Shaping the world with sensor solutions
Dear Ladies and Gentlemen, dear Readers,

ams continuously strives to raise awareness of its environmental impact as well as to implement improvements on efficient use of resources in its business operations. With ams’ understanding of its own operations, accomplished by a product portfolio of sensor solutions that enables efficient and effective use of resources in many areas of our daily life, we contribute to the global environmental protection.

ams’ own production – which takes place predominantly in Austria and in the Philippines – is certified according to the Environmental Management System DIN EN ISO 14001. In addition, our wafer production site in Austria is certified according to the Energy Management System DIN EN ISO 50001 since November 2015. With both management systems in place, we enable a target-oriented approach focusing environmental and energy efficiency implementations.

The environmental report 2015 provides a detailed insight and many facts and figures, which are focusing on the environmental performance of our production sites. It also gives you information about the achievements throughout the year and an outlook on the goal setting for the coming year. In addition, ams introduces its recently certified energy management system at a first glance.

We would like to emphasize the installation of a heat pump to decrease the usage of primary energy which was one of our important measures in 2015. With this installation the heat load from equipment is utilized to produce warm water. This enables a significant reduction of the natural gas consumption and consequently contributes to a carbon dioxide emissions reduction.

We would like to take the opportunity of publishing this report to thank all employees of ams AG and all the suppliers and partners, who actively contribute every day to this success by their awareness of environmental aspects, by their conscious daily acting and doing and by the many good ideas we receive for continuous improvement.

If you have questions, concerns, comments or ideas, how we can further improve our environmental performance, please do not hesitate to contact us.
Table of contents
1. Introduction 6

1.1. Mission 6
1.2. Company Profile 6
1.3. Manufacturing Capability 6
1.4. Locations 7
1.5. Quality, Environment, Safety & Corporate Responsibility Commitment 7

2. Description of Production 8

3. Environmental Management System 9

3.1. Responsibility 9
  3.1.1. Environmental Representative 9
  3.1.2. Director Facility Management 10
  3.1.3. Representative Organization 10
3.2. Corporate Social Responsibility Policy 11
3.3. Environmental Aspects 12
  3.3.1. Assessment of the Environmental Aspects 12
  3.3.2. Indirect Environmental Aspects 12
3.4. Environmental Programs 12
  3.4.1. Environmental Program Review 2015, Austria 13
  3.4.2. Environmental- and Energy- Program 2016, Austria 15
  3.4.3. Environmental Program Review 2015, Philippines 17
  3.4.4. Environmental Program 2016, Philippines 19
3.5. Risk Management 20
3.6. Products and RoHS, REACH 20
3.7. IMDS (International Material Data System) 20
3.8. UN Global Compact 20

4. Legal Compliance 21
5. Energy Management System

5.1. Energy Representative
5.2. Energy Team
5.3. Energy Performance Indicators
5.4. Energy Program 2016, Austria

6. Input-Output Analysis 2014, Austria

6.1. Input
   6.1.1. Electrical Energy
   6.1.2. Natural Gas
   6.1.3. Operating Materials
6.2. Output
   6.2.1. Product Packaging
   6.2.2. Waste
   6.2.3. Waste Water
   6.2.4. Air Emissions
   6.2.5. Carbon Dioxide
   6.2.6. Noise

7. Emission Control on Steam and Hot Water Boilers

7.1. Exhaust Emissions
   7.1.1. Emission Measurements after Exhaust Air Scrubbers - Fab B
   7.2. Boiler Plant Emission Measurements
   7.3. Waste Water Emission Measurements

8. Input Output Analysis 2015, Philippines

8.1. Input
   8.1.1. Electrical Energy
   8.1.2. Water
   8.1.3. Electrical Energy and Water Consumption per tested ICs
8.2. Output
   8.2.1. Waste
1. Introduction

1.1. Mission

ams is shaping the world with sensor solutions

Sensors are analog. Sensors are everywhere.

ams sensor solutions take sensing to the next level by providing a seamless interface between humans and technology. We enable our customers to create highly differentiated products that are smarter, safer, easier to use and more eco-friendly.

1.2. Company Profile

ams develops and manufactures high performance analog semiconductors and sensors that solve its customers’ most challenging problems with innovative solutions.

ams’ products are aimed at applications which require extreme precision, accuracy, dynamic range, sensitivity, and ultra-low power consumption. ams’ product range includes sensors, sensor interfaces, power management ICs, and wireless ICs for customers in the consumer, communications, industrial, medical, and automotive markets.

ams’ headquarters are in Premstaetten near Graz, Austria. Key research and development facilities are based in Austria, in Plano, Texas (USA), a center of excellence in optical sensors, and in sixteen other design centers worldwide. Employing around 2,100 people in over 20 countries, ams operates direct sales offices in all major regions of the world. It has a network of channel partners around the globe, including its worldwide distribution partners DigiKey, Future Electronics and Mouser.

ams is listed on the SIX Swiss stock exchange (ticker symbol: AMS).

1.3. Manufacturing Capability

As a high performance analog sensor company, ams has its own in-house wafer manufacturing and test facilities. This capability allows ams to push the limits of analog performance in lowest noise, highest sensitivity and minimum power consumption. It also enables a flexible and secure supply as well as highest quality performance.

At the forefront of technology, ams provides state-of-the-art technologies for leading-edge sensor and analog designs such as 3D IC integration using a proprietary through-silicon via (TSV) technology and proprietary processes for high voltage, optoelectronics and RF applications. In its specialty foundry business ams offers customers a full service approach that includes packaging and testing options. ams also works with wafer fab, assembly and test partners:

- Strategic technology partnership with TSMC
- Strategic technology partnership with IBM
- Foundry partner UMC
- Assembly partners FCI, Amkor, ASE, Carsem, Hana
- Test partner OKINS
1.4. Locations

ams headquarters and production is located in Austria. A high volume test center is located in Calamba at Philippines and there are 18 design centers around the world in Austria, Belgium (new), Finland, Germany (3), India, Italy (2), Japan, Netherlands, Portugal (new), Singapore, Slovenia, Spain, Switzerland, and USA (2).

1.5. Quality, Environment, Safety & Corporate Responsibility Commitment

Ethical, professional practices and environmental responsibility are fundamental principles guiding ams’ business approach. ams is part of the United Nations (UN) Global Compact, the world’s largest corporate initiative for responsible business and sustainability. With more than 10,000 participants in 130 countries, the UN Global Compact is committed to human rights, just labor standards, environmental protection, and anti-corruption measures.

With its dedication to protecting the environment and to the sustainability of resources, ams is committed to significantly reducing its carbon emissions. ams promotes efficient energy use throughout its operations, where innovative methods for reducing electricity and gas consumption bring about both environmental and cost benefits.

ams remains a pioneer in environmental certification and is DIN EN ISO 14001 certified for its locations in Premstaetten, Austria, and Calamba, Philippines.

**Certified under**

- ISO/TS 16949 (automotive)
- DIN EN ISO 13485 (medical)
- DIN EN ISO 14001 (environment)
- Zero defect commitment with industry-leading field failure rates
- Global quality systems with local resources/labs in key markets
- Top rankings by customers

**Corporate responsibility**

- Member of the UN Global Compact
- CDP (Carbon Disclosure Project) participant
- Conflict minerals/hazardous-use materials program implemented
- Reduction of CO₂ equivalents, continuously in the scope of corporate environmental program
2. Description of Production

The production of ASICs is a know-how intensive process and can be described briefly as follows:

01. In the development department, circuits are designed in line with individual ideas or customer requirements. The electrical functionality of a component, together with schematics, is processed based on these designs.

