



# HYPERLOOP **TT**

Comments of Hyperloop Transportation Technologies, Inc.  
to the United States Department of Transportation, Office of the Secretary  
Docket No. DOT-OST-2019-0165  
Request for Comments  
on Non-Traditional and Emerging Transportation Technology (NETT) Council

January 10, 2020

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Hyperloop Transportation Technologies, Inc. (HyperloopTT) respectfully submits these comments in response to the Request for Comments (RFC) in this docket, published at 84 Federal Register 65214 *et seq.* (November 26, 2019).

In this docket the Office of the Secretary of Transportation requests comments on matters relevant to the work of the Non-Traditional and Emerging Transportation Technology (NETT) Council, an internal body at the U.S. Department of Transportation (USDOT) that focuses on issues concerning new transportation technologies, including federal transportation laws or regulations that inhibit innovation by creating barriers to the advancement of transportation technologies.

## Introduction

Transportation defines our human experience: where we live, where we work, and how we connect. Traffic congestion, poor air quality, and rapid urbanization are a few of the many concerns surrounding existing modes of transportation, as well as expected growth in cities and regions across the United States.

Hyperloop is a tube-based inter and intra-city transportation system that moves people and goods at airplane speeds safely, efficiently, and sustainably. Passenger and cargo capsules levitate inside a tube using next-generation passive magnetic technology and a linear electric motor. By creating a low-pressure environment inside the tube using vacuum technology, friction is considerably reduced allowing for not only faster speeds, but a safer, cleaner and quieter form of energy-efficient transport.

The hyperloop system is ecologically sustainable and low impact. Renewable energy provides power to the system, which is designed to be net-energy positive over a year of operation.

Hyperloop leverages its innovative design to reduce up-front capital expenditures as well as operational costs. Lower construction and operation costs translate directly into less expensive life cycle costs. Together these advantages create a profitable mobility solution.

Three main factors enable hyperloop to provide ultra-high-speed transport at substantially lower costs than other high-speed ground transportation alternatives.

**Energy** | By using a passive magnetic levitation system, not only are the capital costs for the corresponding linear infrastructure lower than active magnetic levitation systems, but propelling the hyperloop requires far less electricity than conventional maglev systems.

**Enclosed Environment** | By enclosing the system and lowering air resistance, energy use is reduced, maintenance needs are reduced, environmental factors eliminated, and interaction with weather, road and rail traffic, pedestrians, and wildlife removed.

**Autonomy** | The system operates autonomously, which increases safety and reduces operating costs.

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With commuting between metropolitan areas no longer a barrier to economic independence, this fifth mode of transportation provides solutions for affordable housing and job commuting while enhancing personal lives in an environmentally sustainable manner.

Hyperloop Transportation Technologies Inc. (HyperloopTT) is a transportation and technology innovation, and systems integration company focused on realizing the hyperloop. Through the use of unique, patented technology and an advanced business model of lean collaboration, open innovation and integrated partnership, HyperloopTT is creating and licensing technologies, and all the other means, that allow infrastructure operators and transportation operators to build and operate the hyperloop.

Several projects are currently in pre-construction phases globally including the Great Lakes Region connecting Cleveland, Chicago and Pittsburgh; Abu Dhabi, UAE; and others. A full-scale HyperloopTT test track has been constructed in Toulouse, France, where our technologies are currently undergoing testing and certification.

More information can be found at [www.hyperlooptt.com](http://www.hyperlooptt.com).

## Responses

In support of the tube-based transportation industry, we are pleased to offer responses to the questions presented in the RFC as follows:

1. Are there existing Federal transportation laws or regulations that inhibit innovation by creating barriers to testing, certifying or verifying compliance, or operating non-traditional and emerging transportation technologies? Please provide specific examples, explain why the requirement imposes a barrier, and identify the specific law or regulation that you believe should be changed and describe how it should be changed. Please identify all associated regulations that should be changed, including specific citations to the Code of Federal Regulations and explain the need for the change.
  - HyperloopTT does not believe that new rulemaking is needed on specific topics for safe construction or operation of a hyperloop system as we envision it. Based on the TUV-SUD guidelines presented to USDOT we believe that hyperloop technology can be safely regulated using a thoughtful combination of existing laws, regulations, and standards. After USDOT review, we suggest that assurances from NETT Council and USDOT be provided that address, and if appropriate agree, with this approach. We also suggest that USDOT advise on the regulatory body that will provide the review or assist in coordinating across the multiple administrations (e.g. FRA/FHWA/FAA) to agree on who is responsible for what.
2. Are there existing design or performance requirements that may contribute to a reduced safety purpose or impose more cost or restriction on the design of non-traditional and emerging transportation technologies than is warranted?
  - Applied correctly we do not foresee any sacrifice in safety, performance, or cost to implement and operate a hyperloop system in order to comply with existing laws,

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regulations, and standards. If all elements of FRA regulations are imposed, however, then we could end up with a heavier than necessary capsule with headways that are much too long. Or, as an example, if we follow automated people mover (APM) standards, we would need a manual control console with a steering wheel inside the capsule which is not currently needed in conjunction with our fully-automated system.

