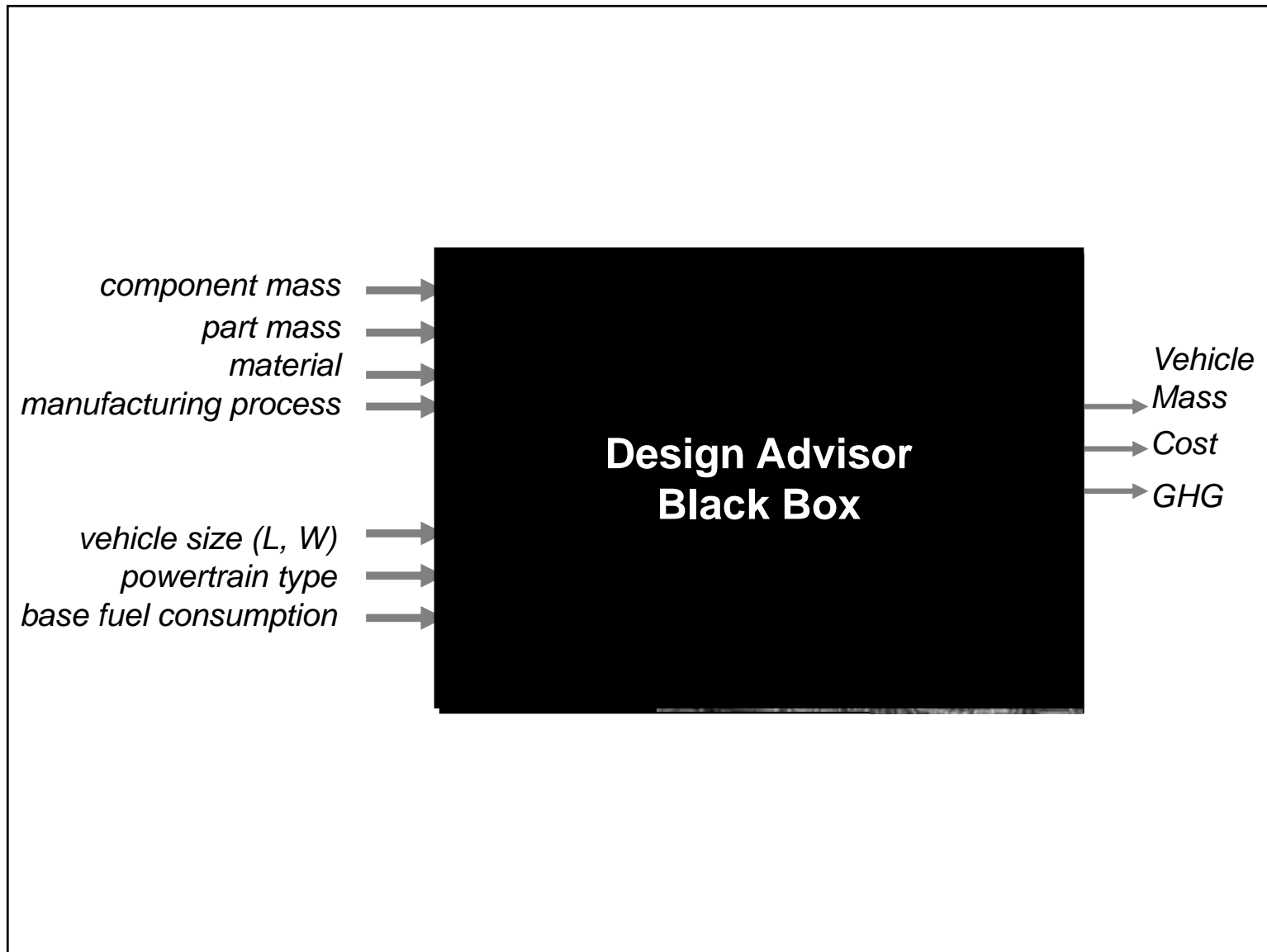




Design Advisor Workshop

Session 7

Sensitivity Analysis



