

Data and Trends

**Environmental Protection
and Safety**

2014



EMS-GRIVORY
EMS-GRILTECH
EMS-SERVICES

Data and Trends 2014

EMS works sustainably and responsibly. Protection of the environment and the health and safety of our employees 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 people at the production site in Domat/Ems, Switzerland.

The graphs show the specific quantities which are used or produced in each case during the manufacture of one ton 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.

During analysis of this data it becomes very clear that **2014 was a record year!**

With the exception of investments, all environmental protection and safety key figures reached new record levels in 2014.

The continuity and sustainability of the measures can be seen in particular in a comparison with the first figures compiled in 2001.

Key figures		2001	2014	Δ (2001->2014)
E+S investment share	[%]	4.7	5.9	+ 26 %
E+S outlay	[CHF/t product]	112.9	85.4	- 24 %
Energy consumption	[MWh/t product]	3.5	2.1	- 40 %
Waste quantity	[kg waste/t product]	26	19.2	- 26 %
Waste water load	[kg TOC/t product]	0.7	0.2	- 71 %
Emission factor	[kg/t product]	270.9	40.3	- 85 %*
Accidents with working hours lost	[per 1000 MA]	50	27	- 46 %

* 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



Investments

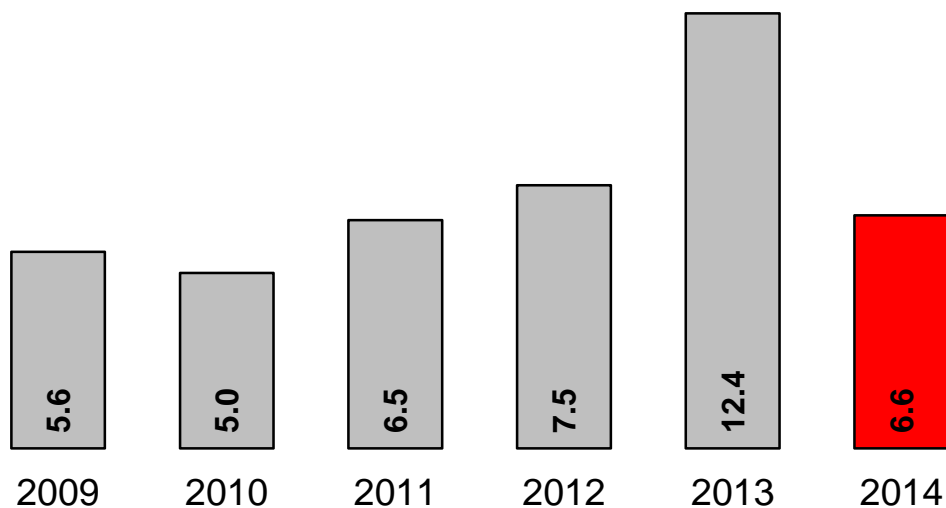
Back to previous years' levels after record investments in 2013

Following the record levels of investment in 2013, the share of investments in Environmental Protection and Safety (E+S) dropped to the level of previous years.

The majority of measures implemented during the reporting year involved process technological improvements to reduce waste and dust emissions and increase plant reliability.

Focus points included fire and explosion prevention as well as various minor projects to increase working safety in operating plants and involving site traffic.

Share of investment for environmental protection and safety (E+S) in % of all investments