3. If you identified a barrier to innovation in response to Question 1 or 2, above, can this barrier be removed or mitigated without resorting to additional rulemaking? If rulemaking is necessary, please identify all associated regulations that should be changed, including specific citations to the Code of Federal Regulations and explain the need for the change and how safety will not adversely be impacted.
  - As indicated above, HyperloopTT does not believe that new rulemaking is needed on specific topics for safe construction or operation of a hyperloop system as we envision it. Based on the TUV-SUD guidelines presented to USDOT we believe that hyperloop technology can be safely regulated using a thoughtful combination of existing laws, regulations, and standards.
4. If you identified a barrier to innovation in response to Question 1 or 2, above, is legislation necessary to remove or mitigate that innovation barrier? Please identify the barrier with specificity, explain why it is a barrier, and identify the specific law that you believe should be changed. Please describe how it should be changed and why there will be no adverse impact to safety.
  - Applied correctly we do not foresee any barrier to innovation or sacrifice in safety, performance, or cost to implement and operate a hyperloop system in order to comply with existing laws, regulations, and standards.
5. Do you believe that there are international bodies or organizations (at any level) that the Department should be working with to develop standards or best practices for potential application to non-traditional and emerging transportation technologies in the United States?
  - Initially we would suggest collaboration with the European Commission (EC) to whom we have presented our “Generic Guidelines for Design, Operation and Certification of Hyperloop Applications,” prepared by TUV-SUD. The EC is leading the European efforts with their Transportation unit, “DG Move,” that is currently coordinating all hyperloop initiatives on standardization and safety with:
    - o Current hyperloop promoters
    - o European Union Member States who have expressed serious interest in hyperloop (approximately 16 out of 27 members)
    - o All related European organizations and other ED directorate-generals (such as DG Grow and the DG for R&D) and the EC Joint Research Unit
    - o Shift2Rail, the joint undertaking for modernizing the European railways sector
    - o Foreign standardization bodies in the U.S. (USDOT) and India
    - o European regulatory bodies for railways (ERA) and aerospace (EASA)



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- In the United Arab Emirates (UAE), we suggest the Federal Transport Authority – Land and Marine.
  - For Australia, we suggest collaboration with the Department of Infrastructure, Transport, Cities and Regional Development and its Office of Future Transport Technology that has developed Australia’s National Policy Framework for Land Transport Technology.
6. Does the current landscape of State/local/Tribal regulation for non-traditional and emerging transportation technologies hinder or support innovation? More specifically:
- a. What laws or regulations do State, local, or Tribal governments rely upon, other than Federal transportation laws and regulations, to regulate the safe design, construction, and operational safety of non-traditional or emerging transportation technologies (e.g., hyperloop and non-traditional tunneling)? In what ways do these laws or regulations hinder or support innovation? (Please be specific in your response.)
- Given a comprehensive evaluation of existing rules and regulations at the federal level, and our view presented above that HyperloopTT does not believe that new rulemaking is needed on specific topics for safe construction or operation of a hyperloop system as we envision it, we do not see the need for individual states or local governments to duplicate or modify federal efforts. Indeed, for projects with interstate common carrier status potentially onerous state or local regulations could result in unintended consequences such as interstate trade restriction.
- b. Are there State/local/Tribal occupational license regimes that govern the safe conduct of operators of non-traditional or emerging transportation technologies? Do they hinder or support innovation?
- We are not currently aware of any such occupational license regimes.
- c. Are there State/local/Tribal laws that assist innovators in developing safe prototypes, road testing, deploying, or commercializing new transportation technologies? (Comments on regulatory gaps or feasibility studies and analyses are encouraged.)
- We are aware of several states and local governmental agencies that cooperatively assist in development or commercialization of new transportation technologies including state DOTs (e.g., Ohio DOT) and Metropolitan Planning Organizations (MPOs) (e.g., Northeast Ohio Areawide Coordinating Agency – NOACA). This assistance is generally limited to technical and economic feasibility studies and conceptual engineering often as part of a Public-Private Partnership (P3) with private sector partners.
7. Would intermodal or cross-sector regulations support or inhibit innovation and ensure safety of transportation infrastructure, as well as the safe movement of goods, services, capital and the

traveling public? Please explain why or why not. Include specific examples, studies, or other data if available.

