

Environmental Impacts in the Liner Shipping Industry

The Hapag-Lloyd Online tool EcoCalc Reveals Emissions Arising from Container Transportation

Simone Ziegler

Abstract The liner shipping industry is the most environmentally friendly way to transport goods around the world volume wise. However, since worldwide business continues to grow the environmental strains have to be kept to a minimum. Regulatory measures demand this by claiming the environmental footprint of a transport. And customers are increasing their requirements as well. In order to meet all these expectations and requirements for sustainable transport solutions Hapag-Lloyd implemented an online tool to reveal emissions in 2011, the Hapag-Lloyd EcoCalc.

1 Emissions in the Liner Shipping Industry

Liner shipping is the most environmentally sound way to transport large volumes of goods around the world. It produces less greenhouse gases per tonne kilometer compared to any other mode of transport (Table 1).

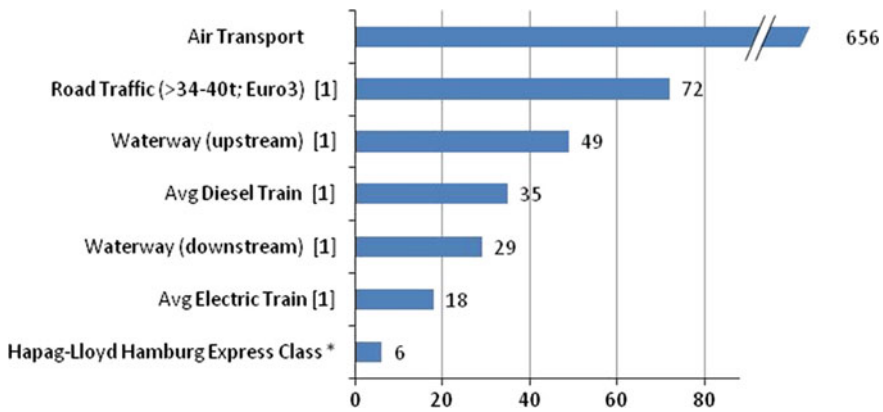
Vessels carry approximately 90 % of the traded goods by volume [1] however, according to various independent sources this accounts only for some 2.7 % of global greenhouse gas emissions [2]. The shipping industry is generally aware of the impact that transport services have on the environment such as greenhouse gases, noise, waste etc. The environmental strain of the transport and all supporting activities should therefore be kept to a minimum. The worldwide reduction of environmental impacts from shipping is a significant challenge for the industry as the global fleet continues to grow with the increase in worldwide trade.

Great potential for reducing environmental impacts lies in the reduction of vessel's fuel consumption. Emissions are directly related to the amount of fuel

S. Ziegler (✉)

Hapag-Lloyd AG, Sustainability Management, Ballindamm 25, 20095 Hamburg, Germany
e-mail: simone.ziegler@hlag.com

Table 1 Average CO₂ Emissions for cargo transport within Europe[9]



*Hapag-Lloyd own data

burned as they result from the combustion of marine fuel when operating vessels. Carbon dioxide (CO₂) emissions are those directly depending emissions from fuel combustion and can therefore easily be calculated. Obviously less fuel consumption leads to reduced emissions.

Carbon dioxide is the dominant greenhouse gas worldwide. Transport is the only sector in the EU in which CO₂ emissions have risen in the last few years. In addition, it is the main greenhouse gas in terms of emitted volume and noxiousness to humans and to the environment [3].

Due to the significant environmental impact and the external requirements from customers or regulatory bodies CO₂ emissions are often reported by many companies.

2 Goals for Implementation

Hapag-Lloyd decided to indicate emissions when transporting a container along the whole container transport chain or door-to-door transport. This is what an intermodal calculator offers. Consequently Hapag-Lloyd decided to present its own intermodal calculator—in line with the saying: “You can only manage what you measure!”

Data for the seaborne part have been available in-house since Hapag-Lloyd had calculated emissions for its seaborne transportation in the past according to the

Clean Cargo Working Group Methodology.¹ However, comprehensive emission figures for the pre- and on-carriage were still needed.

