

INTEGRATED REPORT 2015  
NON-FINANCIAL NOTES: ENVIRONMENTAL PERFORMANCE

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# Non-Financial Notes: Environmental Performance

## **WHAT CAUSES OUR EMISSIONS: A DETAILED VIEW**

We look at our energy usage and emissions throughout our entire value chain, gaining insights to help us manage our environmental performance and, in turn, help our customers do the same. Below we highlight the activities and trends that lie behind our results for 2015, from where we consume the most purchased electricity to the impact we have through the use of our products.

### **Direct Emissions (Scope 1)**

Consumption of fuel for our company cars remains the single greatest contributor to our Scope 1 emissions. In 2015, we continued to enhance our car policy by linking emissions caps to efficiency improvements of the automotive industry. In addition, we focused on greater shifts in commuting habits. We continued the global roll-out of TwoGo by SAP, our ride sharing solution, which is now available in 114 SAP locations worldwide. To increase scale and attractiveness of TwoGo, the solution is available to the public free of charge. With our 20% electric vehicles in 2020 initiative we continue to offer incentives to our employees to purchase electrical cars. As example of additional mobility alternatives for our employees we established a company bike program in Germany, where employees have the opportunity to select between using a bicycle or a company car to commute to work. Furthermore we expanded the "Bahncard 100" offering as a commuting alternative to a company car in Germany.

### **Indirect Emissions (Scope 2)**

Our purchased electricity powers everything from our data centers to our buildings throughout the world. Whenever we refer to our green Cloud, we mean our Cloud is carbon neutral due to purchasing 100% renewable electricity certificates and compensation by offsets, at SAP. We continued a wide range of efficiency projects to reduce our energy usage, including facility upgrades and new LEED certifications. We also expanded the

management of our environmental performance through ISO 14001.

### **Upstream Emissions (Scope 3)**

Only selected upstream emissions like business flights, paper consumption and co-locations of data centers are directly measured and hence included in our corporate target. The additional upstream emissions products and services or grey energy of our buildings are based on an estimate. Together our upstream emissions are responsible for about 16% of SAPs total carbon footprint.

As it is expected that the emissions from external data centers (Co-Locations) will continue to grow in the future, SAP committed to a green cloud strategy, to compensate the emissions with renewable electricity certificates.

### **Downstream Emissions (Scope 3)**

The vast majority of our overall emissions stem from the use of our software. When SAP software runs on our customers' hardware and on their premises, the resulting carbon footprint is about 21 times the size of our Scope 1 and Scope 2 emissions. We have developed a strategy to help our customers, hardware providers, and others address this impact. Given that we cannot control our customers' IT landscapes because they usually contain many elements not related to SAP software, we share this responsibility with others.

Our downstream emissions strategy focuses on two main areas. We continue to engage with our customers to optimize their on premise landscapes. We work with our customers to help them decommission legacy systems, archive unused data, and consolidate their business applications, as well as virtualize their system landscape – all of which helps reduce the size and cost of their IT environment. The second part of our strategy involves SAP HANA, which not only increases computing speed but can also help create much leaner and simpler operations. With SAP

HANA, the worlds of analytic and transactional data are merged into one real-time, in-memory platform, which can further simplify the system landscape for our customers.

One of the most important ways that we can help our customers reduce their energy usage and emissions is by managing their SAP systems through managed cloud services provided by SAP's green Cloud offerings, thereby enabling them to share our infrastructure. Using 100% renewable energy in our data centers in 2015, our green cloud strategy will further advance our ability to help our customers reduce their carbon footprints.

### Offsets

It is our policy to only apply offsets to our Scope 3 emissions. Our investment in Livelihoods Fund has provided us with 23 kttons of high-quality carbon credits, which we used to compensate Scope 3 emissions in 2015.

As a new approach we introduced carbon emission offsets for business flights in 2015. In addition to avoiding and reducing overall business flights, we began to offset selected business flights in the second half of 2015. This offset effort resulted in a compensation of 35 kttons of CO<sub>2</sub>.