Operating expenses

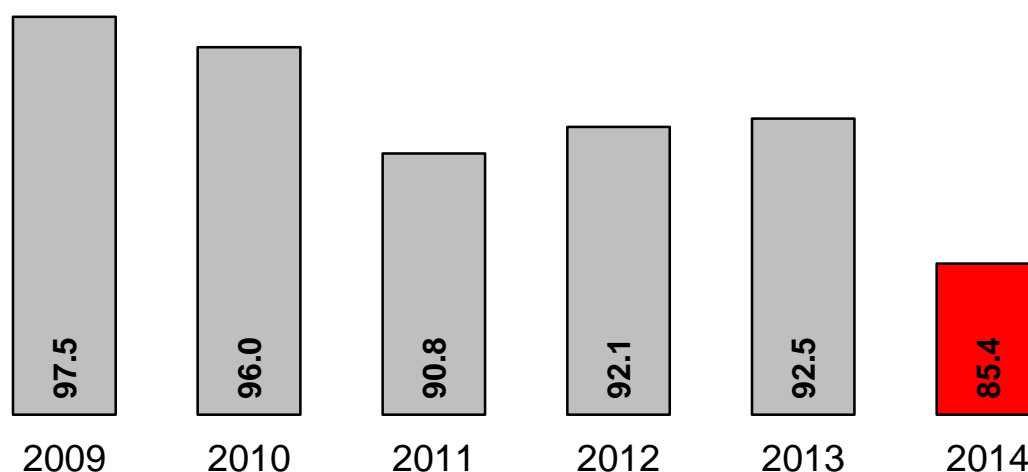
A further increase in efficiency – lowest costs despite higher requirements

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. Costs in the field of safety result mainly from measures to ensure protection of health, fire prevention, site security and working safety.

In 2014, it was possible above all to reduce costs for environmental protection in the field of waste water treatment (see also the chapter "Waste water"). It was also possible to maintain other costs at the same level as in previous years, although in nearly every area, requirements became more stringent.

The share of E+S costs per ton of manufactured product sank by -8% in 2014 compared to the previous year, to the lowest value since the start of reporting in 2001. At that time E+S outlay was recorded as 112.9 CHF/t product.

E+S outlay CHF/t product



Resources

A slight drop in energy consumption – reduction programmes continue

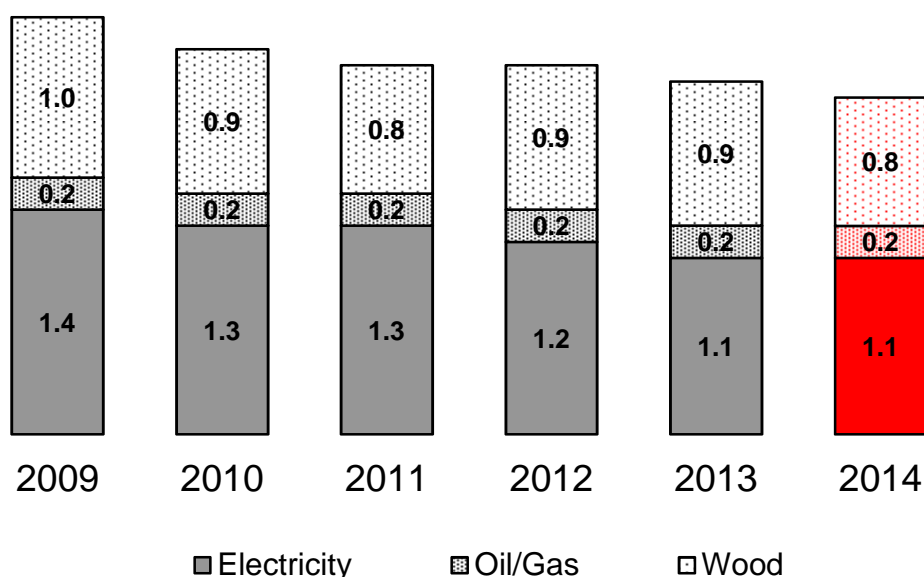
Over the last years, consumption of electricity at the production site has dropped continually. At the levels we have now achieved, further savings potential is limited. Comprehensive analysis is required and is implemented continually in order to identify and take advantage of opportunities for cost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

Main activities are focussed on:

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

Projects started in 2012 to replace conventional lighting technology with energy-saving LED were maintained in 2014 and will continue in 2015. Production plants and facilities are being gradually converted to energy-saving lighting systems. 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 3x 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 without difficulty.

Energy consumption in MWh/t product



Manufacturing waste

Record low waste volumes – recycling share increased to 39%!

