Environmental Profit and Loss

Methodology and Results

2014/15

Vodafone Netherlands

Foreword

At Vodafone Netherlands we are determined to be a successful company, now and in the future. Our success depends on us achieving our core purpose of empowering our customers to be confidently connected. Every day we challenge ourselves to do more for our customers and to be at the forefront of our industry. But achieving success means looking beyond our performance of today.

We recognise that the measure of success is not just our share price, or how loyal our customers are or the size of our revenue. Success is finding the right balance between all our stakeholders' interests, whether they are customers, suppliers, employees, investors, NGO's or regulators.

I'm passionate about our industry and believe that it can help people to resolve many of the problems in our society. Telecommunication is already having a big impact on our lives and helps us in many ways. However, there are costs to the benefits it brings, which are not fully reflected in the financial measures that we use to steer our company.

If we are to be a leader in our sector, we need to assess our company not only on the traditional financial ratios, but on the value we create for society at large. To measure and manage the total value that we create, we must look beyond standard financial accounting to find the right balance between financial and societal values, for our stakeholders and for society. That's what I call a sustainable business - one that is successful, today and tomorrow.

The Vodafone Environmental Profit & Loss account (E P&L) is our first attempt to measure our impact on society at large. With this information, we can create new insights that enhance the strategic decisions we make every day. We are able to steer our performance more responsively, which helps us to focus on the areas where we can make a difference. For instance, our Machine to Machine (M2M) business is a growing activity that allows our customers to be more efficient, so by doing more to increase this business we can reduce ours and our customers' environmental impact.

Measuring our environmental impact is a first step in assessing the total impact we have on the world around us. The E P&L can help us to understand how we can reduce the toll we take on our environment and enable our customers to reduce theirs too. With this E P&L, we can contribute to the debate on the environmental impact of business in general and inspire other companies in and outside our industry to do the same.

Rob Shuter, CEO Vodafone Netherlands

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What is an E P&L?

The Vodafone Environmental Profit & Loss account (E P&L) is an overview of all the positive and negative environmental values (or impacts) that Vodafone creates in the course of its business and throughout its value chain. To take two examples, Vodafone creates positive environmental value by the mobile connectivity services it provides such as Smart Garbage systems which help customers avoid energy and related air emissions. However, Vodafone has a negative environmental impact from the energy used by its data centres and in the production of mobile devices.

Why Vodafone developed an E P&L

Vodafone aims to use the E P&L to improve its decision making so that it can reduce its negative impact on the environment and boost its positive impact. By knowing what impacts it has, Vodafone can strategically focus on its full performance, rather than just its financial performance. This E P&L has five goals:

1. Strategic insights on the environmental value of the value chain
2. Insights for internalisation
3. Clarity
4. Forecasting
5. Benchmarking.

Scope

In order to identify Vodafone's impact, five steps were taken:

STEP 1: Decide what to measure

The purpose of this step was to identify what should be included in the E P&L. Vodafone aims to include as many business areas as possible.

The E P&L is based on:

1. Business scope: which parts of the Vodafone business are included?
2. Value chain scope: how far back in the supply chain or forward to the customers is included?
3. Impact scope: which types of environmental impacts are taken into account?

STEP 2: Map the value chain

The second step is to map the value chain in order to make sure that Vodafone understands it. The key areas are defined at each stage in the value chain, including transport. Most information about the value chain is derived from life cycle analysis or from the direct supplier of Vodafone.

STEP 3: Collect data

Data used in this E P&L is based on primary and secondary data. Primary data was collected from Vodafone's own operations. Based on this information, Vodafone was able to assess its own impacts. Secondary data from suppliers and additional research were used to fill in the gaps, especially to assess impacts deeper in the value chain.

STEP 4: Valuation

Vodafone has put a monetary value on its impacts, by converting non-financial impacts (such as CO2 emissions) into financial numbers. Putting a monetary value on activities helps Vodafone better understand the positive and negative impacts of its business.

STEP 5: Calculating E P&L

The collected data is translated into financial values and summarised in an E P&L.

Executive Summary

Results

In the 12 months to 31 March 2015, Vodafone Netherlands had a negative environmental impact (Loss) of ≈€21.6 million, of which ≈€1.9 million is directly caused by Vodafone Netherlands own operations, which is only 9% of the total negative impact. The negative impact includes four key elements: network, products, servicing customers by employees and buildings. Carbon emission counts for 42% of the total negative environmental impact. Water for 33%, air for 24% and waste for 1% of the total E P&L.