02. All activities in Design and Layout are carried out using sophisticated CAD/CAE tools and technologies. ams has a standard cell library at its disposition, so that only parts of the circuit have to be designed from scratch. As a result, a so-called mask control tape (pattern generator tape) is created, that is used directly for mask production.

03. In the mask production, the structures of a chip level are transferred to quartz glass plates - the surfaces of which are coated with chromium - using a high-powered argon laser. Expressed in simplified terms, the masks are used as a negative for the exposure of the silicon wafers, using step and repeat methods. An average of 23 masks is required for production of a wafer.

04. Monocrystalline, ultrapure silicon sliced into 0.7 mm thick wafers, ground and polished. These silicon wafers are brought in as raw material for wafer processing.

05. In the subsequent wafer fabrication, these silicon wafers are - in sequence - coated with photoresist up to 34 times, exposed, developed, and, in between, etched, coated, doped, and cleaned. Here, the wafers pass through photolithographic processes combined with dry and wet etching processes, chemical and physical processes for segregation of metal and other coatings, and various cleaning processes.

06. The structures of the mask are transferred to the wafer using a stepper. With a 365 nanometer wavelength light source, the resolution is better than 0.35 micrometer. ams implemented the manufacturing technology down to 0.18 micrometer resolution.

07. To achieve the required conductivity, the wafers are doped, i.e. doping atoms are implanted to the silicon. It’s important to distinguish between ion implantation and ion diffusion here. With implantation, the atoms are more or less "fired" into a predefined wafer. Diffusion is a doping technology using heat (900° to 1200°C).

08. Before the wafers undergo further production stages, the function of all circuits on the processed wafers are tested.

09. The finished, tested wafers are attached to films with frames and cut into the individual circuits (dice) using a diamond-toothed saw blade.

10. After a visual inspection, the devices are mounted on copper support frames and the contact points connected to the support frame with gold or aluminum wire (bonds).

11. For easier handling and for protection against environmental influences (dust, moisture, ...), the ICs (integrated circuits) are housed in plastic or ceramic packages.

12. The now functional chips are then cleaned and galvanically treated* to improve the solderability (* separate process, no longer carried out in the factory).

13. Afterwards, the pins are punched out and bent, the package stamped and passed to final test.

14. In the final test, all chips are tested before delivery, using modern test computers and instruments. The test is performed according to customer specification and application. ams has modern test equipment available, with the main focus on mixed-signal testing (analog and digital).

15. The components come to a further quality inspection and are then released for dispatch, afterwards.

The fundamental criteria for production of integrated circuits is the availability of ultraclean production areas (dust free, to clean room ISO class 3*), ultrapure chemicals and gases, large quantities of ultrapure water and high precision production machinery, to be able to produce structures accurately in the sub-µm ranges.

*according ISO 14644 – ISO class 3 = 1,000 particles per m³ air with a maximum size of 0.1 µm;
102 particles per m³ air with a maximum size of 0.3 µm
3. Environmental Management System

The environmental management system set up by ams ensures the implementation of the environmental policy and the environmental program, and hence the achievement of the environmental objectives for continuous improvement of corporate environmental protection. It fulfills the requirements of DIN EN ISO 14001, and is harmonized with the existing quality assurance system. As a result, equality is achieved between environmental protection and quality assurance, and the required organizational elements can be used synergistically.

Corporate environmental protection is an integrated part of the overall company policy. Every employee carries the responsibility for environmental protection. The Management Board is responsible for setting up and approval of the environmental policy. Further, the effectiveness of the environmental management system is checked and assessed by the Management Board in regular management reviews.

The system is subject to a dynamic process, with periodic checks, adaptations, expansions, and continuous improvements.

3.1. Responsibility

3.1.1. Environmental Representative

The environmental representative is the person mainly responsible for the maintenance and development of the environmental management system. The environmental representative is positioned directly under the management board.

The environmental representative’s responsibilities also include checking compliance with ams Corporate Social Responsibility Policy and coordination of environmental protection measures.

Each organizational unit is responsible for the application and implementation of the regulations and directives of the environmental management system.
3.1.2. Director Facility Management

The director facility management is responsible for all measures for technically correct, continued operation of the entire infrastructure in accordance with all relevant legislation, for supply of various media, energy and chemicals, and for correct disposal of waste, treatment of wastewater and contaminated exhaust air.

He also acts as spokesperson for the company with regard to the authorities and local residents. He is supported by the environmental representative in the execution of duties related to the environment and the authorities.

To fulfill the duties described, the Facility department is sub-divided into several specialist operational units with the following areas of responsibility:

- Chemistry / Water / Waste / Environmental control
- Electrical Systems / Building Control
- Fab Support & Maintenance
- CAFM / Building and Premises Management

The manager of the Chemistry / Water / Waste / Environmental Inspection area is appointed as the waste management representative and fulfills all duties associated with this role, such as preparation, updating and execution of the waste management concept.

3.1.3. Representative Organization

In fulfillment of the various legislations and allowances ams has a comprehensive representative organization, which covers the following areas:

<table>
<thead>
<tr>
<th>Designation</th>
<th>Organizational integration</th>
<th>Legal basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Manager</td>
<td>Safety</td>
<td>Employee Protection Act</td>
</tr>
<tr>
<td>Radiation protection representative</td>
<td>Facility</td>
<td>Radiation Protection Act</td>
</tr>
<tr>
<td>Fire protection representative</td>
<td>Facility</td>
<td>Workplaces Regulation</td>
</tr>
<tr>
<td>Fire protection group</td>
<td>Facility</td>
<td>Workplaces Regulation</td>
</tr>
<tr>
<td>Toxic materials representative</td>
<td>Facility</td>
<td>Chemicals Act</td>
</tr>
<tr>
<td>Environmental representative</td>
<td>Environmental Management</td>
<td>DIN EN ISO 14001</td>
</tr>
<tr>
<td>Waste management representative</td>
<td>Facility</td>
<td>Waste Management Act</td>
</tr>
<tr>
<td>Laser representative</td>
<td>Production</td>
<td>Health and Safety Regulations</td>
</tr>
<tr>
<td>Gas rescue service</td>
<td>Facility</td>
<td>Health and Safety Regulations</td>
</tr>
<tr>
<td>Electric representative</td>
<td>Facility</td>
<td>IEC and Austrian Law</td>
</tr>
<tr>
<td>Hazardous materials representative</td>
<td>External</td>
<td>Hazardous Materials Regulation</td>
</tr>
<tr>
<td>Occupational health physician</td>
<td>External</td>
<td>Employee Protection Act</td>
</tr>
<tr>
<td>Energy representative</td>
<td>Facility</td>
<td>Energy Efficiency Law - EEffG</td>
</tr>
</tbody>
</table>
3.2. Corporate Social Responsibility Policy

ams is committed to an overall Corporate Social Responsibility (CSR) involving responsible environmental management, energy management, and comprehensive health and safety protection. All our activities are aligned with our internal guidelines and will be continuously improved. ams strives to continuously involve its employees by communication and training, as well as ensures the appropriate resources for the achievement of objectives in the purpose of this policy.

Corporate Sustainable Responsibility
As a member of UN Global Compact Initiative, CSR activities are fully integrated into our daily business and are aligned with the ten principles in the areas of human rights, labor, environment and anti-corruption.

Employees
We provide a safe and healthy workplace to all employees at ams. We have a strong focus on reducing accidents and promoting health. We motivate our employees through information and training on environmentally- and energy-aware activities.

