

Tunnel Euralpin Lyon Turin (TELT)

EUROPE'S MISSING LINK





TELT

TUNNEL EURALPIN LYON TURIN

Europe's Missing Link

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A desire to bring social, cultural and economic links closer across Europe is drawing ever nearer thanks to the stunningly complex Lyon-Turin rail project. While Lyon, located in central eastern France, and Turin, in northern Italy, are relatively close, the sticking point is what has historically separated them - the Alps!

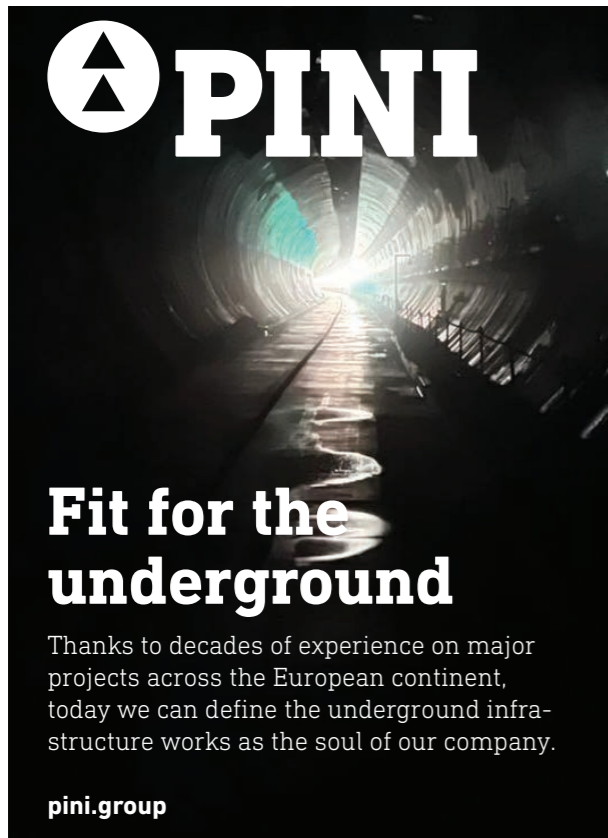
Such a monumental challenge to bridge a critical missing link between France and Italy is being overcome through the Tunnel Eurapin Lyon Turin (TELT) Project - a cross-border engineering marvel in which 65km of the passenger and freight rail line will run through the base of the mountain range.

Due for completion by 2032, the TELT project - with the longest underground rail tunnel in the world - will form part of a larger 270km link between Lyon and Turin. This will become the hub of the Mediterranean Corridor, one of several Trans-European networks of 17,000 km of rail lines that will eventually link the EU's important airports, ports and urban centres.

Overview

The hopes and dreams of many traders and empire builders over the centuries have always been to develop a route across the Alps. The aim has always been to go around the mountain range or over the top - but never through it.

That was until 1844 - 180 years ago - when Belgian engineer Henry Maus was commissioned to carry out a study concerning the possible construction of a rail link between Savoy in France and Piedmont in Italy. Work on the Fréjus Tunnel began in 1857 and was completed in 1871.



The new TELT tunnel stands 800 metres below the Fréjus railway tunnel. The average daily capacity of the Fréjus railway tunnel is just 60 trains per day. The predicted daily number for TELT is 162 freight trains, transferring around 1 million heavy goods vehicles per annum

A Tale of Two Cities

Fast forward to the 21st century. After prolonged political debate, 2016 saw backing for new works for the cross-border section of the Lyon-Turin line. This enabled TELT – a 50-50 partnership between the French and Italian governments – to be launched.

The cross-border section of the line extends 65 km from Saint-Jean-de-Maurienne in Savoy to Val Susa in Piedmont, of which 57.5 km consists of the Mont Cenis base tunnel – 45km in France and 12.5 km in Italy.

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Lyon is France’s third most populated city and capital of the Auvergne-Rhône Alpes Region, with a population of over 2 million. All industrial sectors are present, but the city’s international reputation is mainly linked to mechanics, textiles and chemistry. It is one of France’s largest university and cultural centres, while boasting a strategic role due to its position between the country’s north and south. It also has a state-of-the-art freight and passenger transport system.

