

Client case —

Volvo Group:

Building the case for electric buses

About the Volvo Group

The Volvo Group is one of the world's leading manufacturers of trucks buses, construction equipment and marine and industrial engines. The Group also provides complete solutions for financing and service. The group, with its headquarters in Gothenburg, Sweden, employs about 100,000 people, has production facilities in 18 countries and sells its products in more than 190 markets. In 2015 the Volvo Group's net sales amounted to around US\$37 billion.

Transforming to a low-carbon economy brings disruptive changes to many industry sectors. Industry leaders must not only deal with disruption effectively, but also identify the upside of risks and act on those opportunities.

In the transport sector, Volvo Group of Sweden, supported by KPMG in Sweden, has carried out pioneering work on the case for low-carbon electric buses by building environmental and social impacts into the total cost of ownership. We asked Niklas Gustafsson, Volvo Group's Chief Sustainability Officer, how this analysis has helped to reinforce Volvo Group's position as a leader in sustainable transport solutions.

There is a shift to cleaner, quieter and more efficient cities

Momentum is building worldwide behind a technological shift towards low-carbon city transport including fully electric bus systems. The C40 Cities Climate Leadership Group is committed to accelerate the implementation of ultra-low emission bus technologies and 23 of its members have signed the Clean Bus Declaration calling on the finance and transport sectors to support them through technology innovation and financing.

Fully electric buses have significant environmental and social advantages because they are exhaust-free, almost noiseless and can shorten travel time, helping to create cleaner, quieter and more efficient cities. The buses can even operate indoors which offers new opportunities for innovation in city planning and transport routing. All this translates into a market with attractive growth prospects.

The global electric bus market is expected to grow at a compound annual growth rate of 28 percent between 2014 and 2020, and to

reach an estimated annual sales volume approaching 35,000 units by 2020.¹ Volvo Group is already embarking on a mission to address this demand.

True cost of ownership goes beyond direct financial costs

Municipalities and transport authorities must base their investment decisions on the best available data which traditionally focuses solely on direct financial costs. Costs related to environmental and social impacts are rarely factored in because relevant data is not easily available. That is why Volvo Group decided to take a leadership role and quantify the environmental and social value created by its electric buses.

"Standard investment appraisals do not take into account all of the costs that impact society and the environment. Therefore, to quantify all of the aspects, we calculated the monetary value of an electric bus line," says Mr. Gustafsson.

The objective of the analysis was to understand how the total cost of electric buses compares with that of diesel and biogas buses when social and

¹ Persistence Market Research, 2015, Global Market Study on Electric Bus.



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environmental impacts are taken into account. In order to do so, Volvo Group chose to work with finance and sustainability professionals from KPMG member firms and to develop an approach called True Total Cost of Ownership (TrueTCO). This methodology monetizes the environmental and socio-economic impacts of an organization and/or its products and services - in other words, it quantifies them in financial terms.

The process identifies material environmental and social impacts

Volvo Group and KPMG's Sustainability practice in Sweden carried out a comprehensive stakeholder dialogue and materiality analysis to identify the socio-economic and environmental impacts to be quantified in financial terms in Volvo Group's TrueTCO analysis.

Speaking about the process, Daniel Dellham, the partner leading the project for KPMG in Sweden says: "In order to apply the methodology to the client's specific case, we needed insight from many Volvo Group stakeholders to identify environmental and social factors that have a material impact.

"We consulted with many stakeholders, both from within Volvo Group and external ones like city and transport authorities, environmental NGOs and universities. This extensive dialogue

helped to ensure we covered all relevant perspectives for Volvo, as well as to create support and buy-in to the process."

Once all factors material to TrueTCO had been identified, the central challenge was to find credible and robust data to monetize what are traditionally perceived as non-financial impacts. For example, traffic noise can adversely affect people and has been linked to health issues such as heart conditions and stress. The True TCO analysis required the team to apply a financial cost per person per year to account for the adverse effects of traffic noise.