Legal Compliance
We operate in compliance with all legal and voluntary requirements, in all environmental and energy related matters. ams respects and complies with the fundamental employment rights set out in international conventions of the United Nations.

Business Activities
We fully assess the environmental impact of our business activities and operate in a manner that avoids or minimizes emissions of pollutants and reduces energy consumption in order to improve our energy performance.

Customers
We work with customers to solve their problems regarding environmental protection and corporate responsibility issues.

Suppliers and Subcontractors
We consider environmental aspects of our suppliers and subcontractors, as well as energy efficiency of products and assets we are acquiring.

Environmental Product Control
We implemented an environmental product control program, in order to ensure no harmful materials to human health and the environment are placed to the market. Within this program we even focus on new product developments according to ams Green standards* and customer requirements. A strong involvement with and validation of our subcontractor’s compliance is included as an essential facet in our business practice.

Publicity and Communication
We communicate our CSR activities as well as environmental measures to customers, shareholders, and the general public in an appropriate way.

Special Programs
We define special projects for improving the specific energy consumption as a focus until 2019. One of our major project is the installation and operation of heating pumps that significantly reduces our natural gas consumption.

*ams Green standard: ams defines its own green standard, which bannes and restricts substances of concern for the environment and humans
3.3. Environmental Aspects

The activities of ams in Premstaetten and Calamba give rise to impacts on the environment typical for semiconductor factories. This includes consumption of energy, use of water, generation of wastewater, exhaust air from production, emissions from the various boiler plants, vapor from the cooling towers and generation of wastes. The current environmental aspects at the location for the existing plant and the anticipated environmental aspects of our production line are explained in the following sections.

3.3.1. Assessment of the Environmental Aspects

ams has implemented a two-stage process for assessment of the environmental aspects. An internal team of experts carries out a comprehensive assessment of environmental aspects using simplified risk analysis for the respective processes with the help of predetermined criteria. The result of this analysis gives rise to the environmental significance of the processes, which can be expressed as a number. If a defined value is exceeded, an FMEA (Failure Modes and Effects Analysis) investigation is carried out for the process concerned.

In the FMEA, all relevant areas and systems undergo a detailed analysis, weak spots are identified, assessed and necessary actions worked out. It is also important that experts from the respective area are integrated in this team. The assessment of the environmental aspects is checked at least once a year, or else when there are changes to the process, and update if required.

3.3.2. Indirect Environmental Aspects

ams realizes the importance of ensuring that our contractual partners employed on site are duty bound to comply with our strict environmental regulations. All external companies, suppliers and external service personnel can only go about their duties after they have received instruction covering both safety rules and the environmental regulations applicable at the specific location.

ams provides a private company bus for its shift workers at the location in Premstaetten. This company bus operates several times a day following the shift pattern, running between the primary catchment area for shift workers (Western Styria) and the facility. This avoids each employee having to drive to work in his own car. Minivans are used to transport our products (particularly small quantities) to the airport close by, so reducing the number of empty truck movements.

Similarly, an assessment of environmental performance is made when selecting our suppliers and bought-in products. ams is now demanding that key suppliers run an environmental management system certified in line with DIN EN ISO 14001.

Since 2004 ams is Sony Green partner. This meant introducing an upstream management program (the full value-added chain of a product under analysis). This has helped to exclude the product being contaminated by certain substances.

3.4. Environmental Programs

In order to have a successful continuous improvement, ams develops an environmental program annually. The program is reviewed and assessed once a year. ams defines individual programs for its productions site in Premstaetten, Austria and for its test house in Calamba, Philippines.
### 3.4.1. Environmental Program Review 2015, Austria

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Environmental Target</th>
<th>Activities</th>
<th>Implementation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Management</td>
<td>Reduction of waste water emissions</td>
<td>Expansion of analytical laboratory capacity (ion chromatography etc.) for environmental related tests</td>
<td>Equipment installed, team- training ongoing, methods being developed</td>
</tr>
<tr>
<td></td>
<td>Improve recycling rate</td>
<td>Installation of UV oxidation unit for UPW reclaim and installation of a water cascade to use waste water for the supply of abatements. Increase the recycling rate of Fab-B from 29% (2014) to 33-35%</td>
<td>Installation of water cascade is on-going</td>
</tr>
<tr>
<td></td>
<td>Reduction of water consumption</td>
<td>Installation of additional monitoring equipment for water balance. Evaluation for potentials of water reduction</td>
<td>System installed and operational. Water consumption under observation</td>
</tr>
<tr>
<td>Energy</td>
<td>Certification for ISO 50001</td>
<td>Prepare integrated management system for energy management requirements. Perform initial ISO 5001-certification audit</td>
<td>Certification audit successfully completed by 2./3.11.2015</td>
</tr>
<tr>
<td></td>
<td>Increase employee’s awareness on energy reduction</td>
<td>Announce the integration and commitment to energy management. Define an appropriate training concept and integrate it into the present safety and environment training</td>
<td>Announcements send to staff. Training on basic energy management implemented in safety and environmental training</td>
</tr>
<tr>
<td></td>
<td>Reduction and control of energy consumption</td>
<td>Installation of energy monitoring system software and additional hardware</td>
<td>Software is installed and metering of energy consumptions is in operation. Additional setups are on-going and customizing is finalized by Q1/2016</td>
</tr>
<tr>
<td></td>
<td>Saving of electrical energy</td>
<td>Upgrade of illumination of the parking lots by LED lighting. Expected energy saving potential of &gt; 30 MWh/a</td>
<td>Replacement of lamps in completed by Q3</td>
</tr>
<tr>
<td>Aspect</td>
<td>Environmental Target</td>
<td>Activities</td>
<td>Implementation Status</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CO$_2$</td>
<td>Freezing of operational carbon footprint (natural gas vs. PFCs) per 8” wafer produced</td>
<td>Transfer of wafer fab heat load from chillers to heat pump to compensate for increasing PFC emissions caused by higher fab production</td>
<td>Heat pump 1 operational since Q2, reduction of NG by 18%</td>
</tr>
<tr>
<td>Waste</td>
<td>Increasing of the recycling rate and the thermo mix fraction of non-hazardous waste</td>
<td>Evaluation of potential for better separation of waste fractions. Install appropriate waste separation system</td>
<td>This goal is not implemented due to additional construction activities. Nevertheless, this measure will be implemented 2016</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Reduction of chemical consumption</td>
<td>Evaluation of measurement equipment in order to assign chemical consumption to specific equipment</td>
<td>Evaluation done and budgeted for 2016</td>
</tr>
<tr>
<td>Packaging</td>
<td>Reduce non-degradable packaging materials</td>
<td>Evaluation of substitution of foams as packaging material</td>
<td>Membrane packaging currently under testing by external organization. Approved internal and used applied to wafer shipments for dedicated customers</td>
</tr>
<tr>
<td></td>
<td>Reduce non-degradable packaging materials</td>
<td>Evaluation of substitution of bubble wrap</td>
<td>Evaluation done –scientific research proof that plastic foils are environmental friendly in overall life cycle. Decision: Not to use alternative paper filling materials as substitute</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Transparency of sustainability in the supply chain</td>
<td>Definition of questionnaire and assessment criteria for suppliers in social, environmental, ethics, legislation matters for determination of a supplier management tool</td>
<td>Self-assessment send and collection done for key suppliers</td>
</tr>
<tr>
<td></td>
<td>Environmental standard established in the supply chain</td>
<td>Create and establish environmental standard for suppliers</td>
<td>GEN – 125 established. Key-suppliers informed and agreement achieve for major suppliers. On-going activity for additional suppliers</td>
</tr>
</tbody>
</table>
### 3.4.2. Environmental- and Energy- Program 2016, Austria

