The Volvo Group – Sustainable Transportation

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VP, Transport Solutions & Services
Volvo Group Trucks Technology
The Volvo Group

- ~$45 BUSD net sales
- One of the world’s leading manufacturers of trucks, buses, construction equipment, and drive systems for marine and industrial applications
- 115,000 employees worldwide, production in 19 countries, serving customers in 190 markets
- One of the world’s largest manufacturers of heavy trucks and heavy-duty diesel engines
- In the US: 15,000 employees, six production facilities in five states
- The only heavy-duty truck manufacturing group that exclusively serves the U.S. market with domestically produced trucks.
Our Corporate Values

QUALITY

SAFETY

ENVIRONMENTAL CARE
The Volvo Group’s CSR approach

The Volvo Group is committed to:

- contributing to sustainable development
- creating value for our shareholders and society
- taking stakeholders’ perspectives into account
- conducting business in a responsible manner
Sustainable Transportation

1. The right product or service in order to contribute to high productivity in the transport system

2. Energy efficient transport solutions with very low emissions of CO₂, PM, NOₓ and noise

3. Safe and secure transport solutions

Economic dimension

Environmental dimension

Social dimension
Sustainable Transportation

Energy efficiency

Renewable fuels

Efficient transport systems
Excerpts from our Sustainability report

...... Between 2009 and 2011, emissions of carbon dioxide from road, rail and sea transportation of goods to and from the Volvo Group's plants were reduced by 18 percent.

...... In 2011, 88 percent of the major transport suppliers were certified in accordance with the environmental standard ISO 14001 or equivalent.

...... Social and ethical requirements are also included in supplier requirements specifications, in accordance with the Group's requirements.

...... The EnvCalc tool is used to calculate emissions to air for new or changed transport routes. The calculation is based on the volume of goods, the distance and the mode of transport.

...... The Volvo Group requires suppliers of road transportation to comply with engine class requirements and have their drivers trained in fuel efficient driving. These requirements are followed up by an annual supplier survey.

...... A significant portion of the Volvo Group's transports is conveyed by sea. Since 2010 all contracted sea carriers are required to report the environmental impact of each of their vessels. The Volvo Group is a member of the Clean Shipping Index.

...... The Volvo Group uses a reusable packaging system to transport goods from material suppliers to the plants, and all the way to the production line. When empty, the packaging can be stacked, taking minimal space when freighted.
Met Objectives:

- Reduced waiting time (25% measured)
- Validating driver credentials
- Increased cargo security
- Share of adequate information between stakeholders to facilitate clearance
### Los Angeles ports

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### TEU’s/year

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<td>14 million</td>
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### Trips/day

<table>
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<th>Today</th>
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<tr>
<td>35,000</td>
<td>100,000</td>
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Volvo Group Hybrid Vehicles

• Volvo began testing hybrid vehicles in the 1980s and has demonstrated hybrid solutions in transit bus, refuse collection trucks, distribution trucks, and wheel loaders.

• Commercial production of Volvo hybrid buses and trucks began in 2006. Volvo provides hybrid double decker buses for the city of London, providing up to 37% fuel savings.

• Technology based on unique Volvo technology – I-SAM: Integrated Starter Alternator Motor. Diesel engine not starting until bus reaches 15-20 km/hour.

• Mack Trucks has provided hybrid electric refuse trucks to New York City Department of Sanitation. The trucks provide 30% fuel economy improvements.

• Volvo Group has sold over 1000 hybrid vehicles to date
Volvo Plug-in Hybrid and Full Electric Technologies

- **Volvo Bus** will deliver three plug-in hybrid buses to the city of Gothenburg, Sweden for testing in 2013. These buses are anticipated to cut diesel consumption and climate impact by 75%.

- **Nova Bus** is involved in a $73 million public-private partnership with the government of Quebec to develop a Quebec made fully electric bus.
Plug-in Drayage Truck

- Two projects running from 2012 - 2016

- **Objectives:** Develop a concept plug-in hybrid drayage truck and validate technical and commercial feasibility of PHEV technology
  - Ability for fully zero-emission electric mode for limited distances at low speeds
  - Potential for engine downsizing
  - Test two trucks in field test operations
Full Electric?

Is it realistic to let equipment, consuming 30...150 kW average power, be pure electric and run on batteries?
✓ No, not if the charging occasions are too few!

100 kW x 10 h = 1000 kWh =
Tons of batteries!

It’s all about charging....
✓ As often as possible, ideally continually! Must adapt to local stationary AND continous charging interfaces at all applicable markets.
Electric Road Systems – 3 concepts

Catenary power transfer (Siemens, Volvo)
Demonstration project at POLA/POLB

Inductive power transfer (Scania, Bombardier)

Conductive power transfer (Volvo, Alstom)

Pilot projects in Sweden
Conductive (ERS) power transfer
Conductive (ERS) power transfer

Test truck (FH, conventional with resistorbank)

2 different "pick-up’s” have been developed and tested at various speeds between standstill up to 80km/h.

Measurements confirm that the prototype pick-up’s can maintain both mechanical and electrical contact, and that they can adjust for driver tolerances, up to +/-50cm.
Conductive (ERS) power transfer

Track function principle:
22m length segments powered when vehicle approaches the segment.
The Gateway Cities Technology Plan for Goods Movement is developing several technology applications and operations improvements to move goods safely and efficiently in and out of the region. These projects were identified as part of the ITS Integration Plan for Goods Movement with the support of a Southern California ITS Working Group. With solutions like these in place to address the growing demand for Southern California goods movements, the region will see less congested roadways, cleaner air, and more capacity for economic growth.
Truck Platooning

Platooning demo on public roads
Barcelona, Spain, May '12