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

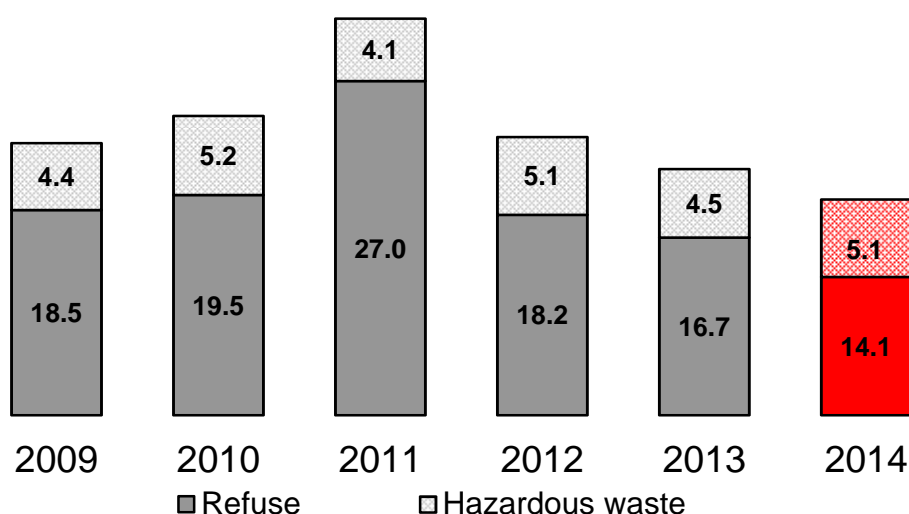
Compared to 2013, it was possible to save nearly -10% waste volumes overall which means the production site has never been more economic with regard to resources.

In 2014, more than 1336 tons of recyclable materials such as metal, glass, wood, paper and packaging materials were separated from the waste for recycling. The recycling rate was increased from 26% in the previous year to 39% in 2014.

The major part of remaining refuse is sent for incineration and replaces fossil fuels such as oil or gas as secondary fuels in energy-intensive plants in the cement industry. Only refuse with lower heating value is disposed of together with household refuse in incinerator plants.

The amount of hazardous waste encountered in 2014 was slightly higher than in the previous year. New regulations have resulted in specific packagings and other materials now being treated as hazardous waste. All hazardous waste is disposed of solely by authorised disposal companies and only in specialised facilities located in Switzerland.

kg refuse/t product



Waste water

Waste water volumes -16% – Drying of sewage sludge saves 190 truckloads

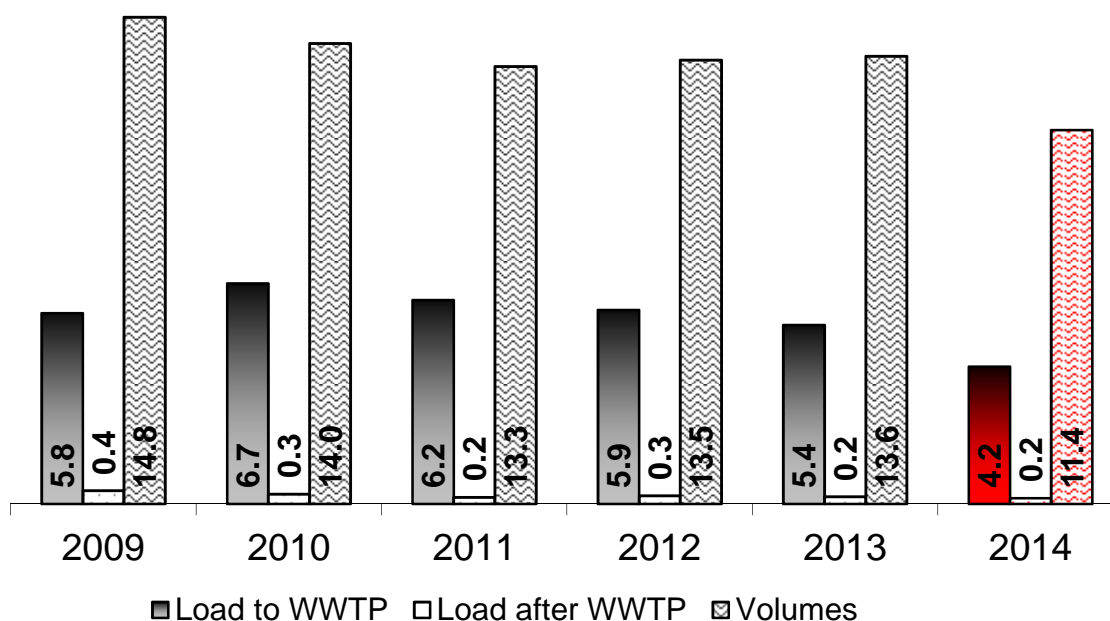
The graph shows the development of waste water quantities and waste water load before and after treatment at our treatment plant. As the water load is made up mainly of organic material, this is shown as TOC (total organic carbon).