Turin, Italy’s first capital, is now the capital of the Piedmont Region and represents the country’s third-largest economic and productive area. It is a major university and scientific centre, and the hub of the Italian automotive industry, as well as publishing, banking and insurance, information technologies, food and wine, aerospace, and industrial design.

A Five-Year Journey: Partners And Milestones

Since construction began in 2018 on the railway, work has been divided into 12 operational segments. 9 involve civil construction and are divided by geographical area, while 3 concern associated activities. At its peak, the TELT project will have engaged over 20,000 different companies and 8,000 workers.

The first phase, boring 9km of the base tunnel and starting from Saint-Martin-la-Porte in France, was completed in

2019. The tender was won by a group of companies: Spies Batignolles TPCI, Eiffage TP, Ghella, CMC, Cogeis, Sotrabas, Egis and Alpina.

Four vertical ventilation shafts at Avrieux, costing € 220 million, were awarded to a consortium comprising VINCI Construction Grands Projets, Dodin Campenon Bernard, VINCI Construction France, Webuild and Bergteamet. The shafts, to be excavated from the foot of the Villarodin-Bourget / Modane access tunnel, will be 500m deep and have a diameter of 5.2m. They were excavated using the Raise Boring Machine

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H&P Railservice GmbH is based in Kemetten in Burgenland. The state-of-the-art office building with attached workshop and high-bay warehouse offers enough space to handle all projects properly. The neighboring grounds are also owned by H&P Railservice GmbH and there are no limits to future expansion.



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type TBMs, a technology developed by the mining industry for vertical excavation of small-diameter tunnels.

Works on a cut-and-cover tunnel relating to the French entrance portal of the tunnel were carried out, and the "Lyon Torino C.08" enterprise grouping, composed of Implenia Suisse (group head), Implenia France, NGE Génie Civil, Itinera and Rizzani de Eccher, completed the construction site installation. The construction management group composed of Egis, Alpina, Ingerop Conseil et ingénierie and Geodata.

In 2021, TELT took a significant step awarding €3 billion worth of contracts for around 80% of the entire work site. This will enable for substantial progress to be made on a complex system of tunnels, with two parallel tubes to keep separate the flow of trains in both directions and ensure complete safety.



The contracts relate to three phases. The first, valued at €1.47 billion, was for 22km of tunnels between the existing Villarodin-Bourget/Modane tunnel and Italy. Awarded to EIFFAGE Génie Civil, SPIE BATIGNOLLES, GHELLA and the COGEIS consortium, the companies will excavate towards Turin using two tunnel boring machines and towards Lyon with traditional methods of a hydraulic breaker and explosives

A €1.43 billion contract was awarded to a consortia of companies comprising VINCI Construction Grands Projets (group head), DODIN CAMPENON BERNARD, VINCI Construction France TP Lyon and WeBuild. This related to 23km of tunnels between Saint-Martin-la-Porte/La Praz and Modane towards Italy.

The third set of contracts was for 3 km of tunnel between the French entrance portal at Saint-Julien-Montdenis and

Saint-Martin-la-Porte. This €228 million project was awarded a consortium consisting IMPLENIA Suisse, IMPLENIA France, NGE, ITINERA and RIZZANI de ECCHER.

A final contract, around €1 billion of work for the base tunnel in Italy, was awarded to the binational group of companies of Itinera, Spie Batignolles and Ghella.

Following this last award of contracts for the Italian side of the tunnel, Daniel Bursaux,



TELT President, said: "This important milestone is the result of extraordinary cooperation between France and Italy and the support of the European Commission. Now that all the contracts for excavating the tunnel have been awarded, this central link in the Mediterranean Corridor of the TEN-T network can become even more real. One more step towards decarbonising transport in a better-connected Europe."

Maurizio Bufalini, TELT General Director, added: "This result could have not been taken for granted until a few years ago and was achieved thanks to the commitment of the technicians, the support of the Italian and French institutions and social partners, and the great support of Europe."

