



Freiburg Location

**“Preserving what we value”**

Micronas  
**Environmental**News 2014

to EMAS/ISO 14001

## „Sustainable environmental protection, safeguarding our production sites“

### Editorial



In the 2014 financial year, Micronas succeeded in meeting its sales and profit forecasts. One of the highlights was the changeover from 150 mm to 200 mm wafers in our production facility at the Freiburg site. For Micronas, this changeover, together with the production start-up of a number of key products, were important steps towards a long-term productivity increase and a sustainable margin improvement. The capacity utilisation of the Freiburg production facilities, which comprise both frontend and backend activities, was approx. 85 percent in 2014.

We were also able last year to put a number of promising products onto the market, such as the first ISO 26262-compliant switch family HAL 15xy in SOT23 package, the HAL 7xy from our 3D HAL sensor family with outstanding angle performance, and our first linear sensor with integrated block capacitors – the HAC 830.

We are now focusing on the market launch of the new embedded motor control family and on the completion of the new linear Hall sensor family, HAR 24xy. These „Dual Die“ sensors have two integrated redundant silicon dies in one package. The very flat TSSOP14 package has the advantage that it fits perfectly into space-demanding applications with reduced air gap. The small distance between the Hall plates of the two silicon dies improves the correlation between the two output

signals significantly, as a result of which the sensitivity of the sensor is considerably increased. This means that much smaller magnets can be used in the respective application. Furthermore, the magnet is located closer to the sensor's active area which makes the overall design less sensitive to stray parasitic fields.

The Hall 24xy sensor family is especially suitable for automotive applications such as throttle position measurement, pedal position detection and exhaust gas recirculation (EGR). Exhaust gas recirculation is used to reduce the emission of nitrogen oxides ( $\text{NO}_x$ ), which are formed in the combustion of fuel. Some of the exhaust gases are mixed here with fresh air and returned to the suction chamber.

In the combustion process in the engine, it is sensible for environmental reasons to reduce the formation of nitrogen oxides at an early stage of the combustion. It is not possible to adhere to the prescribed emission thresholds simply through measures of exhaust gas after-treatment, and this is especially true following the introduction of the Euro VI thresholds in September 2014. With diesel engines, exhaust gas recirculation is one of the most important measures for lowering nitrogen oxide emissions. With gasoline engines, exhaust gas recirculation contributes to a reduction in the load cycle losses and thus also lowers the vehicle's fuel consumption.

In July, I had the honor, together with the Lord Mayor of the city of Freiburg, Dr. Dieter Salomon, of inaugurating the company's own cogeneration unit for combined heat, cooling, and power generation at the Freiburg site. From this power plant with two redundant modules, around 30 percent of Micronas' electricity demand will be met.



At the intended capacity utilization, the cogeneration plant has an overall efficiency level for electricity, heat and cold generation of over 93 percent. With these energy saving measures, we can not only lower our operating expenses, we are also saving a total of 6,000 tonnes of  $\text{CO}_2$  every year.

Environmental protection is an absolute priority on the list of our company's corporate goals. Micronas' activities are also helping the Industry Zone North, in which Micronas is based, to develop into a Green Industry Park. At the beginning of July 2014, Intechnica Cert GmbH carried out the recertification and validation audit. The auditor confirmed that the Micronas management system for environmental protection, occupational safety and fire protection at the Freiburg site satisfies all parts of the ISO 14001 standard and the European EMAS Regulation (No. 1221/2009; Eco-Management and Audit Scheme), and that Micronas has been able to further develop its UAB management system.

All the necessary immission control and water regulation permits have been obtained, but we want to go even further than simply complying with the regulations. In 2014, we also drove forward a number of environmental protection projects on climate protection and the conservation of resources that go beyond the legal requirements. You will find an overview on page 4. We would first like to first inform you about the energy management scheme implemented at Micronas.

