



# Vinci - Grand Paris Express

Fundamentals on Environment & Sustainability

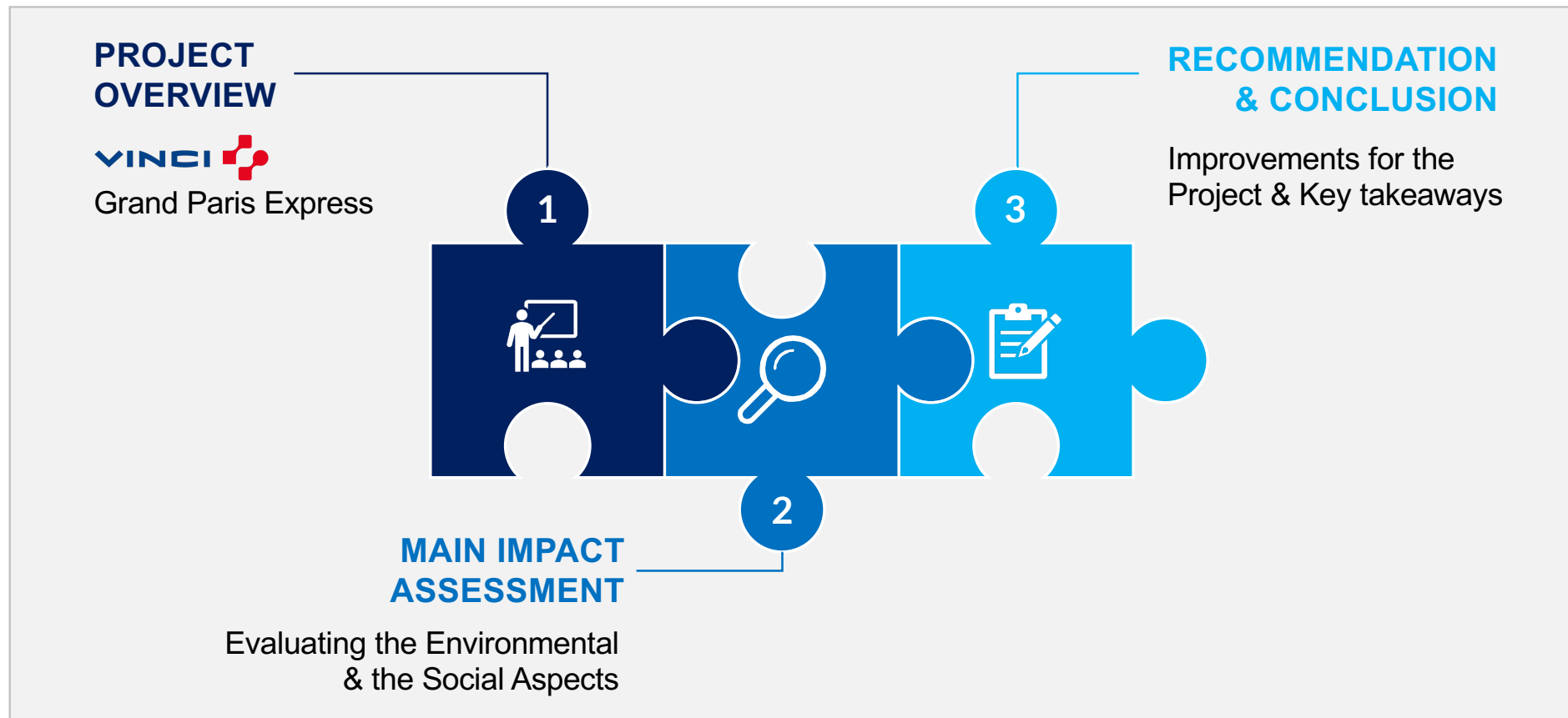
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## Agenda – Today's Exploration Path...



# 1 | Project Overview - Vinci Grand Paris Express: A Landmark Infrastructure Project Delivering a Sustainable, Innovative and High-Capacity Transport Link

## Company Overview



Name:	<b>VINCI</b>
Headquarter:	<b>France (Rueil-Malmaison, near Paris)</b>
Founded:	<b>1899</b>
Employees:	<b>272.000 (approx.)</b>
Revenue:	<b>€ 68.8bn</b>
Presence:	<b>Operates in &gt;120 countries</b>
Core Activities:	<b>Concessions, Construction, Energy</b>
Main Divisions:	<b>VINCI Construction, VINCI Energies, VINCI Autoroutes, VINCI Airports</b>
Stock Listing:	<b>Euronext Paris (CAC 40 index)</b>
Sustainability:	<b>Net-zero emissions by 2050</b>
Specialties:	<b>Large-scale infrastructure projects (transport, energy, urban development)</b>
Approach:	<b>Focus on innovation, safety, social inclusion, environmental responsibility</b>



