

Climate change impact on the supply chain

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Supply chains have become complex global networks, often with specialized inputs produced in specific locations with reduced inventories. It is within this context that supply chains face growing climate risks, both from the physical impacts caused by climate change and from the transition to a low-carbon economy. These risks directly affect the cost, quality, timeliness, and certainty of supply chain production.

The EU mentions that the transport industry alone is responsible for 24% of the EU greenhouse gas emissions in 2016.

So all the players from the entire supply chain are facing a double challenge: they need to lower their carbon footprint by 2050, while, at the same time, they have to boost their competitiveness – taking into account that this sector represent an important share of GDP and jobs in Europe.

At its core, supply chain management has four primary objectives:

- Reduce the overall cost of production
- Enhance the speed and responsiveness of delivery
- Enhance the quality of goods and services produced
- Manage the uncertainty of major disruptions

The characteristics of modern supply chains—their global geographical reach, specialized inputs that are increasingly produced in specific locations, and reduced inventories from just-in-time production—render them more vulnerable to disruption by climate risks. Climate change now affects all four of these objectives.

By identifying and prioritizing affected parts of the supply chain, taking action, and evaluating impact, companies can build resilience to these risks, increasing the likelihood of business success.

CLIMATE RISKS

The [Task Force on Climate-related Financial Disclosures](#) identified two categories of risks:

1. **Physical climate risks** from extreme weather events and changing climate patterns that could disrupt the availability of raw material and energy supply, supplier operations and communities along supply chains
2. **Corporate policy and legal risks including:**
 - Market risks from changing customer and consumer preferences and demand for low-carbon and sustainable goods and services,
 - Operational risks from the future pricing of greenhouse gas (GHG) emissions for businesses, demand and use of low-carbon materials, revised planning techniques and new technologies,
 - Reputation risks to the company's brand image from failure to address climate risks and potential legal action.

Examples of possible climate change impacts to different links in the supply chain are summarized [in this paper](#) published in Journal of Industrial Engineering and Management:

Supply chain links	Typology of climate change impacts/risks
Manufacturing	<ul style="list-style-type: none"> • damage or complete destruction of assets • liability risks • disruption of plants and production lines • regulation with regard to carbon emissions • changes in the effectiveness or efficiency of production processes • increased costs for energy and maintenance activities • increased cost of upstream operations and product quality • stimulation of investments in renewable energy and energy efficiency projects increase in demand for biofuels and renewable energy sources in the energy sector • increase in demand for pharmaceuticals' sector • stimulation of demand for non-emitting products • deployment of lower carbon intensity operating practices by market leaders development of diversified products based on lower GHG emissions
Transportation	<ul style="list-style-type: none"> • increase in buckled rails and rutted roads • delays leading to paying compensation to operators and causing problems to customers • overhead cables brought down because of strong winds • problems related to coastal defences • drainage issues • landslip resulting from heavy rainfall • securing stability of structures
Warehousing and storage	<ul style="list-style-type: none"> • vulnerability of infrastructure, personnel, communications, supply etc • possible dislocation due to extreme weather events
Trading	<ul style="list-style-type: none"> • reputational risk in downstream sectors due to increased need for transparency • new regulations regarding product labeling • increases in the consumer goods production costs and prices • decrease of demand for consumer products
Consumption and Customer Service	<ul style="list-style-type: none"> • need for improved product design aiming at the elimination of packaging material and the enhancement of product durability, reusability, recyclability, and materials efficiency

Business Actions

Companies can address climate-related risks in their supply chains, create value, and potentially develop a competitive advantage by identifying and acting where they have the greatest impact on the environment, and the greatest influence.

According to a report published by BSR, titled *Climate and Supply Chain - The Business Case for Action*, creating a framework that addresses the climate change impact on the Supply Chain industry means taking these three steps:

- Identify priorities
- Take action and develop targets
- Evaluate impact

Identify priorities

Structured assessment of the supply chain can help companies prioritize high-risk areas that offer the greatest opportunity for creating supply chain resilience—including areas of high GHG emissions and areas of high climate vulnerability. For companies seeking a method to prioritize parts of their supply chain according to climate risks, BSR suggests assessing business-critical spend categories—as well as the geographies from which those categories are sourced—against two dimensions: quantity of emissions generated, which exposes the supply chain to transition risks, and level of vulnerability to physical climate risks. These two dimensions can be mapped to produce a visual representation of the priorities.

STEP 1: Companies can determine the scope for the exercise, focusing on categories of high spend, as well as any categories that are deemed high priority, such as business-critical suppliers or key raw materials that are not sourced directly.

STEP 2: Companies can develop two scores for each category—one for “emissions” and one for “vulnerability.”

