GE TRAIN DESIGN PROJECT

Identify and Define the Problem:
Define
- Best method to get a locomotive from Philadelphia to Pittsburgh
- Cost and emissions will be analyzed to determine the best result.

Identify
- Cost could include building new trains or tracks.
- Could sell old train parts to pay for new parts.
- Important factors from most important to least important include cost, capacity, emissions and on time delivery.

Develop Possible Solutions:

- Replace with a maglev train system
- Replace with Tier 4 locomotives
- Replace with Tier 3 locomotives
- Replace with locomotives that use alternative fuels
- Replace with a trucking system
- Replace with an air shipment system

Evaluating the Solutions:

- Three different evaluation methods
- Used to determine which is the best solution
- Uses weight of specific concepts to calculate analysis

Rating Method:

- Rank each solution 1-10 in each different category
- Each category has a different weight
- Best solution calculated was a new Tier 4 Locomotive

Option	Cost	Emissions	Capacity	On time delivery
1. New Locomotive (Tier 4)	5	7	6	6
2. New Locomotive (Tier 3)	6	5	6	6
3. Alternate Fuels	3	6	6	4
4. Transport by airplane	2	4	8	8
5. Transport by truck	10	2	3	1
6. Maglev	1	10	6	8
Maximum ranking	**10**	**10**	**8**	**8**

Scaling Method:

- Input data and units for each category and solution
- Determine if the maximum or minimum data is the best
- Pairs up with the ideal value method

Option	Cost (min)	Emissions (min)	Capacity (max) (kg)	On-time delivery (max) (%)
New Locomotive (Tier 4)	$99M	.03 g/hp-hr	120,000	80
New Locomotive (Tier 3)	$66M	.1 g/hp-hr	120,000	80
Alternate Fuels	$1.04B	.12 g/hp-hr	120,000	65
Transport by airplane	$5.1B	.2 g/hp-hr	140,000	90
Transport by truck	$42M	.2 g/hp-hr	19,000	50
Transport by maglev	$50B	0.0001 g/hp-hr	80,000	90

Ideal Value Method:

- Calculations depend on the highest or lowest data within the category
- Best solution calculated was the Maglev

Option	Cost (min)	Emissions (min)	Capacity (max) (kg)	On-time delivery (max) (%)
New Locomotive (Tier 4)	0.42	0.0033	0.86	0.89
New Locomotive (Tier 3)	0.64	0.001	0.86	0.89
Alternate Fuels	0.04	0.00083	0.86	0.72
Transport by airplane	0.008	0.0005	1	1
Transport by truck	1	0.0005	0.14	0.56
Transport by maglev	0.0008	1	0.57	1

Communicate the Solutions:

- Tier 4 train had the highest ranking among all of the categories.
- Use the same tracks, but sell the old trains and upgrade to Tier 4 trains
- Cost money initially
- Resale value of old trains will give us some money back
- Cheaper operating cost of newer trains
- Overall, we will get our money back