With the implementation of the DIN EN ISO 50001 (Energy Management System) in November 2015, ams established a combined program definition for environmental- and energy- management.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Operational Target</th>
<th>Measure</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>Definition of measurement- and monitoring plan</td>
<td>Evaluation of additional electrical and mechanical metering</td>
<td>Q1/2016</td>
</tr>
<tr>
<td></td>
<td>Definition of measurement- and monitoring plan</td>
<td>Installation of electrical metering according timeline, phase 2</td>
<td>Q2/2016</td>
</tr>
<tr>
<td></td>
<td>Definition of measurement- and monitoring plan</td>
<td>Installation of mechanical metering, phase 1</td>
<td>Q3/2016</td>
</tr>
<tr>
<td></td>
<td>Reduction of energy consumption for illumination by &gt;30 MWh</td>
<td>Replacing fluorescent lightning by LED lightning for dedicated manufacturing and office areas</td>
<td>Q4/2016</td>
</tr>
<tr>
<td></td>
<td>Reduction of standby energy losses</td>
<td>Combined management of vessel operation</td>
<td>Q3/2016</td>
</tr>
<tr>
<td></td>
<td>Reduction of primary energy consumption</td>
<td>Detailed engineering of heat recovery project phase 2</td>
<td>Q1/2016</td>
</tr>
<tr>
<td></td>
<td>Evaluation of efficiency of air handling units</td>
<td>Evaluation of potential to exchange air handling unit</td>
<td>Q3/2016</td>
</tr>
<tr>
<td></td>
<td>Evaluation of efficiency of air handling units</td>
<td>Replacement of second water supply pump</td>
<td>Q1/2016</td>
</tr>
<tr>
<td><strong>Water Management</strong></td>
<td>Reduction of waste water emissions</td>
<td>Expansion of analytical laboratory capacity (AAS, pH meter etc.) for environmental related tests.</td>
<td>Q2/2016</td>
</tr>
<tr>
<td><strong>Waste</strong></td>
<td>Increasing of the recycling rate and the thermo mix fraction of non-hazardous waste</td>
<td>Evaluation of potential for better separation of waste fractions. Install appropriate waste separation system.</td>
<td>Q4/2016</td>
</tr>
<tr>
<td></td>
<td>Recycling of DMSO solvent</td>
<td>Evaluation of possibilities for the recycling of DMSO</td>
<td>Q3/2016</td>
</tr>
<tr>
<td>Aspect</td>
<td>Operational Target</td>
<td>Measure</td>
<td>Date</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Reduction of chemicals for water purification in Fab B, by 5%.</td>
<td>Increasing water pre-treatment for Fab B</td>
<td>Q1/2016</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Control of sustainability measures in the supply chain</td>
<td>Perform Environmental and Code of Conduct audit at dedicated key-suppliers, according external audit plan</td>
<td>Q4/2016</td>
</tr>
</tbody>
</table>
### 3.4.3. Environmental Program Review 2015, Philippines

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Environmental Target</th>
<th>Activities</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Emissions</strong></td>
<td>Carbon Footprint Measurement for Narra 5% lower than 2014 (indicator in terms of CO₂ equivalents/kpcs)</td>
<td>Compensation program: Part 3 of the tree planting at CIP 2 (ams Asia Inc.) Target to plant &gt;400 tree saplings</td>
<td>Target: 400 seedlings could not be reached due to Narra Phase 2&amp;3 construction priorities. Small tree planting activity inside ams Asia Inc. facility only.</td>
</tr>
<tr>
<td></td>
<td>Reduce Solid Waste indicator 5% lower than 2014 (indicator in terms of kgs waste/kpcs)</td>
<td>Reduce Solid Waste indicator 5% lower than 2014 (indicator in terms of kgs waste/kpcs)</td>
<td>Not part of the scope of CO₂ reduction program. Recommend to make this as a separate program in 2016</td>
</tr>
<tr>
<td><strong>Energy Consumption</strong></td>
<td>Reduce Energy consumption indicator by 5% from previous year</td>
<td>Define new areas and implement use of motion sensor for lighting control (Narra Phase 2 &amp; 3 projects)</td>
<td>Implemented in 2015 (Phase 2 &amp; 3 restrooms, some storage areas, pantry)</td>
</tr>
<tr>
<td></td>
<td>Implement 24°C +/- 1°C cooling temperatures in all offices and conference rooms</td>
<td>Implement 24°C +/- 1°C cooling temperatures in all offices and conference rooms</td>
<td>Done in April 2015 and continuously observed.</td>
</tr>
<tr>
<td></td>
<td>Shutting down and unplugging office PC’s when leaving work.</td>
<td>Shutting down and unplugging office PC’s when leaving work.</td>
<td>Done in 2015 and observed continuously. Forms part of the IT orientation to newly-hired employees</td>
</tr>
<tr>
<td></td>
<td>Checking P1, P2 and P3 where energy efficient lights can be installed. Ex: replacing conventional lights with LED lights.</td>
<td>Checking P1, P2 and P3 where energy efficient lights can be installed. Ex: replacing conventional lights with LED lights.</td>
<td>Installed LED in selected areas within 2015</td>
</tr>
<tr>
<td>Aspect</td>
<td>Environmental Target</td>
<td>Activities</td>
<td>Implementation</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Land Contamination</td>
<td>Improve proper waste segregation indicator by 5% from previous year (in terms of kg/ kpcs)</td>
<td>Improve waste segregation practice (e.g. canteen)</td>
<td>December 2014 - January 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a.) Trainings</td>
<td>a.) Done trainings within Q1 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.) Additional bins</td>
<td>b.) Done Q3, delays caused by priorities in Narra projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c.) Control disposal of used cooking oil</td>
<td>c.) Started in Q1 2015 and will continuously implement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improve plant-wide waste reduction programs (Re-use and Recycle)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a.) Awareness training</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.) Waste recycling: (plastics, paper, vegetable cutting for compost and organic fertilizer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c.) Implement container gardening to support composting and urban vegetation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a.) Started in Q1 2015 the awareness trainings, short movies viewing in Q2 for reminders at canteen area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b.) Container gardening and vermicomposting training conducted in coordination with HR. Trays recycling and spool recycling are continuously implemented..</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b.) Cancelled. No more space to implement the container gardening program after the completion of Narra Phase 2 &amp; 3</td>
</tr>
<tr>
<td>Water Consumption</td>
<td>Improve water consumption indicator by 5% from previous year</td>
<td>Establish a system for rainwater collection.</td>
<td>Done in Q4 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Install system for collection of RODI drain for watering plants.</td>
<td>In-plan with the rainwater catchment project.</td>
</tr>
</tbody>
</table>
### 3.4.4. Environmental Program 2016, Philippines

