Hyperloop Technology Assessment

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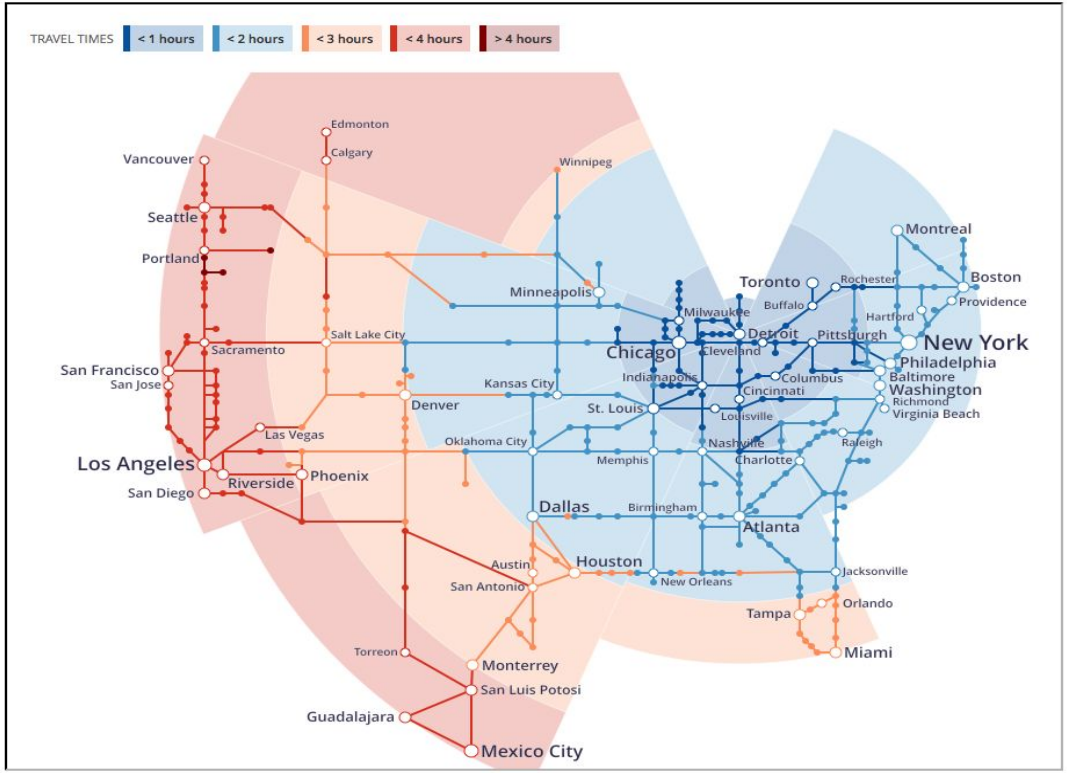


Background Information

In 2013, Elon Musk imagined a new transportation system; the **Hyperloop**. Faster, safer, more convenient.

Tubular Pipeline Structure held up by pylons.

700 mph speed

80% of U.S within 5 hours travel time

Vacuum Technology- high pressure and magnets to propel pod

20-30 people per train. (3 pods)

Problem Induced Vantage Point

Environmental Problems: Carbon based fuels contributing to greenhouse effect.

