the city (e.g. Weißig)
- Access to urban development areas (e.g. Ostragehege)
- Replacement of bus traffic on heavily frequented routes (e.g. Nürnberger Strasse) and in the city centre

In the long term, all buses in the city centre - such as here at Pirnaischer Platz - are to be replaced by more efficient and ecological trams.

The Tram Network Keeps Growing

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A Network Developed over Time

Since the opening of the first horse tramway in 1872, the Dresden's tram network has grown ever larger and more dense. It spreads widely and branches out into all parts of the city. Several lines converge on the most important trunk sections. This ensures high service frequency and many direct connections to the centre.

A number of lines had to be abandoned after the Second World War. The residential areas of Prohlis and Gorbitz, newly built in the 1970s and 1980s, were immediately connected to the tram network.

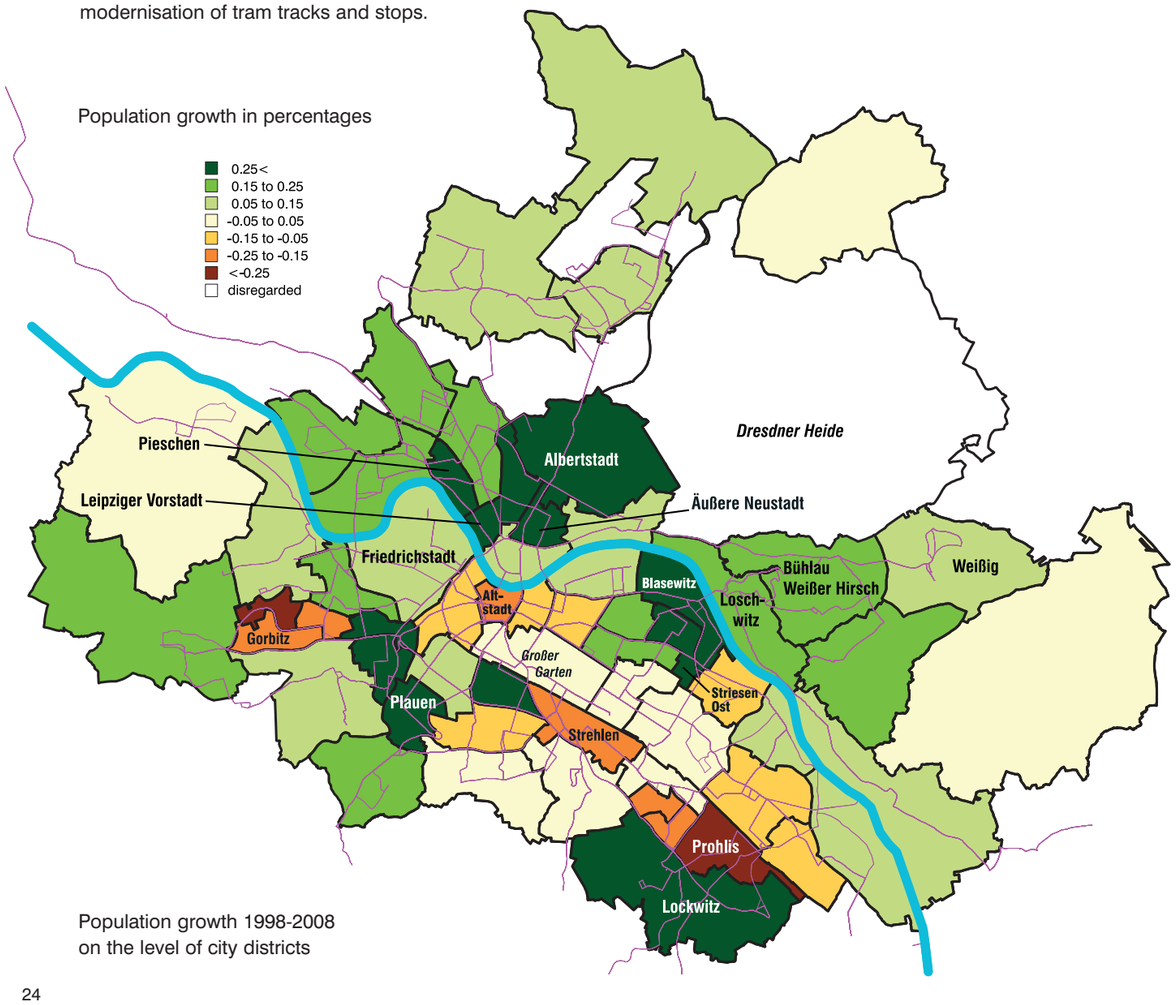
Compared to other towns in Eastern Germany, Dresden built relatively few new tracks in the last twenty years. Instead, it was a question of preserving and improving the existing network. Since 1990, DVB invested about 600 million Euros into the modernisation of tram tracks and stops.

