

Data and Trends

**Environmental Protection
and Safety**

2015



EMS-GRIVORY
EMS-GRILTECH
EMS-SERVICES

Data and Trends 2015

EMS works sustainably and responsibly. Protection of people and the environment during production and distribution of our high-quality products is a primary concern of the companies of the EMS Group.

With the annual publication "Data and Trends", we report on current developments and measures in the field of environmental protection and safety and take the opportunity to comment on significant changes and developments. The data refers to the business units EMS-GRIVORY, EMS-GRILTECH and EMS-SERVICES. These companies employ around 1000 at the production site in Domat/Ems.

The graphs show the specific quantities which are used or produced in each case during the manufacture of one tone of finished product. These ratio figures are independent of annual fluctuations in quantities manufactured and allow a volume-independent comparison to be made over a period of several years.

With one exception which remained stable, all environmental and safety-relevant key index figures reached new best values in 2015.

The continuity and sustainability of the measures can be seen particularly clearly a comparison with the first key index figures published in 2001:

Key index figures		2001	2015	Δ (2001->2015)
E+S investment share	[%]	4.7	13.8	+ 294 %
E+S outlay	[CHF/t product]	112.9	81.1	- 28 %
Energy consumption	[MWh/t product]	3.5	2.1	- 40 %
Waste quantity	[kg waste/t product]	26	20.8	- 20 %
Waste water load	[kg TOC/t product]	0.7	0.3	- 57 %
Emission factor	[kg/t product]	270.9	40.3	- 85 %*
Accidents with working hours lost	[pro 1000 workers]	50	26	- 48 %

* reduction in CO2 due to conversion to generation of steam by burning wood in 2007

The progress achieved does not mean that we can rest on our laurels; it forms the basis and drive for future improvements.

Our goal is and remains continual improvement in all areas.

This is what we work towards – every day!



Dr. Joachim Maigut
Head Environmental Protection and Safety



Investment

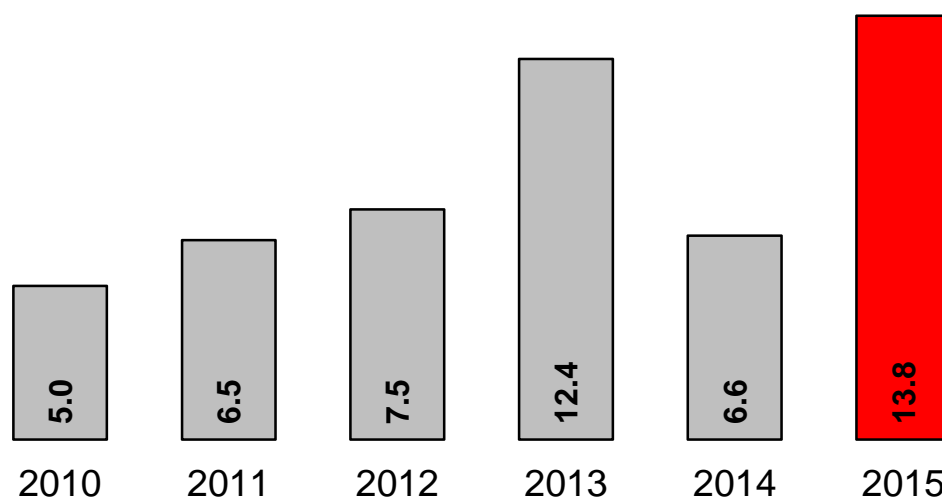
New record year 2015

Investment in environmental protection and safety in 2015 exceeded the record levels of 2013 and lie way above the average of earlier years.

Emphasis in 2015 was on achieving improvements in air quality in various production units through improved ventilation, cleaning of exhaust air and optimized fresh air intake.

Other focus points were renovation of a warehouse for hazardous materials and higher safety levels in an energy-optimized grinding process.

Share of investment for environmental protection and safety in % of all investments



