

**SMOOTHER
TRAVEL &
LOWER CARBON
EMISSIONS**

The Grand Paris Express adventure

KEY INFORMATION - LINE 16

10
stations

16
communities

200,000
journeys per day
forecast

17 km
of twin-track
tunnel

NGE has achieved multiple milestones on its Grand Paris Express worksites during 2021, and completed work on 3 major work packages. It also won a number of new contracts.

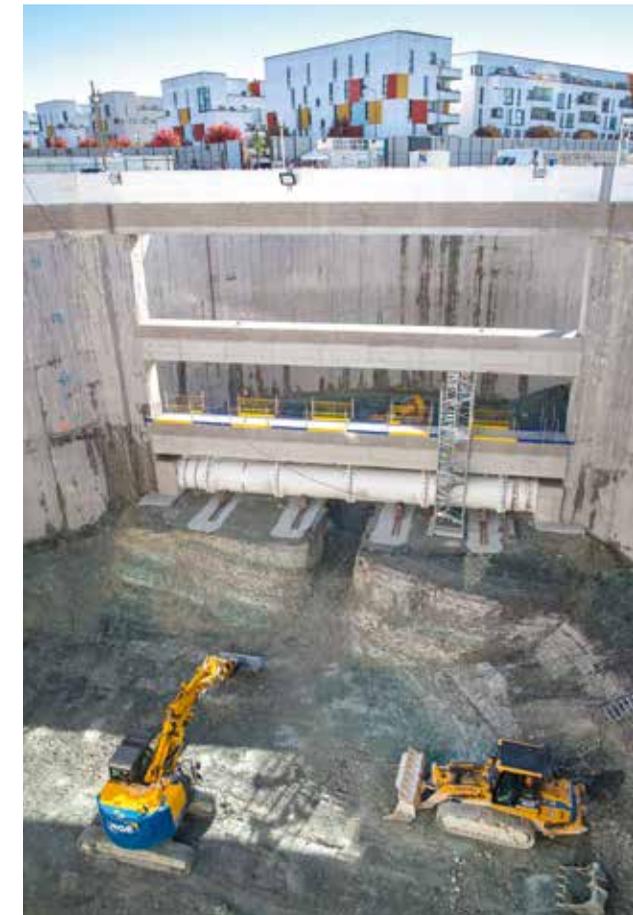
ON SCHEDULE WITH LINE 16

When complete, Line 16 will serve 10 stations, from Saint-Denis Pleyel to Noisy-Champs with a journey time of just 26 minutes. NGE is already a major contributor to this key Grand Paris Express rail link, in terms of the rail contracting aspects of Work Package 1, and on Work Package 2, with the startup of the Mireille and Houda tunnel boring machines in 2021. In November 2021, the Group was awarded the contract for Work Package 2.3. This contract covers the installation of tracks, points, crossovers and catenaries. With a scheduled start in 2023, this Work Package will see NGE carry out all the rail contracting work for this line.

NGE has also been contracted to carry out an identical programme of works for the first 2 km section of Line 17 North, between the Le Bourget Airport and Le Bourget RER stations.

DESIGN & BUILD PROJECTS FOR LINE 15

During the contract tendering phase, NGE submitted its first Design & Build tender for a section of Line 15, with a contract value of several billion euros. A task force dedicated to working on this type of comprehensive tender was brought together and allocated the largest body of design resources ever provided for a project at NGE, because this is the largest project the Group has ever tendered for as consortium leader. It is also a demonstration of how engineering is becoming increasingly important to the Major Projects and International activities of the Group.