Matthias Bopp  
Chief Executive Officer



## Environmental projects

# „Energy management – economic and ecological targets exceeded“



Plant operators: l. to r.: Ralf Schäfer, Harald Durm, Michael Schöllhorn

## A year's operating experience with the heat and power unit (CHP) for combined heat, cooling, and power generation

After the first year of operation, there is unanimous opinion that the CHP unit has been a complete success. The results so far have exceeded all expectations.

### Overall concept

- Gas-operated combustion engines with the respective generators for electricity production
- Heat utilization as required for heating purposes, and utilization of the cold for cooling purposes when needed for operating the absorption chillers. The combined heat and power unit is in operation virtually without interruption. On conclusion of the start-up activities in June 2014, the last optimization steps and fine-tuning are now nearly completed. The enormous amount of work involved has been worthwhile. The electrical efficiency was initially increased from 42.4% to over 43.1%, which corresponds to an increase in output of nearly 2% with the same primary energy input.

The most important measure for the project's success is the unit's electrical power. Through fine tuning and optimization of the intake temperature of the combustion engines, the electrical efficiency has been successively increased and now, in permanent operation, stands at over 43%. This applies in both cold winter and hot summer temperatures.

The combined heat and power unit has so far only briefly been taken out of the grid for maintenance work and, over the period covered by this report, was available for over 99% of the time. The expectations as regards efficiency have been met and, in terms of availability, were significantly exceeded.

The thermal efficiency, when the heat pump is used to cool the generator room, is over 50%, which raises the overall efficiency of the unit to over 93% of the primary energy input of natural gas.

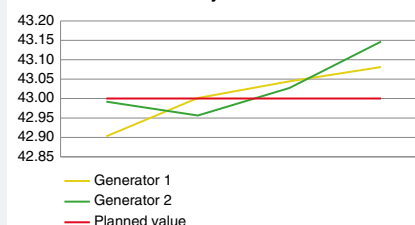
The exhaust gases are passed over oxidation catalysts to reduce the harmful gases. Through the optimum combustion and permanent operation of the engines, the legal requirements are more than complied with, which naturally benefits our environment.

The expert report from the Institut für Energietechnik in Amberg confirms that the CHP unit satisfies the regulations according to Directive 2012/27/EU.

Our cogeneration unit project has thus been successfully concluded. It is all down to the excellent work done by our employees in its planning and implementation, and they also made sure it was completed on schedule and commercially beneficial. Everyone should be proud of this.

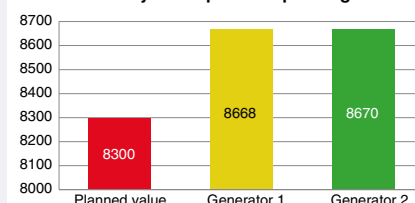
As things look today, we will continue to fully satisfy or even exceed our economic and ecological targets in the future, too.

Electrical efficiency in %



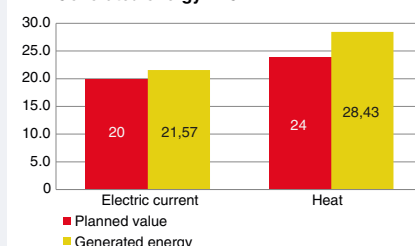
**Increase in the electrical efficiency during the first year of operation by optimizing the operating conditions.**

Availability of the plant in operating hours



**Optimum heat utilization ensures the generators can run continuously. They are only switched off briefly for maintenance work.**

Generated energy in GWh



**Because of the uninterrupted operation of the unit, the energy output increases.**

Andreas Merkt,  
Head of Plant Engineering



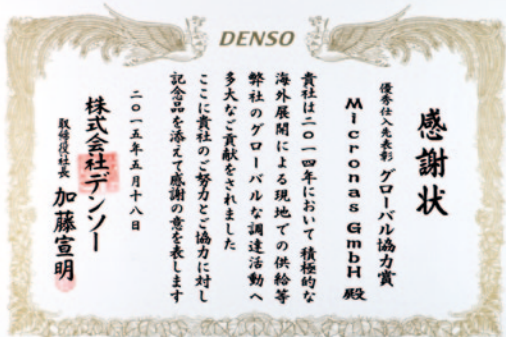
# Overview of current and planned projects

