

# Overcoming the issues in Cost-Benefit Analysis assessment of High-Speed lines in long-term scenarios

A Methodological Proposal

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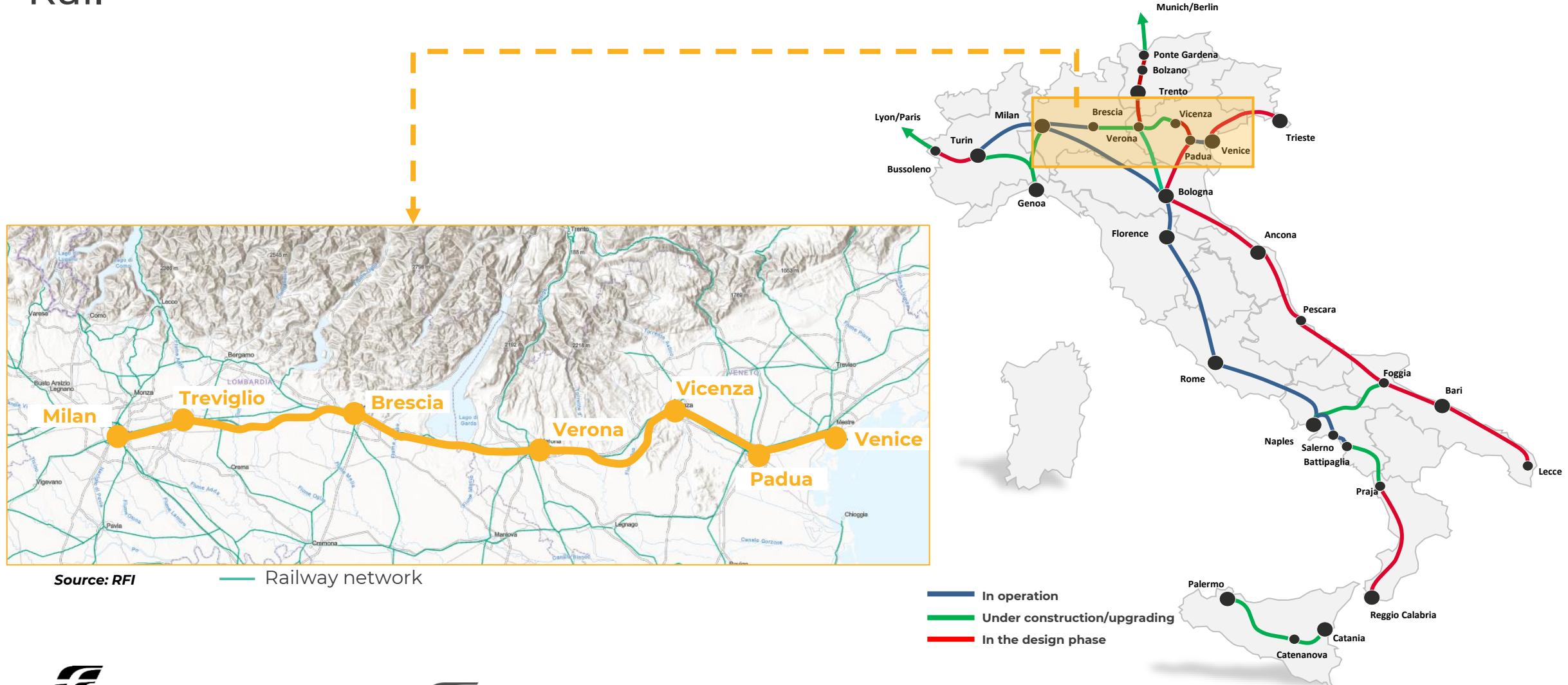
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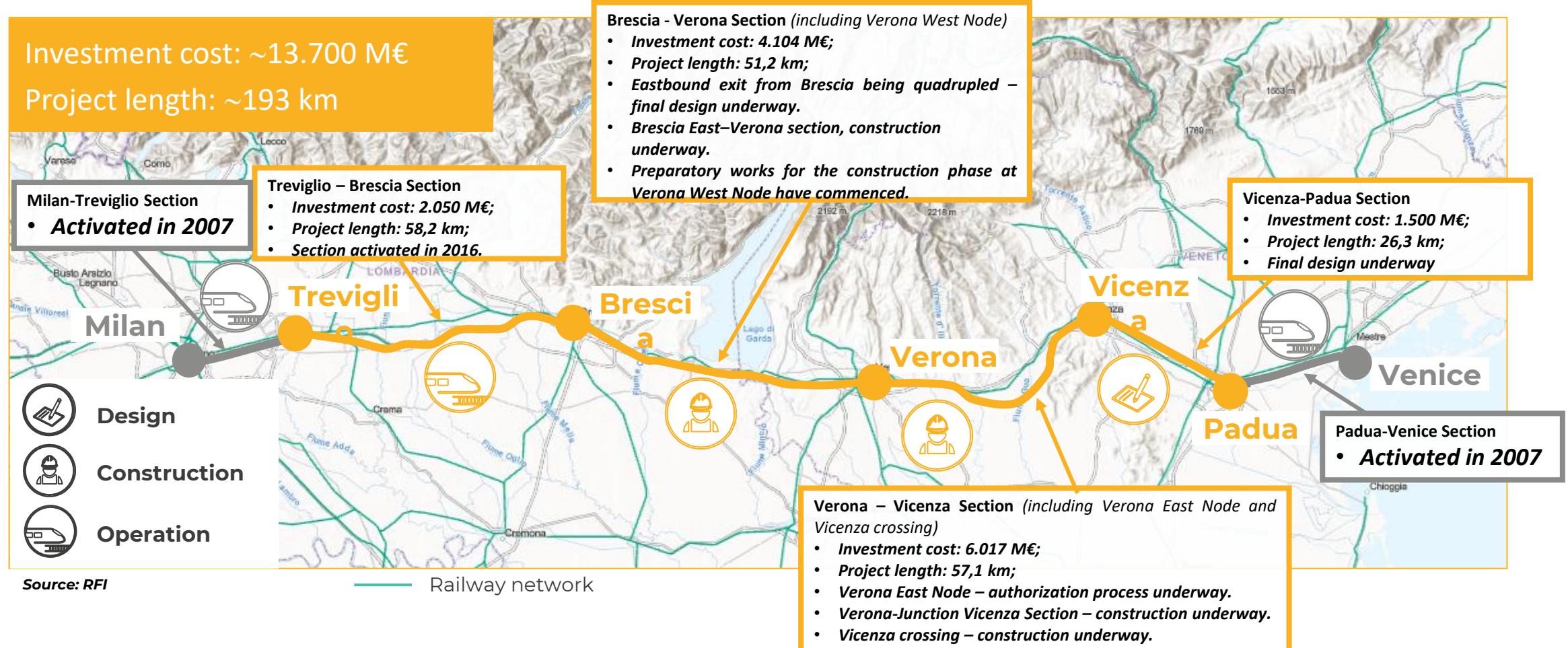
# Assessment of a new HS line implemented in consecutive construction lots