## GENERAL INFORMATION ABOUT THE ENVIRONMENTAL NON-FINANCIAL INDICATORS

### Boundaries

Our boundaries take two different perspectives: SAP as a company, which includes all our legal entities and operations and supply chain, and SAP as a solution provider enabling our customers. These boundaries are listed in detail in the GRI G4 Content Index.

### Environmental Indicators

Data for our environmental indicators is collected and reported on a quarterly basis and is subject to external assurance for annual reporting.

Reporting on Total Energy Consumed, Data Center Energy, and Renewable Energy is based on the data collected for the calculation of our Greenhouse Gas Footprint (GHG Footprint). Therefore, the same reporting principles apply as for the GHG Footprint.

All numbers are based on the metric system. Whenever we state "tons" we mean metric tons.

The indicators greenhouse gas emissions per employee, total energy consumed per employee are calculated on the basis of an average number of employees. This average is calculated by adding the full-time equivalents (FTE) at the end of each quarter and then dividing the result by four. Representing our cloud strategy and increased consumption of computing power and thus data center energy by our customers we replace the performance indicator data center energy per employee

(kWh/employee) by data center energy (own data centers plus external co-locations) per million Euro non-IFRS revenue (kWh/million € non-IFRS revenue).

### GREENHOUSE GAS FOOTPRINT

We define the Greenhouse Gas Footprint (GHG Footprint) or carbon footprint as the sum of all greenhouse gas emissions measured and reported for SAP, including the compensation with renewable energy or offsets. SAP's preparation of the GHG Footprint is based on the Corporate Accounting and Reporting Standard (Scope 1 and 2) and the Corporate Value Chain (Scope 3) Standard of the World Resources Institute/World Business Council for Sustainable Development. This approach conforms with the requirements of GRI G4 indicators EN3, EN4, EN15, EN16, and EN17.

### Reporting Principles

GHG accounting and reporting practices are evolving and are new to many businesses; however, the principles listed below are derived in part from generally accepted financial accounting and reporting principles. They also reflect the outcome of a collaborative process involving stakeholders from a wide range of technical, environmental, and accounting disciplines. (Source: GHG Protocol – Corporate Accounting and Reporting Standard)

GHG accounting and reporting shall be based on the following principles:

- **Relevance:** Ensuring the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.
- **Completeness:** Accounting for, and reporting all of GHG emissions sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusion.
- **Consistency:** Using consistent methodologies to allow for meaningful comparison of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
- **Transparency:** Addressing all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.
- **Accuracy:** Ensuring that the quantification of GHG emissions is systematically neither over nor under true emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieving sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

(Source: GHG Protocol – Corporate Accounting and Reporting Standard)

SAP does not consider a dual reporting of the recently introduced amendment to the GHG Protocol Scope 2.

### Organizational Boundaries

SAP defines our organizational boundaries by applying the operational control approach as set out in the GHG Protocol.

Operational control is established when SAP has the full authority to introduce and implement its operating policies. The emissions of all operations over which the company has operational control and all owned, leased facilities, co-location data centers and vehicles that the company occupies/operates are accounted for in the GHG Footprint, being based on either measurements or, where no measured data is available, on estimations and extrapolations.

A portion of SAP's leased facilities operates under full-service and/or multi-tenant leases, where the building owner/manager pays for the utilities directly and SAP does not have access to actual energy consumption information. SAP includes these facilities in its definition of operational control and accounts for them by estimating related energy consumption.

To support the growing demand for SAP's cloud offerings, we sub-contract computation power in local third party data centers. Carbon emissions are approximated and included based on the consumed computation power.

In most instances, however, SAP has 100% ownership of our subsidiaries. Accordingly, the difference between applying the control versus the equity approach is about 0.6 % based on SAP revenue. If further investments in associates were included, the difference would be even smaller, about 0.5%.