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Environmental Target</th>
<th>Activities</th>
<th>Deadline / Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Emissions</strong></td>
<td>Carbon Footprint Measurement for Narra 5% lower than 2015 (indicator in terms of CO₂ equivalents/ kpcs)</td>
<td>Monitor Frequent Travels (business travels)</td>
<td>Q4 2016 HR / Operational Excellence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitor Energy Consumption reduction program</td>
<td>Q4 2016 Facilities / Operational Excellence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitor Commuting / Transportation activities</td>
<td>Q4 2016 HR / Operational Excellence</td>
</tr>
<tr>
<td><strong>Reforestation Program</strong></td>
<td>Tree planting Part 3 Target to plant more than 400 seedlings</td>
<td>Compensation program to mitigate carbon dioxide emission</td>
<td>Q3 2016 Management / Operational Excellence</td>
</tr>
<tr>
<td><strong>Energy Consumption</strong></td>
<td>Reduce Energy consumption indicator by 5% from previous year</td>
<td>1) Convert lightings in selected areas to LED (hallways, parking area; treet lights, storage area, canteen whichever is feasible)</td>
<td>Q3 2016 Facilities / Operational Excellence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) More light sensors in offices/warehouse/PPRE area/ PBXS</td>
<td>Q3 2016 Facilities / Operational Excellence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Back-up: Small wind turbine power source</td>
<td>Q4 2016 Facilities / Management</td>
</tr>
<tr>
<td><strong>Land Contamination</strong></td>
<td>Improve proper waste segregation indicator by 5% from previous year (in terms of kg/ kpcs)</td>
<td>Reduce grease/sludge generation by use of most effective and environmentally-friendly technology solution</td>
<td>Q1 2016 Facilities / Operational Excellence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduction of solid waste indicator by 5%</td>
<td>Q4 2016 Facilities / Operational Excellence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a.) use of baskets when sending trays for cleaning to sub-contractor instead of carton boxes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b.) by promotion of re-usable eco-bags and paper bags.</td>
<td></td>
</tr>
<tr>
<td><strong>Water Consumption</strong></td>
<td>Improve water consumption indicator by 5% from previous year (in terms of Cu.M./kPcs)</td>
<td>Implement rain water collection and review the increase in capacity of volume RODI concentrate water be used for watering plants, for cleaning MAU filters and cleaning cooling towers.</td>
<td>Q4 2016 Facilities / Operational Excellence</td>
</tr>
</tbody>
</table>
3.5. Risk Management

Appropriate measurement, inspection and safety systems are in place to ensure high reliability of the environmental protection systems. ams is not subject to the IPPC Directive* and is not a “hazard-inclined” plant in the sense of the Health and Safety Regulations, as the actual values fall clearly below the quantities and limits prescribed in these regulations.

A multiplicity of safety installations, such as retention basins for waste water, fire detectors and sprinkler systems, as well as gas sensors are installed. All important systems are designed with redundancy. Liquid chemicals are held in suitable storage areas with retention basins that drain into the holding basins of the wastewater purification plant.

The strict conditions with regard to fire protection and plant safety imposed by the industrial plant insurance company FM Global are fulfilled. Since 2005 the plant has been classified as “highly protected risk”.

In the event of an alarm, the appropriate emergency response team is notified via modem from this building control / building management system, which also performs an emergency shutdown where necessary.

A stand-by team consisting of experienced employees, who can be contacted round the clock, enables immediate and competent actions to be taken in the event of any emergencies.

The reception is manned by technicians round the clock as well. They carry out regular inspection patrols and can take immediate action in the event of deviations or alarms. They monitor the factory by means of the central building control system, fire alarm systems and site surveillance systems.

3.6. Products and RoHS, REACH

Essentially, the composition of the products of ams corresponds to the typical components required for production of Integrated Circuits. ams products comply with the RoHS directive and do not contain any Substances with very high concern (SVHC) according REACH Regulation.

3.7. IMDS (International Material Data System)

ams also makes its product information available in the IMD-System. This system ultimately enables automobile manufacturers to record all materials used in their product. As a result, compliance with national and international specifications, standards and rules of law is assured.

3.8. UN Global Compact

In 2009 ams joined the UN Global Compact initiative. The UN Global Compact is the world’s largest corporate initiative for responsible business and sustainability. Over 8,700 participant organizations in more than 130 countries share the UN Global Compact commitment to ten principles in the areas of human rights, labor standards, environmental protection and anti-corruption measures. This commitment also encompasses the efficient use of energy and resources, highest environmental standards, fair labor conditions and ethical business practices.

*Integrated Pollution Prevention and Control, according EC directive: RL 96/61/EC
4. Legal Compliance

In 2014 there were no complaints made to ams from either the responsible authorities, the community, or the local residents in regard to any environmental damage or on account of other negative effects. No processes are being operated that cast doubts on the company’s legal conformity.

5. Energy Management System

ams aims to introduce a sustainable energy efficiency program, in order to identify energy consumers with potential for improvements, introduce measures and monitor its improvement. Therewith, a continuous improvement processes can be introduced. ams committed and recently was certified according to DIN EN ISO 50001, which is an energy management systems (EnMS) that supports the continuous improvement approach.

In addition, ams is performing the external audit by an authorized agency that aims to assess the corporations compiled energy balance and identifies recommendations for improvements. With the DIN EN ISO 50001 certificate and the external audit ams ensures compliance with the Austrian Energy Efficiency law (Energieeffizienzgesetz, EEffG).

An important characteristic of the management system in place is a systematic approach, which involves the relevant processes, as well as involves all participating decision makers and users. Further, the measurement and processing of energy-relevant data according to DIN EN ISO 50001 is essential to identify malfunctions, identify potentials for energy saving and consequently successfully achieve energy reduction and increase in energy efficiency.

As a first step, ams collected all energy relevant data to created individual performance indicators. ams introduced an energy monitoring software which records energy consumptions from existing measuring equipment. Within the system we aim to record specific and absolute total energy consumption (as per energy source), specific energy consumption of consumer groups with significant energy usage, and we will create the annual energy balance. With the installation and setup of the software solution, we laid the foundation for continuous and automatic evaluation and analysis of energy-relevant data.

To utilize and assess the energy saving potential on our company, we established an energy team across different departments. In addition, ams integrates the energy management system with existing managements systems for environment and quality. This enables ams to benefit from synergies across the different management system approaches.

The Management Board is also responsible for setting up and approval of the energy management system.

5.1. Energy Representative

The energy representative is the person mainly responsible for the setup, maintenance and development of the energy management system. The energy representative is reporting to the Executive Vice President Operations & Supply Chain Management and reporting to the management board on regular basis.
5.2. Energy Team

In order to fulfill the requirements that apply to the scope of energy management systems, as well as to ensure all relevant areas are considered. The energy team is defined and consists of representatives from the following departments:

- FAB B Engineering Management
- Facility Electrical Systems & Building Control
- Facility Air Systems
- Facility Chemistry / Water / Waste
- Environment Management
- Purchasing Direct Materials & Capex
- Energy Management

5.3. Energy Performance Indicators

The annual comparison of major primary energy consumptions are shown in below chart. To be emphasized here is that the consumptions are separated per manufacturing area.

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAB B</td>
<td>259.53</td>
<td>243.79</td>
</tr>
<tr>
<td>total electrical consumption (kWh/wafer)</td>
<td>74.91</td>
<td>47.50</td>
</tr>
<tr>
<td>FAB A / Test</td>
<td>129.26</td>
<td>122.36</td>
</tr>
<tr>
<td>total electrical consumption (kWh/wafer)</td>
<td>70.36</td>
<td>75.87</td>
</tr>
</tbody>
</table>

FAB B

Total electrical consumption reported as kWh/wafer decreased by 6.1% due to the more efficient utilization of process chambers.

Total natural gas consumption reported as kWh/wafer was reduced by 36.6% compared to 2014 due to the installation of a heat pump.

FAB A / Test

Total electrical consumption reported as kWh/wafer decreased by 5.7% due to the more efficiently utilized production equipment.