- The Italian HS network is integrated with the conventional network.
- The construction of a new HS line involves a substantial financial commitment, which, in a resource optimization perspective, is carried out in functional construction lots connected to the existing network.
- The design and construction timelines for the entire project, carried out in consecutive construction lots, are significant.
- Being a public investment, the project is subject to a Cost-Benefit Analysis that considers not only the design and construction period but also an operational period exceeding 50 years.
- Best practices recommend evaluating the entire new HS line rather than individual functional construction lots, following an approach that considers the so-called Global Project, capable of leveraging all the synergies of the new transport infrastructure.
- Preparing an economic and social assessment over a time horizon of around 80 years is complex due to the numerous variables that influence the mobility sector.
- In analyses covering such long-time horizons, the discount rate—Social Discounted Rate (SDR)—becomes particularly important.
- A methodological proposal has been put forward to reduce the SDR for this type of assessment, in line with the choices made by other European countries.

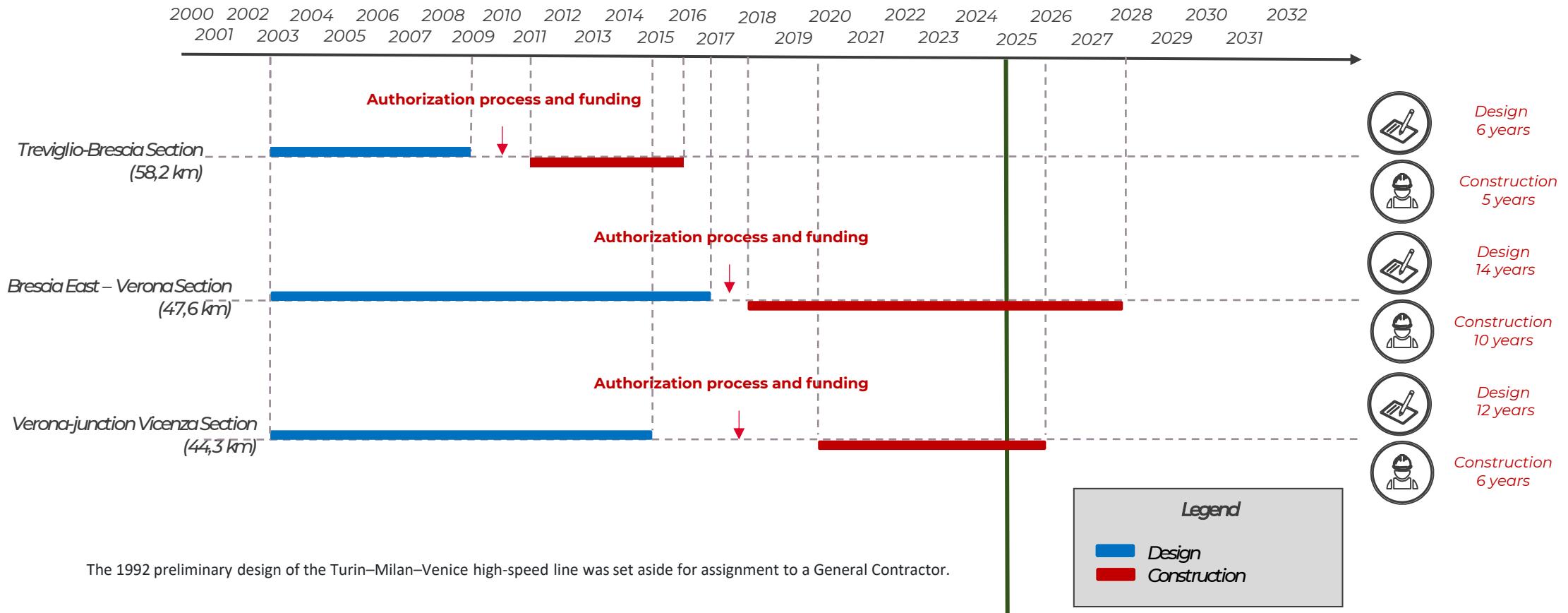
# The Milan–Venice corridor within the framework of Italian High-Speed Rail