Key drivers for the implementation were:

- ensure stronger customer relations with better value proposition
- improve corporate image
- spearhead green developments in the container shipping industry
- meet legal requirements such as the European Standard DIN EN 16258 as well as the French decree no 2011-1336²
- gain competitive advantage.

3 Requirements of the Software Tool

Many intermodal calculators which indicate emissions within the supply chain were available on the software market. These tools employ different approaches from carbon accounting for the whole company as well as environmental auditing.

The tool Hapag-Lloyd wanted to offer needed to meet certain requirements.

The tool must offer comprehensive data for the pre- and on-carriage that unfold emission figures for different modes of transport such as truck or rail transportation. All sources of data behind these figures had to be reliable and profound. For example a container transport by truck in Germany causes other emission values

¹ This calculation model projects CO₂ emissions especially for shipping in an effort to improve transparency and comparability.

Parameters used in this model for CO₂ calculation are:

- Actual fuel consumption
- Actual distance sailed
- Number of days vessel was deployed
- Total TEU (nominal capacity)
- Number of reefer plugs

The CCWG [4] will include recent consolidated findings of the DIN EN 16258 in enhancing the calculation model with regard to vessel utilization and upstream emissions as from 2013 on. The CCWG basic calculation model takes the specific factors deriving in the container shipping industry into account.

As from 2010/2011 ocean carriers were asked to independently verify their calculation process according to the CCWG method including data gathering and actual calculation to independently proof the correctness of the data.

² In 2013 the European Standard DIN EN 16258 [5] as well as the French decree no 2011-1336 of 24 October 2011 [6] come into force.

The voluntary DIN EN 16258 provides a homogeneous “Methodology for calculation and declaration on energy consumptions and GHG emissions in transport services”. For liner shipping allocation rules have to be obeyed.

The French decree no 2011-1336 requires the delivery of carbon emission data for each transport service (goods and passengers transport) carried out in France.

than a truck transported in China. Thus it is essential to investigate how these distinctions between countries, continents and within modes of transport are considered by the different tools in order to reach this imposing goal.

Additionally, the methodology needed to be independently checked to facilitate trustworthy and reliable data. Possibilities of customizing and access to the Hapag-Lloyd IT-systems has to be checked beforehand as well. The implementation costs and the costs for the tool itself needed also to be considered.

4 Development and Implementation

Hapag-Lloyd decided to use EcoTransIT (Ecological Transport Information Tool) because it is currently the most sophisticated software tool in the transport industry offering a comprehensive database [7]. EcoTransIT provides an online tool to calculate emissions and energy consumption per transport worldwide and for different modes of transport such as truck, rail etc. This is exactly what Hapag-Lloyd was looking-for. The methodology of EcoTransIT was developed by the internationally recognized Institute for Energy and Environmental Research (ifeu) Heidelberg and the Institute for Applied Ecology in Berlin, and it already fulfills the requirements of the future European CEN-Standard 16258. More information and the scientific basis behind EcoTransIT are provided on the project's website [7].

The project: "Implementation of an online Hapag-Lloyd Emission Calculator" was led by the department Sustainability Management that involved various departments besides the EcoTransIT and customer input:

- IT for the technical work infrastructure and web support
- Global Sales equipped and trained the sales colleagues all over the world with the necessary background knowledge
- PR developed the logo and led the media relations
- Legal department checked the contracts and disclaimer
- Sustainability department led the project team, coordinated the project tasks and acted as point of entry for external parties such as our supplier EcoTransIT and selected customers who were involved in testing EcoCalc procedures.

A key task was to customize the EcoTransIT's product in order to develop a Hapag-Lloyd online emission calculator. Hapag-Lloyd implemented specific values such as trade lane specific CO₂ values and the port layer into the EcoTransIT product.

There were regular project meetings every two weeks to discuss project plans and developments. The work plans were adjusted accordingly.

