

Green Supply Chain & Logistics

Climate protection through process optimization:
A Key Performance Indicator (KPI) to assess CO₂ emissions



INNOVATION

ENGINEERING

OPTIMIZATION



Bayer Technology Services

Powering Your Performance

Green SCL

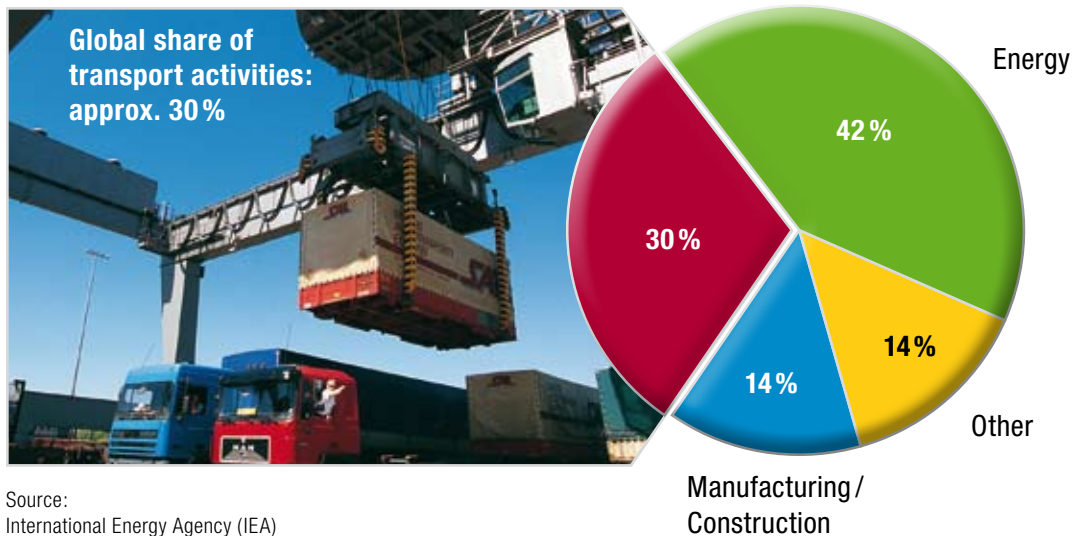
THE “GREEN SCL” MODULE Climate-Optimized Supply Chain & Logistics

Climate protection – A global challenge even for industrial companies

Climate protection is one of the most pressing global challenges we face today. This is caused by the enormous increase over the past few years in emission of greenhouse gases, especially carbon dioxide (CO₂). Experts state that these emissions are largely man-made.

The need for climate protection measures is recognized around the globe. Companies, national governments, and international organizations have agreed on climate protection targets and are working towards achieving them. The assessment of all factors contributing to the emissions along entire process and value chains is difficult. However, these factors are the keys to evaluating the economic constraints for individual climate protection measures.

Annual emissions of carbon dioxide equivalents (CO₂e): 27 Gt



The Bayer Climate Program has set ambitious targets

Through the Bayer Climate Program the Bayer Group adopts an innovative approach to climate protection. Lighthouse projects focusing on developments and products have been initiated as climate protection enablers. Take for example the Bayer Climate Check: Certified by TÜV, a renowned German inspection agency, this check helps to identify and quantify the potential for energy efficiency improvement. The results of this process provide the basis for measures to lower greenhouse gas emissions.

In Supply Chain and Logistics (SCL), too, all climate protection projects start with an analysis of the current situation – the SCL Climate Footprint. We have defined this to be a specific product-related indicator for all emissions caused by logistics processes, expressed in the form of CO₂ equivalents. Statistics by the International Energy Agency (IEA) reveal the major role of emissions resulting from logistics processes: In 2005, transport operations were responsible for almost one third of all CO₂ emissions generated by the combustion of fossil fuels in OECD countries.

There is significant potential for savings right along the logistics value added chain. In order to identify and unlock this potential, Bayer Technology Services has developed the “Green SCL” module.

Our module provides a Key Performance Indicator (KPI) to optimize both individual logistics processes and the entire supply chain with respect to climate protection.