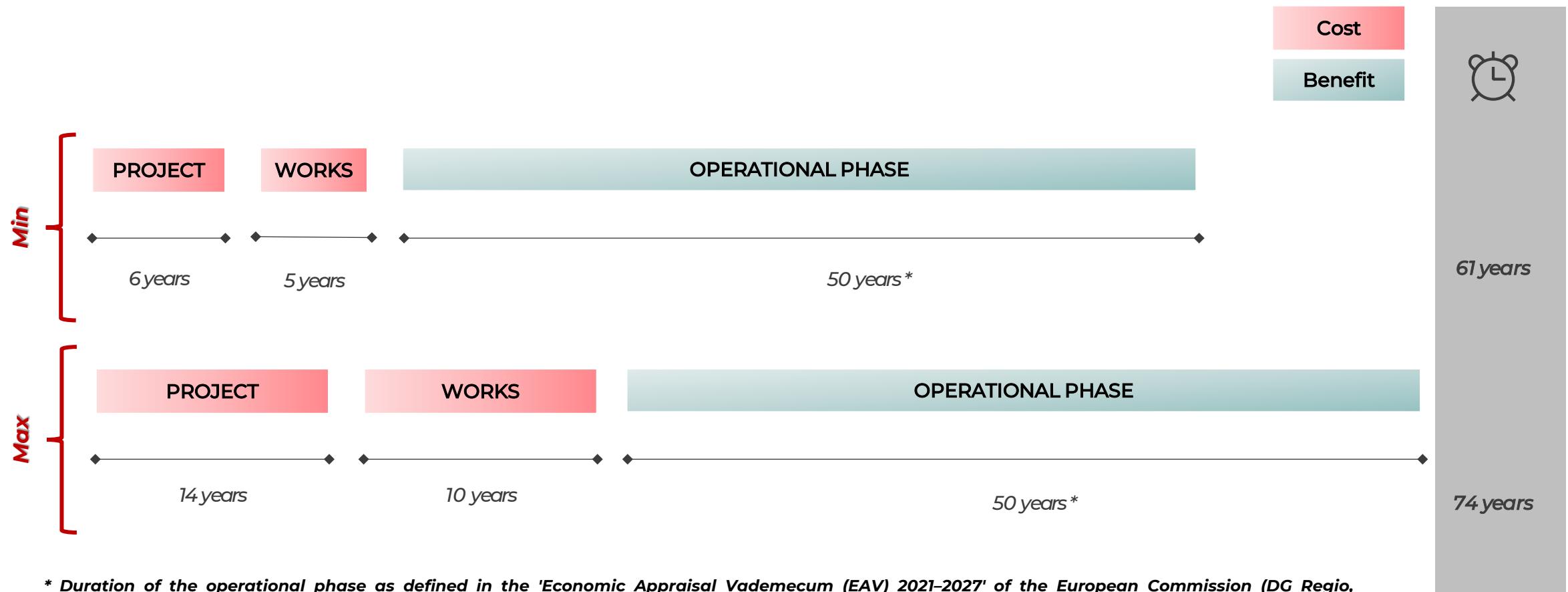
# In recent years, we have been working on the central section Treviglio–Padua



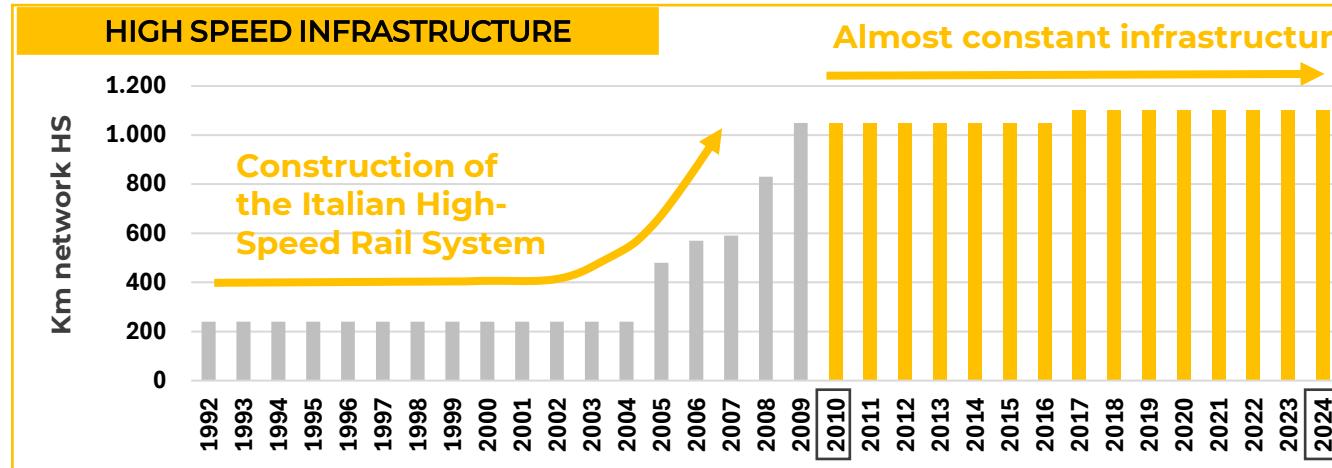
# Timeframes for design and construction of the most advanced sections (excluding nodes)