Key actions were to find a dependable way of implementing the Hapag-Lloyd tradelane specific CO₂ values into the EcoTransIT database and to decide which parameters to use for the background calculation. Some actions arose during the execution of the project for example which transport mode to use in the background calculation when showing pre- and on-carriage.

In summary the implementation of the EcoCalc worked quickly by the excellent cooperation and support through all members of the project group.

5 The Online Calculator EcoCalc

Since October 2011 the online tool EcoCalc is publically available on the Hapag-Lloyd website [8]. EcoCalc calculates the environmental impact of freight transports worldwide based on data independently verified and scientifically sound. Evaluated emissions are Carbon Dioxide (CO₂) Nitrogen Oxide (NO_x), Sulphur Dioxide (SO₂), and Particulate Matter (PM₁₀).

Although most attention is paid to CO₂ and SO₂ emissions with regards to transport, there are also NO_x and PM emissions arising during transportation. Both emissions are publically more and more discussed. Hapag-Lloyd also provides these emission data for reference.

6 Conclusion

This project to implement an online intermodal calculator was a great success for Hapag-Lloyd. Customer and stakeholders have been included in the project at an early stage in order to develop a sophisticated web-product to match their requirements.

1, 5 years after its launch the Hapag-Lloyd EcoCalc still enjoys a frequent usage by our customers who determine their environmental footprint with this online calculator.

In summary we have identified four main success factors:

1. The EcoCalc is compliant. It fulfills the rising regulatory framework for logistic providers: the requirements of the European CEN-Standard 16258 and the French decree no 2011-1336 of 24 October 2011 coming into force this year.
2. The EcoCalc methodology is reliable. Data and methodology from EcoTransIT are scientifically based. In 2013 the Germanischer Lloyd has verified the data submission provided by Hapag-Lloyd.
3. The EcoCalc is complete. It allows to calculate the emissions of a container transport from the beginning to the end of its journey—the complete door-to-door transport.
4. The EcoCalc is comprehensive. It reveals relevant emissions of Carbon Dioxide (CO₂), Nitrogen Oxide (NO_x), Sulphur Dioxide (SO₂), and Particulate Matter (PM₁₀).

Further enhancements of the functionality of EcoCalc are planned and aim to improve its usability for customers as well as the accuracy of the data.

The EcoCalc has made emissions more transparent and has increased the awareness for ecological-friendlier logistics. The industry has come a long way in reducing emissions, but need to cut them even further as well as to lower the overall environmental impact of transporting goods.

This requires a variety of different measures such as:

- Technical enhancements of the equipment of ships
- Operational measures in the daily vessel operation
- Emission-reducing activities ashore
- Reduce the environmental impact of the container production.

References

1. International Chamber of Shipping (2013) Shipping, World Trade and the Reduction of CO₂ Emissions, p 2. <http://www.shippingandco2.org>. Accessed 22 Apr 2013
2. International Maritime Organization (IMO) (2009) Second IMO GHG Study 2009, p 3, figure 1.1: Emissions of CO₂ from shipping compared with global total emissions
3. EcoTransit (2013) Covered environmental impacts of transport. <http://www.ecotransit.org/environmental.en.html>. Accessed 22 Apr 2013
4. Clean Cargo Working Group (2013) Clean Cargo. <http://www.bsr.org/en/our-work/working-groups/clean-cargo>. Accessed 22 Apr 2013
5. Deutsches Institut für Normung DIN (2013) DIN EN 16258. <http://www.nadl.din.de>. Accessed 22 Apr 2013
6. French Environment and Energy Management Agency (ADME) (2013) Information about CO₂ emissions from transport services. <http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=25296>. Accessed 22 Apr 2013
7. EcoTransIT(2013) Calculation. <http://www.ecotransit.org/index.en.html>. Accessed 22 Apr 2013
8. Hapag-Lloyd (2013) EcoCalc. http://www.hapag-lloyd.com/en/about_us/environment_eco_calc.html. Accessed 22 Apr 2013
9. EcoTranIT (2008) Environmental methodology and data, p 38, table 22: European Mean Values