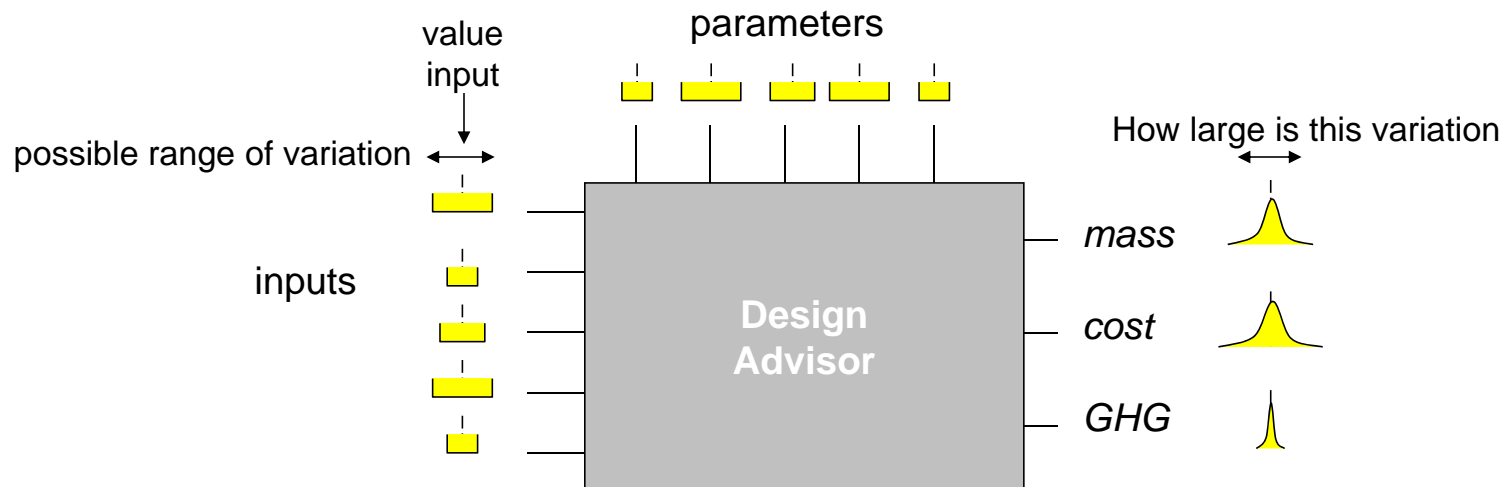
Sensitivity Analysis

First order analysis uses approximate inputs and parameters.