Operating expenses

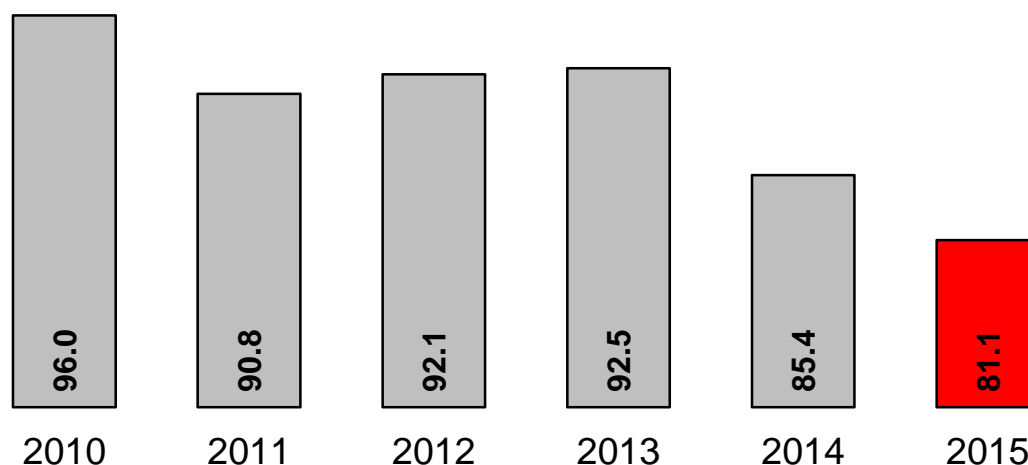
A further increase in efficiency – lowest costs despite higher requirements

Outlay for environmental protection consists primarily of operating costs for waste water and exhaust air cleaning systems as well as the cost of waste management. Operating costs in the field of safety are generated mainly by measures implemented to ensure protection of health, fire prevention, site security and working safety (accident prevention).

In 2015 it was possible to achieve savings in treatment of waste water and cleaning of exhaust air. Other costs were maintained at the same levels as the previous year although requirements became more stringent in practically all areas.

The share of E+S costs per ton of product sold sank by -5% compared to the previous year to reach the lowest value since start of monitoring in 2001. At that time, costs for E+S outlay were recorded as 112.9 CHF/t product.

E+S outlay CHF/t product



Resources

Lower electricity consumption again – increased share of renewable energy

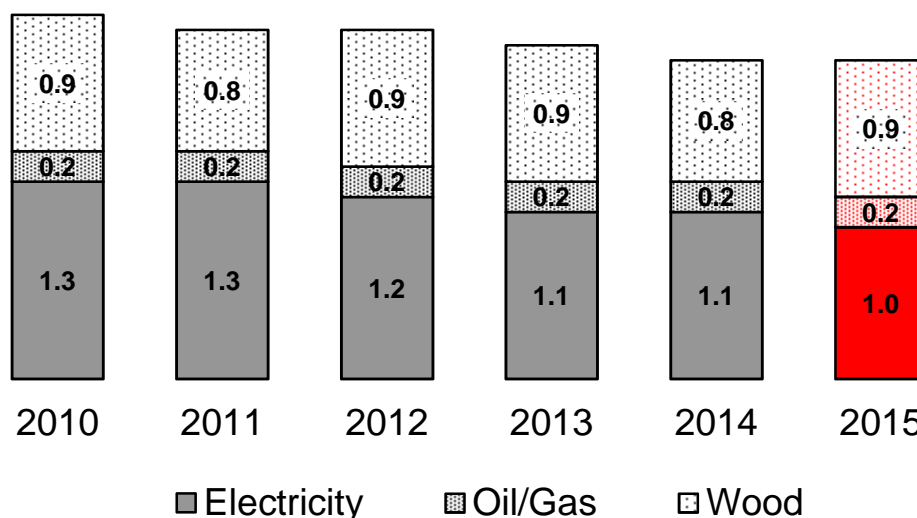
Over the last years, consumption of electricity at the production site has dropped continually. At the current level, further savings potential is limited. Comprehensive analysis is required and is implemented continually in order to identify and take advantage of opportunities for cost savings.

Main activities are focused on:

- saving of electricity (above all drive systems, process heating and lighting systems)
- limiting heat loss

These projects enabled us to reduce electricity consumption by a further -10% through savings mainly from increased plant efficiency. Energy-saving LED lighting technology has also been installed indoors and outdoors at the production site. A positive side effect is the longer operating life of these lights; the industrial standard for LED lamps is currently around 50,000 hours which is three times more than for conventional energy-saving lights! This has resulted in a significant drop in replacement investments and time-consuming changing of lightbulbs in the production plants. In addition, the LED lights contain no mercury and can be disposed of safely.

Energy consumption in MWh/t product



Manufacturing waste

Slightly more waste – Recycling share increased!

Waste management at EMS-CHEMIE AG follows the principle of avoidance before recycling before disposal!