"This contract award will quickly translate into jobs, generating important opportunities for the territory already during the construction phase."

Construction is now progressing at ten sites on both sides of the Alps. Over the next few years, the sites will employ up to 8,000 directly hired workers and people in related industries.

A €800 contract was awarded by the consortium set to undertake the work on the French side for the recovery of excavation materials. This includes the Vinci Construction subsidiaries Carrières du Bassin Rhônealpin and Terélian, as well as Eurovia Alpes, SATM, Granulats Vicat,

Spie Batignolles Valérian, Spie Batignolles Malet, and GIE GMM 73.

The scope of work includes the industrial processing of approximately 23 million tonnes of excavation materials. Vinci said a circular approach to the work will be taken, with a focus on the reuse of over 50% of the spoil directly on the site. The project also aims to implement sustainable practices in the handling of excavation materials.

The project includes the establishment of three permanent storage sites, three materials processing stations, eight logistics platforms, 15km of conveyor belts, and a comprehensive train loading facility.

In 2023, steps were advancing on awarding €3 billion worth of work to transform the base tunnel into a fully interoperable railway infrastructure. This saw TELT working to define the functional and technical specific features of the railway and non-railway systems of the new freight and passenger line.



There will be 140km of tracks and catenaries, two control centres at either end to manage the tunnel systems and the train traffic 24 hours a day, with more than 900 cameras and sensors installed along the entire route.

Three independent electrical substations will guarantee traction supply for the trains. Five safety areas, three of which are underground, with reception space and their own external air exchange, can each accommodate up to 1,200 people. Tunnel ventilation will be provided by five central ventilation units using the four existing access adits and the four double-flow Avrieux shafts, which, in the event of fire, smoke will be extracted and clean air pumped in.

The project provides two rescue trains and six rail-road bimodal vehicles to deal with fires or incidents. The underground areas





will be equipped with a misting system connected by heat-sensitive FibroLaser cables, making it possible to detect a fire's exact location on a train immediately by transmitting the location to the operator in the control room, who can then activate the misting to extinguish the fire directly on the spot.

Tunnel Boring Machines

The first of TELT's seven tunnel boring machines (TBM), unveiled at the Herrenknecht factory in Germany in 2023, will be used by the French-Italian group of companies, consisting of VINCI Construction Grands Projets, Webuild, Dodin Campenon Bernard and Campenon Bernard Centre Est. It will be responsible for excavating the 9km of the northern tube of the base tunnel between Saint-Martin-la-Porte and La Praz, running parallel with the part completed in 2019 by the Federica

TBM. Another two TBMs are being built and will excavate tunnels between La Praz and Modane.

The construction of the TBM, which was designed, manufactured, and assembled in 10 months, involved numerous European companies, including a dozen in Italy and France. The 180m-long, 10.4m-diameter TBM, which weighs 2,300 tonnes, has a head with 61 rotating cutters - the 'teeth' that crush the rock and allow the machine



It is projected to take over a million trucks off the road annually and allow a 40% saving in energy

to advance into the mountain. Immediately after the head has moved forward, the cutter covers the living rock of the tunnel with a succession of rings: 8 segments of tunnel lining in reinforced concrete that assure the tunnel's stability. Ten attached trailers will transport the extracted rock by conveyor belt to the surface.

Sustainably On Track

Currently, only 9% of goods travel by rail on the Italian-French route. Between Italy and Switzerland, that rises to 64% and 69% between Italy and Austria. However,

when finished, the railway will address this imbalance and create a new low-carbon link between Western and Central-Eastern Europe.

It will cut journey times and deliver significant economic benefits. It is projected to take over a million trucks off the road annually and allow a 40% saving in energy, thanks to the easing of the gradient and the doubling of the load capacity. While making rail transport competitive compared to road transport, it will also reduce 3 million tonnes of greenhouse gas emissions.