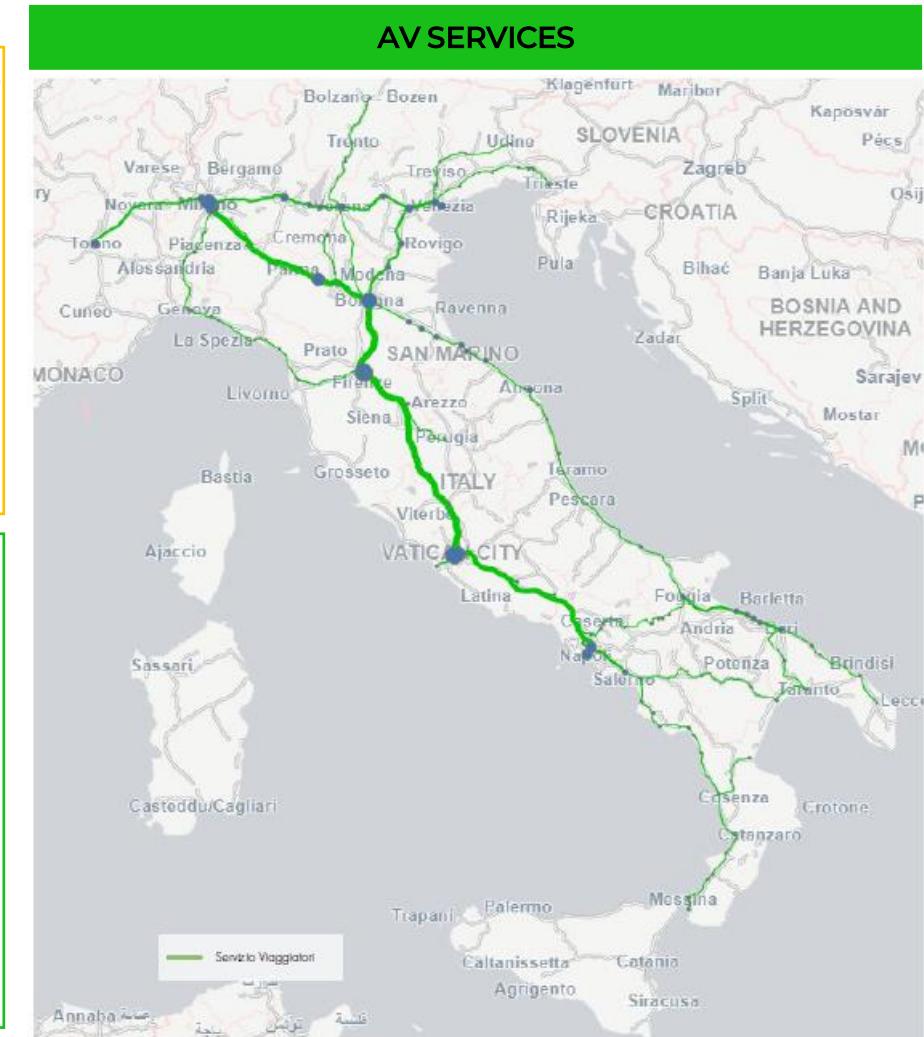
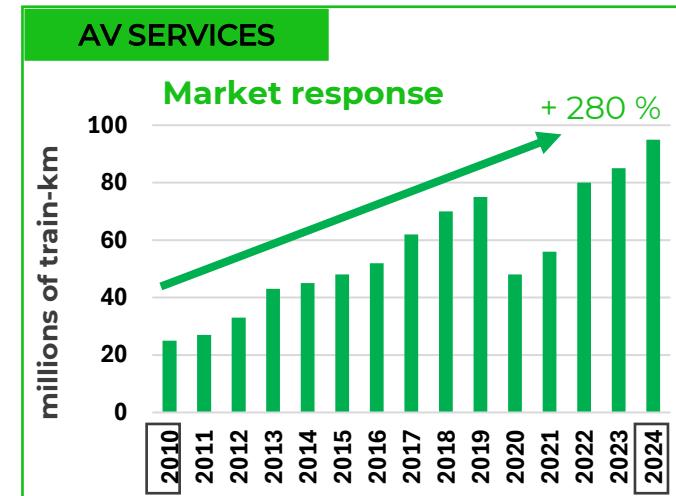
# Time horizon of the Cost-Benefit Analysis



# In addition: traffic response is gradual

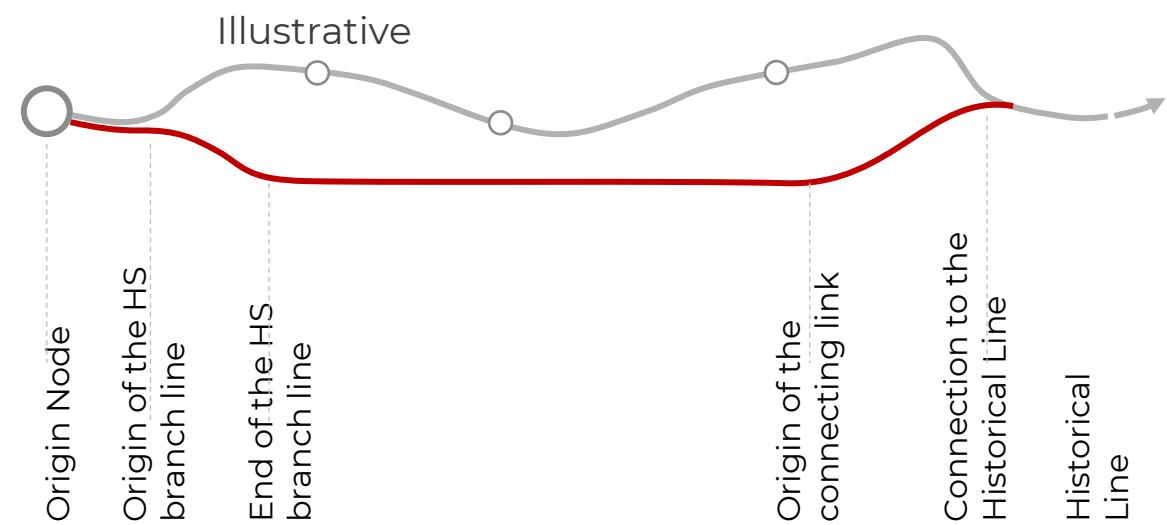
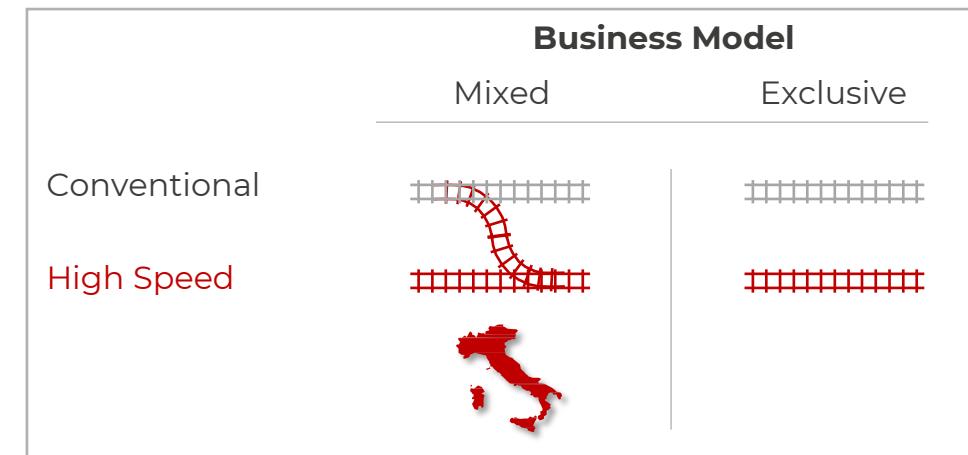