With a track length of 130 kilometres, the tram network operated by DVB AG is one of the largest in Germany. 150 trams on 12 lines roll through Dresden every day.

Dresden's Growth Goes Against the Trend

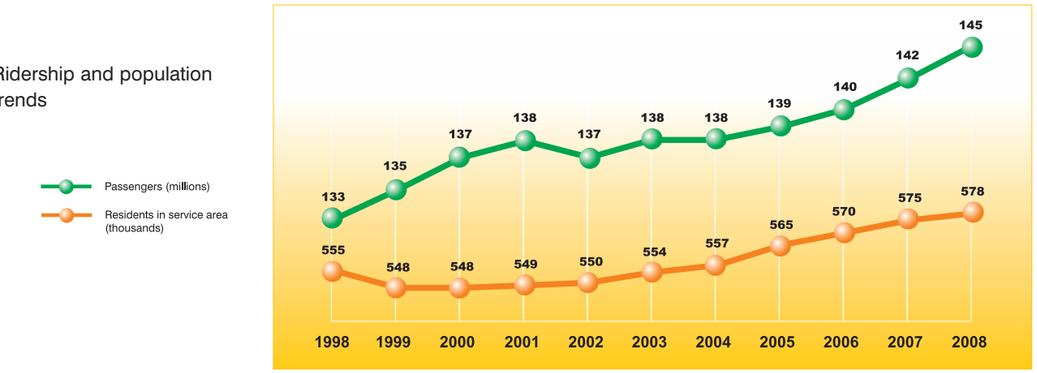
Dresden has developed magnificently in recent years. Between 2000 and 2008, the population has increased by 30,000 to a total of 507,000.

Some city districts registered a growth of up to 30%. Dresden's tram network has had to keep up with this development.



Population growth 1998-2008
on the level of city districts

Ridership and population trends



New Tracks for the Tram since 1990

Plauen-Coschütz

Opening:	1999
Track length:	1.2 kilometres
Investment:	3.9 million Euros
Result:	990,000 new passengers per year

Mickten-Kaditz

Opening:	2003/2004
Track length:	1.8 kilometres
Investment:	9.0 million Euros
Result:	980,000 new passengers per year

Gorbitz-Pennrich

Opening:	2008
Track length:	2.6 kilometres
Investment:	15.9 million Euros
Result:	710,000 new passengers per year (extrapolation)

The modernisation and extension of Dresden's tram network has only been possible throught generous financial support by the state of Saxony and the Federal Government. The average funding rate was 65 per cent of the capital costs.

Trends of City and Mobility Development until 2020

- **Further growth of the population** by 20,000 to a total of about 522,000
- **Re-urbanisation and city centre development**
- **A growing number of pupils**
  Because of numerous schools being closed down, children and young people have to travel longer and longer distances
- **A growing number of senior citizens**
  Older people have a growing need for mobility, are strongly oriented towards public transport, but an increasing number owns a car
- **Increasing leisure-related travel**
  for example the growing shopping tourism of people from the region

How the share of public transport in Dresden's transport market will develop depends very much on the quality of the supply. Thus, it is essential that the tram keeps up with the city's development and provides new impetus to it.

The Future of the Tram in Dresden

Fakt

From Friedrichtstadt to Ostragehege

Planned link:

- Inner city - Dresden Trade Fair

Planned new line:

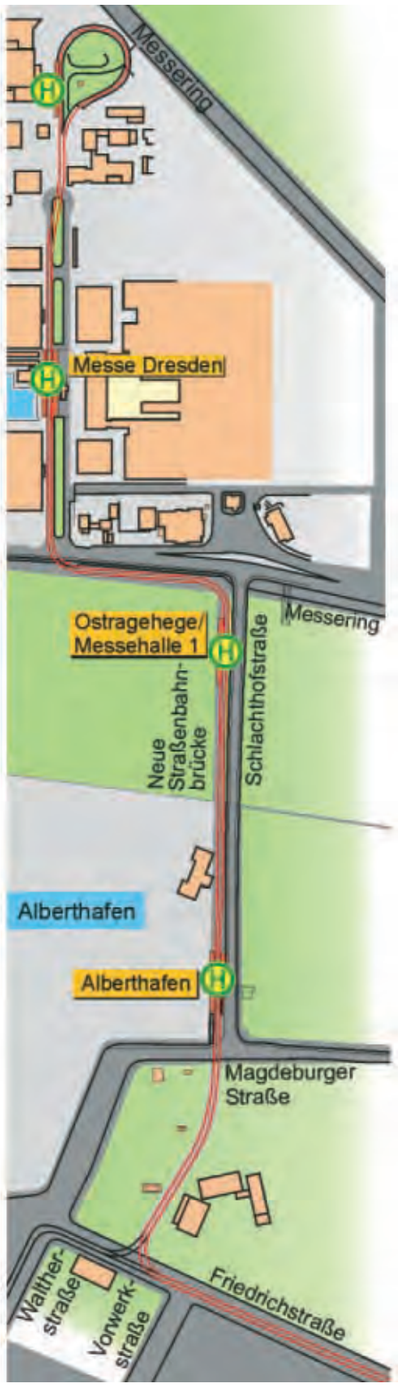
- Friedrichstadt - Dresden Trade Fair (1.3 km)

Ostragehege Needs a Tram Connection

Until now, the trade fair, sports facilities, sports secondary and high school, and Albert harbour in Ostragehege are accessible only by bus line 75, which has reached the limits of its capacity during major events. About 500,000 visitors come to the trade fair and other events every year. If Ostragehege improves its profile as a venue, major events and concerts will attract even more visitors. There are also plans to bring businesses to the area in the longer term.

The Continually Developing Ostragehege Needs an Efficient Tram Link.

Today one bus line runs to Dresden Trade Fair.
Tomorrow the tram?



To Plauen and Johannstadt

Planned link:

- Johannstadt - Inner city - Town hall Plauen

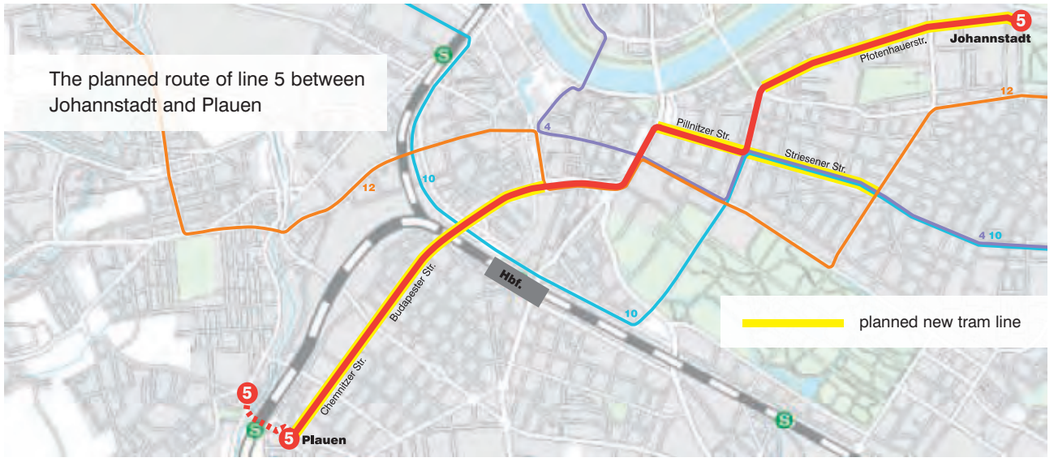
Planned new line:

- in Johannstadt: Pfotenhauerstrasse - Pillnitzer Strasse (2.7 km) and Striesener Strasse (1.0 km)
- in the Western Südvorstadt: Budapester/ Chemnitzer Strasse (3.2 km)

Investment:

- 85 million Euros

Today one bus line runs on Pfotenhauerstrasse.
Tomorrow the tram? (Photomontage)



Popular Districts with a Historical Tram Connection

Johannstadt North and the Western Südvorstadt are among those areas with a comparatively high population density. Both were previously connected to Dresden's tram network. After the bombs in 1945, life was extinguished in Johannstadt and the Western Südvorstadt. Due to lack of demand and material, the tracks were not rebuilt.

Thanks to its special location on the Elbe river and its proximity to the city centre, Johannstadt has regained great popularity. The same applies to the Western Südvorstadt. In addition to the students who appreciate the proximity to the inner city and to the campuses of the Technical University and the University of Economics and Technology, quite a number of jobs and training positions have made this one of Dresden's growth centres.

