Sustainability and carbon footprint calculation in city logistics: The case of Kontzoglou Distribution Networks SA

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Agenda

• Carbon footprint in freight transport: Facts and figures

• Sustainable city logistics

• Methodologies and tools for calculating carbon footprint in freight transport operations

• Calculating carbon footprint in Kontzoglou Distribution Networks SA
31.8% of the energy consumption in EU-28 comes from the transport sector

71.9% of the GHG emissions (from all transport modes) come from road transportation

The carbon footprint will increase in the following years!

Source: European Commission, EU Transport in Figures, 2014
City logistics challenges

• Until 2020, 80% of the European population will live in cities

• Customers ask for less and more frequent deliveries

• E-commerce plays a significant role in the increase of city logistics operations (e.g. Home Delivery)

• EU asks for a reduction of CO2 emissions of 60% that come from transport operations until 2050

• A significant number of EU cities have already implemented various green policies (e.g. Low Emission Zones, Tolls in city center, etc)

All the aforementioned requirements and constraints create a complex environment for city logistics operations and the need for actions towards sustainable urban mobility
Sustainable city logistics

- Reduction of traffic nuisance
- Less accident fatalities
- More friendly cities

- Less CO$_2$ emissions
- Noise reduction

- Transport pooling
- Synergies / Use of UCCs
Methodologies and tools for calculating carbon footprint in freight transport operations

<table>
<thead>
<tr>
<th>Mode</th>
<th>Road freight transport</th>
<th>Rail freight transport</th>
<th>Inland Waterways</th>
<th>Sea freight transport</th>
<th>Ferry transport</th>
<th>Air freight transport</th>
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<tbody>
<tr>
<td>EN 16258</td>
<td>COPERT</td>
<td>Bilan Carbone</td>
<td>EN 16258</td>
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<td>NTM</td>
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<td>Carbon Footprint for Metro Group Logistics</td>
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<td>analyses (WTW)</td>
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Source: AUVINEN, Heidi; CLAUSEN, Uwe; DAVYDENKO, Igor; DE REE, Diederik; DIEKMANN, Daniel; EHRLER, Verena; LEWIS, Alan; TON, Jaurieke (2013) “Calculating Emissions Along Supply Chains – Towards the Development of a Harmonised Methodology” In the Proceeding of the 13th WCTR, July 15-18, 2013 – Rio de Janeiro, Brazil
The EN 16258:2012 standard

• This European Standard establishes a common methodology for the calculation and declaration of energy consumption and greenhouse gas (GHG) emissions related to any transport service (of freight, passengers or both).

• EN 16258:2012 standard relies on an energy-based methodology (i.e. fuel consumption) for carbon footprint calculation

• Potential users of this standard are any person or organisation who needs to refer to a standardised methodology when communicating the results of the quantification of energy consumption and GHG emissions related to a transport service
Methodology for calculating carbon footprint

Phase A

Step 1: Collection of primary data

Step 2: Carbon footprint calculation

Step 3: Recommendations for carbon footprint reduction

Step 4: Recalculation of carbon footprint

Step 5: Carbon offsetting

Phase B
Indicative results from carbon footprint calculation (1/2)

- **Area of delivery operations:** Thessaloniki
- **Primary data collection time:** 6 months
- **Number of trucks:** 4

<table>
<thead>
<tr>
<th>Truck ID</th>
<th>Load (Tn)</th>
<th>Distance traveled (Km)</th>
<th>Fuel consumption (lt)</th>
<th>Total CO₂ (Tn)</th>
<th>Emissions gr CO₂/Tn-Km</th>
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</thead>
<tbody>
<tr>
<td>Mercedes 510 NBT-7320</td>
<td>44.6</td>
<td>10544</td>
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<td>9297</td>
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<td><strong>Total</strong></td>
<td><strong>446.40</strong></td>
<td><strong>45002</strong></td>
<td><strong>7313.39</strong></td>
<td><strong>12.94</strong></td>
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Most efficient and environmental friendly truck!
Results from carbon footprint calculation (2/2)

- **Average CO2/tn-Km:** 155.1 gr CO2/tn-km

**Total CO2 emissions (kgr/tn-km)**

<table>
<thead>
<tr>
<th>Truck</th>
<th>CO2 Emissions (kgr/tn-km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBT-7320</td>
<td>0.2398</td>
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<tr>
<td>NEH-7613</td>
<td>0.0449</td>
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<td>KOK-2658</td>
<td>0.1293</td>
</tr>
<tr>
<td>NHZ-8144</td>
<td>0.2065</td>
</tr>
</tbody>
</table>

**CO2 emissions per truck (in %)**

- NBT-7320: 33%
- NEH-7613: 21%
- KOK-2658: 7%
- NHZ-8144: 39%

The most efficient and environmental friendly truck
Recommendations for minimizing carbon footprint

• **In distribution management level**
  • Redesign of weekly delivery plan (per vehicle) - clustering
  • Vehicle routing via an intelligent vehicle routing system
  • More drop points per delivery trip

• **In order fulfilment level**
  • Insert the policy of “Minimum order” (for certain customers)

• **In drivers’ level (soft skills)**
  • Eco Driving seminars
Carbon footprint offsetting via afforestation

Each tree offsets annually approximately 250 kg of CO₂
Main results and conclusions

• Increase of loading factor: 19%
• Reduction of distances travelled: 28%
• Reduction of CO₂ emissions: 35%

12 % reduction of operational cost in 1 year !
Thank you very much for your attention!

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