- Specialized high-speed services were introduced only once the HS network had achieved sufficient route development.
- It's interesting to note that market response has been increasing even more than 10 years after the completion of the high-speed rail network.



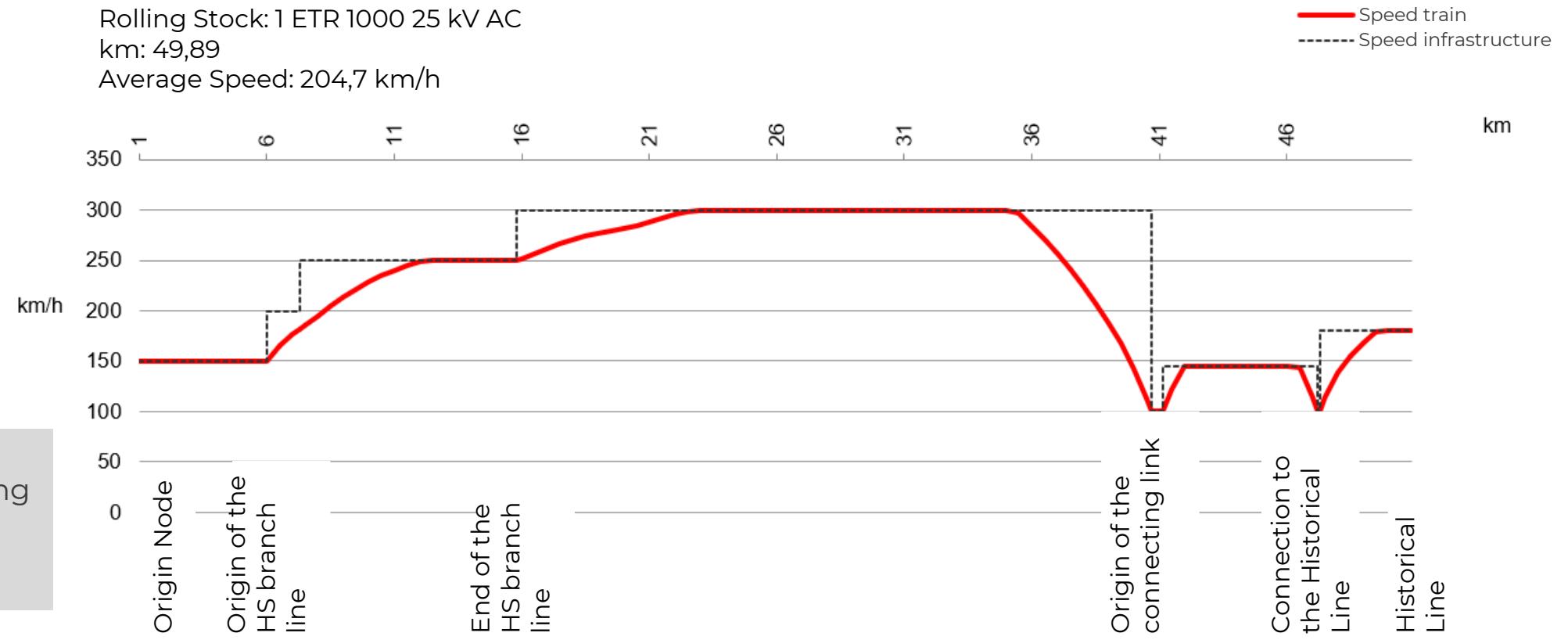
Source: RFI Commercial Plan, October 2024

