

3. Pune-Mumbai Hyperloop Project

Prelims Level: Newer Invention

Mains Level: GS-III Science and Technology - developments and their Applications and effects in everyday life Achievements of Indians in Science & Technology; Indigenization of Technology and developing New Technology.

Why in News?

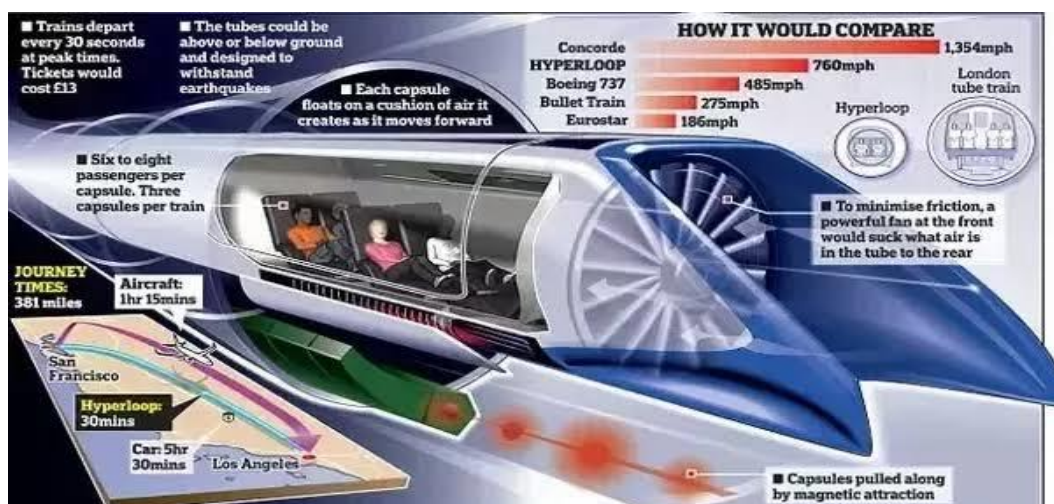
- The proposed Pune-Mumbai Hyperloop project, an ultra-modern transport system may be scrapped by the State Government.

About Hyperloop Project:

- It is a transportation system where a pod-like vehicle is propelled through a near-vacuum tube connecting cities at speeds matching that of an aircraft.
- The hyperloop concept is a brainchild of Tesla founder Elon Musk.
- This ultra-modern transport system will reduce the travelling time between the two cities to 25 minutes from 2.5-3 hours.
- The state has expressed reservations about the project that was still in its experimental stage, and had not been “implemented anywhere in the world”.

How it is Operated?

- In hyperloop transportation, custom-designed capsules or pods are expected to zip smoothly through continuous steel tubes which are held at partial vacuum.
- The pod which sandwiches the passenger compartment between an air compressor upfront and a battery compartment in the rear is supported by air caster skis at the bottom.
- The skis float on a thin layer of air provided under high pressure, eliminating rolling resistance and allowing for movement of the pods at high speeds.



- These capsules are expected to be driverless with estimated speeds of 1,000 km/h.
- Linear induction motors that are placed along the tube control the speed of the pod.
- Electronically-assisted acceleration and braking determines the speed of the Capsule.

What are the Challenges Faced by Hyperloop?

- **Constructing a Tube Hundreds of Kilometres long** would be an engineering marvel in of itself.
- Small scale experiments reveal the fundamentals of the idea are sound. Although, in the real world, there are tens of thousands of kilograms of **atmospheric pressure which threatens to crush any Vacuum Chamber.**
- There is also the problem with thermal expansion which threatens to buckle any large structure without proper thermal expansion capabilities.
- The Hyperloop would also be stupendously expensive. There are many unavoidable problems facing the Hyperloop that threaten the structural integrity, and every human life on board. The problems can be addressed, but at a great cost.