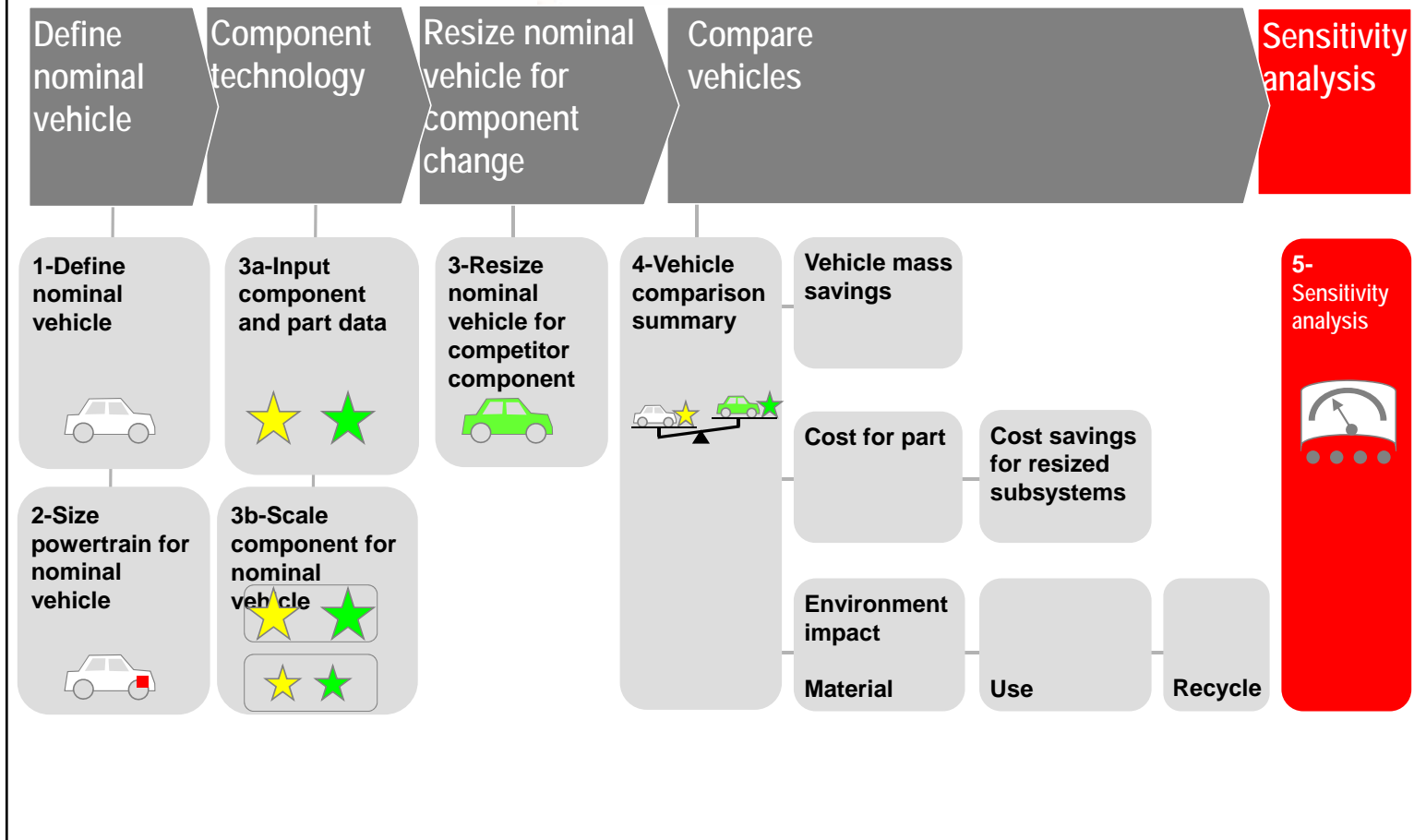
Given this:

- *How robust are the estimates for mass, cost, CO₂?*
- *Will a small change in a value flip a decision?*