The emissions dimension is scored based on the level or intensity of GHGs associated with a category.

The vulnerability dimension is scored based on:

- The extent to which the category is sourced from climate vulnerable countries, ecosystems, or facility locations
- The extent to which the category relies on climate-vulnerable natural resource inputs, such as water, to produce the product
- The extent to which the category relies on extended supply chains and distribution routes in climate-vulnerable locations

- The extent to which a significant proportion of suppliers within the category are not sufficiently aware of risks, or lack resources to mitigate risks; and
- The extent to which the category otherwise creates risk

Take action and develop targets

Considering the urgency of climate change, companies should set targets and take action in tandem. In practice, the processes tend to happen iteratively.

Climate action takes many forms, and companies can increase efficiency by adopting a structured approach to identify actions with the highest potential for impact. Types of supply chain climate actions companies can take are internal, with suppliers, and in broader collaboration, according to BSR.

Internal action is about working with teams in procurement and related functions to improve requirements and processes to more successfully consider climate impacts in sourcing and procurement decisions. Supplier action is about setting requirements and encouraging suppliers to reduce their emissions, develop adaptive capacity, and participate in programs with these goals.

Collaborative action is about joining, leading, or starting initiatives with other businesses and stakeholders. These initiatives can be commodity-focused, industry-focused, or community-focused.

Once actions are identified, companies need to prioritize and ensure this prioritization relies on a robust rationale. This could include prioritization factors, such as a company's level of ambition, resources needed, the potential scale and likelihood of the impact on key metrics, or the measurability of results.

Setting measurable, time-bound targets helps companies focus and drive their actions to address their supply chain climate risks. It also helps companies reduce these risks faster and more profitably than acting without concrete targets.

Targets should focus on identified supply chain priorities, including both emissions reductions to address transition risks and strengthening areas that are vulnerable to physical climate risks.

While quantitative emissions-reduction targets across the supply chain are ideal, many companies, as well as suppliers or segments of the supply chain, may not yet be ready to commit to quantitative goals. In this case, companies or their suppliers can set qualitative climate targets as a useful first step.

Here are some examples:

- Establishing energy-management systems
- Taking steps toward emissions reduction (e.g., identifying climate priorities)
- Conducting a return-on-investment analysis of a range of potential emissions-reduction activities to identify quick wins
- Developing an emissions-action plan and implementing GHG-reduction projects
- Including GHG-reduction criteria in supplier selection and product design (e.g., use of less GHG-intensive materials or supply chain processes)

Evaluate impact

Monitoring, evaluating, and reporting helps a company understand how well different actions contribute to achieving targets and effectively addressing supply chain climate priorities. They can also determine whether there is any need for a company to amend its approach.

BSR states that, in particular, metrics can help a company understand the outcomes and impacts of its climate actions and adjust targets over time. While a wide array of possible metrics exists, there is growing momentum around consistent, comparable climate metrics and disclosures, particularly for GHG emissions.

Specific metrics may vary by industry, but they can build on existing carbon accounting and reporting standards. We believe standardized supply chain emissions metrics are best when linked to science-based targets for emissions reductions. Metrics for adaptive capacity could include, for example, the amount of supplier financial investment in infrastructure that helps minimize the impact of climate change or the percent of spend with suppliers in vulnerable locations. Metrics could also include the number of suppliers with climate preparedness plans.

To help identify priorities, establish areas for action and targets, and evaluate results, companies can review the areas of value, or capital assets, that intersect their supply chains. BSR has identified six capital assets:

- Human Capital
- Political Capital
- Financial Capital
- Physical Capital
- Social Capital
- Natural Capital

When reviewing these capital assets, a company can identify the particular assets that face the greatest climate risks, take action to strengthen those assets, and measure the results of their action over time.

Green Logistics

During the discussion about the sustainability of logistics companies, the term “Green Logistics” has emerged. This is more than just reducing the carbon footprint; it is also a management task, because it must be strategically planned and operationally implemented in order to achieve long-term economic benefits in addition to short-term measures. In other words, the aim of Green Logistics is to find a balance between the economic aspect and the ecological one.

Basically, Green Logistics is committed to:

1. Measuring the carbon footprint of companies, in order to have a starting point
2. Reducing air, soil and water pollution
3. Appropriate use of consumables by reusing containers and using recycling packaging

Currently, logistics is not an industry characterized by a high degree of sustainability. Companies face considerable obstacles to the implementation of environmental policy requirements in the logistics sector.

Strategies for applying the Green Logistics Principles

1. Inclusion of environmental criteria in procurement policy

Within the scope of a company's purchasing and procurement policies, sustainability criteria can be included in the evaluation of suppliers. These can refer to:

- a) Characteristics of the product – for example, the use of ecological packaging and the reduction of plastic as packing material.
- b) Manufacturing process – there are international regulations that guarantee environmental management, such as ISO 14001.
- c) Location of the supplier – preferably, you should choose the one that is situated closer.

