

Trailer Side Skirt Calculator User Guide

The Trailer Side Skirt Calculator is a tool that enables you to determine potential fuel and monetary savings. You can also use it to determine the reduction of greenhouse gas (GHG) emissions resulting from the installation of trailer side skirts and to estimate the payback for such an investment.

This guide explains the information to be entered in the calculator. It also explains the assumptions and calculations embedded in the calculator, some of which can be changed to better reflect a specific situation.

The Trailer Side Skirt Calculator is organized as follows:

Inputs

1. Cost per unit - purchase and installation cost per semi-trailer:
 - The purchase costs (OEM or after-market) of trailer side skirts vary from \$1,400 to \$2,500 with installation costs of \$300–\$500 (installation time can vary from 3 to 6 man-hours).

TIP: Input your actual total cost (P): default value is \$2,000.
2. Annual maintenance costs related to the trailer skirts:
 - Some trailer skirts are built from multiple panels that are bolted together so that they can be adapted to a variety of trailers; therefore, individual panels can be replaced if damaged.
 - Some users report trailer skirt damage due to road or yard rutting and potholes.

TIP: Input your actual annual maintenance cost (M): default value is \$200.
3. Fuel savings:
 - FPInnovations track-tested 20 devices in previous years in the framework of Energotest™ campaigns and the potential of this approach was confirmed: trailer skirts showed fuel savings of up to 7.5%.

TIP: Input the certified percentage fuel savings for your skirts (F) (as recognized by an independent organization, such as the U.S. Environmental Protection Agency's SmartWaySM program, or FPInnovation's Energotest™): default value is 6%.
4. Annual mileage of tractor:
 - You have the choice of kilometres or miles.



TIP: Input your tractor's actual average yearly mileage (K): default value is 200 000 km.

5. Number of semi-trailers per tractor:

- Usually, the number of semi-trailers in a fleet is much bigger than the number of tractors, which means that one tractor would use several semi-trailers during the year.
- For example, if a fleet has 50 tractors and 100 semi-trailers, one tractor would use on average two semi-trailers during the year, which means that each semi-trailer will do approximately half the mileage of the tractor.

TIP: Input your actual number of semi-trailers per one tractor (n): default value is 2 semi-trailers per tractor.

6. Annual mileage of a semi-trailer:

- Average annual mileage of a semi-trailer (S) is calculated automatically by dividing the annual average mileage of a tractor (K) by the actual number of semi-trailers per one tractor (N): $S = K / n$.

7. Fuel price:

- Fuel price fluctuates and has a direct and significant impact on annual savings and payback period.

TIP: Input the actual fuel price in ¢/L (X): default is 110 ¢/L.

8. Current fuel consumption:

- This is your fuel consumption prior to installing the trailer skirts.
- You have the choice of L/100 km or mpg (US).

TIP: Input your actual fuel consumption (Y): default value is 34 L/100 km.

9. Proportion of annual semi-trailer mileage driven at speeds of 80 km/h or more (%):

- Trailer side skirts have greater fuel savings potential when used at higher speeds. Driving at higher speeds has a direct and significant impact on fuel savings, monetary savings, and investment payback period.

TIP: Input your actual percentage (p): default value is 80%.



Results

➤ Annual fuel savings per semi-trailer:

- Is calculated as a function of: percentage of annual semi-trailer mileage driven at speeds of 80 km/h or more (p), the average annual mileage of a semi-trailer (S), percentage fuel savings (F), and actual fuel consumption (Y),
- Using the equations:
 - For fuel consumption in L/100 km: $A = f \times p \times S \times F \times Y$
 - For fuel consumption in mpg: $A = f \times p \times S \times F / Y$
- Where f is a conversion factor, calculated based on user's input for units of distance and fuel consumption. The below table is provided for information only:

Unit of S	Unit of Y	f	Conversion factor (f) formula
km	L/100 km	1	km x L/100km
km	mpg	235.25	km x L/100km (=3.786 x 100/(1.61 x mpg))
miles	L/100 km	1.61	km (=1.61 x miles) x L/100km
miles	mpg	378.60	km (=1.61 x miles) x L/100km (=3.786 x 100/(1.61 x mpg))

- Example for converting a mileage of 100 000 miles in kilometres and a fuel economy of 6 mpg in fuel consumption of L/100 km:
 - Mileage: 100 000 miles = 100 000 x 1.61 km = 161 000 km,
 - 6 mpg = 3.786 x 100/(1.61 x 6) = 39.2 L/100 km,
 - Total conversion factor: 1.61 x 3.786 x 100/1.61 = 378.60.

TIP: To obtain the total annual fuel savings resulting from the installation of all trailer side skirts in your fleet, multiply the annual fuel savings per semi-trailer by the number of semi-trailers equipped with side skirts.

➤ Annual GHG emission reduction per semi-trailer:

- The most prevalent GHGs released by the burning of diesel fuel are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The production of the other two GHGs is extremely low compared with CO₂, so they are usually not considered for estimation purposes.



- The potential of reducing GHG emissions is calculated based on the annual fuel savings per semi-trailer (A) considering that the combustion of diesel fuel produces 2.7 kg CO₂ equivalent per litre, with the equation: $G = A \times 2.7$.

TIP: To obtain the total annual GHG emission reduction resulting from the installation of all trailer side skirts in your fleet, multiply the annual GHG emission reduction per semi-trailer by the number of semi-trailers equipped with side skirts.

➤ Annual savings per semi-trailer:

- Is calculated as a function of: annual fuel savings per semi-trailer (A), annual maintenance cost per semi-trailer (M), and fuel price (X),
- Using the equation: $B = A \times X - M$.

TIP: To obtain the total annual savings resulting from the installation of all trailer side skirts in your fleet, multiply the annual savings per semi-trailer by the number of semi-trailers equipped with side skirts.

➤ Payback period per semi-trailer:

- Is calculated as a function of: purchase and installation cost per semi-trailer (P), and of annual savings per semi-trailer (B),
- Using the equation: $C = P / B$.

Disclaimer

- The purpose of these simplified models is to demonstrate the cost-saving opportunities available for fleet owners through best practices and fuel-saving devices.
- The model can be refined further based on the customer's requirements.
- The user is responsible for verifying the accuracy of the results.
- In no event shall Transport Canada be liable to any direct, consequential, incidental, special, punitive or other damages.
- High-speed track tests at Energotest™ showed fuel savings of up to 7.5% for trucks equipped with advanced trailer skirts: not all trailer skirts offer similar performances.



References

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