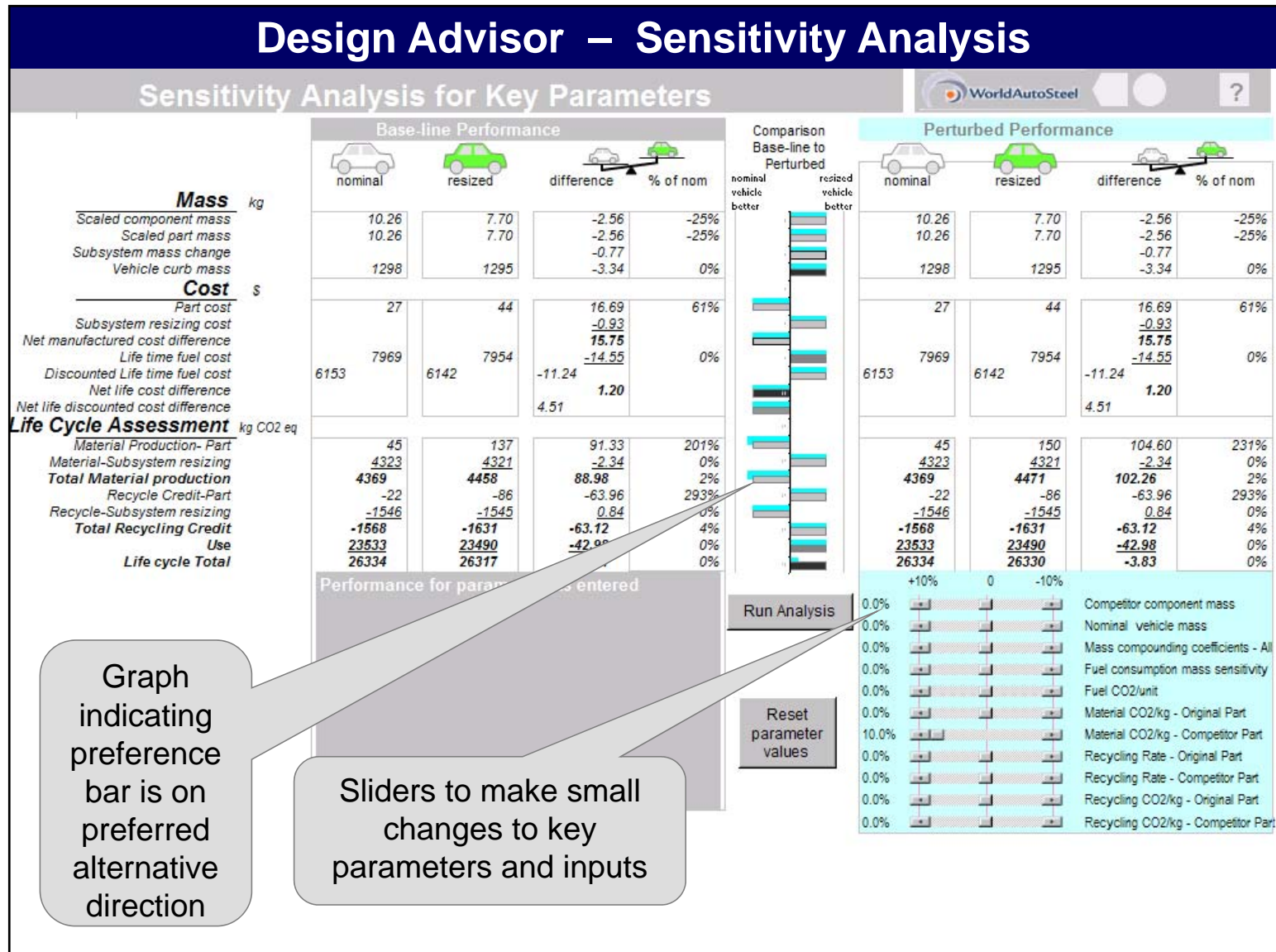
Sensitivity analysis is the study of how variations in certain inputs and parameters will effect variation in the output.



