

## FRANCE High Speed

## Faster to the west



Three sections of *Ligne à Grande Vitesse* are opening in France this year. Two will carry conventional traffic as well as TGVs, while all three have been built under public-private partnership deals worth a total of €13.6bn, reports **Murray Hughes**.

This year will see the addition of more than 700 route-km to France's national high speed network, with the opening of three new lines. Destinations along France's Atlantic coast will be easier to reach from July when both LGV Sud Europe Atlantique — now being marketed as *TGV L'Océane* — and LGV Bretagne – Pays de la Loire open for business. They will be followed at the end of the year by the Nîmes – Montpellier bypass, destined to alter travel patterns along the western part of France's Mediterranean coast.

Opening on July 2, the 302 km LGV SEA (RG 3.15 p38) between Tours and Bordeaux is an extension of the southern arm of LGV Atlantique. It will put the wine capital just over 2 h away from Paris compared with the present best timing of 3 h 14 min, giving rail a clear edge over air on this important route.

A trip from Paris to the Spanish border at Hendaye will be cut to 4 h 30 min compared with 5 h 42 min at the moment, while many other towns and cities along the Atlantic seaboard will gain more and faster services. Additional trains tailored to holiday traffic will run

A test train streaks across the Sarthe viaduct north of Le Mans on LGV Bretagne Pays de la Loire.

during the summer. Arcachon, for example, will have a daily through train to and from Paris, but this will only run at weekends in the autumn.

The time gain to and from La Rochelle is less impressive as the new infrastructure is used for only 85 km between the connection with LGV Atlantique south of Tours and a junction at Poitiers. The fastest of up to eight return workings a day will be a Mondays to Thursdays departure from Paris at 17.27. This reaches the coast in less than 2½ h as it will omit a call at Poitiers,

leaving the high speed line at Fontaine-le-Compte. Further acceleration of La Rochelle services is expected after the completion of upgrading work on the conventional line from Poitiers towards the end of the year.

#### Service level disputed

During 2015 the level of service proposed over LGV SEA was the subject of a spat between SNCF and the private-sector concessionaire, LISEA (p41). Having won the PPP contract to build, operate and maintain the line in 2011,

The station at Bordeaux Saint-Jean has been rebuilt to accommodate TGV L'Océane services. In the background is the four-track viaduct over the River Garonne.





Photo: Gaël Arnaud / Eiffage

six a day each way will continue to and from Toulouse, with extra services at weekends. Toulouse will be reached in 4 h 9 min instead of 5 h 25 min. This may not be truly competitive with air, but it is significantly faster than the direct route via Vierzon and Limoges.

A further cut in timings to Toulouse to 3 h 10 min must await completion of the planned Bordeaux – Toulouse LGV, as part of the *Grand Projet Ferroviaire du Sud-Ouest*, although this is not envisaged until 2024 at the earliest. The package also includes extension of LGV SEA from Bordeaux to Dax by 2027.

The anticipated construction of the Bordeaux – Toulouse line was cited by the government last October to justify a proposed build of 15 more Euroduplex TGVs as part of a package to support train production at Alstom's Belfort factory. However, when the order was placed by SNCF on February 16, the operator said they would be used on LGV SEA services, avoiding the need for a planned €150m refurbishment of 24 older TGV Duplex trainsets to the same standard and simplifying the fleet.

The TGV Atlantique trains are more than 25 years old, and passengers will doubtless appreciate the introduction of the double-deck *TGV L'Océane* trainsets with reversible seats in first class. With 556 seats, each set has two first class cars and one with first upstairs and second below. Alstom has so far delivered eight of the initial 40 sets, and 17 should be available in time for the launch, with the extra 15 being delivered from 2019.

SNCF is pitching particularly for business travellers, offering special packages and 'dedicated business services throughout their journey', including revamped lounges at the principal stations. Connectivity will improve with free wi-fi available thanks to an onboard optic fibre backbone and lineside 4G coverage provided by Orange.

Overall, SNCF anticipates that the line will generate 2.4 million additional passengers a year from 2019. There will be more than 35 000 seats a day on offer between the Paris region and Bordeaux, compared with around 7 000 on flights over the same route. Its market surveys of Bordeaux residents suggest that 55% of those who preferred to drive and 66% of those who chose air would in future expect to use TGV services more often.

### Commissioning underway

Commissioning of the line is well underway following the progressive energisation of the 25 kV 50 Hz catenary from June 2016. First section to go live was the 120 km between Mondion and Lux, which had been chosen for the initial phase of test running.