The major impact for the total natural gas increase of 7.8% resulted from a long down time of a centrifugal chiller, which required substitution of chilling capacity by gas driven absorption chillers. A minor additional effect came from the completion of the new office building.

5.4. Energy Program 2016, Austria

ams defines and follows a combined environmental- and energy program, beginning with 2016. Please refer to 3.4.3 Environmental- and Energy- Program 2016, Austria.
6. Input-Output Analysis 2015, Austria

The environmental report gives an overview of media and materials used and the company’s environmentally relevant effects in the year 2015. Comparison with the previous year gives an insight into the efficiency of all environmental protection measures taken.

The total increases in the quantities of media and materials used can be attributed to the continuous expansion of the capacity at the location.

Below data depicts the indicators for the facilities in Austria. The data for the operations in the Philippines is pointed out separately.

### 6.1. Input

#### 6.1.1. Electrical Energy

ams energy management comprises the usage of electrical energy and natural gas. The latter is described below, in chapter 6.1.2. The main consumers of electrical energy are:

- Air conditioning, maintenance of the clean rooms required for production in compliance with the specified “climatic” conditions
- Production machinery (diffusion furnaces, sputter systems, implanters, ...)
- Operation of support systems (such as water purification, water treatment, compressors, nitrogen production plant).

#### Electrical energy per 200mm wafer

As compared to 2014, increase in production of 18.2% caused an increase of total energy usage by 6.2% in 2015.

Related to the 200mm wafer equivalents produced on site which were started in production, an average of 0.37 MWh per wafer was consumed in 2015. Compared to 2014, the value is decreased by 10.1% per wafer, because of higher utilization of existing production equipment. Since 2011 ams buys renewable electricity guaranteed as 100% hydropower.
6.1.2. Natural Gas

Natural gas is used for generation of hot water and low pressure steam and for afterburning of exhaust gases. This heat energy is used for fresh air heating, air humidification (air conditioning), building heating and for operation of the absorption chillers.

Optimized utilization of energy is implemented due to the ams applied clean room concept in the production facilities Fab B, so-called mini-environments. This aims to encapsulate areas in which the silicon wafers are processed against the surroundings. Conventional type clean rooms use approximately three times the amount of energy for maintaining of the clean room in comparison to mini-environments.

Emergency power supply systems and a number of UPS (uninterruptable power systems) units provide high reliability of the energy supply which is required for the very sensitive production equipment.

**Natural gas per 200mm wafer**

The total natural gas consumption in 2015 decreased by 4.3% compared to 2014.

Related to the wafer starts in 2015 the decrease of natural gas is 19%, compared to 2014 – meaning 12.1 m³ natural gas per 200mm wafer was consumed.

ams implemented measures to reduce the total natural gas consumption. The installation of a heat pump utilizes heat load of equipment to produce warm water and in that way contributed significantly to this improvement.

6.1.3. Operating Materials

Main operating materials are: gases, chemicals, raw material, and water. Raw materials and semi-finished products make up a relatively small share.

6.1.3.1. Gases

6.1.3.1.1. Bulk Gases

**Nitrogen per 200mm wafer**

The total consumption of Nitrogen in 2015 increased by 3.7% compared to the previous year. Per wafer start 62.9 m³ of nitrogen was used, which is a decrease of 12.3% compared to 2014. Liquid Nitrogen is not only used for production equipment, it is also used for maintaining the storage conditions.
Oxygen per 200mm wafer

The total consumption of Oxygen in 2015 increased by 3.2% compared to 2014. 4.7m³ oxygen was used per wafer produced – meaning a decrease of 12.6% compared to 2014. The reduction is related to the implementation of new processes and higher utilization of equipment.

Argon per 200mm wafer

The argon consumption in 2015 increased by 17.7% in total, compared to 2014. Per wafer produced 0.23m³ argon was used, which is stable to 2014.

6.1.3.1.2. Process Gases

All gases which are consumed for the manufacturing of wafers are considered. The decrease of applied process gases per 200mm wafer is 4.4% and can be attributed to the higher utilization of production equipment.

6.1.3.2. Chemicals

Liquid chemicals account for the largest quantitative share of operating materials, beside ultrapure water.
6.1.3.2.1. Industrial Grade Chemicals

The following quantities of chemicals were required for preparation of ultrapure water, for wastewater treatment and exhaust air purification.

Related to the consumed water for production, 1.66kg industrial grade chemicals are required for one m³ water - this reflects a decrease by 7.6% in comparison to 2014. The decrease is a result of the ongoing programs for water recycling.

6.1.3.2.2. Process Chemicals

Due to the increased capacity of the wafer production and load, the consumption of most ultrapure chemicals also increased. The consumption is stable.

6.1.3.3. Silicon

The total consumption of silicon in 2015 was 8.6 tons, which represents an increase of 18.2% in comparison with the previous year. This reflects the much higher production volume.

6.1.3.4. Water

ams draws the water required for production and cooling purposes from a company-owned deep-well. Drinking water and water for sanitation purposes is supplied by the public water mains, in accordance with the requirement of the authorities. The well water is used for production of fully desalinated water (ultrapure water/deionized water) and partially desalinated cooling water.

The partially desalinated water is treated using mechanical filtration and subsequent reverse osmosis processes. It is used for cooling part of the production machinery and, later on in the sequence, as feed water for the cooling towers. Cooling water is supplied in a closed loop. More than 98% of the total cooling water is recirculated. The consumption of ultrapure water is quite stable.
During winter months, the steam emissions that would occur from cooling towers are avoided by the operation of free cooling. With ambient temperatures below 5°C, no water is evaporated from the cooling towers, so the formation of “industrial snow” is prevented.

The required ultra-pure water is produced applying mechanical filtration, reverse osmosis and multi-stage ion-exchange, ultrafiltration, UV-stabilization and other cleaning steps. The ultra-pure water is used in production for various cleaning purposes. Contaminated rinsing water is, to some extent, reprocessed within the company, and hence used several times.

**Water per 200mm wafer**

In the year 2015, ams drew 16.2% more water from the company-owned deep well compared to 2014. The water drawn from this well is needed for production of ultrapure water, softened cooling water and boiler feed water.

The water consumption per 200mm wafer increased by 15.8%, compared to 2014 – this corresponds to 2.38m³ per wafer. The reason is an increased demand for additional cleaning processes.

### 6.2. Output

ams produces Integrated Circuits (ICs) for applications in the automobile industry, and for the communications, industrial electronics, medical, and health fields. The ICs are supplied in plastic, ceramic packages, or undiced wafers.

#### 6.2.1. Product Packaging

In the year 2015 69.8 tons cardboard packaging and 139.5 tons compound materials were used for product shipping. ams records in these product packaging indicators all packaging materials that are picked from the warehouse. Moreover, it combines packaging materials used in Premstaetten and Calamba, as these locations are the main distribution centers.

#### 6.2.2. Waste

Waste is generated in all departments and areas (e.g. production, maintenance, development, administration, dispatch) within ams. Unavoidable waste is collected separately and, wherever possible, passed for internal recycling or external reuse. Where waste must be disposed, this is done by authorized contractors. Within the framework of the operation of the plant, the following main types of waste are generated:

- waste paper and cardboard packaging
- used cleaning fluids (amine)
- domestic-type waste
- thermal fraction (plastics)
- solvents, photoresist (halogen-free)
- dry sludge from the waste water treatment
6.2.2.1. Non-Hazardous Waste

Non-hazardous waste adds up to 345.06 tons in 2015. In comparison to 2014 this reflects an decrease of 13.1%. This value includes the dry sludge from waste water treatment as well – it is classified as non-hazardous waste according the statement of Federal Ministry of Agriculture, Forestry, Environment and Water Management since 2012.