- There may be a need to foster or encourage greater collaboration among intermodal or cross-sector operations recognizing that streamlined development, reporting and operational practices will result in more efficient and cost-effective services to the public.
8. Would cross-sector or cross-modal transportation safety regulations support or inhibit investments in non-traditional and emerging transportation technologies? Please explain why or why not. Include specific examples, studies, or other data if available.
- Ambiguity in the regulatory landscape is foreseen as a risk to investment and implementation of innovative transportation technology projects. A clear view on this will serve to help mitigate the risks for private investment.
9. How can Federal policies, regulations, or legislation be used to foster mobility service providers, remove barriers to new non-traditional and emerging transport operations, or promote safe, efficient, environmentally sound and user-friendly mobility systems? Please explain, using specific examples where feasible.
- Ambiguity in the regulatory landscape is foreseen as a risk to investment and implementation of innovative transportation technology projects. A clear view on this will serve to help mitigate the risks for private investment.
  - Enabling and allocating funding toward hyperloop feasibility studies, environmental studies and development would help accelerate this non-traditional and emerging transport operations in a safe, efficient, environmentally sound and user-friendly mobility system.
10. Technology Companies/Innovators: What standards or code of conduct are relevant to ensuring a balance between supporting innovation and ensuring the safety of transportation infrastructure and the traveling public?
- Independent evaluation of safety systems, controls, and related integrated technology with a prescriptive evaluation schedule would provide assurances sufficient to ensure public health and safety of transportation infrastructure and the traveling public.
11. Technology Companies/Innovators: What actions can the NETT Council take to support your work, while maintaining its safety focus?
- In the early stages of a potential project, after a comprehensive technical and economic feasibility study has been completed, the NETT Council could provide valuable assistance by mapping and guiding the project through the subsequent development and licensing steps and to streamline this regulatory pathway.

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- a. At what point in the development of the technology or operation would it be ideal to interface with the NETT Council?
    - In our view a potential project should complete a comprehensive technical and economic feasibility study prior to interface with NETT Council, to qualify a project for possible federal support or oversight.
  - b. Considering the resource constraints and the potential cross modal nature of non-traditional and emerging transportation technologies, would an on-going relationship with the NETT Council during the development and construction of your project be helpful to assess potential safety risks and unintended consequences be helpful? If so, how often should engagements occur?
    - In our view an on-going relationship with NETT Council during development and construction of a project is essential to developing a knowledge base applicable to future projects in terms of actual development timelines, project and unit costs, optimization of means and methods of construction, and overall communications with stakeholders during the development and construction phases.
12. Local, State, Tribal, and Other Public Entities: What support should the NETT Council consider providing when non-traditional/emerging transportation technology companies propose a non-traditional or emerging transportation technology or system in your jurisdiction?
- N/A
  - a. In what way could Federal action help maintain the overall safety of the design, construction, and operation system? What aspects do you believe are best addressed by State, local, and Tribal entities? Please provide specific examples to support your comment.
    - N/A
  - b. In what way could Federal actions assist you in overseeing any risks (safety or other) and unintended consequences that are local in nature? In what way could they interfere with your oversight and enforcement authorities? Please provide specific examples to support your comment.
    - N/A
  - c. In what way could Federal actions improve or clarify oversight roles? Please provide specific examples to support your comment.
    - N/A
13. Local, State, Tribal, and Other Public Entities: Has a company approached you about a non-traditional or emerging transportation technology? If so, are there any best practices you

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can share from working with companies that could shape how the NETT Council approaches non-traditional or emerging transportation proposals?

- N/A

## Conclusion

In February 2018, the Northeast Ohio Areawide Coordinating Agency (NOACA) signed an interagency agreement with the Illinois Department of Transportation as a partner on the Cleveland to Chicago Feasibility Study. NOACA and HyperloopTT then entered into a public private partnership (P3) to complete the technical analysis and evaluation of a Cleveland, Ohio to Chicago, Illinois corridor, later incorporating an extension into Pittsburgh, PA, known as the Great Lakes Hyperloop Feasibility Study (GLHFS).

The project has many collaborating partners such as: Indiana Toll Road, Federal Highway Administration, NASA, Eastgate Regional Council of Governments, Erie Regional Planning Commission, Southwestern Pennsylvania Commission, Team NEO, and Toledo Metropolitan Area Council of Governments. In addition, as part of this initiative, a growing number of regional stakeholders formed the Great Lakes Hyperloop Consortium. Together there are 80 entities organized to forward the hyperloop conversation.

The GLHFS was completed in December 2019. The final draft forecasts that hyperloop will offer tens of billions of dollars to the economy along the Chicago-Cleveland-Pittsburgh corridor. These direct benefits, and the added value associated with greatly reduced travel times and greatly increased economic opportunities, show that hyperloop provides an unprecedented advantage to the public.

Between 2025-2050, along this corridor, it is estimated that over 900,000 jobs will be created on the supply side of the economy.

TEMS, the third party economic consultant hired by NOACA, also projects a 38% increase in regional property values along the HyperloopTT corridor which is two times what it costs to build the project. Further, TEMS' analysis shows increases in Federal Taxes of over \$9B, not including an added \$3.4B in state and local taxes.

In addition, hyperloop can also absorb the forecasted traffic growth in the corridor with room to spare, thereby avoiding future costs of highway expansion. Plus, the projected decrease in CO<sub>2</sub> emissions from using hyperloop is equivalent to reducing Cleveland's recent annual emissions by 45% or taking 30 million cars off the road.

With a hyperloop ultra-high speed transportation system, users can enjoy safe, secure, fast transportation that is not only good for their regional economy, but good for their environment as well.

HyperloopTT is honored to be working alongside the NETT Council, and we thank you sincerely for the opportunity to collaborate, and be of assistance as we all look to bring the fifth-mode of transportation to fruition in the United States.