

# Delivering a 'no-frills' tram

**BUDGET** Besançon is the latest French city to embrace light rail, with construction of a 14.5 km tram line set to begin in the summer. However, the local authority has broken with convention by stipulating a low-cost design that could reduce the construction outlay by up to a third.

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The regional capital of Franche-Comté, Besançon also sees itself as 'the green capital of France'. The *communauté urbaine* is home to 180 000 inhabitants across 59 *communes*, and Besançon itself has a population of around 120 000.

The city has a long heritage of embracing progress in the transport and environmental fields, having become the first French city to introduce a pedestrian-only zone in 1973. This was followed by the creation of the high-frequency 'Ginko' bus network, which has given Besançon one of the highest per capita levels of public transport use of any city in the country at 140 trips per year — two to three times higher than the national average.

For many years, the local authorities have been keen to ensure that its transport network makes use of the latest energy-efficient technologies to help minimise our carbon footprint. This led to development of park & ride services, and the use of natural gas and low-emission diesel engines with particulate filters on our buses.

Nevertheless, although the Ginko network is carrying around 90 000 passengers/day, road traffic continues to grow, and the resulting congestion has compromised the effectiveness of buses. Under the auspices of President Jean-Louis Fousseret, the Grand Besançon authority agreed that other modes of public transport would be required.

## Enter the tram

Following the example set by several other French cities, we chose a modern tram network as the best answer to our long-term urban transport needs. It would complement the existing bus and park & ride services, transporting a larger number of passengers quickly, comfortably and



An impression of the planned stop at Orchamps; note the relative sobriety of the landscaping and architecture.

with minimal environmental impact. The tram is intended to become the spine of our transport network, acting as a catalyst to ensure continuing ridership growth.

Initial studies for a single line began in 2004, leading eventually to consultation on a Y-shaped 14.5 km east-west route. Completion of the public enquiry process is expected in July when a *Déclaration d'Utilité Publique* is expected to be issued, allowing civil works to start over the summer. The line is scheduled to open in 2015.

Connecting Hauts-du-Chazal, a residential and industrial suburb where the city's main hospital is located, with the business hub of Marnières via the city centre, the alignment also includes a short branch serving the main line station at Besançon-Viotte. From December, SNCF shuttle trains on a renovated branch line will link Viotte to Besançon Franche-Comté TGV, providing connections with high speed services on LGV Rhin-Rhône.

Along the tram route, 30 stops will serve the principal traffic sources. The urban and regional bus networks will be adapted to feed passengers

onto the tram, and we envisage a major expansion of park & ride facilities to accelerate modal shift.

Trams would operate between 05.00 and 01.00 daily with 5 min headways at peak times. We anticipate an initial daily ridership of around 43 000, rising to 55 000 in the medium term.

## Budget constraint

Besançon's tramway differs from the example set by other French cities primarily because of its budget framework. The *communauté* decided at the outset that its tram project would be delivered at a cost substantially lower than its contemporaries. A capital cost of €228m at 2008 prices was agreed, with a 5% margin of error. This gives a cost per kilometre of approximately €16m; recent tram projects in France have incurred capital costs in the region of €290m to €400m (Table I).

The desire for rigorous cost control reflects the conviction of the President and elected officials that the tram must not abstract funds from other public services. Whilst we are determined that our tram should be

comparable in terms of quality with other modern light rail networks, its innovation will stem from its economy rather than its technology. We have assessed each major source of spending and tried to take the most rational and cost-effective option without compromising on quality, comfort or equipment life.

One major economy we sought was in provision of rolling stock. Having looked at the alignment and planned frequency, we decided that a 30 m long LRV would be bigger than we needed. So the tender specified a length of around 24 m with an option to lengthen the cars in the longer term. We hoped the procurement process would elicit responses from a range of manufacturers across Europe.

A call for tenders was issued on April 17 2009 covering design and manufacture of the fleet plus a 15-year maintenance agreement. Following two rounds of negotiations, we were left with a shortlist of five manufacturers: Alstom Transport, Stadler, Lohr Industrie, AnsaldoBreda and CAF.

The Procurement Committee recommended the Spanish supplier, and an order for 19 CAF low-floor cars was duly ratified on June 30 last year. The contract value is €34.4m, giving a saving per vehicle of €300 000. The three-module articulated low-floor cars will be 23 m long and 2 400 mm wide, with four asynchronous motors powering all three bogies to give a maximum speed of 70 km/h. Each car will carry up to 132 passengers; forced ventilation will be used with coated glass to reduce the risk of overheating in summer. The vehicles are expected to be assembled at CAF's French plant at Bagnères-de-Bigorre.