GREEN SCL

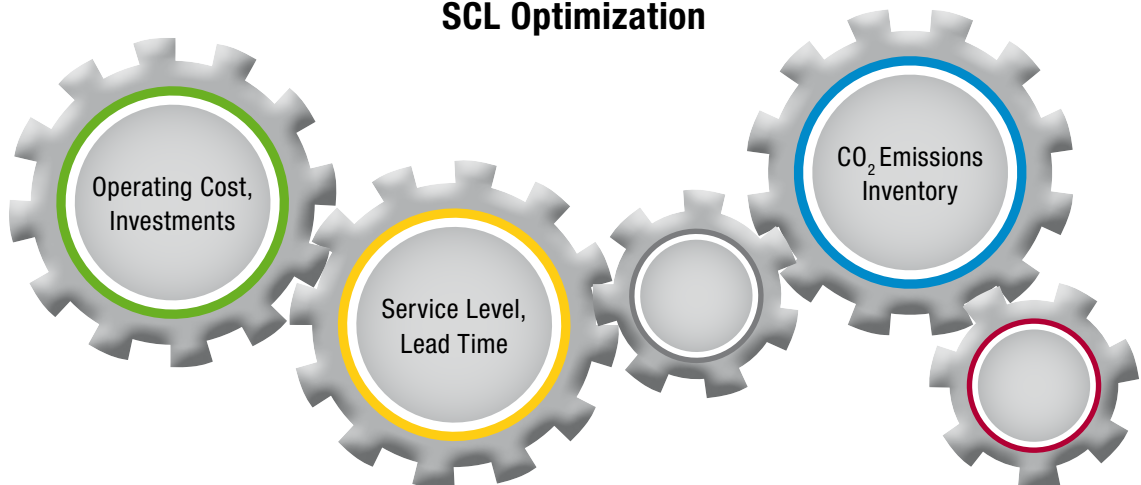
THE “GREEN SCL” MODULE Method, Results and Benefits

The “Green SCL” module combines the parameters of a conventional logistics/supply chain optimization with an additional climate KPI – the Logistics Climate Footprint.

The method – from raw data to KPI

The analysis starts with a targeted data collection using our dedicated questionnaire. We work with you to decide upon the scope of the logistics processes and to collect information on all kinds of transport operations, filling and packaging processes, and warehousing activities. These comprehensive data are used to identify the best ways for achieving an economically reasonable improvement.

SCL Optimization



Results as the basis for strategic decisions

The first step when assessing these data is to determine the SCL Climate Footprint. This indicates from the outset how effective further steps to exploit the identified potentials will be. Taking into account additional key parameters such as costs, service levels, or the capital lockup in stocks, it is possible to identify specific potential and measures. The potential can be simply and quantitatively aligned with strategic corporate goals, thereby creating an excellent decision-making basis. For example, this method allows for an initial comparison between various solution scenarios to balance the conflict between questions such as “How green should the company be?” and “How much can it cost?” or “How will the service level be affected?” The optimal approach is then selected based on the calculated change in the contribution to emissions and additional business management KPIs.

