

Paris, 06 October 2021

Press release

**Grand Paris Express:  
the first tests on prefabricated voussoirs made with ultra-low-carbon concrete in  
France.**

- a world first
- CO<sub>2</sub> emission reductions amount to about 70%

Société du Grand Paris and VINCI Construction announce that they are using “voussoirs made of ultra-low-carbon concrete”, which are prefabricated in mechanical moulds, at a Grand Paris Express pilot worksite (Line 18, works package 1).

VINCI Construction started fine-tuning low-carbon concretes for a variety of applications several years ago and has now grouped them together in its Exegy range. After using its breakthroughs in buildings, it has started using them in components such as voussoirs (prefabricated wedge-shaped, compression-assembled parts, to line a tunnel) and pipes for smaller tunnels.

The pilot project on Line 18, which is jointly funded by Société du Grand Paris, is designed to ascertain that the formula with a very low environmental impact works adequately, verify that it can be poured into formwork (casts) at the pace required for an industrial operation, then check the finished product's behaviour in storage and over time under operating constraints.

An initial phase, which involved testing at CDB, a VINCI Construction subsidiary that specialises in concrete prefabrication, led to a concrete formula suited specifically to voussoirs. The second phase, industrial production at Stradal, the subcontractor selected by VINCI Construction (which has been awarded Line 18 works package 1), began in September 2021. This phase will involve producing five full rings (the equivalent of 40 voussoirs) sized for the project, and the first units will be used for full-scale qualification tests (ISO fire test, load tests).

Replacing conventional concrete voussoirs with Exegy ultra-low-carbon concrete ones and Ecocem Ultra alkali-activated binder has a significant impact on the worksite's environmental performance: emission reductions amount to about 70% compared to traditional concrete and 50% compared to very-low-carbon concrete (respectively 90 kg of CO<sub>2</sub> per cu. metre in the case of ultra-low-carbon concrete, 170 kg of CO<sub>2</sub> in the case of very-low-carbon concrete and 330 kg of CO<sub>2</sub> in the case of traditional concrete).

The use of permanent prefabricated voussoirs made of ultra-low-carbon concrete, containing cement-free alkali-activated slag, in a section of a metro tunnel in use, is a world first. It will thus be an opportunity to conduct a benchmark study, in real-life conditions, on the use of a new, greener material in tunnels. Over time, qualification of this type of Exegy voussoirs and the mainstreaming of ultra-low-carbon solutions could bring about a massive drop in the carbon footprint of the tunnels built in France.

A European Technical Assessment to secure approval for the Ecocem Ultra alternative alkali-activated binder has been under way since 2019. Then, concretes containing this binder will be able to earn NF EN 206/CN certification by October 2021. Certification will open the door to using Exegy ultra-low-carbon

solutions containing Ecocem Ultra binder for a wide variety of purposes and thus to significantly shrinking the carbon footprint of the concrete poured.

The production of this ultra-low-carbon concrete containing an alkali-activated binder has been patented jointly by VINCI Construction and Ecocem. VINCI Construction is working with partner concrete manufacturers to equip them with the know-how to produce Exegy concretes.

*“Innovation needs to be one of the important levers to rise to the environmental challenges facing our company. With our laboratory, our respected concrete experts, the research capabilities at universities including the École Normale Supérieure in Cachan and Institut National des Sciences Appliquées in Toulouse, and with specialist partners such as Ecocem, we are focusing all our know-how on this issue. The environmental performance of our concrete engineering hinges on one tangible metric: its approval and effective use at worksites. The fact that Société du Grand Paris has allowed us to trial it is a wonderful opportunity to take exactly this approach.”*

**Patrick Kadri, Managing Director in charge of the Major Projects Division, VINCI Construction**

*“We are very proud to be in a position to enable our partners to try out new solutions at our construction sites, as those solutions can benefit the building and civil engineering sector as a whole moving forward. We have been encouraging our partners’ initiatives, in particular the ones that reduce our construction projects’ carbon impact, since the beginning of the programme. The use of ultra-low-carbon concrete voussoirs fits perfectly into our approach to reducing CO<sub>2</sub> emissions at our worksites. And this is paving the way for using it more extensively. So we will be watching the experiment results particularly closely. Innovation is embedded in our DNA at Société du Grand Paris. And the Grand Paris Express, which is a pioneering project for the ecological transition, is a fantastic testing ground.”*

**Bernard Cathelain, Member of the Board of Directors, Société du Grand Paris**

#### **About VINCI Construction**

VINCI Construction is a world leader in its fields, which encompass transport infrastructure, buildings, utilities and urban development projects. It leverages its networks of local and specialist subsidiaries, and specific expertise in major infrastructure projects. VINCI Construction’s 1,000 companies are involved in every stage of a structure’s life cycle (financing, design, construction and maintenance), are active in more than 100 countries, employ over 115,000 people and generated €23 billion in revenue in 2020.

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#### **About Société du Grand Paris**

Société du Grand Paris is a public-sector organisation set up by the French State to oversee the delivery and funding of the Grand Paris Express. Its remit encompasses building the infrastructure for the network and acquiring, on Île-de-France Mobilités’ behalf, the train sets that will use it. The Grand Paris Express will be the Greater Paris area’s metro system, and is the largest infrastructure and urban development programme under way in Europe today. The network will span 200 km and the project involves creating four new lines around Paris, extending Line 14, building 68 stations and developing new districts around these future urban hubs.

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