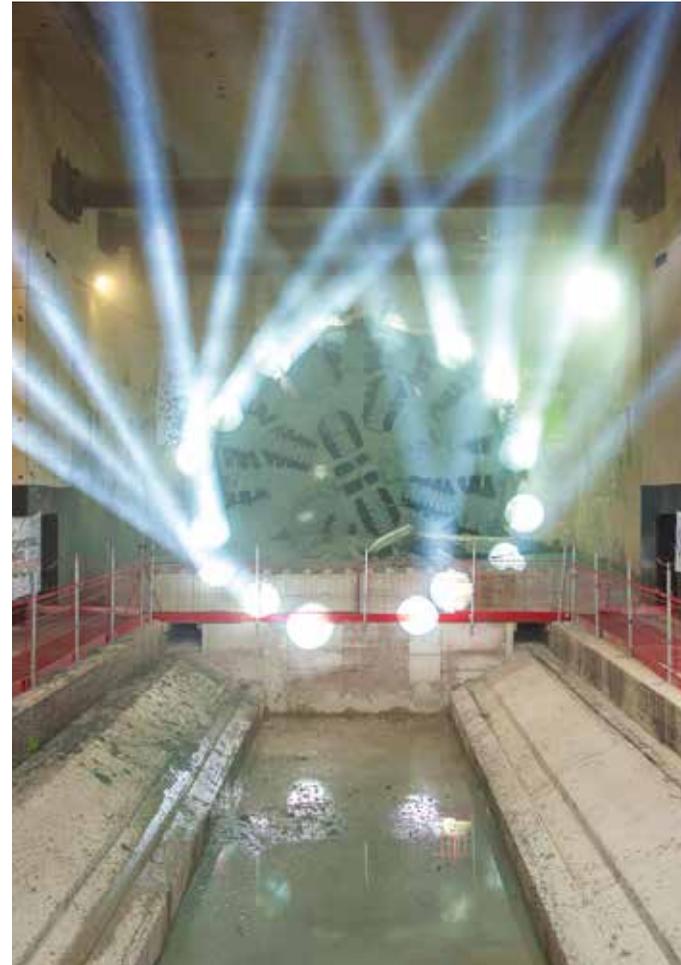
Grand Paris Express: Clichy-Montfermeil station

COMPLETION OF THE FIRST PROJECT WORKSITES

2021 saw completion of three major work packages, with the delivery of Line 14 Work Package 4 at Orly, and Line 15 South Work Package T2C. In July, the Sofia tunnel boring machine completed the 3.2 km Line 11 tunnel it had begun work on the previous September. The teams also completed the Haussmann-Saint-Lazare station tunnel intersection project, and the RER E (Éole) work package for the rail contracting aspects of the line between Haussmann-Saint-Lazare station and Nanterre. On the Aulnay-sous-Bois tram storage and maintenance centre project, operations during the year focused on asbestos removal and the construction of all those areas that could be completed given the level of parallel working with other contractors, and on the creation of a complex new work phasing schedule. ■

18

that's the number of Grand Paris Express work packages that NGE is involved in



The Sofia tunnel boring machine reaches the end of the line at Serge Gainsbourg station on Line 11

PROGRESS ON THE 8 MAJOR WORK PACKAGES	AT END 2019	AT END 2020	AT END 2021
Line 15 – T2C South	60%	85%	99%
Haussmann-Saint-Lazare tunnel intersection project	40%	75%	98%
Aulnay-sous-Bois tram storage/maintenance centre	35%	65%	72%
Line 14, Work Package GC04	60%	94%	99%
Line 11, Work Package GC01	52%	60%	94%
Line 16, Work Package 2	10%	30%	55%
Line 16, Work Package 1 (rail)	0%	6%	21%
Line 16, Work Package 2-3			1%



**Lyon-Turin:
a project like
no other**

Preparatory work underway for Work Package 3 of the Lyon-Turin tunnel

THE LYON-TURIN EUROALPINE TUNNEL

57.5 km

long

2

parallel tunnels

204

safety access tunnels

4

worksite access shafts

➤ After two years of design work, NGE was awarded Work Package 3 of the project to create a new rail tunnel beneath the Alps to link France with Italy. The award of this contract makes the Group a key contributor to a major European passenger and rail freight projects.

In July 2021, NGE was awarded the contract for Work Package 3 of the project to create a new rail tunnel beneath the Alps to link France with Italy. At 57.5 km, it is one of the longest tunnels in the world, and makes NGE the latest member of the exclusive club of major contractors with the capability to commit its teams 24/7 for a project duration of 6 years.

A MOBILITY PROJECT THAT HELPS TO SLOW CLIMATE CHANGE

NGE is contributing to the process of creating a major new infrastructure

for moving goods and people around Europe. As the missing link in the Mediterranean Corridor that links the Iberian Peninsula with Eastern Europe, the tunnel will carry passengers beneath the Alps at speeds of up to 220 kph (120 kph for freight services). Estimates suggest that the new rail link will take a million trucks per year off the transalpine motorways. The project is part of the European Green Deal roadmap to achieve carbon neutrality by 2050.