Benefits – from KPI to climate protection

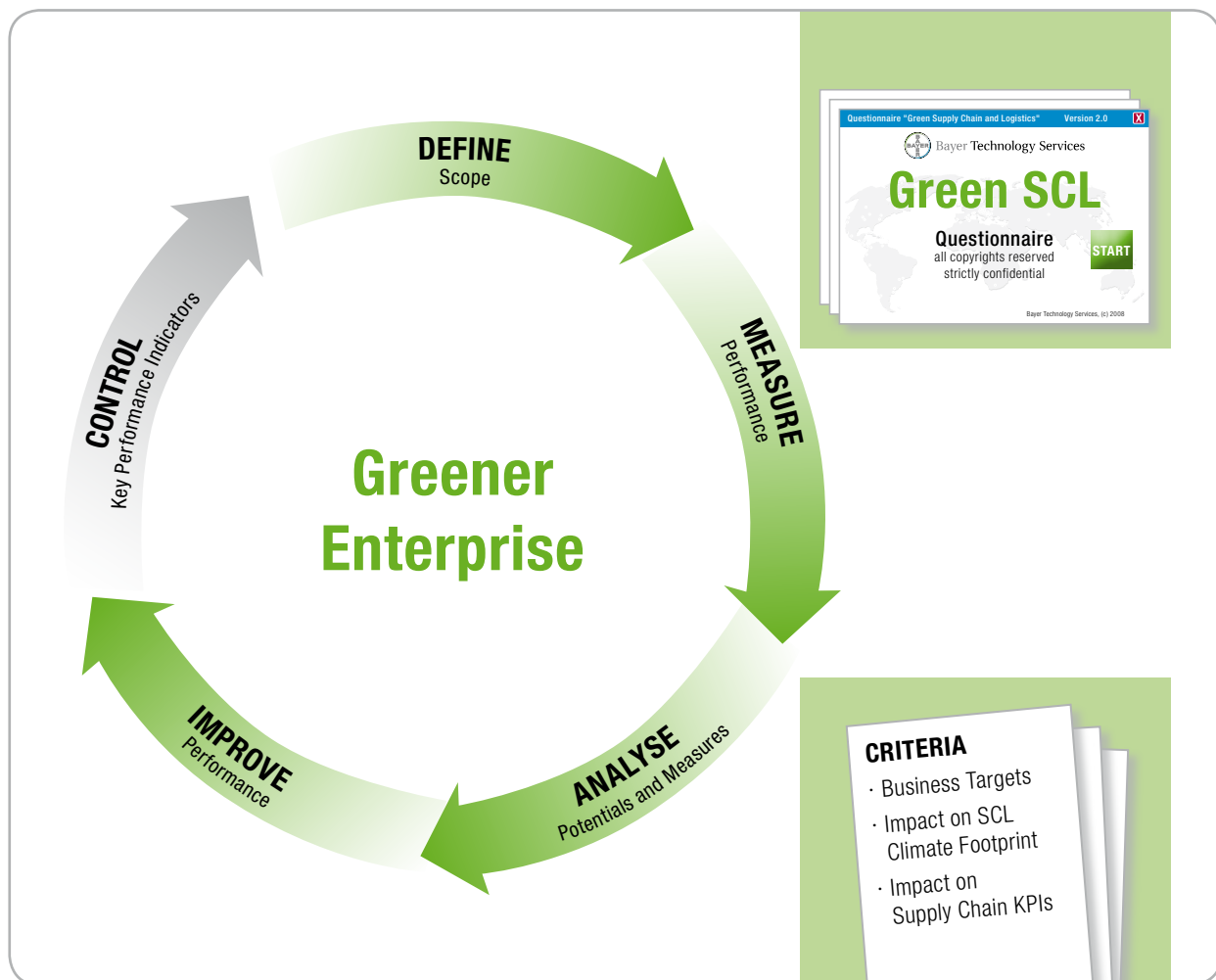
The SCL Climate Footprint – as a whole and in detail – can be used in many ways, including

- quantify the overall climate relevance of logistics processes,
- identify potential for cutting CO₂ emissions,
- consider achievable emissions savings in relation to other corporate KPIs,
- prepare and compare optimization scenarios,
- derive measures based on a list of priorities.

The SCL Climate Footprint provides an excellent foundation for a wide variety of strategic corporate decisions that can now also be assessed in terms of climate-related aspects.

With its clear structures resembling a Six Sigma process, “Green SCL” can be used for the ongoing improvement of the entire supply chain and logistics operation.

Are you interested? Bayer Technology Services will be happy to support your optimization projects. From collecting and analyzing data and identifying potential to preparing and implementing appropriate measures – we offer you a full range of services from a single source.