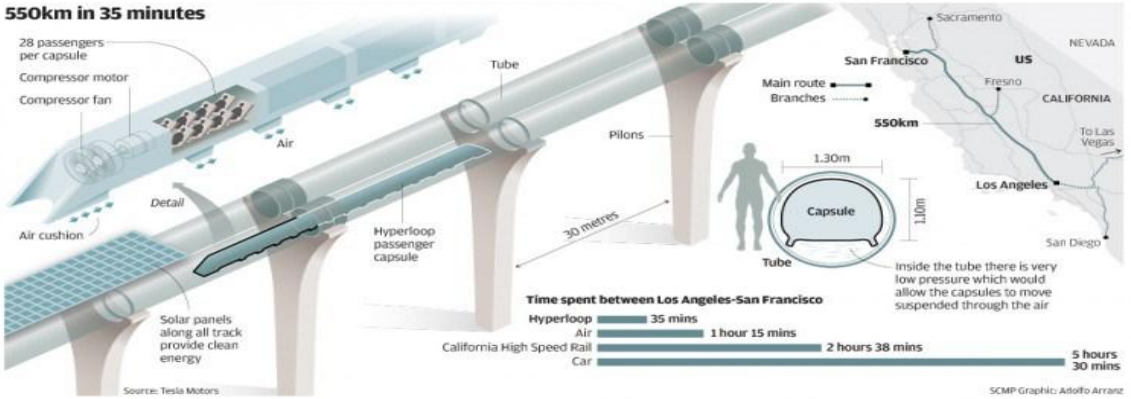
-Dependability and reliance on certain countries

Time is becoming more valuable

-Reduced driving time results in more productivity

-Accomplish more in less time

Technology Induced Vantage Point



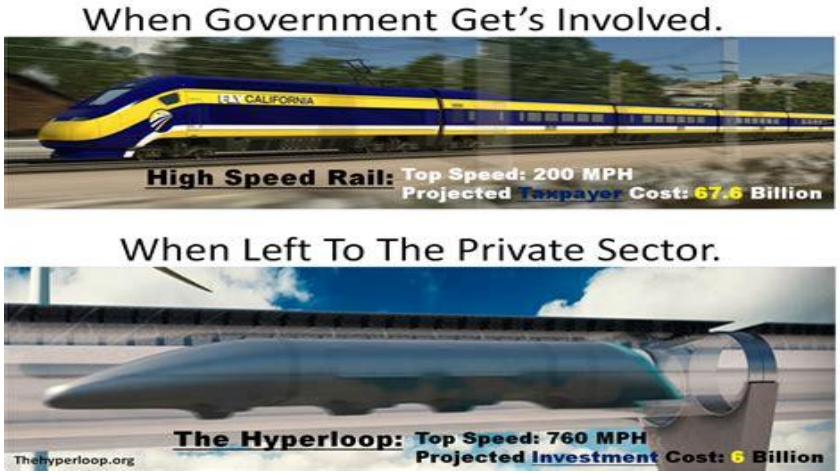
The impact of the Hyperloop on society and natural environment

-Autonomy (society will be calculable, measurable, and predictable)

-Potential for 100% clean energy transportation system (store energy as compressed air)

-Growth (people will move towards “hubs”)

