

Position Paper

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Hyperloop

Hyperloop – The initial CER position

For almost ten years, the hyperloop concept is subject to world-wide activities in which companies, researchers, and students are working in an open environment to advance the technology. The European Commission expects the emergence and wider use of hyperloop for passenger and freight services already in the near future.

Several institutional and corporate stakeholders of the European rail sector are directly or indirectly involved in ongoing hyperloop activities. They are focusing on areas of potential cooperation. However, there are also areas of potential conflicts between railways and hyperloop.

For the time being, it is still too early to elaborate a *final* CER hyperloop position as the possible implications are still not clear. In 2023, CER and its members will, therefore, reopen its internal discussions on the hyperloop concept to reflect again on this topic and to adjust its initial position by taking into account the updated knowledge available by then.

1. Introductory remarks

Hyperloop is described as a sealed tube with low air pressure through which pods travel almost free of air resistance or friction, powered and levitated by electromagnetic devices. These units are supposed to operate at aircraft speeds (up to 1'200 km/h), become more energy efficient than existing rolling-stock for high-speed rail and ensure CO₂ neutrality. Moreover, its operational system could allow for more flexibility compared to conventional rail services. Similar to the emergence of railways 200 years ago, hyperloop is said to have the potential of being a disruptive technology changing the way of transporting people and goods over medium to longer distances.

For almost ten years, the hyperloop concept is subject to world-wide activities in which companies, researchers, and students are working in an open environment to advance the technology. In November 2020, the first human trials were successfully carried out. Hence, public interest is increasing, and national and European institutions are closely following the fast-moving research, development and standardisation process. Commercial services for passengers and freight, possibly based on a totally new economic model, could become a reality relatively soon, possibly already by the end of this decade.

In its recently published Sustainable and Smart Mobility Strategy, the European Commission confirms the ambitious timeline. It expects the emergence and wider use of innovations like hyperloop already in the near future. As the European Commission strives to develop the EU as a prime destination for innovators, it intends to create an enabling environment supporting the piloting and deploying of game-changing technologies. This applies particularly to examples like hyperloop fostering fundamental transformation and pursuing the Commission's objectives for sustainability, digitalization, resilience, and accessibility.

At the moment, several institutional and corporate stakeholders of the European rail sector are directly or indirectly involved in ongoing hyperloop activities; either by co-funding them, by participating in ongoing projects, by acting as advisors, by hosting events like on the sidelines of the Innovation Days of the Shift2Rail Joint Undertaking in October 2020, or by launching standardisation work in CEN-CENELEC.

As the subject is gaining more and more importance, it is time for CER to take a closer look at the topic and outline its initial hyperloop position.

2. Areas of potential cooperation

The conventional rail system and the hyperloop concept have several characteristics in common, e.g.:

- Hyperloop and railways are both network industries relying on the provision of a fixed land-based infrastructure. In addition, both modes of transport are technical systems with a comprehensive and distinct interface between infrastructure and the units needed for service provision.
- Technical and operational regulation as well as standardisation is key in both cases to benefit from economies-of-scale, avoid isolated operations and/or costly retroactive harmonisation efforts. Both modes of transport could benefit from proactive cooperation and standardisation.. However, a balance must be found between establishing the necessary European regulatory framework on the one hand and encouraging innovation on the other hand.

- Given the intended travel range of hyperloop, both modes of transport may have a feeder function for each other and/or other modes of transport. Therefore, hyperloop terminals should be linked to the TEN-T core and comprehensive network and share urban nodes with other modes of transport like rail to meet an increasing demand for intermodal transport chains for passengers and freight.

Representatives of the rail sector have already been in contact with hyperloop project initiators to discuss topics like interoperability, standardisation, certification, authorisation, system safety requirements, risk analysis, sustainability, feasibility, and business cases. This bilateral sharing of information should be continued in the years to come as these exchanges may be beneficial for both sides. This applies particularly to two scenarios:

- Hyperloop infrastructure does not technically fit into existing rail infrastructure but can generate additional economic benefits to existing infrastructure.
- Parts of the hyperloop infrastructure can be obtained by upgrading the existing rail infrastructure (e.g. by using the so-called magrail technology) and by achieving additional economic benefits.