The Tours bypass section of LGV

LISEA was naturally keen to earn a high return on its investment. SNCF, on the other hand, was anxious to keep costs low. Its proposals for the level of service to Bordeaux and intermediate stations fell short of expectations, and local authorities that had contributed funding weighed in, threatening to demand their money back (RG 9.15 p29).

SNCF finally agreed in April last year that it would operate no less than 33 trains each way a day between Bordeaux and the Ile-de-France region. This includes four per day serving Marne-la-Vallée and Roissy-Charles de Gaulle airport, en route to and from Lille or Strasbourg; two of these are to be low-cost Ouigo services. The *TGV L'Océane* timetable is based on an hourly Paris Montparnasse – Bordeaux service that increases to half-hourly during peak periods in the direction of the busiest flow. More than half the trains will run non-stop, with others calling at St-Pierre-des-Corps (for Tours), Poitiers, Angoulême or Libourne. A St Pierre-des-Corps – Bordeaux journey will be 50 min faster than at present.

Some trains will run beyond Bordeaux to Tarbes or Hendaye. A further

## 33 trains

A DAY WILL OPERATE EACH WAY OVER LGV SEA BETWEEN BORDEAUX AND THE ILE-DE-FRANCE REGION

Atlantique which opened in 1990 was electrified at 1.5 kV DC, as it was designed for use by locomotive hauled passenger and freight trains. As part of the LGV SEA project, this DC section has been converted to 25 kV 50 Hz; the equipment had been designed from the outset with conversion in mind.

While LGV SEA traverses relatively easy terrain, there are several noteworthy structures. These include twin viaducts at Migné-Auxances just north of Poitiers and the viaduct over the Dordogne to the north of Bordeaux, which is 1319 m long. There are more than 500 structures of various types, 50 of which are described by LISEA as 'non-standard'.

Additional works being carried out by SNCF include reconstruction of the station at Bordeaux Saint-Jean; the rebuilt concourse was opened on January 23 by Mayor of Bordeaux Alain Juppé and the Chief Executive of SNCF Gares & Connexions Patrick Ropert (p33).

Train control on LGV SEA consists of a digital version of TVM300 derived from TVM430, overlaid with ETCS Level 2. TVM300 was selected to ensure that the existing TGV Atlantique trainsets could use the line. Trains operating with TVM300 will be limited to 300 km/h, whereas those fitted with

Table I. French high speed lines opening in 2017

LGV Sud Europe Atlantique	
Declaration of Public Utility	July 2006; June 2009
Concession	2011-61
Construction start	2012
Opening date	July 2 2017
Length km	302
Connections	9 (38 km)
Maximum speed km/h	320
Viaducts	19
Tunnels/covered trenches	7
Substations	5
Cost €bn	7-8
PPP partner	LISEA
LGV Bretagne – Pays de la Loire	
Declaration of Public Utility	October 2007
Concession	July 2011-36
Construction start	2012
Opening date	July 2 2017
Length km	182
Connections	8 (32 km)
Maximum speed km/h	320
on Sablé-sur-Sarthe chord km/h	200
Viaducts	11
Covered trenches	7
Substations	2
Cost €bn	3-5
PPP partner	Eiffage Rail Express
Nîmes – Montpellier bypass	
Declaration of Public Utility	May 2005
Concession	2012-37
Construction start	2013
Opening date	December 2017
Length km	60
Connections	5 (20 km)
Maximum speed km/h	200, later 300
for freight trains km/h	120
Viaducts	11
Tunnels	1
Substations	1
Cost €bn	2-28
PPP partner	Oc'Via
New stations	Nîmes-Manduel Montpellier-Sud de France

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Photo: Christophe Masse

ETCS Level 2 will run at 320 km/h. The line's design speed is 350 km/h, but SNCF says its customers would not wish to travel at the higher speed because 'it would raise fares sharply for a marginal gain in time; everything from maintenance to energy costs would have risen exponentially, which simply wasn't worth it.'

## Bretons gain faster services

July 2 is also the date set for the opening of LGV BPL, which forms an extension of the northern arm of LGV Atlantique from Connerré near Le Mans to Rennes. A spur midway between Le Mans and Laval feeds into the existing line to Angers and Nantes, shortening journey times to those cities.