2. Optimization of fleet management

Transport is one of the areas with the highest carbon footprint in the logistics chain. To limit the CO₂ emissions, in addition to buying more environmentally friendly vehicles, it is necessary to use systems that make planning of delivery routes more efficient and prioritize the consolidation of loads. A good fleet management not only achieves greater efficiency but also reduces CO₂ emissions.

3. A warehouse that meets the standards of construction and sustainable management

There is an increasing demand for new warehouses – the so-called 4.0 logistics buildings, which have environmental protection measures embedded in their planning and construction.

Even though you do not have a “smart warehouse”, you could diminish the energy-related costs by implementing some small changes. For example, the need for artificial light can be reduced by completely automating certain storage processes (emulation of the method known as lights-out production). Another way to pursue sustainable logistics approaches is to use packaging that is as close as possible to the products to limit the waste of resources, or to use adaptive packaging material with greater versatility.

4. Measures to reduce and recycle the waste generated in the warehouse

One of the measures for the implementation of the green logistics in the warehouse is the disposal of the accruing waste and recycling most of the materials.

EU's view on sustainable future of mobility of goods and people

The European Commission is working towards a form of mobility that is sustainable, energy-efficient and respectful of the environment.

Its aim is to reduce the adverse effects connected to mobility. This means, above all, promoting co-modality, i.e. optimally combining various modes of transport within the same transport chain, which looking forward, is the solution in the case of freight. Technical innovations and a shift towards the least polluting and most energy efficient modes of transport — especially in the case of long distance and urban travel — will also contribute to more sustainable mobility.

[The Low-Emission Mobility Strategy](#) was adopted in July 2016 by the European Commission and addresses the need to find more sustainable ways for the mobility of people and goods.

By midcentury, greenhouse gas emissions from transport will need to be at least 60% lower than in 1990 and be firmly on the path towards zero. Emissions of air pollutants from transport that harm our health need to be drastically reduced without delay.

The strategy will benefit European citizens and consumers by delivering improvements in air quality, reductions in noise levels, lower congestion levels and improved safety. Consumers will benefit from less-energy consuming cars, from better infrastructure for alternative fuels, better links between modes of transport and better safety and fewer delays thanks to the roll-out of digital technologies.

There are three priority areas for action:

1. Increasing the efficiency of the transport system by making the most of digital technologies, smart pricing and further encouraging the shift to lower emission transport modes,
2. Speeding up the deployment of low-emission alternative energy for transport, such as advanced biofuels, electricity, hydrogen and renewable synthetic fuels and removing obstacles to the electrification of transport
3. Moving towards zero-emission vehicles. While further improvements to the internal combustion engine will be needed, Europe needs to accelerate the transition towards low- and zero-emission vehicles.

The Strategy draws on existing mechanisms and funds. The Investment Plan for Europe plays a very important role, with significant progress already made with projects that are in the pipeline for funding under the [European Fund for Strategic Investment](#). In addition, EUR 70 billion is available for transport under the [European Structural and Investment Fund](#), including EUR 39 billion for supporting the move towards low-emission mobility, of which EUR 12 billion for low-carbon and sustainable urban mobility alone. Under the research program [Horizon 2020](#), EUR 6.4 billion is available for low-carbon mobility projects.

Also, the EU is committed to reaching an agreement to address international aviation and international maritime emissions.

Case Study: EROSKI Group (Spain)

EROSKI Center in Oñati is a store with a neutral balance in CO₂ emissions. In implementing the [Eroski Group Environmental Plan](#), it was determined that the most appropriate and effective way for the company to try to curb CO₂ emissions was in the transportation of its products from the production site to the distributor.

A group of experts in logistics designed environmental optimization plans for the transportation of products.

To help reduce greenhouse gas emissions:

- Optimization of routes.
- Use less polluting means of transport.
- Use of fuel plant additive to reduce emissions by 2%.
- Use of biofuels.
- Driving more efficiently and environmentally friendly, reducing fuel use by 10%.

After implementing this plan, it became the first store in Europe with a neutral balance in CO₂ emissions, thanks to the incorporation of criteria of sustainable construction, energy efficiency measures and use of renewable energy.

The energy consumption reduced by 60%, whilst emissions derived from the rest of consumption were offset by the purchase of green energy.

Thus, the supermarket is recognized through the BREEAM-Spain certification of sustainable construction, the first in the state, and the first in Europe to achieve the ISO 50001 energy management certification.

Sources and further reading

Climate and Supply Chain Management: The Business Case for Action – BSR

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