Design Project 2

For this project, the customer (GE Transportation) has provided some requirements which we must fulfill. We had to develop the most efficient and safest option to solve the issue of locomotives that travel from the Pittsdelphia area. We needed to mostly focus on the emissions impact and meet the EPA requirements with a cost effective solution which reduces smog while maintaining or increasing freight capacity.

In order to do this we used the engineering design process, the analytical hierarchy process (AHP), ideal value method, and classification tree to develop the best possible solution. Some examples of our rating methods are presented below:

	Option 1	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**	**Option 7**
Cost	>$200 mil	$42,500,000	$5 bil 5 mil	~$250 mil	<$100 mil	<$150 mil	> $150 mil
Emissions	1.3	4.75	2	10.44	4	0.02	4.75
Throughput	+++	+++	+++	++	-	+	+++
Public Opinion	+++	+	+++	--	+	--	+
On-Time Delivery	+	+	+	--	+++	++	+

1) Sell current locomotives & Buy New Locomotives (Tier IV)

cost: $4 mil/locomotive (50 locomotives)= $200 mil +

emission NOx: 1.3 g/hp -hr

2) Update current fleet & locomotives (to Tier III)

cost: ($750 k/locomotive + $100 k after-treatment/locomotive)(50 locomotives)= $42,500,000

emission NOx: 4.75 g/hp -hr

3) Utilize alternative fuels

cost: $1 mil/locomotive upgrade (50 locomotives) + $1 bil/fueling station (5 fueling stations)= 5 bil 5 mil

emission NOx:

4) Using Shipping Mode

emissions: 10.44 g/hp-hr

5) Using Air Mode

emissions: 10.2 kg/LTO

6) Using Trucking Mode

emissions: 0.02 g/hp-hr

7) Sell current locomotives & Buy New Locomotives (Tier III)

cost: $3 mil/locomotive (50 locomotives)= $150 mil +

emissions: 4.75 g/hp -hr

At the end of the project we decided that the best possible solution to solve this problem would be to sell the current Tier-2 locomotives and to buy new Tier-4 locomotives, which are the cleanest, newest, and more efficient locomotives on earth today.