Being financed, built and maintained by Eiffage Rail Express under a 25-year PPP concession signed in July 2011, the project required the construction of 182 route-km of double track plus 32 km of connections. There are eight junctions with the conventional

**Eight out of 40 TGV l'Océane trainsets had been delivered to SNCF by the start of the winter timetable in December. Set 856 pauses between tests at Paris Gare de l'Est.**

network, at Connerré, La Milesse, Sablé-sur-Sarthe, Laval and Rennes. The Connerré junction with LGV Atlantique was the last to be completed, over the weekend of October 15-16.

There are seven 'covered trenches' totalling 827 m and 11 viaducts plus four other major bridges; at 433 m, the Sarthe is the longest viaduct. The eastern section of the line includes 105 km where the track structure incorporates a bitumen base below the ballast.

The 25 kV 50 Hz catenary on LGV BPL was energised at the end of last year, when the train control equipment was also commissioned. As with LGV SEA, the signalling consists of TVM 300 overlaid with ETCS Level 2, supplied and installed by Ansaldo STS. ETCS Level 1 is also provided over the 25 km section round Le Mans, where freight trains will share the tracks between the junction with the conventional line from Chartres to the east of Connerré and a junction at La Milesse to the north of Le Mans.

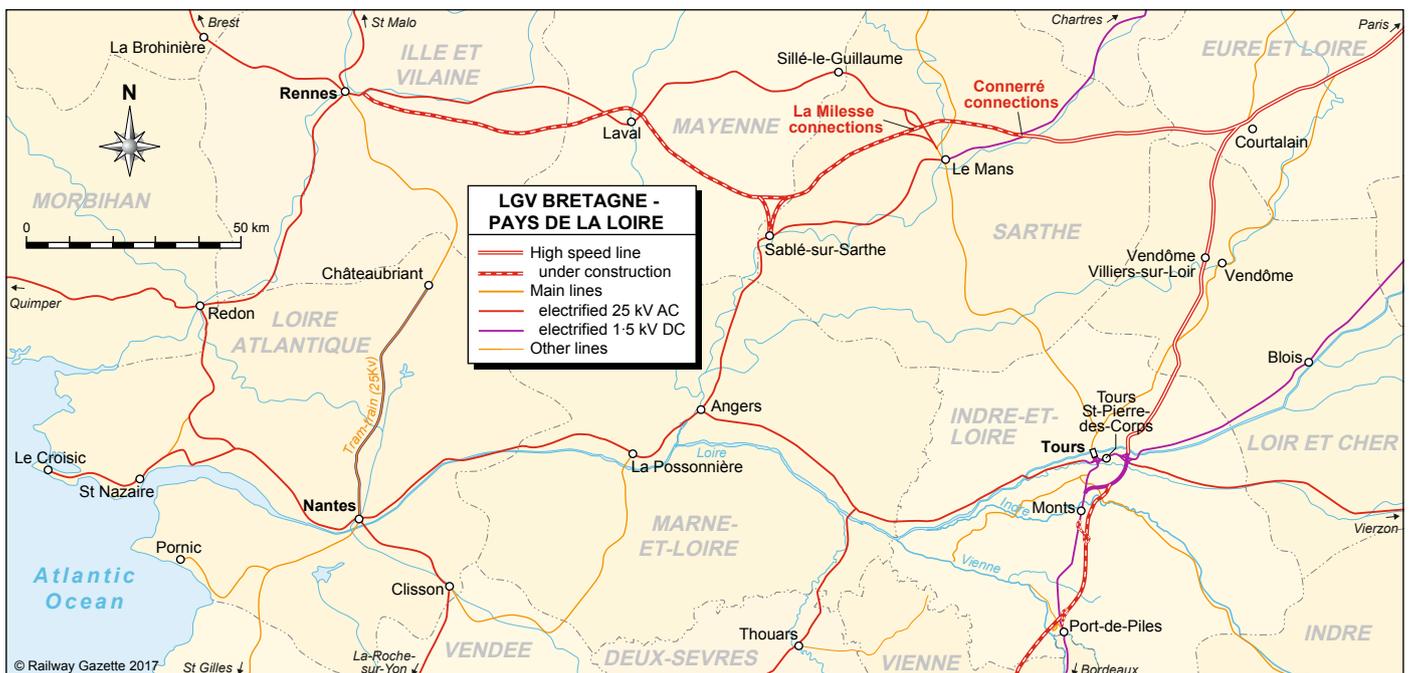
Dynamic testing has been in progress since November and is due to be completed this month. During the last week of January test trains ran over the whole line at up to 352 km/h, this being 10% above the maximum speed in commercial service.

