TRANSPORT IS THE BIGGEST SOURCE OF GREENHOUSE GAS EMISSIONS IN BC

All emissions in BC by sector (2014)

Deforestation
Industrial processes
Agriculture
Waste
Fugitive sources (NG)
Stationary combustion
road 25%
other 13%
All transport 38%

GHG emissions change since 2007

While passenger vehicles and buses have enjoyed emissions reductions since 2007, trucks of all types have seen continued emissions growth.

PASSENGER - 12% OF GHGs

0.78% 5.43% 5.75% 2.33% 6.83% 4.19%

buses
cars

minivans, SUVs, etc.

LIGHT TRUCKS

MEDIUM-DUTY TRUCKS

HEAVY-DUTY TRUCKS

HOW MUCH DO WE NEED TO CUT EMISSIONS IN THE TRUCKING SECTOR?

WHY DO WE CARE ABOUT 2040?

To meet the province’s overall legislated GHG emissions reduction target of 80% by 2050, the road freight sector must cut its emissions by 64% by 2040. Analysis of the requirements of electrification of trucking depends upon GDP projections, electricity forecasts and natural gas production and demand in BC, which were only available until 2040.

ELECTRIFICATION OPTIONS

<table>
<thead>
<tr>
<th>Energy intensity</th>
<th>Very long charging time</th>
<th>Carbon intensity</th>
<th>Need for carbon capture &amp; storage</th>
<th>Range, weight, temperature, &amp; challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery electric</td>
<td>low</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Fuel-cell/hydrogen from electrolysis</td>
<td>high</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Fuel-cell/hydrogen from natural gas</td>
<td>med</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Legislated emissions trajectory

- Absolute GHG emissions from trucks (Mt CO2 eq)
- Percent GHG reduction on 2007
- 2007
- 2040
- 2050
- Some time after mid-century

- 0%
- 25%
- 50%
- 75%
- 100%

66.5

-0.78%

-5.43%

-5.75%

-2.33%

-6.83%

-4.19%

64%
HOW MUCH ELECTRICITY DO WE NEED TO DO THIS?

The proportion of the truck stock needed to be all-electric of all classes, either battery electric or fuel-cell-electric, by 2040 is at least 65%.

![Proportion of truck stock by class needed to be all-electric by 2040](chart)

Annual truck sales vary between 5% and 7% of the total stock. So this means that to achieve that 65% penetration rate by 2040, as early as 2025, all new sales need to be of electric trucks, regardless of type.

![65% OF ALL TRUCKS ELECTRIC BY 2040](circle)

![100% OF ALL NEW TRUCKS SOLD ELECTRIC BY 2025](circle)

HOW MUCH ELECTRICITY DO WE NEED TO DO THIS?

Electricity generation requirement for 64% trucking decarbonization by 2040

<table>
<thead>
<tr>
<th>Proportion</th>
<th>Lower bound</th>
<th>Upper bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery-electric</td>
<td>+20%</td>
<td>+55%</td>
</tr>
<tr>
<td>Fuel-cell &amp; electrolysis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Electricity generation requirement](chart)

Production of hydrogen by electrolysis, or the splitting of water into its component hydrogen and oxygen atoms by passing an electric current through the water, uses a lot of electricity. Hydrogen then needs to be pressurised and transported, processes that also require electricity or some other clean energy.

Production of hydrogen by ‘cracking’ natural gas instead of electrolysis requires less electricity. But this produces greenhouse gases and thus would need to be coupled with carbon, capture and storage (CCS) technologies.

WHY SO MUCH ELECTRICITY FOR FUEL CELLS?