TELT will build the base tunnel according to a sustainable strategy for the management of the related excavation materials. The materials will be excavated for six years, and they will mostly be reused in the construction of the tunnel itself: more than 50% of the material will become part of the concrete mixture used to build segments and railway embankments. TELT is also working on innovative re-exploitation tools, and it is developing ways to reuse these materials across both borders, further increasing the reused portion and achieve a "zero waste" construction site.



In addition, over 44 million tons of freight circulate along the Italy-France axis. Of this traffic, over 90% travels by road, compared to 70% in Austria and 30% in Switzerland. It is estimated that at least half of these goods will be able to use the new line given that it will become an essential part of the Mediterranean Corridor.

Economic benefits

Economic trade between Italy and France is worth over €85 billion. However, the volume between Italy and the Western European quadrant rises to about €150 billion. This trade rises still more to €204 billion considering other countries, such as Portugal, Belgium and the Netherlands, that could gravitate around the Lyon-Turin line.

The line between France and Italy represents the central hub of a railway



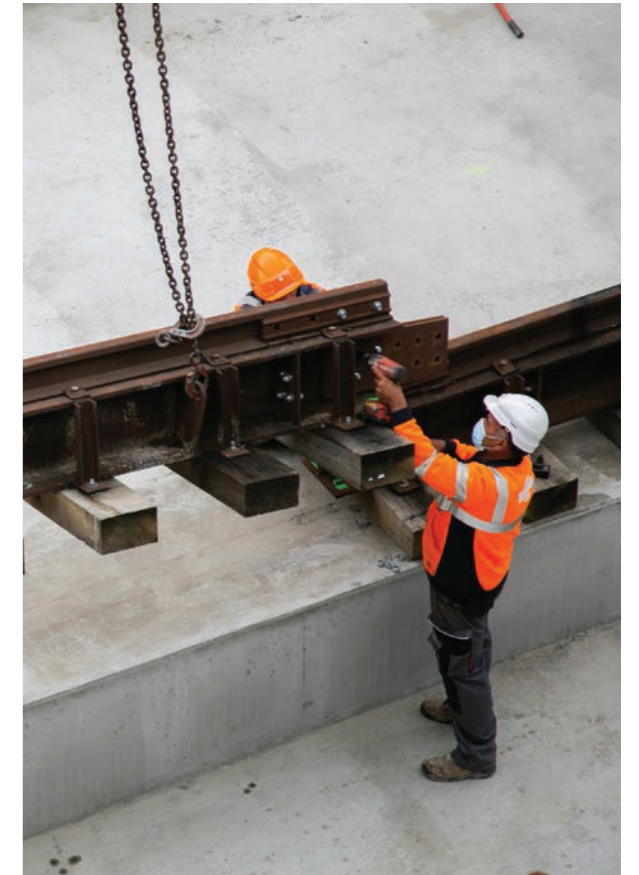
The Lyon-Turin rail connection is a long-awaited, well-thought-out, and highly emblematic European project, contributing to the objectives of the European Green Deal

connecting Algeciras, in Spain, to Budapest in Hungary, serving 18% of the European population and 17% of the Community's GDP. An axis linking the East and West of the continent, crossing seven of the nine European Corridors financed by the EU.

The Corridor is about 3,000km long and has been created to promote economic exchanges and strengthen the competitiveness of the Mediterranean European countries through a high-speed, high-capacity rail network serving major maritime and river ports, large cities and airports.

European Commissioner for Transport, Adina Vălean: "It will bridge a key missing link between France and Italy and help shift large volumes of cross-border traffic from road to rail. But it is more than a bi-national project, as it will become the nexus connecting the Iberian Peninsula to the Eastern part of the European Union.

"The Lyon-Turin rail connection is a long-awaited, well-thought-out, and highly emblematic European project, contributing to the objectives of the European Green Deal."



The Future

Undoubtedly, the project will represent a significant engineering feat by establishing the world's longest tunnel. It also provides a considerable opportunity that connects the Europe. The movement of goods and people will become faster, but drive down CO2 emissions and costs. The Lyon to Turin project will prove the missing link in a giant continental jigsaw puzzle.

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