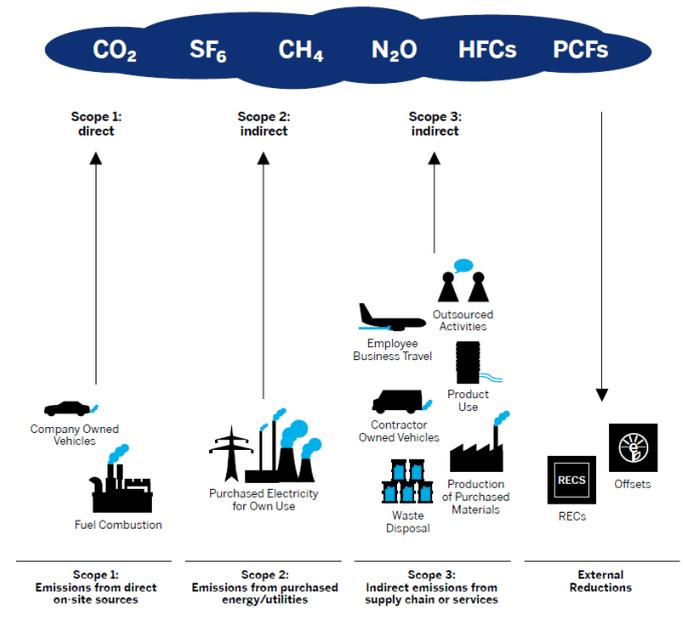
The 2015 carbon footprint also includes the emissions from our acquisitions like Concur (official acquisition in Q4/2014), SuccessFactors (official acquisition in Q1/2012), Ariba (official acquisition in Q3/2012), Hybris (official acquisition in Q3/2013) and Fieldglass (official acquisition in Q2/2014).

Our gross carbon footprint for 2015 was 704 ktons CO<sub>2</sub> (683 ktons CO<sub>2</sub> in 2014). Our gross carbon footprint includes all relevant GHG emission categories in scope 1, 2 and 3 (see Figure 1). Our net carbon footprint is reduced by purchased renewable energy certificates and carbon offsets in the respective reporting period.

### Methodology

In our efforts to continuously improve the data quality of our corporate carbon footprint data, we conducted a comprehensive methodology update in 2010 to fully adapt the GHG Protocol guidelines. We are reporting all our GHG emissions in CO<sub>2</sub> equivalents (CO<sub>2</sub>e), including the impact from CH<sub>4</sub>, N<sub>2</sub>O, and HFCs in our Scope 1 and 2 emissions. As SF<sub>6</sub> and PCFs mainly occur in chemical processes, they are not relevant for us.

Below you will find the different parameters contributing to our carbon footprint:



### Scope 1

**Stationary Combustion Facilities:** Inclusion of CH<sub>4</sub> and N<sub>2</sub>O; stable values (kWh/m<sup>2</sup>) instead of actual average consumption are used for extrapolation of buildings where no measured data is available (50% measured data). In cases where no specific information is available, natural gas reported by local sites is assumed to be reported in Lower Heating Value.

**Refrigerants Facilities:** Refrigerant data is reported for completeness of our carbon footprint, but HFC emissions are fully estimated (0% measured data) based on the number of server units and office space with an A/C system; all refrigerants are assumed to be HFC134a.

**Mobile Combustion Corporate Cars:** Inclusion of CH<sub>4</sub> and N<sub>2</sub>O; in 2015, 31 countries reported actual fuel data (92% data coverage); for other countries stable values (liters/car) are used for extrapolation based on the number of corporate cars reported. The stable values for extrapolation are based on SAP's 2009 carbon footprint data.

**Refrigerants Corporate Cars:** Refrigerant emissions are based on a rough estimate of HFC emissions per car and are extrapolated based on the number of corporate cars reported (0% measured data).