29.2% of the non-hazardous waste generated in 2015 was sent for recycling and 14.4% of non-hazardous waste was used for thermal usage.

<table>
<thead>
<tr>
<th>Reporting Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hazardous Waste</td>
<td>236.45 t</td>
<td>289.53 t</td>
<td>397.26 t</td>
<td>345.06 t</td>
</tr>
</tbody>
</table>

6.2.2.2. Hazardous waste

In 2015, around 333.4 tons of hazardous waste was passed to waste disposal contractors licensed to handle hazardous waste or sent to an external recycling plant. This reflects an increase of 53.2% in comparison to 2014. The increase of hazardous waste can be attributed to the ramp up of a new production process and fully loaded production line. Related to the wafer starts this means 2.07 kg hazardous waste per 200mm wafer.

6.2.3. Waste Water

As a result of the typical production methods in semiconductor manufacturing, the waste water contains acids, developers, caustics and other chemical substances from rinsing processes. The rinsing water is separated according to its contamination, and treated accordingly.

As far as is technically possible, the impurities are removed using physical and chemical processes. The most important treatment process is the precipitation of the contamination followed by filtration. After this separate treatment, the various water-flows are neutralized together and, after a final inspection, continuously discharged into the Grazerfeld Wastewater Authority’s clarification plant for final purification (elimination of nitrogen). On a self-monitoring basis, waste water emissions are checked on a daily, weekly and monthly basis, in line with conditions imposed by the authorities. Independent experts check the effectiveness of the waste water treatment plant twice a year. This inspection includes, amongst other items, checks on parameters such as adsorbable organic halogens (AOX), hydrocarbons, tensides, chlorine and highly volatile organic hydrocarbons. All values are significantly below the officially prescribed limits.

The chemicals storage area and handling zones are drained into the holding basins of the water purification plant, so negative environmental effects from accidents can be avoided. Water used for sanitation purposes is discharged into the municipal sewerage system.

Rain water is kept separate from the waste water and is discharged into the company-owned ponds. These ponds also act as holding basins during heavy rainfall, and as a fire fighting water reserve in the event of fire, or as holding basins for any water contaminated from firefighting. The company ponds are situated in a clay base that is nearly impermeable to water. As a result, subsequent treatment of any contaminated water would be possible if necessary, as infiltration is precluded.
Waste water per 200mm wafer

The waste water emitted due to the production is 0.5% lower compared to 2014 - this presents a value of 3.44m³ waste water per wafer and shows stabilization to the previous year.

This is achieved due to improvements for water reclaim and the cascading usage of water.

6.2.4. Air Emissions

The exhaust air emissions arising can be assigned to the following sources of emission:

- Eteam boilers and hot water boilers
- Exhaust air cleaning systems from the production areas

The steam and water boilers are fired by natural gas. As a result of the environmentally friendly fuel and the use of modern low NOₓ burners, the exhaust gas test values are clearly below the legally prescribed limits.

Cleaning of the exhaust air from the production processes currently takes place in Fab A via exhaust air scrubbers for caustic and acidic exhaust air. A bio-reactor is used to clean the exhaust air from contamination. In the first stage of the bio-scrubber, the solvents used are dissolved in water (counter flow absorption process). After this, aerobic bacteria convert the solvents dissolved mainly into CO₂. All exhaust air scrubbers are designed with built-in redundancy.

Typical contaminants in the exhaust air before the washers are vapors and aerosols of various acids and solvents used, as well as water-soluble reaction products from the plasma etching processes.

In 2015, the total natural gas consumption was 1.96 million m³ for operation of the boilers (four steam boilers, five hot water boilers). Due to the type of fuel used, and the applied low-NOₓ burners, the levels were well below the emission limits. This has been verified by measurements taken by independent experts. Because of the relatively low boiler capacity and low utilization rate, the company is not subject to the conditions of the Emissions Certificate Act of the EU.

Sulphur hexafluoride (SF₆), nitrogen trifluoride (NF₃), perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs) are major contributors to the greenhouse effect (Kyoto Protocol). There is no way to substitute these process gases in the core processes of the semiconductor industry, as no evaluated replacement processes or alternative gases are available. However, ams makes big efforts to keep the consumption of these gases as low as possible, to use process gases with a lower greenhouse potential and primarily to minimize the emissions by means of special abatement systems (exhaust gas cleaning by controlled afterburning in a closed system). All relevant equipment in Fab B is fully equipped with these abatement systems. The average efficiency of these abatement systems is 96%.

ams clearly fulfills the requirements of the Austrian/ European legislature. In addition, ams is also a signatory to the Memorandum of Agreement of the European Electronic Component Manufacturers Association (EECA), in which companies undertake common efforts to reduce the output of PFCs and HFCs.
6.2.5. Carbon Dioxide

ams started a carbon dioxide balance project already several years ago, which should raise awareness of the impact from production equipment and company employees due to greenhouse gases (GHG). The initial goal of this project was to make a GHG inventory of primary and secondary emissions energy sources, including business travel, everyday employee commuting and product shipment.

The trend shows an increase of global CO₂ equivalent emissions over the last three years - in 2015, a total of 30,075 tons CO₂ equivalents were emitted. This is mainly caused by emissions from ams manufacturing activities in Premstaetten. Due to the fact of increased production capacity in 2015, the consumption of special gases is significantly contributing to this increase in CO₂ emissions. The total CO₂ equivalents do not cover emissions from outsourced activities/manufacturing.

Carbon Dioxide Equivalent per Revenue

The diagram shows that related to the company growth in revenue, the CO₂ equivalents decreased by 14.8%.

6.2.6. Noise

There is no noise emitted from the production facilities to the surroundings. This has also been confirmed by measurements carried out in the neighborhood of ams by independent experts. Noise for employees is minimized by taking sound insulation measures directly at the production equipment. Furthermore, other measures to reduce noise pollution on the company site and for local residents have been taken voluntarily, for example the construction of a sound-insulating wall along the motorway.
7. Emission Control on Steam and Hot Water Boilers

7.1. Exhaust Emissions

All measurements were taken by the Steirische Gas-Wärme GmbH (Styrian Gas Heating Co.) over the period from June 8th to 9th 2015.

7.1.1. Emission Measurements after Exhaust Air Scrubbers – Fab B

7.1.1.1. Exhaust Air Scrubber for Acid-Laden Exhaust Air

<table>
<thead>
<tr>
<th></th>
<th>AsH₃</th>
<th>BF₃</th>
<th>HNO₃</th>
<th>HCl</th>
<th>NaOH</th>
<th>H₃PO₄</th>
<th>HF+HBr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Measurement</td>
<td>&lt;0.002</td>
<td>&lt;0.75</td>
<td>&lt;0.75</td>
<td>0.46</td>
<td>0.54</td>
<td>&lt;0.75</td>
<td>&lt;0.15</td>
</tr>
</tbody>
</table>

values in mg/m³

7.1.1.2. Exhaust Air Scrubber for Alkalines

<table>
<thead>
<tr>
<th></th>
<th>NH₃</th>
<th>H₂SO₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Measurement</td>
<td>&lt;0.24</td>
<td>&lt;0.75</td>
</tr>
</tbody>
</table>

values in mg/m³

As is clearly shown in the Emission Measurements after Exhaust Air Scrubbers tables, all measured values are well below the officially prescribed limits.
### 7.2. Boiler Plant Emission Measurements