Proposer's Vantage Point



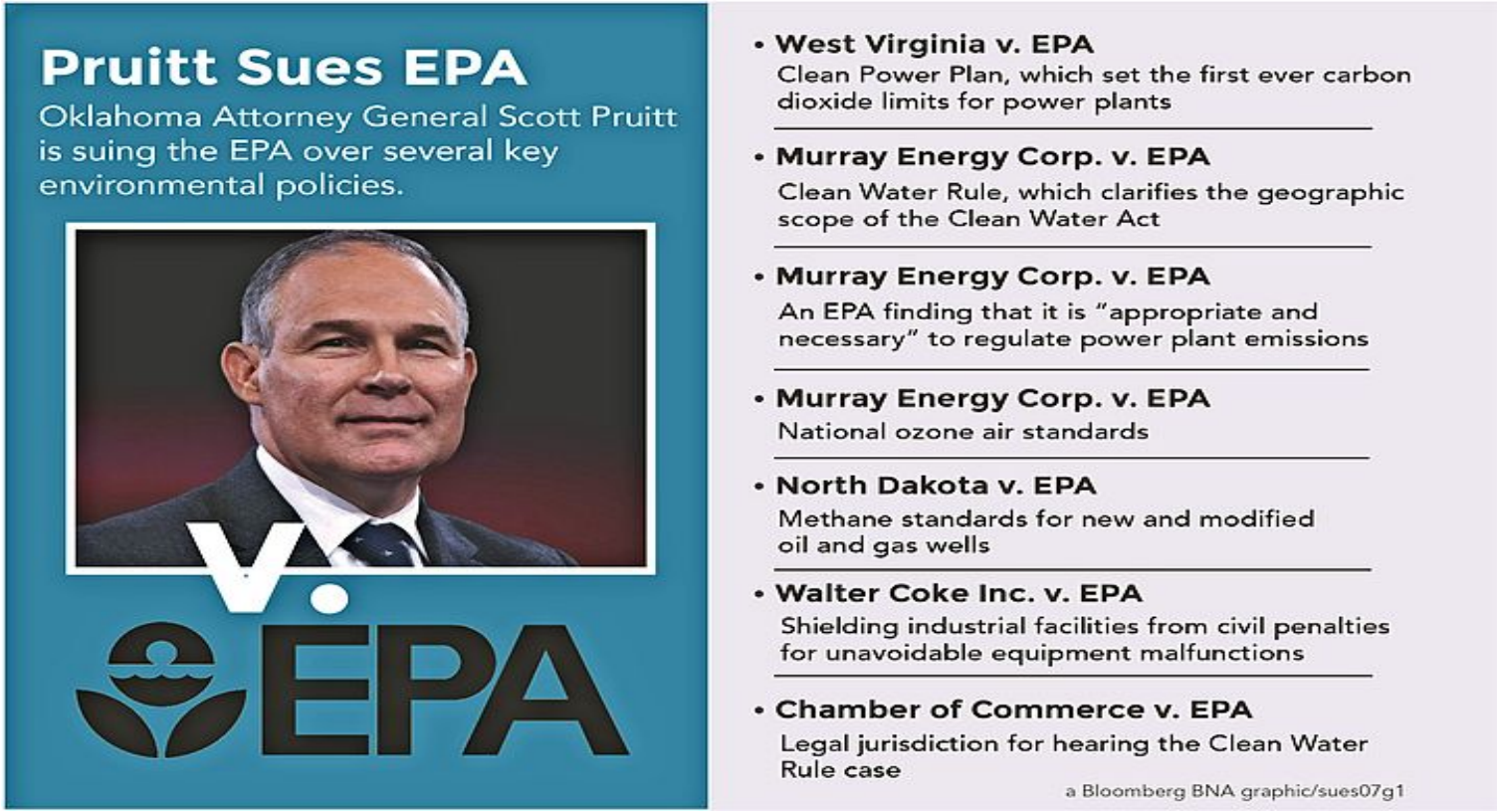
- Reduce travel times
- Increase economic growth
- Cut costs (production/operation)
- Reduce carbon based fuel dependency
- Provide thousands of jobs for a new industry
- Cheaper compared to alternate methods ($60 round trip LA to San Fran) ($90 LA to Las Vegas)
- It's *$60 for 766* total miles with the Hyperloop and *$89 for 460* total miles with the bullet train.
- Safety (doesn't fall out of the sky) If you take away at-grade crossings, pilot error and weather, you eliminate roughly **90% of rail accidents.**
- Above ground, below, underwater capabilities.

Competing Technology & Innovation

- Bullet Train is most closely related.
  - In CA, New York-based Parsons Brinckerhoff, estimated that the cost of building the first phase of rail from Burbank to Merced had risen 31% to $40 billion. And it projected that the cost of the entire project would rise at least 5%.
    - Public Opinion emphasized the fact that costs had nearly doubled the proposed 33 billion dollar budget
- Hyperloop: A passenger-only edition costs **$6 billion. (7.5 B for passenger plus)**
  - The Hyperloop as a whole is projected to consume an average of 28,000 hp (21 MW)
    - A solar array covering the entire Hyperloop is large enough to provide an annual average of 76,000 hp (57 MW)
- Tunneling cost estimations are estimated at $50 million per mile (Boring Company)