**Mobile Combustion Corporate Jets:** Inclusion of CH<sub>4</sub> and N<sub>2</sub>O (100% data coverage)

## Scope 2

**Electricity Office:** Updated CO<sub>2</sub> conversion factors and inclusion of CH<sub>4</sub> and N<sub>2</sub>O based on country specific grid factors; stable values (kWh/m<sup>2</sup>) instead of actual average consumption are used for the extrapolation of buildings where no measured data is available (75% data coverage). The stable values are based on SAP's 2009 carbon footprint data.

**Electricity Data Centers:** Updated CO<sub>2</sub> conversion factors and inclusion of CH<sub>4</sub> and N<sub>2</sub>O based on country specific grid factors; electricity consumption for internal data centers is extrapolated based on the number of server units (73% data coverage). The stable values are based on SAP's 2009 carbon footprint data.

**Purchased Chilled and Hot Water, Steam:** Inclusion of CH<sub>4</sub> and N<sub>2</sub>O based on country-specific grid factors (100% data coverage)

## Scope 3

The following scope 3 GHG emissions are included in our corporate GHG target:

**Business Flights:** Average emission factors for business flights are calculated based on short-, medium-, and long-haul flights; extrapolation of CO<sub>2</sub> is based on the actual distance travelled and the net (excluding tax) costs (58% data coverage), emission factors for business flights do not consider the radiative forcing factors.

**Rental Cars:** Average emission factors from rental cars are calculated based on actual distance traveled and these factors are used for extrapolation based on the costs (89% data coverage).

**Train Travel:** Average emission factors from train travel are calculated based on an actual distance traveled and these factors are used for extrapolation based on the costs (31% data coverage).

**Business Trips with Private Cars:** Carbon calculation is based on distance traveled with a private car. Train and company car trips are excluded from this activity type (58% data coverage).

**Employee Commuting:** A system-integrated commuting survey about the distance to work and the mode of transport is conducted annually for SAP globally. The survey responses are the basis for carbon calculation of employee commuting in the following year. More than 24'000 employees responded to the survey in 2014. Commuting for non-responding employees and quarterly updates are extrapolated based on the number of FTEs excluding those employees who own a corporate car.

**Electricity External Data Centers:** Updated CO<sub>2</sub> conversion factors and inclusion of CH<sub>4</sub> and N<sub>2</sub>O based on country specific grid factors; electricity consumption for external data centers is extrapolated based on the data center capacity, a utilization and

power usage effectiveness (PUE) factor. As the utilization and PUE factors are not available for all external data centers, the average of all provided factors is used as estimate for external data centers with missing information (87% data coverage).

**Logistics:** Calculation is based on the actual number of parcels and mail sent from the German logistics center and is extrapolated globally.

**Data Download:** Carbon calculation is based on the data volume downloaded by our customers globally (100% data coverage).

**Paper Consumption:** Calculation for emissions caused by the consumption of printing paper is based on printer tracker data (100% data coverage).

An External Data Center is a local computing center with server units running SAP software that is operated by an external partner. Those emissions are classified as Scope 3. The SAP owned and managed data centers, coming from acquisitions (e.g. Sybase or Ariba) are classified as Scope 2 GHG emissions.

Additionally, we annually measure and publish the following Scope 3 GHG emissions based on the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard. These GHG emissions are not included in our corporate target and are meant to be for indicative purpose only.

### Upstream:

**Purchased Goods and Services:** Globally available monetary information is used to assess the carbon emitted in the production of goods and services by different sectors in the economy. The financial data used covers about 90-95% of our purchased goods and services.

**Capital Goods:** Globally available monetary information is used to assess the carbon emitted in the production of capital goods by different sectors in the economy (financial data coverage: 100%)

**Fuel and Energy-Related Activities Not Included in Scope 1 or 2:** Upstream emissions of purchased fuels, upstream emissions of purchased electricity, and transmission and distribution losses. Emissions are calculated based on fuel and electricity consumption data and on regional emission factors for energy losses and fuel production in CO<sub>2</sub>equivalents (data coverage of energy/fuel consumption data: see relevant Scope 1 and 2 categories above).