From April, SNCF will commence training around 500 drivers on the new route. At the same time the safety case for the new line will be prepared for the safety regulator Etablissement Public indépendant de Sécurité Ferroviaire, which must issue the authority for commercial operations to the concessionaire.

SNCF says that it expects services over LGV BPL to generate 1.5 additional journeys a year from 2019. The summer timetable will bring faster journeys to and from most rail-served towns in Bretagne, with several destinations getting additional trains. A journey from Paris to Rennes will take 1 h 26 min compared with 2 h 4 min previously. Both Quimper and the naval port of Brest will have two additional return services a day from Paris, with Brest being reached in 3 h 25 min compared with 4 h 11 min last year and Quimper 3 h 31 min against 4 h 16 min.

A single Paris - Saint Malo TGV will be timed at just 2 h 14 min on Mondays to Thursdays; most trips will require a change to and from TER services at Rennes, with the average journey time nevertheless being a respectable 2 h 35 min.

In another innovation for the French high speed network, part of LGV PBL will be used by regional trains, thanks to the so-called *Virgule* at Sablé-sur-Sarthe. This 3.6 km south-to-west chord will allow TER services to run directly from Rennes to Angers and



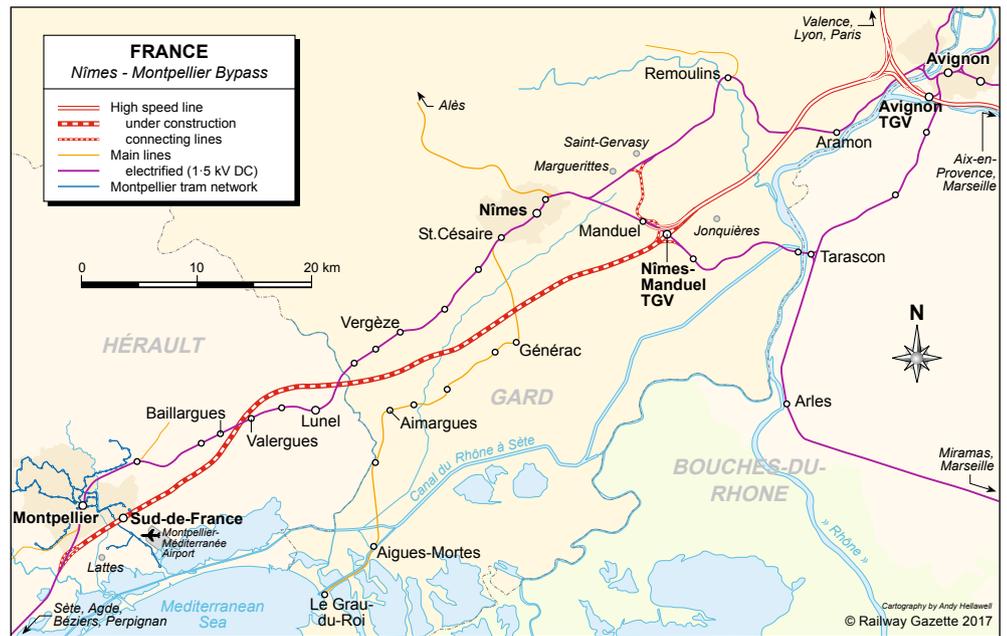
Nantes, cutting the journey time dramatically (RG 7.16 p33).

## Nîmes – Montpellier bypass

In October contractor Oc'Via is due to hand over the *Contournement Nîmes – Montpellier* bypass to SNCF Réseau, ahead of the line's planned opening for commercial traffic on December 11. While the line's impact on high speed operations will be less marked than LGV SEA or LGV BPL, it will save 20 min off the timings of Paris – Montpellier TGV services with a fastest time of less than 3 h. Its opening will in due course precipitate changes in travel patterns across southwest France, with the released capacity on current routes facilitating a planned 30% increase in the level of local TER services in the medium to long term.

At its eastern end CNM links with LGV Méditerranée and the coastal route from Marseille; to the west it connects with the main line to Narbonne and Perpignan, where a further high speed extension is envisaged in the long term.

The bypass has been designed to handle freight trains as well as high speed



services — local authorities are anxious to limit the growth of lorry traffic on the A9 *autoroute* and switch more freight to rail.