# Future Developments of the HS Network in Italy – HS Model



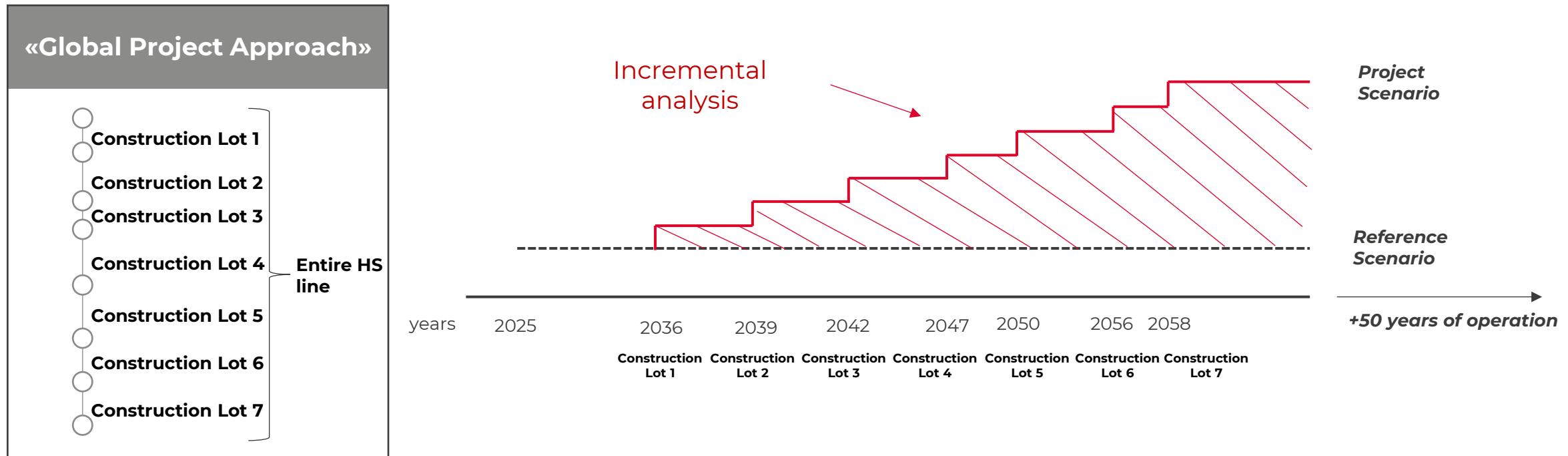
HS alignment – first construction lot

# The capacity benefits of quadrupling outweigh the reduction in travel times



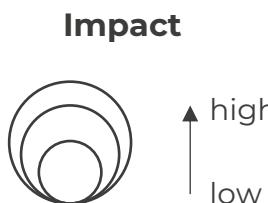
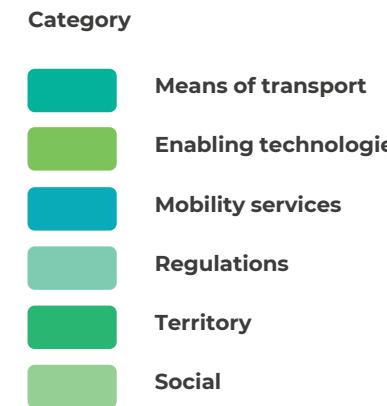
# Global Project Approach for the Evaluation of New Infrastructures

To capture all benefits of implementing a new HS line, the assessment scope includes the execution of all functional construction lots of the project