“With **over 2,000 jobs** created and a strong focus on **local SMEs** and **low-carbon methods**, VINCI is helping to build a more **sustainable** and inclusive **future for Greater Paris**”

- Vinci Press Release (2023)



## Project Key Facts: “Grand Paris Express”



**14 km of tunnels** and **5 underground stations** will be built as **core infrastructure**



**Over 2,000 direct jobs** will be created at the peak of construction activity



Part of the Grand Paris Express, the **largest transport infrastructure** project currently underway in **Europe**



**Integration** with major **transport lines**, including **RER, metro, tram**, and **Transilien** services at La Défense



**20%** of the project scope will be delivered by **local SMEs**, fostering **regional economic growth**



**Project completion** is targeted for end of **2031**, connecting **Pont de Sèvres** to **La Défense**



**16** technical and service **buildings** will be built to ensure **efficient operation** and **maintenance** of the metro system



Use of **low-carbon** and **ultra-low-carbon concrete** used to significantly **cut CO<sub>2</sub>** emissions during construction

## Benefits

A CONTRACT WORTH

**€ 2,7bn**

Delivering **next-generation mobility infrastructure** for the Greater Paris region

**Support** for **community projects** linked to employment and social cohesion through the **endowment fund Chantiers & Territories Solidaries**

The **metro line** is scheduled to **start operating** at the end of **2031**



## 2 | Main Impacts – WATER: Intense Resource Use & Pollution Risks – Resilience Dependent on Integrated Planning

### Construction Phase

The construction of the Grand Paris Express places significant pressure on local water resources due to high consumption, groundwater risks, and runoff pollution

#### Water Usage and Demand

- Tunnel boring machines (TBMs) consume **30,000–60,000 liters/day** per unit, significantly increasing local water demand
- Multiple TBMs operating at once lead to **cumulative stress on local water supplies**, potentially impacting municipal and industrial users

#### Groundwater Disruption and Contamination

- Deep tunneling through sensitive chalk aquifers risks **groundwater drawdown**, altering natural water tables
- Uncontrolled water extraction during excavation may cause **pressure changes**, subsidence, and contamination of aquifers
- Direct contact with slurry and lubricants increases the risk of **chemical contamination**

#### Runoff and Surface Water Pollution

- Excavation runoff carries **oils, diesel, slurry, and sediment** into surface waters (e.g., the Seine), especially during rain
- Polluted runoff from construction machinery can overload local drainage systems and affect urban rivers
- Temporary access roads and material storage areas increase the risk of **uncontrolled runoff**

### Operational Phase

The operational phase poses ongoing challenges to urban water quality and drainage management, but also offers opportunities for sustainable water use

#### Long-term Negative Impacts



Large areas of **impervious surfaces** increase runoff by up to **80%**, leading to frequent **flood risks** and strain on drainage systems



Routine runoff from depots and tracks **carries oils, rubber particles, and microplastics**, polluting urban water bodies, including the **Seine**



Paris' aging **combined sewer system** faces more frequent **CSO events**, degrading **water quality** and threatening aquatic ecosystems

#### Long-term Positive Impacts



**Recycled water systems** can support non-potable uses, reducing **potable water demand**



**Green roofs, swales, and rain gardens** manage runoff, enhance **urban resilience**, and improve local microclimates



Overall, the Grand Paris Express intensifies **water stress during construction** and creates **long-term runoff and pollution challenges**, highlighting the need for integrated water management



## 2 | Main Impacts – EARTH: Heavy Land Use & Waste Generation – Balanced by Circular Opportunities

### Construction Phase

The construction of the Grand Paris Express significantly affects soil and land systems, generating large volumes of waste and causing habitat disruption

#### Soil Disturbance and Erosion

- Extensive **soil sealing** from stations and access roads reduces natural infiltration and disrupts soil ecosystems
- **Soil erosion** and sediment runoff increase on exposed slopes, especially during rainfall
- **Land clearance** for tunnels and stations directly disturbs natural vegetation and habitats

#### Waste Generation and Management

- **45 million tonnes of spoil** generated during excavation creates a major waste management challenge
- **High volumes of CDW (Construction and Demolition Waste)** including concrete, steel, and packaging materials

#### Habitat Disruption and Fragmentation

- **Clearing near green corridors and park areas** disrupts habitats for birds, mammals, and insects
- **Fragmentation of natural habitats** limits species movement and reduces local biodiversity
- **Noise, dust, and machinery** impact urban green spaces and ecosystems

### Operational Phase

The operational phase creates long-term land management challenges, including soil sealing, waste generation, and habitat fragmentation

#### Long-term Negative Impacts



**Impervious surfaces and soil compaction** prevent natural soil regeneration, reduce groundwater recharge, and weaken soil structure



**Fragmentation of green corridors and habitat loss** limit species movement, disrupt ecosystems, and reduce urban biodiversity



**Accumulation of waste** from station operations, including oils, packaging, and non-recyclable materials, increases landfill dependency



**Soil quality degrades** over time due to urban pollution, microplastics, and chemical residues from operational activities

#### Long-term Positive Impacts



**Circular use of excavated soil** through the “Terres de Grand Paris” initiative reduces waste and promotes resource efficiency.