The line's mixed traffic vocation dictated the design and construction

parameters. Curve radii are generally better than 6000 m and the steepest gradient has been set at 1%, or exceptionally 1.25%. Freight trains crossing up to 2810 tonnes with 25 tonne axle-loads will be able to use the line, hauled by dual-system locomotives as the route is electrified at 25 kV 50 Hz whereas the connecting lines are wired at 1.5 kV DC. Signalling will be provided by ETCS Level 2.

## Stations

Two new stations are envisaged as part of the scheme. One will be located at Manduel to the east of Nîmes, and the other southeast of Montpellier at La Mogère. Provisionally known as Montpellier-Sud-de-France, this site was chosen to offer easy access from the A9 motorway, and plans envisage that the station will in future be served by a 1.3 km extension of Montpellier tram route 1 and potentially by route 3.

However, at the start of operations TGV services to Montpellier's new station will be limited to four per day. When this became public knowledge in October last year, Carole Delga, President of the Région Occitanie/Pyrénées-Méditerranée, announced that the region's share of funding for the project would be withheld, even though the station had already been built. Further services will call only once the new station at Nîmes-Manduel has been completed, probably at the end of 2019.

Nîmes-Manduel is due to be built at the junction of CNM with the existing Tarascon – Nîmes line. This will be served by two low-level platforms, while two high level platforms would be used by the TGVs. A public enquiry for the station was scheduled to run from February 6 to March 17. ■

## PUBLIC-PRIVATE PARTNERSHIPS

### Trio of concessionaires

All three of the LGVs opening this year are being built under public-private partnership arrangements negotiated by former infrastructure manager Réseau Ferré de France and novated to SNCF Réseau under the railway reform process.

In each case a concessionaire was appointed as a main contractor, which in turn placed responsibility for construction with consortia or joint ventures; each concessionaire also appointed an operator, whose role will include maintenance of the new lines for a specified period. SNCF Réseau will pay the concessionaire track access charges which are intended to cover maintenance costs, repayment of loans and an element of return on capital for the concessionaire's shareholders.

The structure of the 50-year LGV SEA concession accords project management to the LISEA consortium, which is owned by Vinci, CDC Infrastructure and Meridiam. Design and construction is the responsibility of COSEA, a joint venture of Vinci Constructions, Eurovia, BEC, NGE, TSO, Ineo, Inexia, Arcadis and Egis Rail. MESEA, owned 70% by Vinci Concessions and 30% by Systra, will operate the line and undertake maintenance until 2061 from bases at Villonogon, Nouâtre-Maillé, and Clérac, with a secondary base at Poitiers.

Capital cost of the project is put at €6.2bn, with the total package valued at €7.8bn, making it the largest PPP deal in the French rail sector. LISEA is contributing €3.8bn, with the rest coming from SNCF Réseau, national and local government. The European Investment Bank is providing €1.2bn through a mix of government-guaranteed and non-guaranteed loans to the consortium and the French state, plus contributions to the EU's TEN-T programme. SNCF Réseau is spending a further €1bn on additional works and station enhancements.

The LGV BPL concessionaire is Eiffage Rail Express, which is contracted to hand over the line to SNCF on May 15. Design and construction is in the hands

of the CLERE group, formed of Eiffage subsidiaries Eiffage Travaux Publics and Eiffage Energie.

OPERE has been designated as the operator, with responsibility for maintenance over the remaining part of the 25-year concession. Maintenance bases are located at the former construction depots at Auvers-le-Hamon et Saint-Berthevin.

The €3.5bn cost was shared between SNCF Réseau, government financing agency AFTF and local authorities: the Bretagne region paid €655m, the four départements of Côtes d'Armor, Finistère, Ille et Vilaine and Morbihan contributed a total of €203.4m, and Pays de la Loire region €86.9m.

The €2.28bn concession for the Nîmes – Montpellier bypass was won by Oc'Via, which established two subsidiaries for construction and maintenance. Oc'Via Construction, structured as a Groupement d'Intérêt Economique, has designed and built the line. Oc'Via Maintenance will then maintain it for the remainder of the concession. The majority shareholder in Oc'Via is Meridiam (53%), with Fideppp holding 27%, Bouygues 9.8%, Colas 5%, Spie Batignolles 2.8% and Alstom 2.4%. ■

### Landscaping and planting work in progress at Aimargues on the Nîmes – Montpellier bypass.



Photo: Oc'Via / A Vaucher