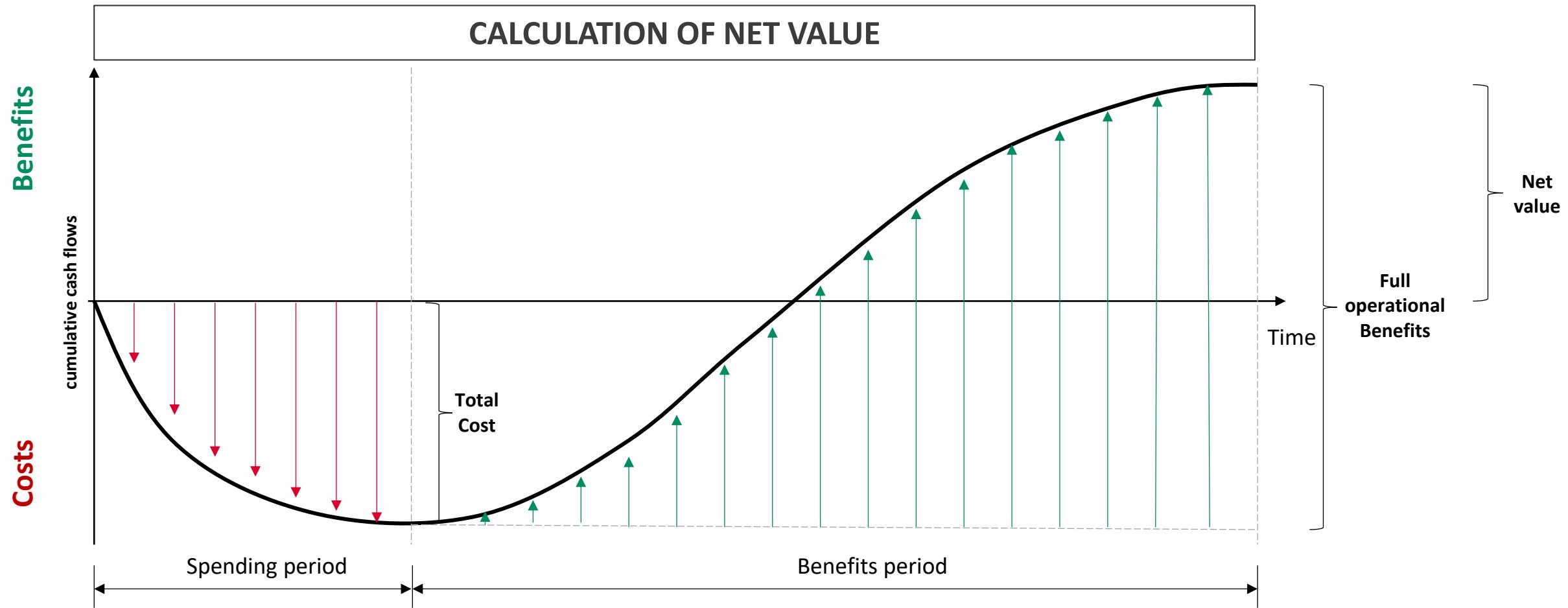


# Key trends affecting long-term mobility

- Envisioning the long-term future of passenger and freight mobility is one of the main challenges in the ongoing transition toward more sustainable social models and lifestyles.
- The complexity of the subject arises from multiple interactions among social, economic, political, and environmental aspects affecting a population with varying growth trends and patterns of urban concentration.
- This transition can be achieved by addressing mobility issues according to several major trends: urbanization, globalization, the new ecology, connectivity, safety, and health, within a cross-cutting approach that sees technology as the enabling factor.



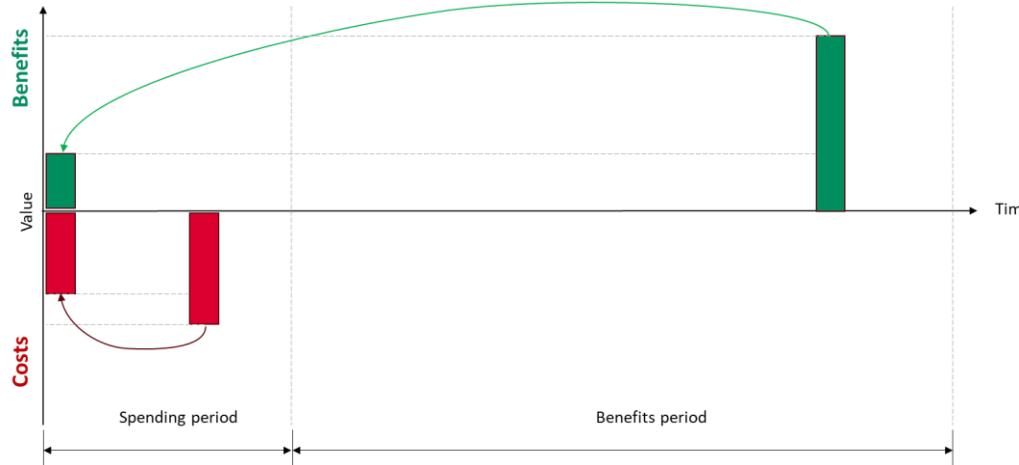
# Cumulative cash flow chart of a Cost-Benefit Analysis



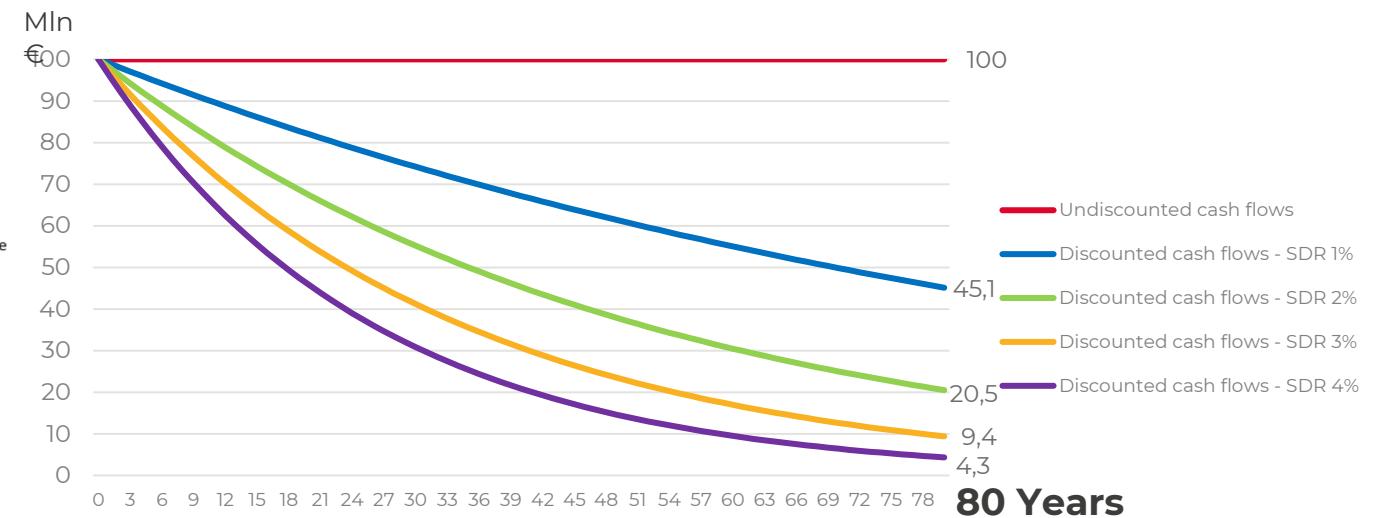
# Social Discounted Rate (SDR)

The Social Discount Rate (SDR) is one of the key economic parameters used in the ex-ante evaluation of the socio-economic performance of an investment project.

The SDR allows for the comparison of values at different points in time, typically by discounting future operational benefits and comparing them with investment costs.



Discounting process reduces the contribution of values that are further in the future.