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

A systematic analysis of waste water flow on the production site was started in 2014. During this project, potential for improvement was identified and made use of so that overall waste water volumes could be reduced by -16%.

The sewage sludge drying plant, which has been in use since 2012, 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 in all areas

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 the EMS-CHEMIE AG:

Volatile organic compounds (VOC): Solvents or secondary products from the manufacturing processes of our performance polymers.

Dust: Mainly fine particles caused by abrasion during the manufacturing process of the granules and from solid raw materials.

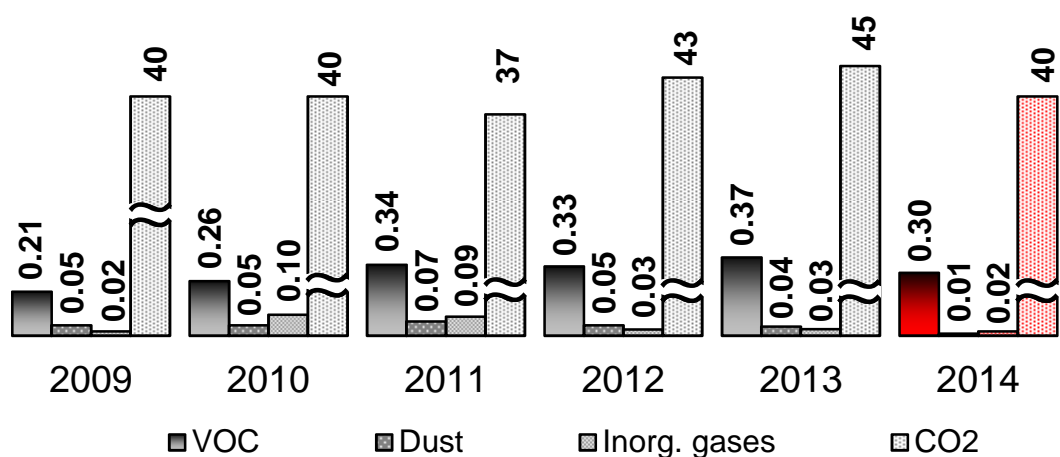
Inorganic gases: Mainly nitrogen oxide generated during combustion of natural gas for heating purposes and from rail transport at the site

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 lower for all substance classes in 2014. Compared to the previous year, CO₂ emissions were -11%; volatile organic substances -19% and the largest reduction was achieved with dust -75%.

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

Emission factor [kg/t product]



Health and safety

Effective measures – Number of work-related accidents reduced by 25%!

With a comprehensive package of measures in the field of accident prevention and working safety it was possible to reduce accident figures again significantly in 2014.

The number of work-related accidents involving lost working hours per 1000 employees dropped by -25% compared to the previous year. In addition, minor accidents with no loss of working hours were reduced by -14%.

Nearly half the accidents in 2014 were caused by tripping, slipping and falls while walking inside buildings and outside on the production site. These were frequently due to a lack of attention and insufficient awareness of dangers.

To raise awareness levels regarding these focus points, all employees on the production site were given group training in a course organised by the Swiss Accident Insurance Fund. During the experience-oriented course they were shown which situations can lead to falls and how accidents involving tripping and falling can best be prevented.

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

