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Heriot-Watt University
Environmental Claims by Online Retailers

Evening Standard  20 June 2007

The Times  26 December 2007
Standard methodologies?

**Defra**
(CO₂ environmental key performance indicators)

**Carbon Trust & BSI**
(Methodology on Carbon Footprint Reporting)

**NOT INCLUDED:**
- Emissions in use
- Indirect impact on supply chain eg. Commuting to factory
- When product is recycled or sent to landfill
- Recently proposed to **included** retail emissions
Key Considerations

<table>
<thead>
<tr>
<th>Product selection</th>
</tr>
</thead>
</table>

Issues common to both **Conventional** and **Online**

<table>
<thead>
<tr>
<th>Warehousing</th>
<th>Freight transport</th>
<th>Personal Buying Choices</th>
</tr>
</thead>
</table>

**Conventional**
- High street retailing

**Online**
- ‘Last mile’ local delivery
Drawing boundaries

**Direct emissions** – directly generated from company’s activities

**Indirect emissions** – part of company’s activities, but provided by 3rd party

**Top-down approach**
(input – output methodology)

**Bottom-up approach**
(process analysis)

- Customised by the type of organisation
- Rely as heavily as possible on currently available data
- Aim to standardise methodology
Scope of the Research

5 Products Groups
- Books
- Small electrical appliances
- Large electrical appliances
- Groceries
- Clothing

5 Distribution Options

- Purchase in shop
  - Transport to home
- Purchase in shop
  - Home delivery
- Purchase online
  - Home delivery
- Purchase online
  - Collection from shop
- Purchase online
  - Collect from other location
Online v Conventional Retailing: Point of Divergence

- **Point of Divergence**
  - Grocery
  - Clothing
  - Multi-channel retailer
  - Pure online retailer

**Grocery**
- National distribution centre
- Shop
- Home

**Clothing**
- Factory / port
- Shop
- Home

**Back-store**
- Shop
- Home

**Shelf**
- Shop
- Home

**Shop**
- Home
Online & Conventional Book Supply Chains

Publishers → Distributors → Wholesalers → Retailers → Consumer

Online Fulfilment Centre

Parcel Hub / Sortation Centre

Trunking

Local Delivery Depot

Van / courier

Local Depot

Customer collection

Direct to customer via postal services

Trunking operation
Primary trunking

- Type of transport operation
- Trip distance
- Fleet size and truck types
- Vehicle utilisation
- Dedicated load issues
Annex 6 – Fuel Conversion Factors

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>% weight laden</th>
<th>Total km travelled</th>
<th>Litres fuel per km</th>
<th>Fuel conversion factor</th>
<th>Total kg CO₂</th>
<th>Total t CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>0%</td>
<td>x</td>
<td>0.236</td>
<td>x</td>
<td>2.63</td>
<td>/1000</td>
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<tr>
<td></td>
<td>25%</td>
<td></td>
<td>0.262</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td></td>
<td>0.288</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>75%</td>
<td></td>
<td>0.314</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td></td>
<td>0.340</td>
<td></td>
<td>2.63</td>
<td></td>
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<tr>
<td>Articulated</td>
<td>0%</td>
<td></td>
<td>0.311</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25%</td>
<td></td>
<td>0.345</td>
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<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td></td>
<td>0.379</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>75%</td>
<td></td>
<td>0.414</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td></td>
<td>0.448</td>
<td></td>
<td>2.63</td>
<td></td>
</tr>
</tbody>
</table>
Energy consumption – what to measure

- Warehousing / Order Picking
  - Lighting
  - Heating
  - Cooling / ventilation
  - Computing
- Electricity (including green sources)
- Manual operation
- Handling equipment
  - Lift & transport trucks
  - Conveyors
  - Order-picking trucks
  - Trailer loading systems
- Gas
- LPG vehicles

- Gas
- LPG vehicles
Retail Operations

Retail Store Operations
- Goods reception
- Display / storage
- In-store handling
- Ancillary activities
- On-shelf storage

• Display area
• Backstore storage / returns
• Customer / employees’ contributions
• Multi-channel grocers – store-picking for online business
Typical Energy consumption - Benchmarks for Non-Domestic Buildings

Delivered energy consumption benchmarks (kWh/m²/yr)

<table>
<thead>
<tr>
<th></th>
<th>Fossil Fuel</th>
<th>Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution warehouses</td>
<td>169</td>
<td>67</td>
</tr>
<tr>
<td>Depots</td>
<td>311</td>
<td>39</td>
</tr>
<tr>
<td>Supermarket</td>
<td>261</td>
<td>1026</td>
</tr>
<tr>
<td>Book stores (all electric)</td>
<td>-</td>
<td>255</td>
</tr>
<tr>
<td>Clothes shops</td>
<td>108</td>
<td>287</td>
</tr>
<tr>
<td>Electrical goods retailing</td>
<td>-</td>
<td>230</td>
</tr>
</tbody>
</table>

Source: Carbon Trust (compiled by BRE, 2005)
## Products & Delivery Methods

<table>
<thead>
<tr>
<th>Product type</th>
<th>Typical order size</th>
<th>Main delivery vehicle type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>2-3 items</td>
<td>• Parcel delivery van</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Postman (walk / bike)</td>
</tr>
<tr>
<td>Small electricals</td>
<td>c 2 items</td>
<td>• Parcel delivery van</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Postman (walk / bike)</td>
</tr>
<tr>
<td>Large electricals</td>
<td>1 item or set</td>
<td>• Two-man delivery</td>
</tr>
<tr>
<td>Clothing</td>
<td>2 items</td>
<td>• Parcel delivery van</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Postman (walk / bike)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Home delivery courier (private car)</td>
</tr>
<tr>
<td>Groceries</td>
<td>c 15-20 orders</td>
<td>• Temperature-controlled vans</td>
</tr>
</tbody>
</table>

Source: Iain Beveridge Associates
Freight transport to the home – The ‘Last Mile’

- Narrow time-windows
- Type of vehicle used (electric / courier)
- Failed (& therefore repeat) deliveries
- Product returns / collections

<table>
<thead>
<tr>
<th></th>
<th>Online</th>
<th>High street</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>3%</td>
<td>up to 20%</td>
</tr>
<tr>
<td>Small Electricals</td>
<td>5-10%</td>
<td>4-5%</td>
</tr>
<tr>
<td>Clothing</td>
<td>20-40%</td>
<td>2-4%</td>
</tr>
</tbody>
</table>

Books | 3% | up to 20%
Small Electricals | 5-10% | 4-5%
Clothing | 20-40% | 2-4%
Personal travel choices & the impact of Home Delivery

Shopping trips eliminated

Remove shopping from multi-purpose trips

Shop for other additional / related products

Usually walk / use public transport to shops

Continue to shop for some products

Browse before buying online

Substitute with other car-based travel

Positive Neutral Negative

Effects on car traffic
Leaving thoughts…
for the plane, train or traffic jam!!

- Shared operations for multi-channel;
- Employees’ indirect contributions;
- Allocating carbon between mixed loads;
- Consumer behaviour & travel;
- The ever-changing retail environment - any audit only offers a snap-shot!!

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