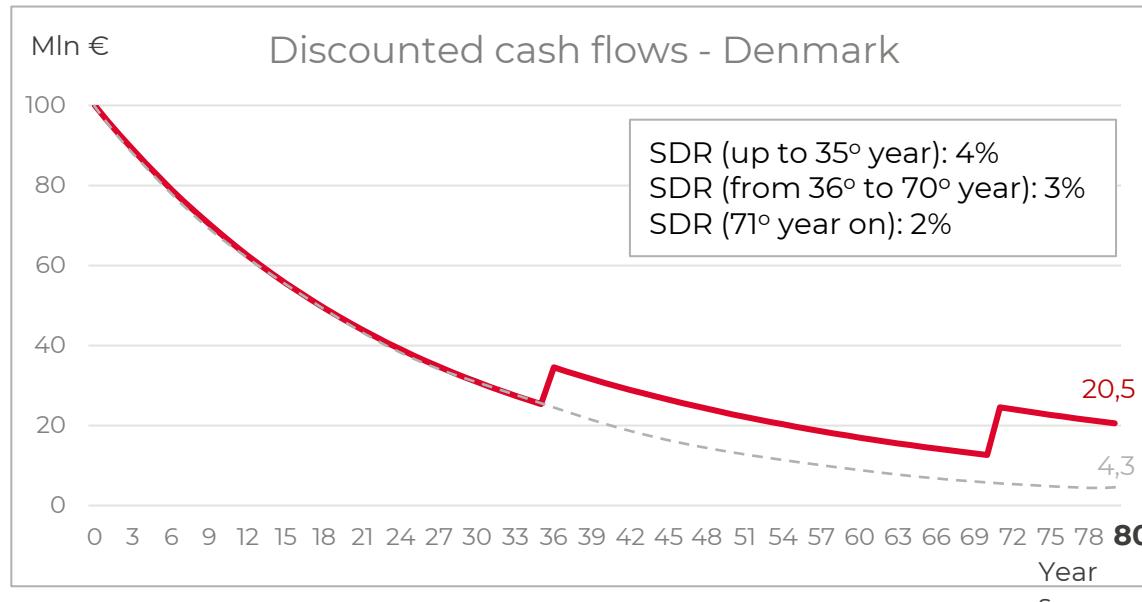


$$FC_t \frac{1}{(1+r)^t}$$

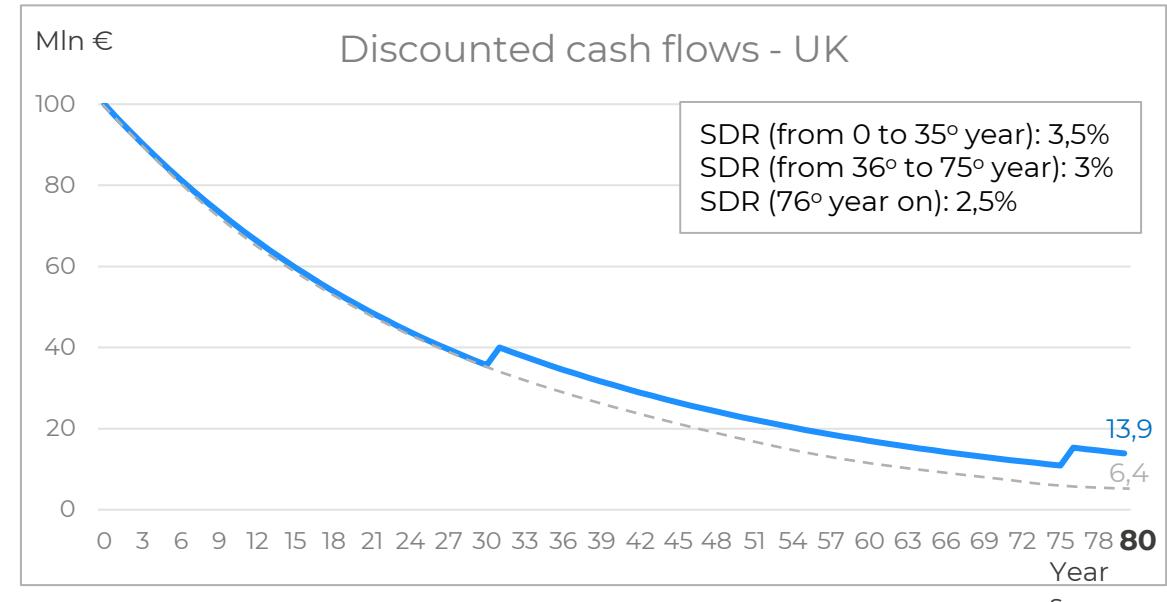
The higher the discount rate 'r', the lower the contribution of future values

# The SDR in the long term: case studies

Due to the high uncertainties in conducting long-term investment appraisals, some countries have adopted declining SDRs over time.



**Denmark:** SDR is set at 4% for projects with a 35-year analysis horizon (3% risk-free rate plus 1% risk premium). For projects exceeding 35 years, the rate decreases to 3% from year 36 to 70, and 2% from year 71 onwards.



**UK:** The discount rate follows HM Treasury (2022), set at 3.5% for years 0–30, 3% for years 31–75, and 2.5% from year 76 onward.

By applying progressively lower rates over time, long-term benefits can be more fully accounted for

# Conclusions

- We have reviewed the timeline of the Milan-Venice HS corridor, noting that the design and construction of a single construction lot typically spans a range of 10 to 25 years.
- The assessment also considers the operational period of the new project for at least 50 years, during which market response grows gradually.
- Best practices recommend assessing the entire line rather than individual sections, to fully capture the synergies between them.
- The time gap between initial investment costs and transport benefits is substantial: over 80 years.
- Over this time horizon, the Social Discounted Rate plays a decisive role: with an SDR of 3%, after 80 years an economic value of 100 (index) is reduced to less than 10.
- In such cases, a methodological proposal is put forward to gradually reduce the SDR over time, in line with the flexibility allowed by the European Commission and following the approach adopted by other European countries.

# Thanks for your attention

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