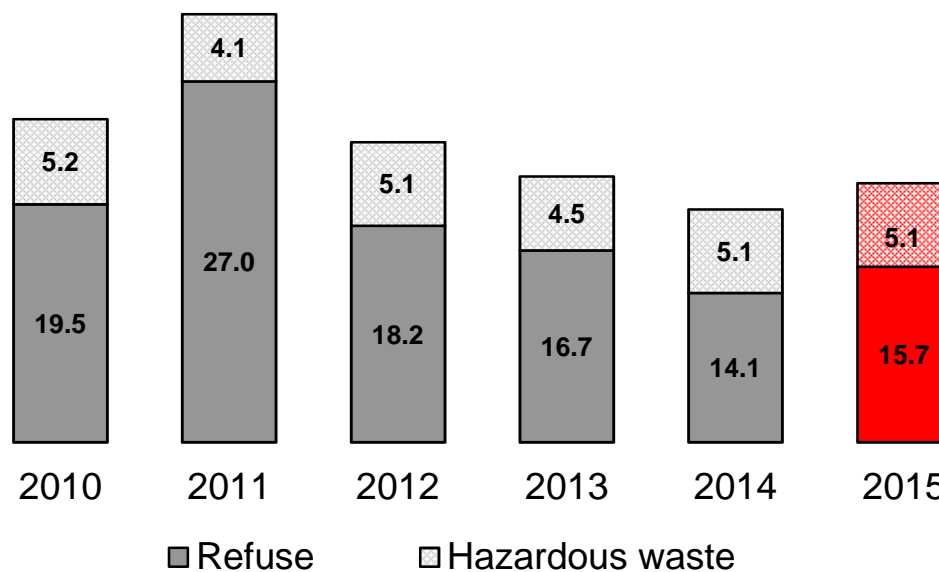
In 2015, a total of 1374 tons of recyclable materials such as metal, glass, wood, paper and packaging materials were separated from the waste for recycling. This is an increase of 2.8% compared to 2014 (1336 tons).

This means that the recycling rate is very high: 35 percent of all waste materials was recycled in 2015.

The major part of remaining waste material is plastic waste which has a particularly high heating value and is used to a great extent for incineration purposes. As secondary fuel in energy-intensive plants in the cement industry, this replaces fossil fuels such as oil or gas. Only refuse with a lower heating value is disposed of together with household waste in an incinerator plant.

The amount of hazardous waste remains at the level of the previous year. All hazardous waste is disposed of solely by authorized disposal companies and only in specialized facilities located in Switzerland.

kg refuse/t product



Waste water

Further reduced waste water load – Cleaning efficiency 92%

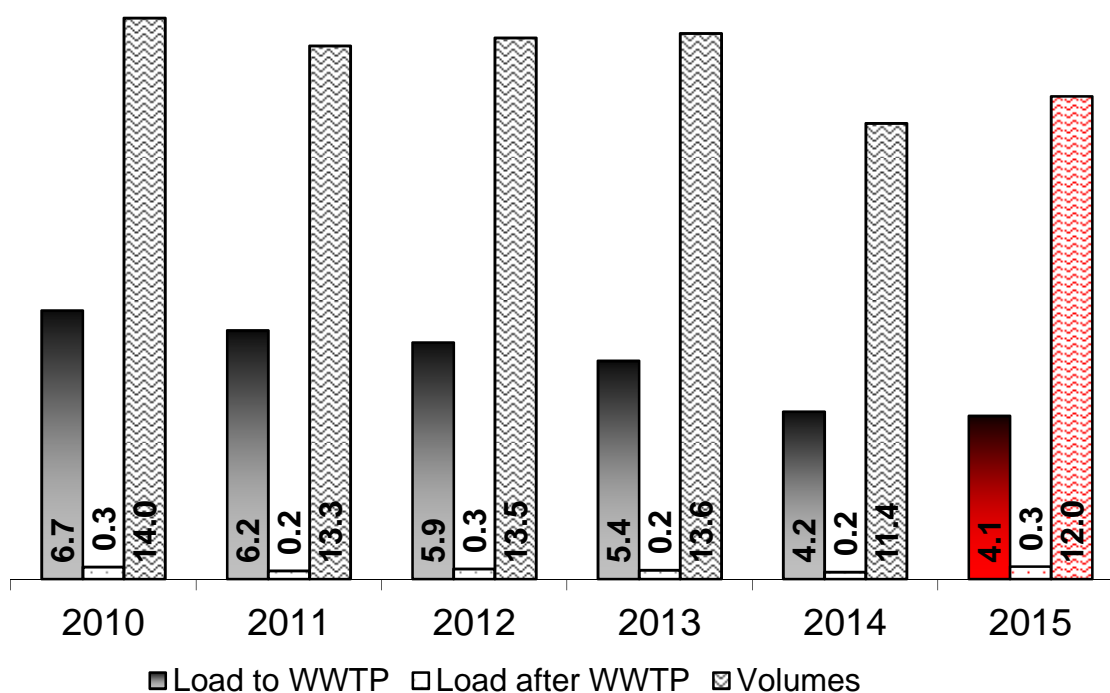
The graph shows the development of waste water volumes and waste water load before and after processing at the company's own treatment plant. As the water load is made up mainly of organic material, this is shown as TOC (total organic carbon).