3. Areas of potential conflicts

In the second half of the 20th century, rail lost a considerable part of its market share to road transport. Motorway networks were developed – in some countries even by initially using the profits of the state-owned railway companies. Given the current financial status of the rail sector, such a shift of funds is rather unlikely. However, there are areas of potential conflicts between hyperloop and railways.

- The European Commission considers hyperloop a high priority. Against the backdrop of the Green Deal, the technology is predicted to have a great future. An internal task force has been set up covering several Directorate-Generals. For CER, these activities must not have a negative impact on the resources of ongoing regulatory projects for the rail sector.
- As a rule, hyperloop projects are currently based on private funding – similar to the situation of the railways in the 19th century. As soon as public support is deemed to be necessary, CER calls for a clear separation of funds to avoid that financial means dedicated for the rail sector are used to support proposals from hyperloop projects.
- The railways are complying with very strict safety requirements, resulting in railways being the safest mode of land transport. In the Legal Action Plan, accompanying the recently published Sustainable and Smart Mobility Strategy, the European Commission has announced to assess the need for regulatory actions to ensure safety and security of new entrants and new technologies, such as hyperloop, in 2021. CER asks for a level playing field as the safety record of public transport must not be impaired by granting simpler market access to a new technological concept – in particular when partly sharing a common infrastructure.
- The European Union Agency for Railways (ERA) and the Shift2Rail Joint Undertaking (S2R) have been set up to work for and to cooperate with the rail sector. However, both organisations are already involved in hyperloop activities. For CER, these activities shall not impede ERA's and S2R's mandates, as long as they remain unchanged and no additional resources are provided.

- In the last 40 years, Member States, European Institutions, private investors, and users have funded the construction and maintenance of high-speed rail infrastructure in Europe. In 2019, the length of lines achieved more than 9'000 km, and more lines are going to be inaugurated in the years to come. In its recently published Sustainable and Smart Mobility Strategy, the European Commission sets itself the target to double high-speed rail traffic by 2030. Compared to 2015, this would result in more than 200 billion passenger kilometres per year.

According to first ideas of ongoing hyperloop projects, commercial services are supposed to connect major European and/or national conurbations. In most cases, they are intended to operate in parallel to already existing high-speed rail infrastructure. To avoid another cannibalisation of land-based modes of transport, CER calls for transparent and fair economic evaluations of potential hyperloop projects by respecting all expected social costs and benefits – particularly the accounting values of existing rail infrastructure assets, and their respective contributions to network effects.

4. Conclusions

CER and its members are following ongoing discussions and activities on hyperloop with great attention. The new technology is still not ready for deployment as not yet mature enough. *While the activities are progressing at high speed, the first commercial services are not expected before ten years from now.*

Based on first analyses, there are areas of potential cooperation and areas of potential conflicts between hyperloop and railways. But it is – for the time being – too early to elaborate a *final* CER hyperloop position as the possible implications are still not clear, thus requiring further research activities and discussion. In its current state of maturity, CER believes it is not the opportune moment to take a pro-active role towards regulatory hyperloop provisions.

In 2023, CER and its members will therefore reopen the internal discussions on the hyperloop concept to reflect again on this topic and to adjust the initial position by taking into account the updated knowledge available by then.

About CER

The Community of European Railway and Infrastructure Companies (CER) brings together railway undertakings, their national associations as well as infrastructure managers and vehicle leasing companies. The membership is made up of long-established bodies, new entrants and both private and public enterprises, representing 73% of the rail network length, 76% of the rail freight business and about 92% of rail passenger operations in EU, EFTA and EU accession countries. CER represents the interests of its members towards EU policy makers and transport stakeholders, advocating rail as the backbone of a competitive and sustainable transport system in Europe. For more information, visit www.cer.be or follow [@CER_railways](https://twitter.com/CER_railways) on Twitter.

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