## Freiburg Location

### Environmental Projects

| Subject             | Goal  | Measure  | Dept. responsible                  | 2014 | 2015 |
|---------------------|---|--|------------------------------------|------|------|
| Energy management   | Electricity savings of 10,000 kWh / year (approx. 2 t CO <sub>2</sub> / year)   | Electricity saving by relocation of hazardous substances in the warehouse and optimization of the electric power consumption of the fan  | Plant Engineering and Facilities   | ●    | ○    |
|                     | Electricity savings of 280,000 kWh / year (approx. 60 t CO <sub>2</sub> / year)   | More efficient cooling generation with turbo refrigeration machines and cooling network between buildings 1, 2, 3, and building 4  |                                    | ●    | ●    |
|                     | Increase in the availability of electricity, heating and cooling, plus reduction of approx. 6,000 t CO <sub>2</sub> / year (calculated with the CO <sub>2</sub> emission factor of the German energy mix) | Installation of a cogeneration unit for combined heating, cooling and power generation   |                                    | ●    |      |
|                     | Electricity savings of 228,000 kWh / year (approx. 49 t CO <sub>2</sub> / year)   | Installation of frequency converters of osmotic pumps in the water treatment plant for regulated pump operation  |                                    | ●    |      |
|                     | Electricity savings of 114,000 kWh / year (approx. 20 t CO <sub>2</sub> / year)   | Installation of LED lamps: car park, building 5 E40  |                                    |      | ●    |
|                     | Electricity savings of 118,000 kWh / year (approx. 25 t CO <sub>2</sub> / year)   | Electricity savings through introduction of "thin clients"   | IT Operations                      | ●    | ○    |
|                     | Electricity savings in Front Assembly of 41,000 kWh / year (approx. 7.1 t CO <sub>2</sub> / year)   | Capacity extension with faster die-bonders   | Backend Assembly                   |      | ●    |
| Immission control   | Use of refrigerants with low to zero ozone depletion potential  | Refrigerant plants switched from R22 to alternative refrigerants   | Plant Engineering and Facilities   | ●    |      |
| Resource management | Savings of approx. 250 kg copper-lead frames, 220 kg molding compounds, 7,900 kWh electricity per year. Substitution of hazardous cleaning chemicals  | Application of new cleaning materials for compression molds  | Backend Assembly                   | ●    |      |
| Health protection   | Encourage healthcare among the workforce  | Health campaigns: Power bags with regional and fair-trade fruit, smoothie vitamin kick   | Working group on health protection | ●    |      |
|                     |   | New offers: Advice on early identification of skin and bowel cancer, prevention of drug dependency, glaucoma.  |                                    | ●    |      |
|                     |   | Health campaigns: Campaign on burn-out prevention, testing of new inner and outer shoes for waferfab employees, information on fitness with free training, tips on well-being and healthy diet |                                    |      | ●    |
|                     |   | New offers: Extra Shiatsu chair for faster easing of back tension, creation of a rest zone, low-noise relaxation room in building 7  |                                    |      | ●    |

Legend: ● Implementation ○ Extension ● Completed, goal achieved



Global Cooperation Award of the Denso Corporation for outstanding support, reliable delivery, and outstanding cooperation.

## Micronas at a Glance

### Micronas at a Glance

#### FACTS AND FIGURES

##### Micronas in 2014

- ◆ Headquarters of holding company in Zurich, Switzerland (SIX Swiss Exchange: MASN)
- ◆ Operational management and production in Freiburg, Germany
- ◆ 929 employees worldwide, of which 828 at the operational headquarters in Freiburg
- ◆ Test center in Glenrothes (Scotland)
- ◆ Sales of CHF 158.5 million / EUR 130.6 million
- ◆ Investment and ongoing expenditures in corporate environmental protection (waste management, water protection, soil decontamination, noise reduction, air pollution control, climate protection, nature protection, landscape conservation) in Freiburg