The positive impact of Vodafone's services is ≈€37.4 million, which derives from enabling customers to reduce their carbon footprint.

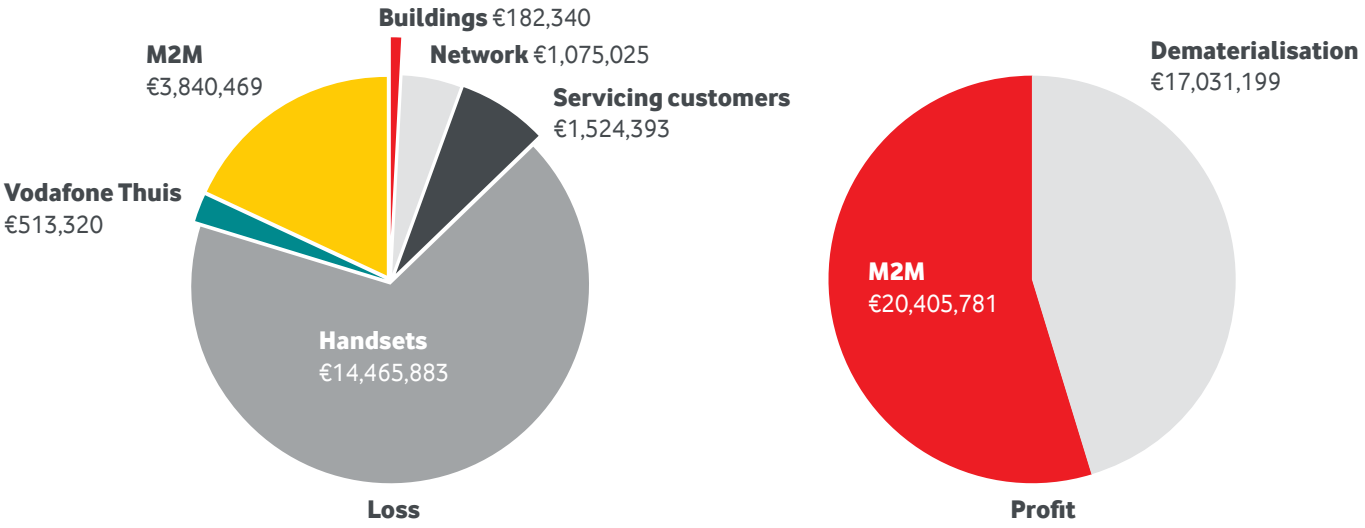
Strategic insights on the environmental value of the value chain. Vodafone is able to have a significant positive impact on the environment by its smart working and M2M solutions. These findings suggest that Vodafone should innovate further with these type of products and services. The negative impact is mainly related to hardware like handsets and M2M equipment, which Vodafone doesn't produce. Circular business can be adopted to reduce this impact.

Insights for internalisation. CO2 emissions create the most material negative and positive environmental impact. Therefore, Vodafone should seek to optimise the balance between these impacts. The new carbon ambition of Vodafone will help to address this material issue: Vodafone Netherlands will help our customers to save 25 times the amount of carbon we are generating though our own activities.

Forecasting. Vodafone's vision is to empower its customers. With the insights of this E P&L, it intends to forecast how it can fulfil customer expectations, based on the value it creates for them. With these insights Vodafone can sharpen its risk strategies and make better investment decisions based on shared value.

Clarity. By publishing this E P&L, Vodafone intends to improve its transparency for its share- and stakeholders. Stakeholders have indicated that they would also like to see insights on the social impact of Vodafone, alongside the environmental impacts.

Benchmarking. By expressing the company's impacts in euros, the impacts across different life stages can be more easily compared. Vodafone expects more companies in its sector to publish their E P&L results. When available, the company can use these results for benchmarking. Further, it can benchmark their own performance in time.



Vodafone Netherlands E P&L 14/15

> *Establishing a profit and loss account for environmental issues influenced by Vodafone's business, is a fine initiative. It will make it possible better to understand the interrelated environmental interests of both company and society and to realize as a company an actual weighting of social costs and benefits. Future business processes and investments can be therefore stimulated in the direction of creating true shared value, both for Vodafone and society as a whole.*

- Karel Zeldenrust, Dutch Ministry of Infrastructure and the Environment

1. General

1.1 Vodafone Netherlands

Vodafone Netherlands is the second largest mobile communication company in the Netherlands. As of 31st March 2015 Vodafone Netherlands had almost 5.2 million customers. The main offices are located in Amsterdam and Maastricht. Furthermore there are offices in Eindhoven, Capelle aan den IJssel, Bodegraven and Amstelveen. Vodafone Netherlands has 245 company-owned shops. The Vodafone Netherlands services encompass mobile and fixed (voice, sms & data) connectivity for businesses and consumers, TV and broadband for consumers. Having started out as a mobile company, Vodafone Netherland's main network is mobile and covers more than 95% of the Dutch population for 2G, 3G and 4G.