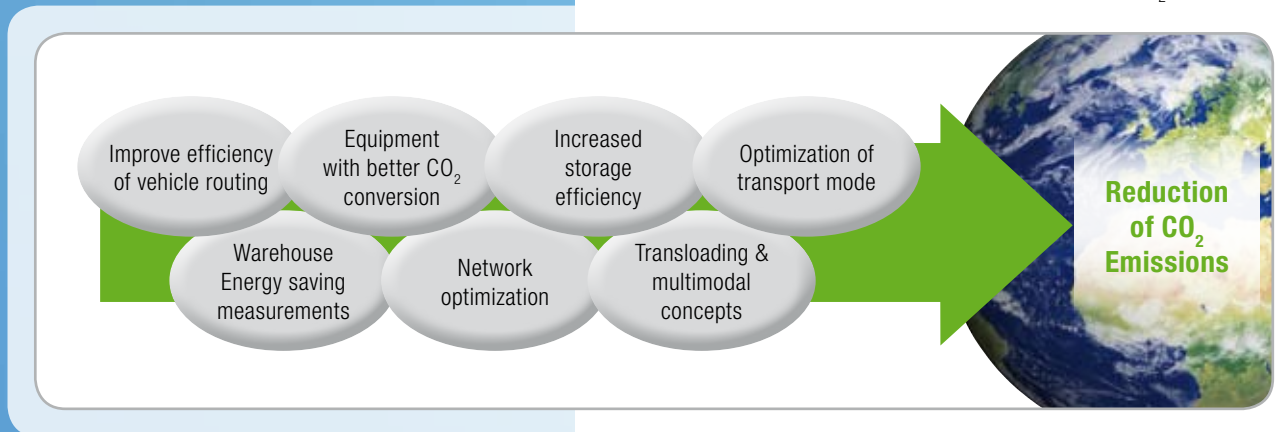


THE “GREEN SCL” MODULE

Optimized Logistics Helps To Achieve Climate Targets

Looking at some examples will better demonstrate how the results obtained from using “Green SCL” can be used in a variety of ways.

The basic supply chain processes, such as transport operations and warehousing, offer significant potential in terms of climate protection. The selected transportation mode strongly influences the level of transport-related emissions. For example, rail transport generates much lower CO₂ emissions than road transport. Transloading concepts and multimodal transport combinations can be used to unlock this potential for cutting CO₂ emissions.



Taking the distribution of plastic pellets as an example, costs and emissions can be optimized by transporting the bulk product in rail tank car rather than by truck. The same applies to the rail transport of finished packaged products in containers, which cuts costs and CO₂ emissions even when considering extra loading and unloading activities.

Systematic energy management opens up significant potential for making savings. In cold storage facilities, for example, several optimization strategies can be used simultaneously. These may include better heat insulation and/or the use of renewable energy sources such as photovoltaics.

Other optimization strategies, such as those related to the distribution network, encompass the entire supply chain. Various scenarios can be used to model how the opening of regional warehouses affects service levels, stock levels, transport costs, and CO₂ emissions, and to select an optimal solution based on given business targets. For example, setting up two additional distribution centers for Bayer HealthCare in China would cut distribution-related CO₂ emissions by approximately 75 %.