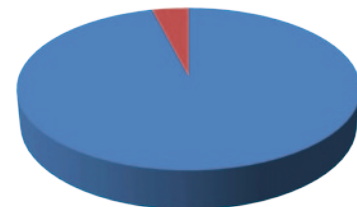
|      | EUR million |
|------|-------------|
| 2011 | 2.2         |
| 2012 | 1.4         |
| 2013 | 1.4         |
| 2014 | 5.8*        |

\* of which EUR 4.2 million in energy efficiency measures

##### Test center in Glenrothes (Scotland)

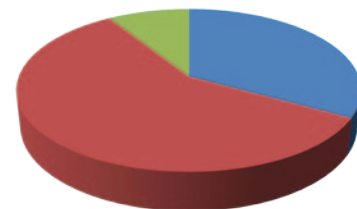
- ◆ 71 employees
- ◆ Energy consumption: 2.7 GWh, equivalent to 1,300 t CO<sub>2</sub>
- ◆ The chief environmental aspect is electricity consumption and the related CO<sub>2</sub> emissions.
- ◆ Main waste fractions: 5 t paper and board, 5 t plastics and 9 t metal into recycling, 6 t of domestic-like waste for disposal
- ◆ One notifiable accident

##### Sales distribution according to production lines



■ Sensors 96 %  
■ Controllers 4 %

##### Sales distribution by region



■ Europe 33 %  
■ Asia 58 %  
■ America 9 %

#### Micronas Certificates



ISO 14001 Freiburg

ISO 14001 Glenrothes

EMAS Freiburg

# Environmental Data 2014

## Environmental Data 2014

The following charts show the 2014 environmental data for the Freiburg site, which is the Micronas headquarters and its largest production site. By publishing these figures, we comply with the requirements of Regulation (EC) No. 1221/2009, the so-called EMAS regulation.

The bar charts show the absolute consumption figures, while the linear diagrams show the consumption normalized to the total gross value added – the so-called “core indicators”. The core indicators themselves are then related to the year 2014. Normalization to the total gross value added over the last four years ensures the required comparability of the consumption data.

### Other environmental data for 2014

- The natural gas consumption (for heating purposes and for electricity and heat generation in the cogeneration unit) in 2014 of approx. 42 GWh according to GEMIS<sup>1)</sup> corresponds to equivalent emissions of 61 kg of SO<sub>2</sub>, 3,400 kg of NO<sub>x</sub>, and 42 kg of dust which are regarded as insignificant environmental aspects.
- The sealed area (core indicator biological diversity) is 39,200 m<sup>2</sup>, the unsealed area is 12,300 m<sup>2</sup>.
- The recycling quota for the entire waste produced in 2014 was 83%

### Total energy consumption from renewable sources and their proportion of the annual total consumption:

|      |                          |     |
|------|--------------------------|-----|
| 2011 | 35.2 GWh                 | 45% |
| 2012 | 38.2 GWh                 | 49% |
| 2013 | 42.0 GWh                 | 52% |
| 2014 | Figure not yet available |     |

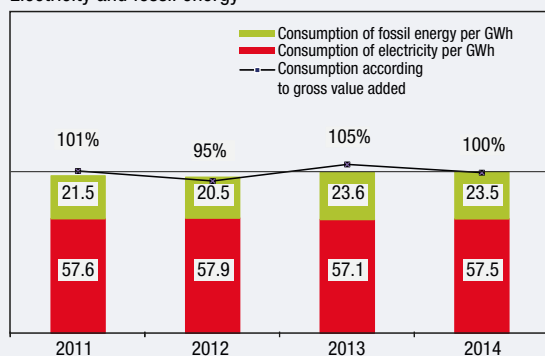
The photovoltaic unit installed at the end of 2011 generated around 304,000 kWh in 2014.