**Green roofs and noise barriers** around stations enhance urban biodiversity, creating microhabitats for insects and birds



Overall, the Grand Paris Express **disrupts soil systems** during construction and creates **long-term land management challenges**, but also offers opportunities for circular design and biodiversity enhancement

## 2 | Main Impacts – AIR: High Carbon Cost Upfront – Long-Term Payback via Modal Shift & Innovation

### Construction Phase

The Construction of the Grand Paris Express generates Major emissions from material use, transport, and machinery

#### Construction Emissions

- ~4.4 million tCO<sub>2</sub>e total emissions, mostly from concrete (~840 kt) and steel (~537 kt)
- **Use of Electrified machinery (TBMs, cranes) reduces** diesel-related CO<sub>2</sub> on-site
- **90% low-carbon concrete (CEM III) used** → ~40% CO<sub>2</sub> reduction
- **Target: -25% emissions vs. baseline** → ~1.1 million tCO<sub>2</sub>e avoided
- **Fiber-reinforced segments (Line 16)** → save ~1,000 tCO<sub>2</sub>/km
- **CarbOptimum model** ensures lifecycle tracking and adaptive management

#### Local Air Pollution (PM, NO<sub>x</sub>, Dust)

- **Diesel machinery, excavation & trucks** are the main PM and NO<sub>x</sub> sources
- **16% of spoil** transported via barge/rail to reduce **truck pollution**
- **PM<sub>10</sub> and PM<sub>2.5</sub>** from site activities → linked to **health risks** (respiratory, cardiac)
- **Stage V engines & Electrification** lower NO<sub>x</sub> emissions
- Real-time **PM alerts >150 µg/m<sup>3</sup>** (15-min avg) trigger mitigation
- **Com'in platform** ensures **monitoring, alerts, and transparency**

### Operational Phase

The operational phase marks a turning point: zero-emission transport and dense urban development drive long-term climate and air quality benefits

#### Long-Term Benefits



The Grand Paris Express will carry over **2 million passengers daily**, enabling a **significant modal shift** from private cars to electric mass transit



Based on the *CarbOptimum* model, the project will help avoid up to **14 million tonnes of CO<sub>2</sub>e by 2050**, primarily due to:

- A **36% reduction** from decreased car usage
- A **64% impact** from densified, transit-oriented urban development



As the system is fully electric and powered by France's **low-carbon energy mix**, **no local tailpipe emissions** (PM or NO<sub>x</sub>) will be generated during operation



**Urban densification** around stations will **reduce urban sprawl**, shorten average travel distances, and improve land-use efficiency



Overall, the project is expected to **offset its own construction emissions 3-5 times by 2050**, making it a strong contributor to France's climate and clean air goals

## 2 | Main Impacts – Comprehensive Socio-Economic Impacts of the Grand Paris Express Project on the Greater Paris Metropolitan Region

### Construction Phase

A major economic engine generating employment, stimulating innovation, and reshaping urban infrastructure to support a sustainable future.

#### Urban Mobility and Accessibility

- **200km** of new automated metro lines with **68 new stations**.
- **Encourages public transport** over car use (decarbonization).
- **Direct suburb to suburb connections** without city center transit.
- Promotes a polycentric urban model and supports Mobility-as-a-Service (MaaS).
- **Reduces travel time** and congestion supports multimodal travel.

#### Economic Growth and Job Creation

- **15,000 jobs/year** during construction.
- **Boost to regional GDP** (up to €20 billion/year by 2030).
- **Stimulates green economy** and local business ecosystems around new stations.

#### Environmental Justice and Equity

- **Integrates** historically underserved suburbs into high-quality transit.
- **Improves access to jobs**, education, and health services.
- **Ensures intergenerational equity** by investing in long-term urban resilience.

### Operational Phase

A transformative mobility system enhancing equity, drives regional development, and supports climate and social goals through sustainable urban planning.

#### Long-Term Regional Development Effects



The Grand Paris Express **decentralizes** the Paris metropolitan area by encouraging the development of **new economic and cultural hubs**.



It supports the **creation of eco-districts** and the provision of **affordable housing** in areas surrounding new stations.



The project incorporates **green infrastructure** elements such as green roofs, permeable surfaces, and urban biodiversity features.



The initiative aligns with the **European Green Deal** and the United Nations Sustainable Development Goals by promoting sustainable and regenerative infrastructure.



By reshaping how people move, work, and live, the Grand Paris Express **lays the foundation for a greener, fairer, and more resilient metropolitan future**.

### 3 | Recommendations & Conclusion – Integrated Environmental and Socio-Economic Insights for Sustainable Infrastructure