Vodafone Netherlands is part of Vodafone Group, which is one of the largest mobile communication companies in the world with 443 million customers per 31 March 2015. Vodafone Group is full or part-owner of more than 30 mobile companies in different countries on 5 different continents. It also has 50 global partner networks. More information is available at **www.vodafone.nl** and **www.vodafone.com**.

The scope of this E P&L are the activities of Vodafone Netherlands. In the rest of this document the name Vodafone refers to Vodafone Netherlands.

1.2 Our vision

Communication technology has become an indispensable part of society and it has a great impact on our busi¬ness and personal lives. As one of the global communication leaders, Vodafone plays a central part in exploring, developing and building technology which empowers our customers to be confidently connected. Communication technology can and will create solutions for problems. As Vodafone grows in a world where connectivity is a commodity, its responsibility to deliver these solutions increases. The company's customers expect this from us, as do its shareholders. Other stakeholders also expect this from us. Vodafone's employees are working to deliver on these expectations, day in, day out.

Solving society's problems or satisfying its needs is the central role a company should seek. When the company works with customers, it can solve, innovate and create. By doing this, Vodafone can create shared value. This means value for its customers, the society and the business. Vodafone believes that long term business success can only be realised when a company sets out to solve societal problems. It achieves that objective with a sustainable balance between social, economic and environmental values.

A shared value should be clear, easy to understand and appropriate for strategic decision making. We know this is not always the case, but it is a necessity to have these insights to assess the problems our services can and should help to address and to assess our performance.

By producing this E P&L, Vodafone can assess the difference that it makes beyond the buying and selling price of goods and services. This is referred to as the impact, value or externalities. Both positive and negative externalities are taken into account. Monetising these values and adding them together, creates an E P&L. These insights allow us to assess the company's performance and give a broader view of the value that it creates.

1.3 Why we developed this E P&L

Vodafone expects that it will become increasingly important in the coming years to determine how much value a company creates for society. Currently, this way of valuation is relatively new. Vodafone's ambition is to assess both the social and environmental value it creates. For instance, the social value it creates by its mobile phone subscriptions and the social value it creates for its employees.

With this E P&L, Vodafone has started to determine the value of its environmental impacts. There are two reasons why it is best to start with environmental impacts.

Firstly, because valuation methods of environmental impacts are more mature. Much research has been done on the environmental impacts of carbon emissions, for example. This reduces the need for Vodafone to develop its own valuation methods and enables better and comparable insights.

General

Secondly, because of the mature data systems Vodafone has in this area. We have measured and reported our environmental performance for years. Through our Eco-Rating scheme of scoring handsets we have good evidence of the environmental impact of handsets and our partner Ericsson has calculated many environmental aspects of building and maintaining a telecommunication infrastructure.

1.4 What is an E P&L?

The E P&L of the Dutch operation is, to our knowledge, the first published E P&L in the global ICT industry. It is an overview of all the positive and negative environmental values (or impacts) that Vodafone Netherlands creates through its activities and throughout its value chain. Vodafone creates positive environmental value by the mobile connectivity services it provides like Smart Garbage systems, which helps customers to reduce energy and related air emissions. But Vodafone reduces environmental value, by the energy used in its data centres and through its supply chain, for instance from the production of mobile devices.

By adding up these two scores, it is possible to estimate an overview of the company's environmental costs and benefits. That information can then be expressed in euros. This allows us to compare different areas where the company has an environmental impact and helps us to make more informed decisions.

The results of the E P&L are approximate rather than exact. However, they help us identify areas of opportunity and risk. Improvements to the E P&L are expected in the coming years, since more business are looking to calculate impacts and publish their results. Examples of other companies who have published their environmental and sometimes social impacts include **Holcim** (Ambuja), **Dutch Railways** (NS), **Kering** (Puma) and **Novo Nordisk**. Also, there are several associations working on the development of impact protocols, such as the **World Business Counsel** of Sustainable Development (WBCSD), which will further develop and harmonise methodologies and valuation methods and speed up the adoption of a common approach to calculating and valuing social and environmental impacts.