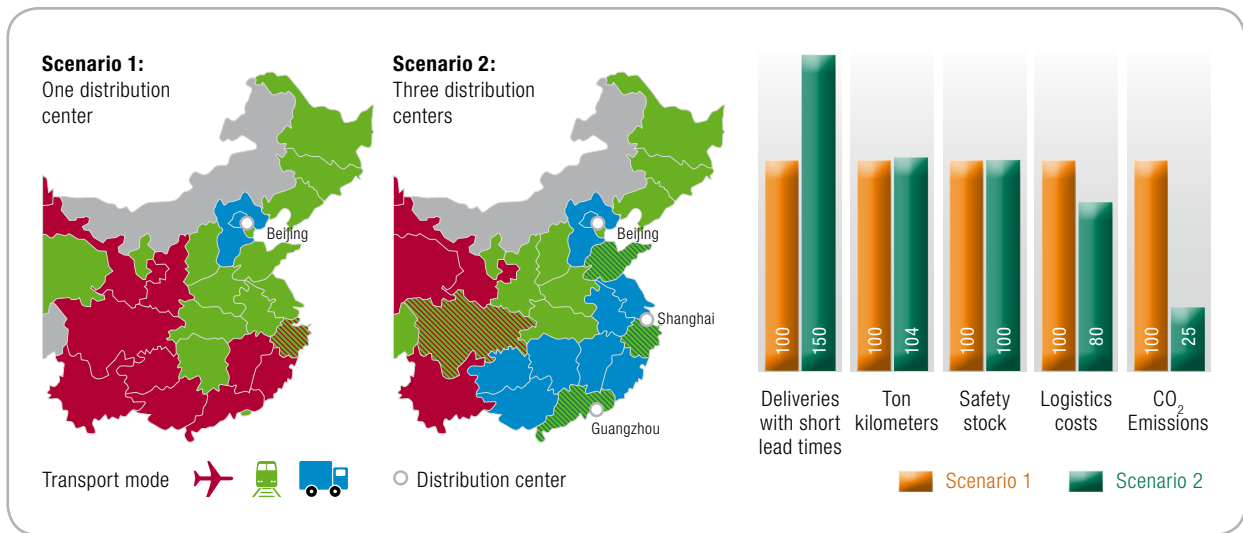
GREEN SCL



This is the case despite an increase in the ton-kilometer figure of 4 %. The key for this significant improvement is a substantial reduction of approximately 70 % in air freight to as little as approximately 10 % of the total freight kilometers.

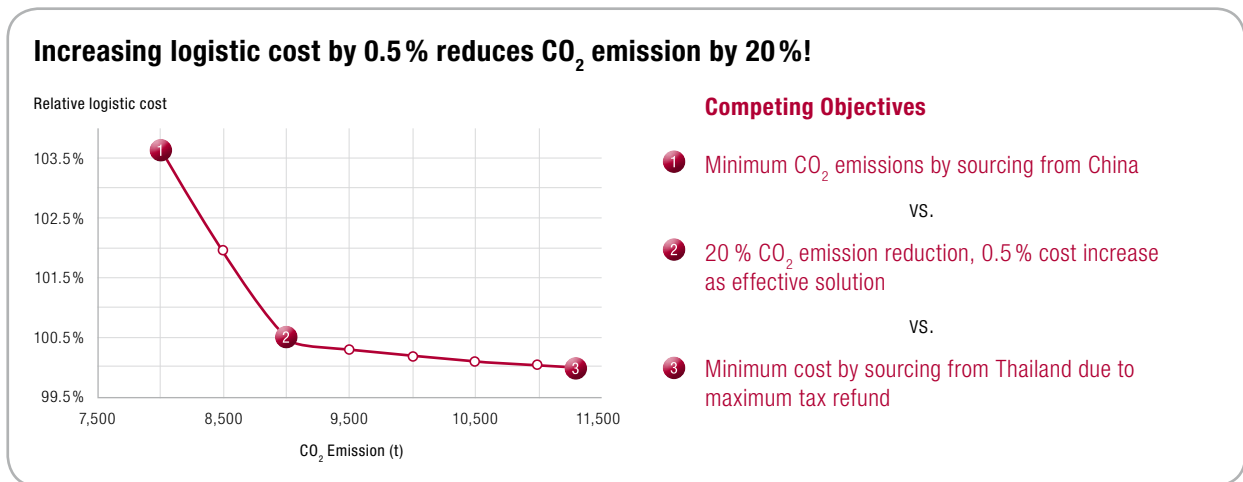
Multi-level inventory management across the network also eliminates the need to increase both moving and safety stocks. Lead times are shorter for about half of all deliveries and stay the same for the remaining shipments. In the example given, the resultant lower freight costs cut logistics costs by roughly one fifth.

local Chinese sourcing for those customers who intend to export their products. One other aspect is the freight costs provided by the market. For example, large flows of goods from Asia keep freight charges in the opposite direction low. Consequently, a product from Europe can be supplied competitively to customers in Asia despite the considerable distances and therefore higher CO₂ emissions involved. In such cases, the best solution is typically a compromise based on a strategic corporate decision. This must define the basic economic conditions for improved climate protection.



In a complex network of production sites, parameters other than freight costs often gain in importance when determining the most attractive delivery options from a costs and/or emissions perspective. As an example, the taxation aspect must not be neglected for deliveries to and from Asia: Here, tax considerations make the supply from neighboring Asian countries preferable to a

Emissions can often be cut substantially at relatively low costs. For the taxation-related example in China, an increase in logistics costs by just 0.5 % enables an emissions cut of 20 %. Only for even more ambitious targets for reducing CO₂ emissions are the specific costs significantly higher.





Bayer Technology Services

Bayer Technology Services GmbH
51368 Leverkusen, Germany
Phone: +49 (0)214/30-1

E-mail: info@bayertechnology.com
www.bayertechnology.com