<table>
<thead>
<tr>
<th></th>
<th>Overall assessment value in mg/m³ at 3% O₂</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power (MW)</td>
<td>CO</td>
<td>NOₓ</td>
</tr>
<tr>
<td>Limit * in mg/m³</td>
<td>100</td>
<td>117</td>
<td></td>
</tr>
<tr>
<td>Steam boiler 1</td>
<td>1.4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Steam boiler 2</td>
<td>1.0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Heating boiler 1 (Fab A)</td>
<td>1.74</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Heating boiler 2 (Fab A)</td>
<td>2.91</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Heating boiler 3 (Fab A)</td>
<td>80</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Limit ** in mg/m³</td>
<td>3</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Heating boiler 4 (Energy Centre)</td>
<td>2.0</td>
<td>3</td>
<td>63</td>
</tr>
<tr>
<td>Heating boiler 5 (Energy Centre)</td>
<td>0.86</td>
<td>7</td>
<td>114</td>
</tr>
<tr>
<td>Steam boiler 3 (Fab B)</td>
<td>0.86</td>
<td>3</td>
<td>110</td>
</tr>
<tr>
<td>Steam boiler 4 (Fab B)</td>
<td>0.86</td>
<td>2</td>
<td>62</td>
</tr>
</tbody>
</table>

* Limit in accordance with LRG-K (Clean Air Act for Boiler Operations) and LRV-K (Clean Air Act for Boiler Plant) for existing systems in mg/m³ at 3% O₂
** Limits for newly installed boiler plant in accordance with LRG-K and LRV-K
*** LRG-K does not specify a defined limit. The low NOₓ burners installed ensure that statutory requirements are met.
**** No limit specified, as the fuel used is natural gas.
### 7.3. Waste Water Emission Measurements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>19.77°C</td>
</tr>
<tr>
<td>Filterable solids</td>
<td>63.0 mg/l</td>
</tr>
<tr>
<td>pH</td>
<td>7.28</td>
</tr>
<tr>
<td>Fluoride, F⁻</td>
<td>12.6 mg/l</td>
</tr>
<tr>
<td>Free chlorine, Cl₂</td>
<td>&lt;0.05 mg/l</td>
</tr>
<tr>
<td>Sum of hydrocarbons</td>
<td>&lt;0.1 mg/l</td>
</tr>
<tr>
<td>Sum of anionic and non-ionic tenside</td>
<td>&lt;0.52 mg/l</td>
</tr>
<tr>
<td>Least volatile lipophilic substances</td>
<td>&lt;5 mg/l</td>
</tr>
<tr>
<td>Sulphate, SO₄⁻</td>
<td>126 mg/l</td>
</tr>
<tr>
<td>Chemical oxygen demand calc as O₂</td>
<td>31 mg/l</td>
</tr>
<tr>
<td>Nitrate-nitrogen</td>
<td>8.0 mg/l</td>
</tr>
<tr>
<td>Kjeldahl-nitrogen</td>
<td>46.0 mg/l</td>
</tr>
<tr>
<td>Total nitrogen</td>
<td>54.9 mg/l</td>
</tr>
<tr>
<td>Phosphate, P</td>
<td>0.20 mg/l</td>
</tr>
</tbody>
</table>
8. Input Output Analysis 2015, Philippines

The subsidiary in the Philippines was founded in 2005 to increase capacity in testing. In 2007, the test house in Calamba, was certified according to DIN EN ISO 14001:2004 by the independent certification body DNV.

In December 2012 the new facility in the Philippines called project Narra has been completed and covers a total of 5,160 m² of building area in a 28,000 m² lot.

ams Aisa Inc. mainly functions as a facility for wafer sorting, wafer sawing (to compliment the wafer sorting process), final testing (ambient, cold, hot temperatures), and taping & inspection (for Standard and WLCSP).

In Q4 of 2014 until Q2 of 2015, project Narra facility expansion was constructed to serve the additional production loadings to support the demand from various customers. This project resulted in an increase in Water and Electricity use for the whole year 2015.

8.1. Input

8.1.1. Electrical Energy

In 2013 there was an increase in energy consumption when the volume of ICs tested went up and the areas in production and the company premises to be lighted increased when the transfer to Narra facility was completed.

In 2014, these same reasons, other than the product transfers from Austria test site to Philippines Test Facility, brought the rise in energy consumption by 29.79%.

The operation of Narra projects resulted in an increase of 40.85% in the electricity use in 2015 against the previous year consumption.

8.1.2. Water

Despite the programs in water reduction such as inspection of piping systems for leaks, effective use of domestic water and the likes, 52.92% increase in water consumption in 2015 is caused by the operation of the Narra projects, and the El Niño Phenomena which resulted in an increase of water use for the watering of the garden activities especially during the first and second quarters of the year when we have the summer days.
8.1.3. Electrical Energy and Water Consumption per tested ICs

For 2015 a positive 5.53% above the target reduction of 5%. in the Energy vs kPcs ICs tested gave a data that is interpreted to be a figure for increased in efficiency for the year 2015 compares to 2014. Despite the factors such as larger building areas and grounds to light, bigger building volume to cool, and more facility equipment to run (e.g. cooling towers, air compressors, elevators, production machines) which contributes to the energy consuming activities by the company, the quantity of products tested compensated for the high energy consumed.

The Water vs kPcs ICs Tested indicator on the other hand, was slightly off the target 5% reduction this year at (-) 2.47% reduction rate. Negative (-) sign means below the base line 5% and does not mean a “gain”. The increase in the use of water for RODI water system to be used for cooling and in wafer sawing processes, higher demand in water for grassland and garden maintenance due to El Niño Phenomena and increase in domestic use due to increase in headcount, resulted in the flop.
8.2. Output

8.2.1. Waste

8.2.1.1. Non-Hazardous Solid Wastes (Production and Domestic)

Non-hazardous wastes are collected in a dedicated storage building. Collection and transport is arranged to PEZA accredited scrappers and residual waste haulers. Regular Audit is conducted to all haulers every year. Improvement in domestic waste generation (reduction by 3 tons from previous year’s data) was evident in 2015 despite increase in production activities which generated higher production wastes. The workgroup will continue to conduct awareness training on the use of re-usable materials, proper segregation campaigns, etc., especially to the newly-hired employees.

![Non hazardous Waste (Production and Domestic Waste)]

<table>
<thead>
<tr>
<th>Reporting Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Waste</td>
<td>10,229</td>
<td>12,593</td>
<td>20,055</td>
<td>17,685</td>
</tr>
<tr>
<td>Production Waste</td>
<td>44,746.00</td>
<td>40,210.00</td>
<td>64,645.50</td>
<td>74,003.05</td>
</tr>
</tbody>
</table>

8.2.1.2. Hazardous Waste

2015 is the year where most types of wastes were generated. The highest waste generated is the grease trapped in the manhole where the canteen utensils washings are collected to be discharged. The two main reasons for this increase in grease are:

1. The sudden increase of canteen users coming from both the ams increased employees headcount and the contractor personnel that dwell within the facilities (during the construction project of Narra Phase 2 and 3 in 2015).

2. The updates in the Philippine Environmental Law (DAO 2013-22) which included all organic wastes such as grease wastes which in the previous version of the law (DAO 2004 - 36, it is only considering generation above 50kg / day to be categorized as “hazardous”.

<table>
<thead>
<tr>
<th>Reporting Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
<td>126.5 kg</td>
<td>401 kg</td>
<td>587 kg</td>
<td>10122 kg</td>
</tr>
</tbody>
</table>
Imprint

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