UNDERGROUND WORK IS UNDERWAY

The NGE consortium has responsibility for the section between the tunnel opening on the French side at Saint-Julien-Mont-Denis and Saint-Martin-la-Porte. From Villard-Clément in Savoie onwards, the tunnel will be excavated using explosives rather than a tunnel boring machine. NGE will blast a 1,810-metre twin-tube tunnel, as well as creating 7 safety tunnels between the rail tunnels at 400-metre intervals and building a 140-metre cut-and-cover section of tunnel. Project duration: 72 months. ■

Alternatives to road transport

NGE is closely involved in the construction and maintenance of urban public transport networks in France and abroad. In terms of rail network projects, the Group typically has responsibility for significant aspects of major contracts.

CATENARIES: THE INNOVATION THAT SPEEDS UP EVERYTHING

Upgrading 200 km of overhead lines per year? Our high-speed catenary sequencing expertise and technology mean that this hugely challenging target can be met. This factory train of simultaneously operating mobile workshops effectively industrialises the process of regenerating the catenary components vital for rail traffic. Developed jointly by NGE and COLAS RAIL, this innovation will make it possible to upgrade a large proportion of France's national rail network within 7 years, and do so in complete safety with no interruption to services. This unique train has been operating on the Paris-Strasbourg line since 2021.

200 km
upgraded per year

Upgrading catenaries using a factory train

RER C UPGRADING

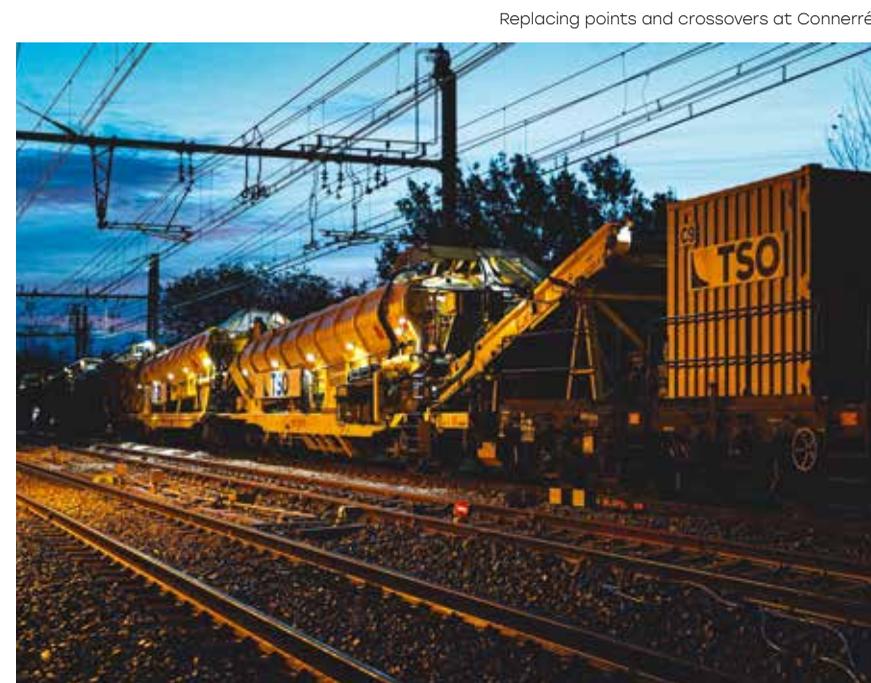
Over a period of between 5 and 6 weeks in summer 2021, the rail contracting subsidiary of NGE carried out a high-impact operation during which traffic was suspended in order to replace the tracks of the RER C regional express line. Two sets of points and 260 metres of track were replaced in tunnels during the year. A further 73 metres of non-ballasted track were replaced in stations. 1,600 metres of track were renewed on viaducts.



High-Impact Operation to upgrade the RER C line

COMPLETION OF THE FIRST SECTION OF THE ANGERS TRAMWAY

NGE has delivered the first section of the Angers tramway. This project worksite is in the very centre of the city, where space is particularly restricted, and the teams have to contend with utility networks, shops, residents and traffic. The 26-month project includes laying 3,500 metres of track and building 7 stations. It is due to be officially opened at the end of 2022.