**Waste Generated in Operations:** Includes all recyclable and non-recyclable waste (including e-waste) generated by offices and data centers from our global operations. Estimates are based on German totals and are extrapolated by FTE headcount. Emissions are calculated using Scope 1 and 2 emission factors for end-of-life treatment. Data on municipal waste was provided

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(estimated) for about 40% of the total space, e-waste data was provided for about 25% of the FTEs (for Germany).

Due to the link of our upstream to operating expenses, for 2015 we extrapolated our upstream figures by multiplying our four key contributors to our upstream emissions from 2014 with the year over year increase of operating expenses between 2014 and 2015.

#### **Downstream:**

**Use of Sold Products:** Resource need per year is determined using a landscape simulation. It is extrapolated globally based on the number of productive installations and power usage effectiveness (PUE). We use a PUE factor of 1.9, representing a global average determined by The Green Grid Consortium. Emissions are calculated using a global electricity emission factor. Due to the special characteristics of software products, an assessment of resource need per year was chosen. This deviates from the minimum boundaries as defined by the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard, which requires assessment and disclosure of "direct use-phase emissions of sold products over their expected lifetime". The calculation covers all SAP's main solutions including on premise product portfolio, Sybase installations and for the first time SAP HANA, SAP Mobile and SAP Cloud. Mobile apps are not included. Calculation parameters will be adapted when significant technology changes occur.

Not included: Upstream Transportation and Distribution (due to data complexity and de minimis); Upstream Leased Assets (not applicable); Processing of Sold Products (not applicable); End-of-Life Treatment of Sold Products (not applicable); Downstream Leased Assets (not applicable); Franchises (not applicable); and Investments (not applicable).

#### **External Reduction**

**Renewable Electricity:** Purchased renewable electricity is already deducted from our Scope 2 emissions in the net carbon footprint; CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O conversions are based on grid specific factors from the origin of renewable electricity; data is only valid with an official certificate or written confirmation of the electricity supplier (100% data coverage).

**Offsets:** Purchased offsets are reported separately based on the carbon reduction amount purchased. SAP ensures that the GHG emission reductions from offsets are credible and that they meet four key accounting principles:

**Real:** The quantified GHG reductions will represent actual emission reductions that have already occurred.

**Additional:** The GHG reductions will be surplus to regulation and beyond what would have happened in the absence of the project or in a business-as-usual scenario based on a performance standard methodology.

**Permanent:** The GHG reductions will be permanent or have guarantees to ensure that any losses are replaced in the future.

**Verifiable:** The GHG reductions will result from projects whose performance can be readily and accurately quantified, monitored and verified.

A requirement for offsets is that the minimum standard (VCS – Voluntary Carbon Standard) is applied. In 2015 our strategic investment in the Livelihoods fund has provided us 23 ktons of offsets which are included in our overall net carbon footprint.

#### **CO<sub>2</sub> Emission Factors**

The calculation of the above emissions is based on factors for conversion and extrapolation provided, among others, by IEA, WRI, US EPA, UK DEFRA, DEHSt, Environment Canada, GHG Protocol, and SAP's own measurements.

Where relevant, our CO<sub>2</sub> Emission Factors consider all CO<sub>2</sub> equivalents (CO<sub>2</sub>e) for all greenhouse gases. Global Warming Potential factors are based on the Second Assessment Report (SAR) of the Intergovernmental Panel on Climate Change (IPCC).

#### **Comparability**

The GHG Protocol requires that, in the case of a structural/organizational change or a change in methodology, companies adjust to historic year inventories if the change has a significant effect on reported emissions. SAP uses a significance threshold of 5% for structural/organizational changes and 1% for methodology changes of total current year emissions. For example, a structural/organizational change that increases or decreases the total inventory by 5% or more will trigger an adjustment of historic years. A structural/organizational change that increases or decreases the total inventory by less than 5% will be considered insignificant and thus no adjustment will be made.