## MICRONAS FREIBURG

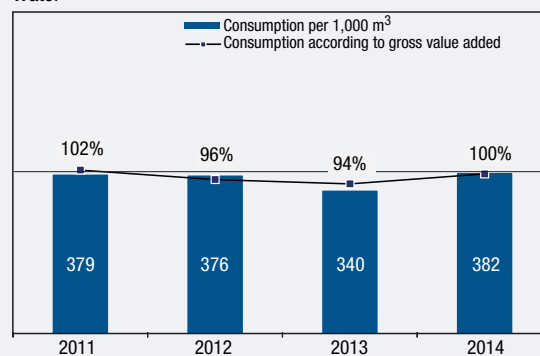
— Absolute consumption

— Consumption related to the total annual gross value added in %, normalized to the year 2014

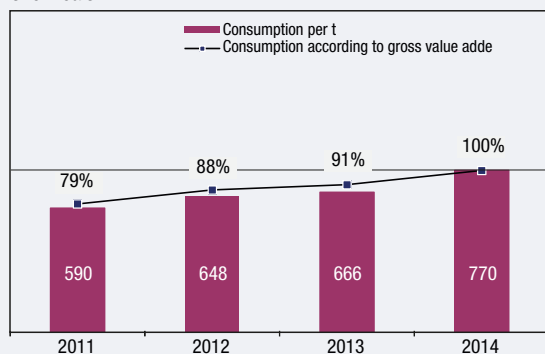
### Electricity and fossil energy



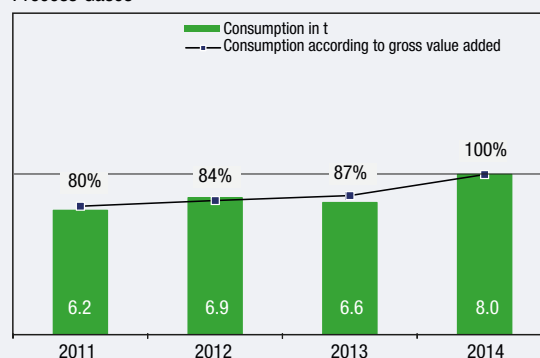
### Water



### Chemicals



### Process Gases





## Environmental Data 2014

### Occupational safety and health protection

At Micronas in Freiburg, the accident figures are well below the comparative index of the Employers' Liability Insurance Association. In 2014, there were three minor reportable accidents, without any particularly frequent occurrence in any one area. We regularly check whether hazardous substances can be replaced by non-hazardous materials (principle of substitution). Where legal changes are made to bans or to the regulation of substances e.g. in Appendix XIV and XVII of the REACH regulation<sup>2)</sup>, we check and document the fact that these substances are

contained neither in our products nor in the raw and auxiliary materials used for their production.

### Environment and transport, sports

- Bus and rail timetables
- Subsidies for regional tickets for public transport
- Cycle repair kit
- Sponsorship of activities for sports groups: running (participation in Freiburg (half) marathon, business run), cycling, indoor soccer, badminton

### Emergency management

- 38 exercise drills with the 26 members of the emergency task force
- Training of six new safety officers who act in production areas as officers in charge in an emergency
- Training of 92 persons in the handling of fire extinguishers

<sup>1)</sup> Global emissions model for integrated systems

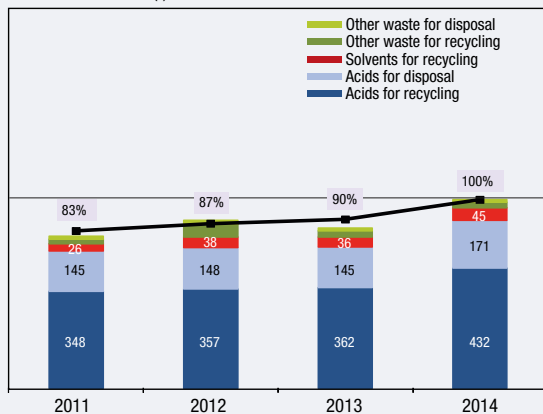
<sup>2)</sup> Regulation (EC) No 1907/2006 of the European Parliament and Council of December 18, 2006 on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), .... Annex XVII: Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles

## WASTE

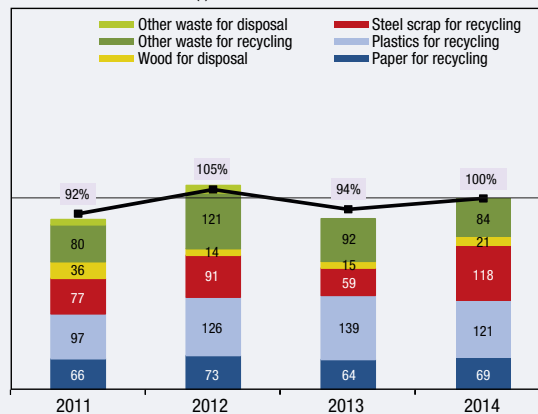
— Waste in t

— Waste referring to gross value added in %, normalized to the year 2014

Hazardous waste (t)



Non-hazardous waste (t)

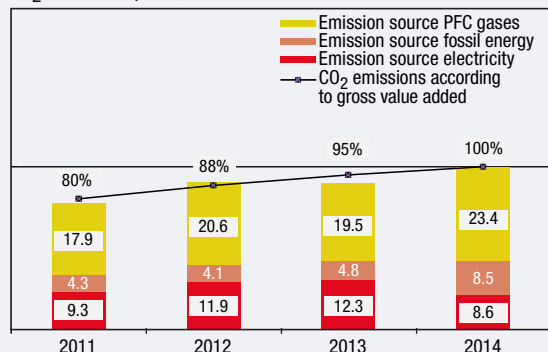


## CO<sub>2</sub> EQUIVALENTS

— CO<sub>2</sub> equivalents

— CO<sub>2</sub> equivalents related to the total annual gross value added in %, normalized to the year 2014

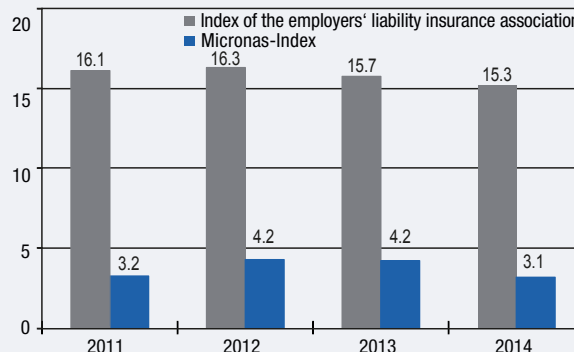
CO<sub>2</sub> emissions per 1,000 t



## ACCIDENTS

Notifiable accidents per 1,000 employees

Accidents





### Environmental Statement

The next consolidated Environmental *Statement* will be submitted for validation at the latest in July 2017. The next updated Environmental *News* will be submitted for validation in July 2016.

### Environmental Verifier / Environmental Verifier Organization

The authorized environmental verifier / environmental verifier organization are as follows:

Dr.-Ing. R. Beer (Permit-No. DE-V-0007)  
Intechnica Cert GmbH (Permit-No. DE-V-0279)  
Ostendstr. 181  
90482 Nuremberg

### Validation

Dr. Reiner Beer, with EMAS environmental verifier registration number DE-V-0007, accredited or licensed for the scope 26.1 (NACE Code Rev. 2), Manufacture of electronic components and boards, declares to have verified whether the site as indicated in the consolidated environmental statement with registration number D-126-00053 meets all requirements of Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS).

By signing this declaration, I declare that

- the verification and validation has been carried out in full compliance with the requirements of Regulation (EC) No 1221/2009,
- the outcome of the verification and validation confirms that there is no evidence of non-compliance with applicable legal requirements relating to the environment,
- the data and information of the updated environmental statement of the site reflect a reliable, credible and correct image of the site activities, within the scope mentioned in the environmental statement.

Nuremberg, July 2015

Dr. Reiner Beer, Environmental Expert

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