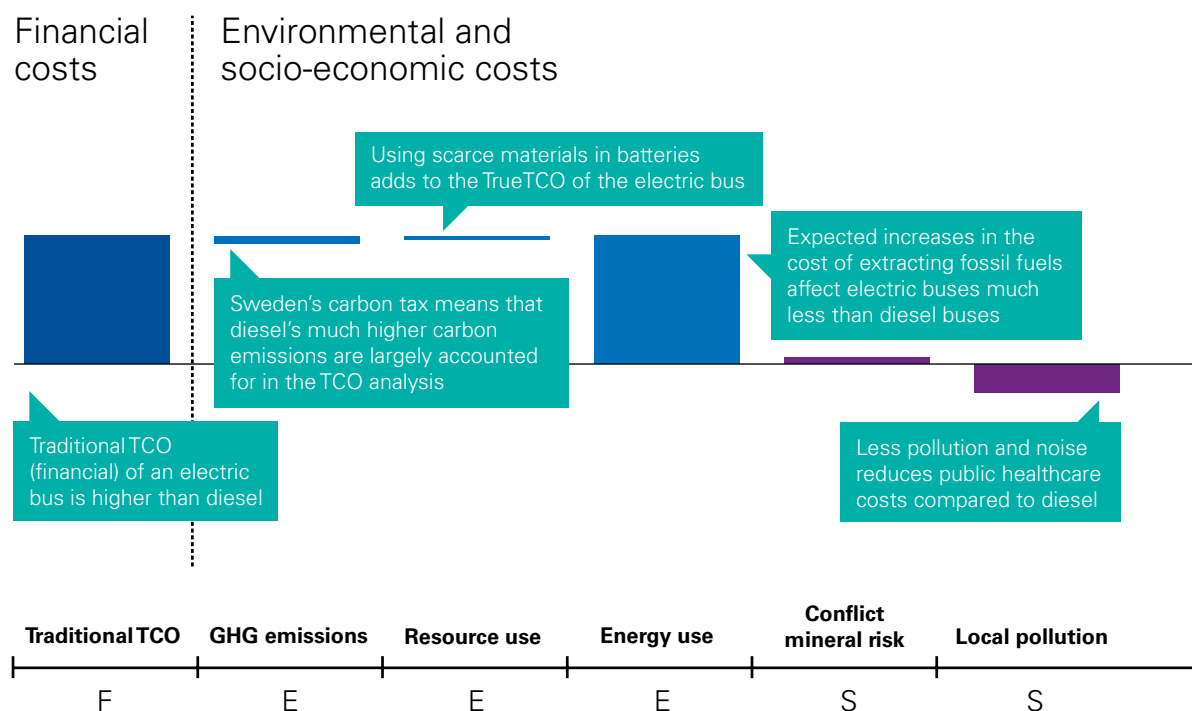
True Total Cost of Ownership transforms the conventional view of costs

Traditional financial cost-of-ownership analyses suggests that the cost of owning electric buses is higher than owning buses based on conventional technologies. However, the picture changes dramatically when the TrueTCO is calculated and environmental and socio-economic impacts are also taken into account.

The TrueTCO of electric buses is significantly lower than that of biogas and diesel buses. Furthermore, electric is the only technology that sees a reduction in ownership costs when the TrueTCO lens is applied.

KPMG True Value Analysis

Comparison of True Total Cost of Ownership of electric bus vs diesel bus



Source: GRC Today, October 2016, KPMG International

“The results show that irrespective of the number of parameters taken into consideration, electric buses comprise the leading public transport solution,” says Mr Gustafsson.

The value bridge below demonstrates how the TrueTCO analysis changes the conventional view of costs. The bars represent the difference in costs between an electric bus and a diesel bus. The bar on the far left shows that the TrueTCO of an electric bus is higher than that of a diesel bus when only direct financial costs are taken into account. The bar on the far right shows that the TrueTCO of an electric bus is lower than that of a diesel bus when the costs of environmental and socio-economic impacts are taken into account.

Savings to society could be significant

“Electric buses are an excellent example of an innovation that can create substantial value for society,” says Mr. Dellham, of KPMG in Sweden.

“Our analysis was based on a city with about half a million inhabitants and 400 buses. If all city buses in Sweden were electric, it could save Swedish society approximately US\$225 million

per year, of which US\$45 million would be public healthcare savings.”

TrueTCO could help to transform urban environments worldwide

The TrueTCO analysis has helped Volvo Group to increase awareness of the environmental and socio-economic impacts of city transport. It can also help city municipalities and transport authorities worldwide to make decisions on city planning and the future development of their transport systems. It is a strong example of how business can drive sustainable innovation and change by quantifying external social and environmental impacts that, until now, have usually been unpriced.

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TrueTCO per bus per year



The current tax incentive structure in Sweden favors diesel buses over electric. The TrueTCO analysis levels the playing field.

Electric bus design reduces travel time by enabling speedier boarding and disembarking of passengers

