

Transportation System Design Problem Statement

Project Objective

Pittsadelphia is looking for the design of a cost-effective freight shipping system that reduces smog and meets EPA requirements, while maintaining or increasing freight capacity into and out of this important port city.

Project background

Every day into and out of the port city of Pittsadelphia, approximately 165,000 tons of freight or minerals (coal, etc.) per day travel via rail. Smog from locomotive emissions is a key complaint of city residents. Smog is generated from engine-emitted NOx. Tier 2 locomotives used to haul freight are approaching age for overhaul, at which time investments will be required to meet EPA Tier 3 (or higher) requirements.

Suggestions have been made to address locomotive emissions (i.e., smog) by

- 1) Upgrade the locomotive fleet to meet more recent emissions guidelines set by the EPA. A few options may exist to meet the new guidelines:
 - Sell existing fleet and purchase new locomotives
 - Upgrade fleet with exhaust after-treatment hardware
 - Utilize alternate fuels (Biodiesel, CNG, LNG, etc.) which may produce less NOx
- 2) Alternate freight shipping methods:
 - By water
 - By air
 - By ground, i.e., trucking

Sponsor Background

GE Transportation, a unit of GE (NYSE: GE), solves the world's toughest transportation challenges. GE Transportation builds equipment that moves the rail, mining, and marine industries. GE's fuel-efficient and lower-emissions freight and passenger locomotives; diesel engines for rail; marine and stationary power applications; signaling and software solutions; drive systems for mining trucks; and value-added services help customers grow. GE Transportation is headquartered in Chicago, IL, and employs approximately 13,000 employees worldwide.

Project Description

Each design team should research and evaluate the suggestions made for fleet upgrade or alternate shipping methods. For upgrades, consider physical constraints of new hardware, as well as fuel storage requirements. Provide your recommendations, commenting on impact to:

- 1) Emissions/Regulatory requirements
- 2) Costs: fuel, infrastructure, etc.
- 3) Freight throughput/capacity
- 4) Public opinion
- 5) On-time delivery

Project Deliverables

Note: Your instructor will clarify her or his expectations for these deliverables and respective due dates.

- Technical report containing the following elements
 - Rationale for the recommendation
 - Description of alternative concepts and their evaluation
 - Systems diagram
 - Concept of Operations
 - Environmental analysis
 - Assessment of important aspects of your system for feasibility and adoption, including public opinion
 - Economic viability of the system o CAD drawings
- Model or prototype of a component of the overall system