Replacing points and crossovers at Connerré

REPLACEMENT OF POINTS AND CROSSOVERS

As part of the SNCF Réseau Vigirail programme, our TSO rail subsidiary has carried track replacement and upgrading work at locations including Château-Thierry, Connerré and Levallois-Perret. This national network safety plan has set the target of upgrading or replacing 500 points every year.

RAIL REPLACEMENT

The TSO BOA rail replacement factory train celebrated its 10th anniversary this year, having replaced 1,400 km of track since its first project in 2011. Its crew continued replacing rails in 2021, with major projects including the LGV Nord Est Européen high-speed rail link between Paris and Lille, and on standard lines in the Île-de-France region.

Model of the future storage and maintenance centre for the Marseille-Toulon-Nice rail line



A RAILWAY STORAGE & MAINTENANCE CENTRE IN NICE

This storage and maintenance centre for the Marseille-Toulon-Nice line is being built for our customer Transdev, the first company in France to be awarded the contract to operate a branch line since the industry was deregulated. Certified as compliant with the Sustainable Mediterranean Building standard, its construction will call on NGE's multi-expertise capability, from property development to civil engineering, rail contracting, catenaries, foundations, and more...



“Our job is all about replacing catenary arms on a massive scale. The factory train designed

by NGE and Colas is a brilliant response to our need for fast and efficient catenary regeneration. This solution is a world first and proving to be a great success. SNCF Réseau will capitalise on this operation for its industrial project worksites”.

PIERRE DABURON,
Regeneration Project Industrial Director
at SNCF Réseau



Track replacement in the UK

A 10-YEAR RAIL CONTRACT IN THE UK

Central Rail Systems Alliance (CRSA) is a multi-year track renewal contract covering the London North West, London North East and East Midland routes. Signed in May 2019, this 10-year contract was awarded to NGE's rail contracting subsidiary TSO, Balfour Beatty, Atkins and Network Rail. It includes all types of work on the track and around points, as well as major projects to upgrade the network capacity, especially station remodelling, which calls on other areas of expertise within the Group, such as civil engineering, catenaries, energy and signalling.

70 km

of tracks replaced in 2021

NGE HELPS TO UPGRADE RAIL TRANSPORT IN EGYPT



The Cairo - 10th of Ramadan City line

With an operational presence on a number of major infrastructure sites, NGE is working with Orascom Construction on the rail link that will connect Cairo with 10th of Ramadan City, the country's new administrative capital, with line speeds of up to 120 kph. This project involves the construction of 66 km of double track, 10 km of single track in depots, and 11 stations. By the end of 2021, the teams had laid 115 km of track.

The Bahria - Port Said Line

NGE is also contracted to upgrade 40 km of track on the line between Bahria, north of Cairo, and Port Said, and replace all its points and crossovers.



The rail link between Cairo and 10th of Ramadan City



DEVELOPING RAIL FREIGHT IN URUGUAY

As the concession holder and rail contractor for the Ferrocarril Central project, NGE is responsible for laying new tracks on an old track bed to link the Port of Montevideo to a giant paper pulp mill inland. The 273 km future line will run through the city of Paso de los Toros, taking trucks off what are already very busy roads, and providing rail connectivity for other logistics facilities.

In 2021, the focus was on earthworks and the start of work on the aggregate base and sub-ballast layers. Around 2,500 employees are working to progress this project as quickly as possible. A number of key milestones were achieved during the year, with 60% of the earthworks completed. 2022 will see the start of work on track laying and signalling systems, as well as the construction of large-scale steel bridges.

273 km

of new rail line

50%

of ballast produced and delivered

55%

of sleepers produced



Installing rail bridge girders and unloading machinery

A RAIL REGENERATION PROJECT IN MEXICO

The Group is currently upgrading the tracks operated by the Kansas Southern Mexico rail company in the north of the country. The teams have begun the regeneration project with track ballast undercutting.

Rail upgrading in Mexico



A KEY PLAYER IN PANAMA'S SUBWAY INFRASTRUCTURES

NGE has had an operating presence in Panama City for several years, and has already contributed to the construction and maintenance of Lines 1 and 2 of its subway system. In 2021, it was awarded the contract to extend Line 2 to Tocumen Airport as part of a project to reduce road traffic and facilitate student access to the Specialist Technical Institute.