Sustainability in Plastics

Calcium Carbonate
[in nature, in life]
Omya Group

Omya is a leading global producer of industrial minerals, mainly fillers and pigments derived from calcium carbonate and dolomite and is a worldwide distributor of chemical products. The company’s major markets are the paper, plastics, paint/coatings/adhesives industries as well as construction, environment, agriculture, food and pharmaceutical. Founded in 1884 in Switzerland, Omya now has a global presence extending to more than 100 locations in over 50 countries with 6000 employees.

Sustainability

Sustainable development is defined as a form of progress that meets present needs without compromising the ability of future generations to meet their needs. Quality, safety and corporate accountability are the principles upon which Omya conducts its business. For us sustainability includes:

Economic growth

- Needs, rights and values of our customers
- Continuous improvement of our products and services

Ecological balance

- Compliance with applicable laws, rules and regulations and constant efforts to reduce our impact
- Environmental responsibility

Social progress

- Omya’s facilities operate safely and are considerate of the community in which they operate
- We are good local citizens and respect our fellow human beings and the environment
- We are guided by ethical principles
Benefits of our Products

Replaces
Our calcium carbonates help to replace petrochemical-based plastics in packaging and packaging components.

Reduces
Our calcium carbonates reduce dependency on petrochemical-based products, in addition to lowering the energy used during processing, and reducing the carbon footprint (greenhouse gas emissions) of the overall package.

Reusable
Calcium carbonate-reinforced plastics are ideal for heavy-duty applications, including pallets and trays which may be used repeatedly.

Recyclable
Plastic products containing our calcium carbonates may be recycled.

Safe
Omya’s calcium carbonates meet the local safety requirements.
Climate Change - Greenhouse Gases

Climate Change has been identified, as one of the greatest challenges facing nations, governments, businesses and citizens for future decades.

In response, international, regional, national and local initiatives are being developed and implemented to limit Greenhouse gases concentrations in the Earth’s atmosphere.

Such initiatives rely on the quantification, monitoring, reporting and verification of greenhouse gases emissions and/or removals. (ISO 14064-1, p.v.)

Global Temperature Changes (1880 - 2000)

Source: U.S. National Climate Data Center
Global CO₂ Emissions

Carbon Footprint

This is the total amount of Carbon dioxide (CO₂) and other greenhouse gases emitted over the full life cycle of a product or service and is usually expressed as grams of CO₂ equivalents.

Carbon dioxide (CO₂) and other greenhouse gases account for different global warming effects.

The carbon footprint is calculated using the Life Cycle Assessment (LCA) method.

IMA Life Cycle Analysis (LCA) Project

- In 2003 the European Commission published a Communication on Integrated Policy stating that LCA is the best framework for assessing the potential environmental impact of products.

- The proposed methodology to develop LCA data in the most cost effective way is to build, when possible, common process-based datasheets on consumption of materials and emissions to air / water / soil that can be used for various products / minerals.

- The end of first period of the project “European Platform on LCA” was completed in August 2008.

- IMA have developed the certified CO₂ figure for ground calcium carbonate (GCC) as shown later.
LCA System for Calcium Carbonate
The GCC Model

ISO standards 14040 and 14044 on Life Cycle Analysis.
The Carbonate Cycle

Natural calcium carbonate deposits may appear massive and immobile, but they do in fact undergo gradual change.

Within this system, atmospheric influences alone drive the cyclic processes. Water evaporates and is transformed into gas or water vapor that is carried away by the wind and returns to the Earth’s surface as rain.

Fine droplets of water (e.g. rain) make effective absorbers of atmospheric impurities like CO₂, SO₂ and NOₓ, which dissolve to form acids. This “acid rain” attacks limestone and decomposes it. If the main acidic constituent is CO₂, bicarbonate is formed according to the equation:

\[ \text{CaCO}_3 + \text{H}_2\text{CO}_3 \rightarrow \text{Ca(HCO}_3\text{)}_2 \]

Calcium bicarbonate is water-soluble, so it is washed away into the oceans. This chemical process supplements the mechanical erosion of hills and mountains by wind and water, and is a principal cause of the increasing salinity in the world’s oceans. In the oceans, changes in temperature, pressure, pH, CO₂ content etc. may reverse the reaction, causing the carbonate to precipitate and gradually form new sedimentary rocks on the ocean floor.

Reference: Omya „Calcium Carbonate in the Paper Industry“
Carbon Footprint & Calcium Carbonate

For natural ground calcium carbonate the IMA carbon footprint figure is 75 kg of CO₂ emitted per ton of CaCO₃ produced. (source: IMA figure is based upon the European average mix fuel)

In comparison to other raw materials used within the plastics industry, the results for calcium carbonate are very positive.

However, there are still possibilities to improve this favourable position and the challenge is to optimize our production process regarding the use of energy and transportation.

We believe that the success of our products will depend increasingly upon optimising our carbon footprint for the future.
Transportation

We strive to have the most efficient means of transportation thanks to our strategy of positioning our business in partnership with our customers.

The CO₂ generated by the transportation of Omya’s calcium carbonate to its final destination, plays an important role in the final carbon footprint calculation.

More than 100 Omya plants situated around the world enables Omya to act as a local supplier which minimises the delivery distance and reduces the CO₂ formation.

Please refer to the Omya web site - www.omya.com for plant locations.

**CO₂ Emissions for Transport Alternatives**

<table>
<thead>
<tr>
<th>Transport System</th>
<th>GWP* kg CO₂ per ton-km</th>
<th>Carbon Footprint kg CO₂ per ton-km</th>
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</thead>
<tbody>
<tr>
<td>Transport Rail</td>
<td>0.0393</td>
<td>0.0393</td>
</tr>
<tr>
<td>Transport, lorry &gt; 32t, EURO3</td>
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<td>0.111</td>
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<td>Transport, lorry &gt; 32t, EURO4</td>
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<tr>
<td>River Ship</td>
<td>0.0464</td>
<td>0.0444</td>
</tr>
</tbody>
</table>

* Global Warming Potential

*Data source: EMPA / ECOINVNET*
Sustainable Development

„Development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.“

As defined by the Brundtland Commission
Natural Products for Sustainability