## Turf accounting

Landscaping and urban design is another area where we are determined to pare back the outlay. For this reason, there will be no wide-spread use of grass tracks as this is difficult to install and maintain, partly because of the need for frequent watering. Instead we will be creating less resource-intensive 'rustic spaces' on and around the tracks; we expect these measures to save around €5m.

The alignment has been carefully chosen to avoid major reconstruction of the city's existing urban spaces.



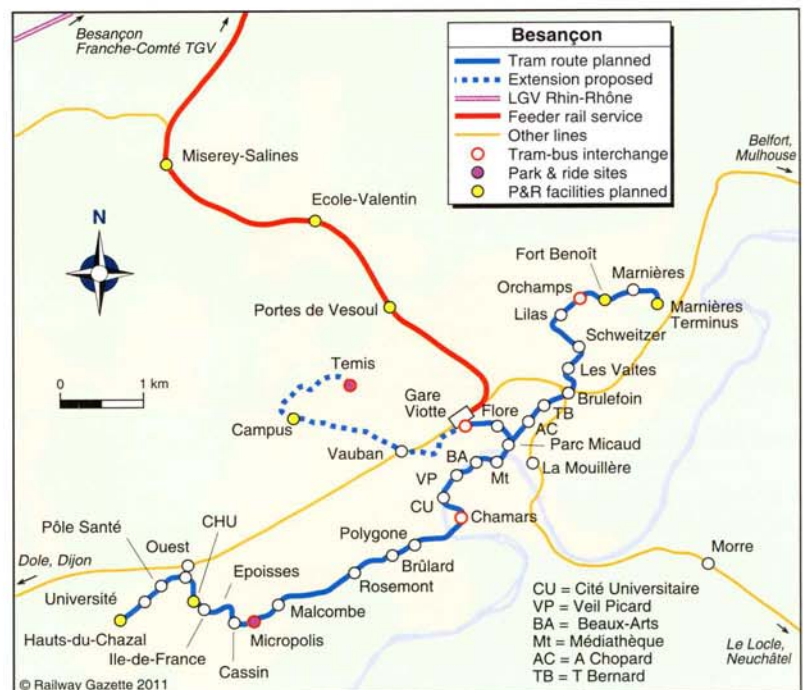
Perhaps the greatest savings will be made during the land acquisition process. We have chosen the route carefully to keep any compulsory

purchases to an absolute minimum, whilst many of the public spaces through which the tramway passes have already been renovated with the tram project in mind. We expect this to generate savings of up to 30%, and together we hope these two measures will remove up to €20m in capital costs.

We also believe that a further €5m could be saved by adopting a simplified project management structure,

where a single supervisory team oversees contractors directly. This avoids the complex layers of management which are typical of many major infrastructure schemes.

Other equipment has also been restricted to a minimum required to meet the quality and reliability standards we have agreed. Following a technical assessment, it was decided that a reduction in the number of substations from 12 to seven would be viable given the planned service pattern. Similarly, with the exception of ticket retailing, many of the existing low-power systems such as passenger information can be shared with the bus network. These measures should result in a net gain of around €8.5m.



The tramway project envisages several additional park & ride facilities as well as interchanges with local rail and bus services.

A compact and functional maintenance depot is another prerequisite. We plan to build a single building of no more than 5 000 m<sup>2</sup> to limit land take, and stabling of trams would be entirely outdoors — here we are targeting a saving of between €3m and €4m.

Finally, we are consciously restricting ourselves to a modest design vision with functionality rather than aesthetic value at its core. For example, we hope to shave a further €2m by reusing our existing bus shelter design at each stop.

**A €50m target**

By relentlessly examining the cost implications of each of the major investment decisions at the outset, Grand Besançon intends to reach its target of reducing the capital cost of the tram network by at least €50m.

That would reduce the per-km outlay considerably to ensure we remain within our financial means, whilst delivering an investment in comfortable, modern, reliable urban transport that aids the social and economic development of the entire urban region. ↩



Image: Atelier Villies et Paysages

Impression of the southeastern terminus at Hauts-du-Chazal, which will serve medical and educational campuses.

Table 1. Comparative costs of selected current and forthcoming French light rail projects					
	Besançon	Dijon	Le Mans	Tours	Brest
Project cost €m	228	399	302	369	383
Length km	14.5	20	15	15	14.3
Cost €/km	15.7	19.95	20.1	24.6	26.8