Additionally, we annually measure the cumulative cost avoidance of our carbon emissions, compared to a business-as-usual scenario. In 2015 we introduced a cumulative cost avoidance calculation based on a triennial rolling method. This leads to additional comparability and we will continue to calculate our cumulative cost avoidance with the triennial rolling approach.

#### **Data Quality Carbon Footprint**

**Error Correction:** If a significant error is found in the base year inventory, it will be corrected. If a significant error is found which does not affect the base year but has an impact on this year's or last year's emissions, it will be corrected. An error is significant if it effects SAP's gross carbon footprint by more than 1%. No restatement due to error correction of historical data was necessary in 2015.

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## RENEWABLE ENERGY

We define renewable energy as electricity coming from renewable energy sources such as wind, solar, hydro, geothermal, and biomass. The shares of renewable energy used by SAP are calculated by adding the amount of renewable energy specifically sourced, produced onsite by our own solar cells and covered by Renewable Energy Certificates (RECs). We have developed a quality standard that defines key criteria for the procurement of RECs in order to drive change in the electricity market and to avoid the risk caused by low quality products. The key characteristics of SAP's Renewable Energy purchasing guidelines are:

**Type of renewable electricity:** SAP considers solar, wind, biogas, geothermal and hydro power as renewable electricity. Renewable electricity from biomass is only considered if it is disconnected from coal or other fossil power plants and if the biomass itself is not related to deforestation.

**Installation:** The power plant producing the renewable energy shall not be older than 10 years. In case of a renovation of an old power plant, the 10 year rule applies only to the additional electricity output due to efficiency increase. Furthermore, SAP does not consider RECs from government supported power plants.

**Vintage:** The renewable electricity must be produced in the same year or the year before with regard to the reporting period it will be applied.

**Accounting:** To calculate the carbon reduction achieved by the REC, SAP will use the grid-specific emissions factor. As RECs are considered independently to the electricity delivered physically to our facilities, the carbon reduction achieved through their procurement can be allocated to any location globally.

All energy outside the above mentioned categories falls within conventional energy. We define conventional energy as electricity coming from the standard electricity grid. The electricity grid provides a country-specific energy mix including all available sources, either fossil, nuclear, or renewable. Energy from renewable sources as part of the local grid is calculated as conventional energy and not displayed as part of renewable energy.

## DATA CENTER ENERGY

We define data center energy as the sum of energy consumed to provide internal and external computation power in SAP data centers and contracted third party data centers. A data center is any global, regional, or local computing center (location with any number of server units) that is part of our Global IT infrastructure strategy. In 2015 we continued analyzing and reporting internal and external data center energy consumption intensity against our non-IFRS revenue. Our revenue represents

the creation, the maintenance and the cloud consumption of our software in internal and external data centers.

Data center energy consumption per euro is calculated by dividing the electricity consumption of all internal and external data centers measured for the calculation of our GHG Footprint (for more information, see Greenhouse Gas Footprint: Electricity Data Centers and Electricity External Data Centers) by the total non-IFRS revenue.

We will continuously improve data quality of energy consumption of external data centers.

## TOTAL ENERGY CONSUMED

We define total energy consumed as the sum of all energy consumed through SAP own operations, including energy from renewable sources. It is calculated based on the consumption data obtained through our measurements for the GHG footprint and is the sum of energy consumption from stationary combustion facilities, mobile combustion corporate cars, mobile combustion corporate jets, electricity offices, electricity data centers, electricity external data centers, and purchased chilled water, purchased hot water, and purchased steam. For more information, see Greenhouse Gas Footprint.

## WATER

By water, we mean total freshwater withdrawn for our facilities. Data is based on estimations from sites and is largely extrapolated. Data was provided (estimated) for 55% of the total space; the remaining data is extrapolated based on square meter footage.

## WASTE

By waste, we mean any recyclable or non-recyclable waste produced in our offices and data centers. Data is based on estimations from sites and is largely extrapolated. For more information, see Greenhouse Gas Footprint.