Structural Data for the Area Served by the Planned Tram Line (as of 2006):

	Johannstadt	Südvorstadt/Plauen
Residents	20,000	12,000
Jobs	13,000	11,000
Training positions	8,000	3,000
Retail area in m²	9,000	13,000

The Future of the Tram in Dresden

Fakt

From Bühlau to Weißig

Planned link:

- Inner city - Weißig

Planned new line:

- Bühlau - Weißig (3.5 km)

Investment:

- 28.6 million Euros

To Weißig for Living, Shopping and Working

Weißig, which was incorporated into the Saxon capital Dresden in 1999, is to be reconnected to Dresden's tram network. Many new residential areas have been built here since 1990. Large retail businesses and some small and medium-sized factories have settled in the industrial park.

Dresden's tram is to provide access to the incorporated area of Weissig on the federal highway B6.

A View beyond the City Boundary

Planned link:

- Inner city - Ottendorf - Okrilla / Königsbrück

Planned new line:

- Weixdorf - Ottendorf - Okrilla (5.0 km) / Königsbrück (15.0 km)

Improved Access and Direct Connection to the City

Commuter traffic between the city and the surrounding regions is constantly increasing. For this reason, DVB AG undertook a study, demonstrating to the transport provider Verkehrsverbund Oberelbe (VVO) that it makes sense to extend the tram from Weixdorf to Ottendorf-Okrilla / Königsbrück.

Currently there is duplication between the tram and local railway, who run parallel between Dresden and Weixdorf. Passengers from Ottendorf-Okrilla / Königsbrück have to change from the railway to the tram on their way to Dresden's city centre. The new tram connection would replace the local railway, which offers many advantages:

- **more stops** and therefore broader access in the area of Ottendorf-Okrilla / Königsbrück
- **shorter intervals**
- **a direct connection to Dresden's city centre**

More detailed studies will be undertaken to determine whether to run the tramway only as far as Ottendorf-Okrilla, or all the way to Königsbrück.

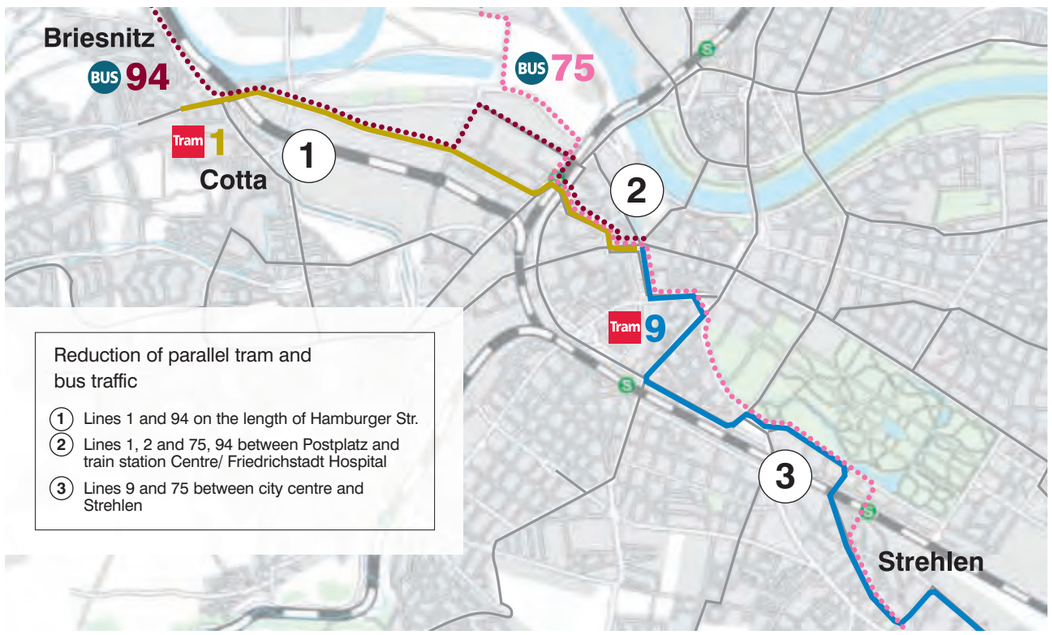
Königsbrück

Tram extension to Ottendorf-Okrilla / Königsbrück: Starting in Weixdorf, the tram is to run on the route of the railway.

An Efficient Public Transport System

Further studies are required in those areas where trams and buses run in parallel over long distances, for example in the Strehlen/ Leubnitz and Cotta/ Briesnitz corridors. Such duplication of transport services are to be addressed in the public transport plan. DVB AG wants to provide better access to these areas and attract new passengers by expanding its tram services. Specific studies have already been scheduled.

Two tram lines and one bus route run parallel on Tiergartenstrasse. More efficient transport solutions will have to be examined in the near future.



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