Design Advisor – Solution Map

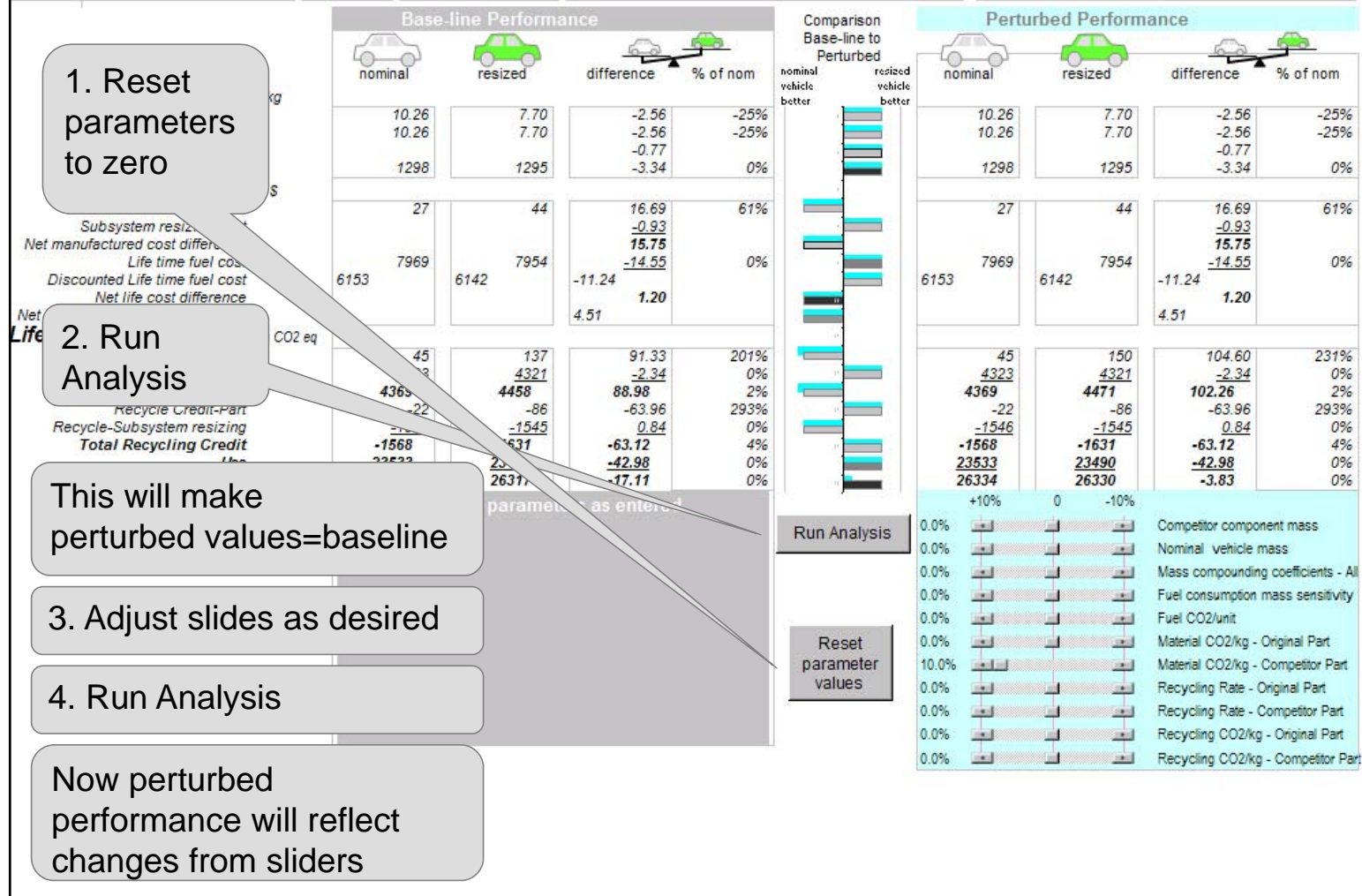


Design Advisor – Sensitivity Analysis



Design Advisor – Sensitivity Analysis

Sensitivity Analysis for Key Parameters



Sensitivity Analysis

The Design Advisor allows a sensitivity analysis for key parameters

- Competitor component mass
- Nominal vehicle mass
- Vehicle mass compounding coefficients - All
- Fuel consumption mass sensitivity
- Fuel CO₂/liter
- Material CO₂/kg - Original Part
- Material CO₂/kg - Competitor Part
- Recycling Rate - Original Part
- Recycling Rate - Competitor Part
- Recycling CO₂/kg - Original Part
- Recycling CO₂/kg - Competitor Part

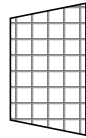
Case Study 6 Hood Sensitivity Analysis

Component: Hood

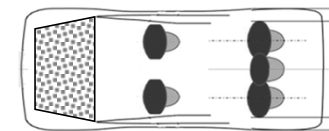
Vehicle Parameters



$$A=2.0 \text{ m}^2$$



$$A=2.0 \text{ m}^2$$



$$A=1.5 \text{ m}^2$$

Note: This data is in the original Design Advisor file

Original Component

Steel
Stamped
13kg total seat mass
12 kg frame mass

Competitor Component

Aluminum
Stamped
10 kg total seat mass
9 kg frame mass

Sedan/Hatchback
5 passenger
100 kg cargo
OAL=4.5 m
OAW=1.7 m
New architecture
Internal Combustion-gasoline
Powertrain is fixed and will not change
5.3 liter/100 km (US schedule)
Life time range = 155,000 km

Purpose: To use the Sensitivity Analysis capability

1. Input data has been pre-loaded in the Design Advisor file distributed – use as is.
2. Go to Sensitivity Analysis and investigate parameter changes which may 'flip' relative GHG
For convenience, use $\pm 10\%$ changes in parameters

Important parameters_____

Unimportant parameters_____

Typical relative importance