Economics & Politics

- The economic growth that would come as a result of the Hyperloop is astronomical
  - The passenger plus vehicle version of Hyperloop is including both passenger and cargo capsules and the total cost is outlined as $7.5 billion USD
- 1. San Diego, California:
  - a. Connects to Los Angeles, California main station.
  - b. Capsule departures every 5 minutes.
  - c. Transports around 3 million people per year.
- 2. Las Vegas, Nevada:
  - a. Connects to Los Angeles, California main station.
  - b. Uses a portion of the San Diego branch route near Los Angeles and tube branches near San Bernardino, California.
  - c. Capsule departures every 8 minutes.
  - d. Transports around 1.8 million people per year.
- Political Standing currently suggests that carbon based fuels will be used regardless of environmental effects
  - The United States consumes more energy from petroleum than from any other energy source. In 2016, total U.S. petroleum consumption was about 19.7 million barrels per day (b/d), the equivalent of about 37% of all the energy consumed in the United States.



14 total lawsuits filed against the EPA before his appointment

Environment & Sustainability

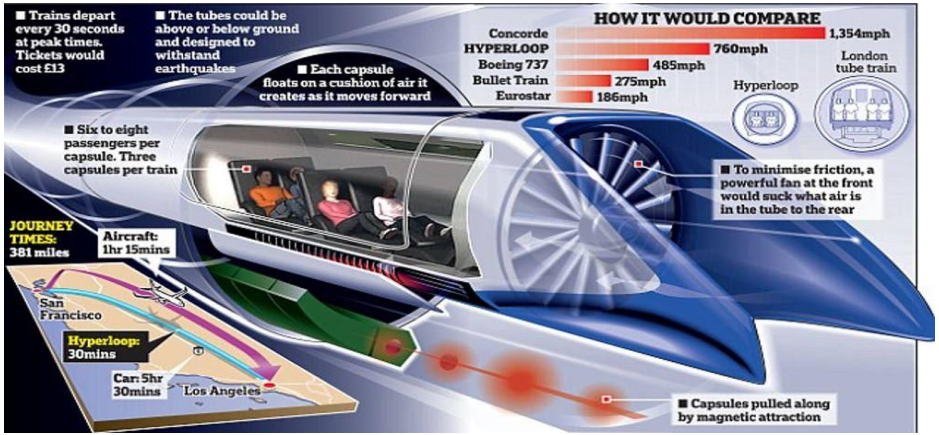
- Construction of tubes can disrupt ecosystems.
    - Local geographical constraints, including location of urban areas, mountain ranges, reservoirs, national parks, roads, railroads, airports, etc. The route must respect existing structures.
        - Pylons in different sizes lift the tube off the ground 25-100 meters in certain cases.
- Solar panel implementation and growing efficiencies of such technologies will allow for minimal operation and maintenance costs.
- Reduction of dependency on carbon based fuels could spark an urban planning revolution throughout the United States
    - Design based on Hyperloop routes could reduce the need for the freedom that comes with the automobile

Forecast

- Direct Effects include
  - Positive:
    - travel times and concurrent increased volume of transportation
  - Negative
    - Reduced freedom of having a car
- Indirect Effects
  - Positive
    - Changes in land use strategy
  - Negative
    - Decrease in biodiversity of ecosystems

- Unintended Effects
  - Autonomous Society (Timing is everything)

Feasibility



- Time consuming to produce/install
- moderate operation cost (can be reduced with solar panels)
- Still need for small automobile travel applications
- Limited amount of people can travel at one time
- Land needs to be purchased ahead of time

Timeline

- By 2021, Hyperloop one is planning on having 3

  production services available

- Could be decades before a nationwide system

  is available due to current industries and practices

The chances of Hyperloop technology taking over are slim to none. For states, it is much more likely that a system could be developed as an alternative

Ultimately this will be determined by population and population density. Politics at the federal level simply teeter totter back and forth.

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