Opportunities for natural gas and biogas vehicles in freight

Gideon Fadiran, Tarun Sharma, Fionn Rogan, Brian Ó Gallachóir

Our 2050 – Final-Project Event, Fitzwilliam Hotel, Dublin | Dec 10th 2018
Approach & options to decarbonize road freight from 99.8% diesel vehicles

Irish unladen goods vehicle above 2 tonnes

Vehicle weight groups (tonnes)

<table>
<thead>
<tr>
<th>Vehicle weight groups (tonnes)</th>
<th>Vehicle population</th>
<th>Average vehicle km</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 12 (W4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-12 (W3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-10 (W2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-7 (W1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-5 (W0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vehicle switching rate

CO2 savings

Vehicle weight groups (tonnes)

- >12t @€20/tCO2 tax
- 10-12t @€20/tCO2 tax
- 7-10t @€100/tCO2 tax
- 5-7t @€100/tCO2 tax

Emissions saved

Total NGV emissions

Total Diesel emissions

Total emission

CO2 savings

Vehicle km

0 20000 40000 60000 80000 100000

0 200000 400000 600000 800000 1000000
W1-vehicle weight group (5-7 tonne); W2-vehicle weight group (7-10 tonne); W3-vehicle weight group (10-12 tonne); W4-vehicle weight group (>12 tonne)

Business as usual Scenario (payback period W1, W2-96m, W3, W4-60m):

- Increasing CO2 per tonne tax levy on diesel only
- €20/CO2
- €30/CO2
- €40/CO2
- €50/CO2
- €100/CO2

- Business as usual Scenario (payback period W1, W2-96m, W3, W4-60m): Increasing CO2 per tonne tax levy on both diesel & NG
- €20/CO2
- €30/CO2
- €40/CO2
- €50/CO2
- €100/CO2
- €100/CO2

Emissions saving CO2 tonne

5000 10000 20000 30000 40000
Policy Insights

• Opportunity for Natural Gas Vehicles declines with reduction in vehicle weight category and kilometres travelled

• €20-€100 CO2 tax/tonne and or providing vehicle subsidy €0-€5000 increases vehicle switching

• Biogas substitution for natural gas improves CO2 savings by 81% with 100% blend.