In addition to processing our industrial waste water, the water treatment plant (WWTP) treats domestic waste water from the local towns of Rhäzüns, Bonaduz and Tamins.

In 2015 a systematic analysis of the waste water flow on the production site was initiated. During this analysis, potential for improvement was identified and made use of so that the waste water volumes could be reduced by -25% or 13 tons.

The sewage sludge drying plant has made it possible to reduce the quantity of dried sludge to be transported to the drying plant in Chur by 4200 tons per year – this corresponds to 190 truckloads each year!

Load in kg TOC/t product
Volumes in m³/t product



Air emissions

Air emissions reduced by 20%

In order to allow a comparison of the values, exhaust air emissions are given as an emission factor. These show which air emissions are released into the air per ton of product manufactured.

The following substance classes are relevant for EMS-CHEMIE AG:

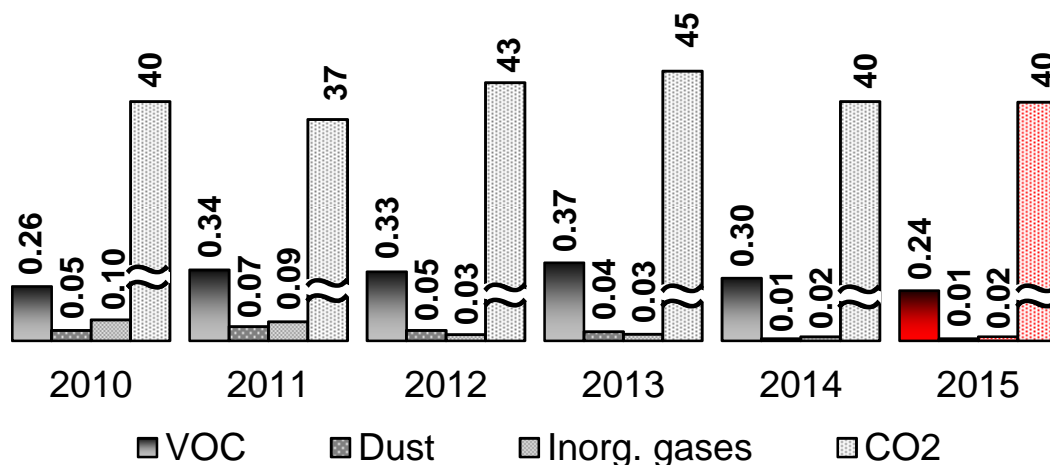
- Ø Volatile Organic Compounds (VOC): Solvents or secondary products from the manufacturing processes for our performance polymers.
- Ø Dust: Mainly fine particles caused by abrasion during the manufacturing process of the granules and from solid raw materials.
- Ø Inorganic gases: Mainly nitrogen oxide generated during combustion of natural gas for heating purposes and from rail transport at the site.
- Ø CO₂: Released during combustion of natural gas or heating oil for heating purposes.

An evaluation shows that manufacturing-related emissions on the production site were reduced again in 2015.

Above all, emissions of highly volatile organic materials were greatly reduced. Compared to 2014, VOC in exhaust air was -20%.

EMS-CHEMIE AG has been committed to sustainable climate protection for many years. With voluntary participation in the project of the Swiss Energy Agency program (a collaboration platform between the Swiss government and Swiss industry), we commit ourselves to active reduction of CO₂-emissions and optimization of energy efficiency. The target agreement is recognized by Swiss federal and cantonal authorities and partners from industry.

Emission factor [kg/t product]



Health and safety

Number of work-related accidents with working hours lost further reduced

Despite several major construction projects, the number of work-related accidents was reduced again in 2015. The good coordination of the many internal and external employees made it possible to complete the building projects without work-related accidents.

The number of work-related accidents involving lost working hours per 1000 employees was reduced by 1 compared to the previous year. Minor accidents with no loss of working hours remained at the same level as in the previous year.

Nearly half the accidents in 2015 involved hand injuries. They occurred during work to resolve process interruptions, repairs and maintenance work.

To raise awareness levels regarding these focus points, a training course involving prevention of accidents causing hand injuries will be carried out in 2016.

The safety audit system introduced in 2015 has proved to be very efficient. This systematic approach made it possible to recognize and resolve hazardous situations and activities before accidents occurred.

Work-related accidents with loss of working hours / 1000 employees