1.5 The aim of the Vodafone E P&L

Vodafone aims to use the E P&L for enhanced strategic decision making in order to decrease its negative value and to boost its positive value. By knowing where the value is most significant, Vodafone can strategically focus on real performance (more than just financial). Vodafone has developed the E P&L for five reasons:

1. **Strategic insights on the environmental value of the full life cycle.** The E P&L creates a better understanding of the company's environmental impact and those of its suppliers. It provides insights on how to increase the efficiency of Vodafone's operations. And further up the value chain, the E P&L shows which products and services create the most shared value which can lead to strategic commercial insights.

2. **Insights for internalisation.** The E P&L provides insights into our most material environmental impacts. This information can help the company to predict and respond to upcoming regulations and standards. It also gives the company an ideas of areas of concern, where stakeholders may take action. Further, Vodafone wants to understand the link between its environmental impacts and the effect of market dynamics, such as scarcity & pricing, extreme weather and new markets.

3. **Forecasting.** The insights of our E P&L and therefore our impact, negative or positive, will help to estimate customer demands over the long term. Predictions based on these insights will enable Vodafone to develop a vision of the future. The E P&L will help to steer and underpin long term business planning, including the environmental risk management process.

4. **Clarity.** The publication of an E P&L will increase transparency to shareholders and stakeholders. This is one of the biggest reasons for carrying out the E P&L. As well as external transparency, it will create internal awareness of sustainable business. The research and development of an E P&L will develop knowledge and experience with non-financial accounting, which Vodafone needs to broaden shared value based calculations in the future.

5. **Benchmarking.** The results of the E P&L will be used to assess the performance of the company's value chain. As more companies publish their E P&L results, Vodafone will use its E P&L for benchmarking purposes.

The methodology of the E P&L is aimed at identifying both the positive and negative environmental impacts of Vodafone and to monetise this impact. The impacts on the environment are determined by analysing Vodafone's externalities as discussed in section 1.2. The information to calculate the externalities is mainly based on company data, LCA analyses, stakeholder dialogues, materiality assessments, Vodafone's vision and strategy and publicly available information. It is important to understand the boundaries of the analysis, which are given in the next chapter.

2. Scoping

The process of generating this E P&L was divided into five steps. First, Vodafone had to decide what areas of the business the company wanted to measure. Second, the value chains of these areas were mapped. Then data was gathered in these areas and the valuation factors were drawn up. The final step was calculating the E P&L.

STEP 1: Decide what to measure

The first step in the E P&L was the scope setting. The purpose of this step was to identify what should be included in the E P&L. Vodafone aims to include as many business areas as possible. In Appendix A, a detailed assessment is provided.

The scope of the E P&L is based on:

1. Business scope: which parts of the Vodafone business are included?
2. Value chain scope: how far back in the supply chain or forward to the custowmers is included?
3. Impact scope: which types of environmental impacts are taken into account?

Business scope

Vodafone has determined its relevant business impact areas by assessing four areas: Vodafone's buildings in which it operates, the network it uses for its services, business related activities of its employees and the impacts of the products and services it delivers. All products Vodafone delivers are included in the materiality analysis, including handsets, tablets, Vodafone Thuis, dematerialisation, and M2M. Tablets were excluded from the impact measurement, as they are not statistically significant (tablets in this reporting year account for less than 1% of the total number of devices sold).

Value chain scope

Vodafone has included the entire life cycle for each business area, except the value chain of the office buildings in which it operates.

Impact scope

Environmental indicators were identified for each material business area. All major environmental indicators were included in the assessment (greenhouse gas emissions, air emissions, water consumption, water pollution waste production, land use, and biodiversity). In each area some environmental indicators were excluded, due to lack of available information and materiality.

STEP 2: Map the value chain

The second step is to map the value chain, in order to make sure that the company understands it. The key areas are defined at each stage in the value chain, including transport. Most information about the value chain is derived from life cycle analysis or from the direct supplier of Vodafone.

Figure 1 provides an example of a value chain map. The map gives an overview on the processes that are necessary to produce a handset. The value chain is divided in four life stages: production, distribution, use, and end of life.

Based on the outcomes of the value chain map and the initial scoping exercise, Figure 2 was developed, which illustrates the final scope of this E P&L. Areas in scope are coloured red. For each area, environmental indicators have been included, based on availability of data. Included indicators are specified in Figure 2.

Scoping

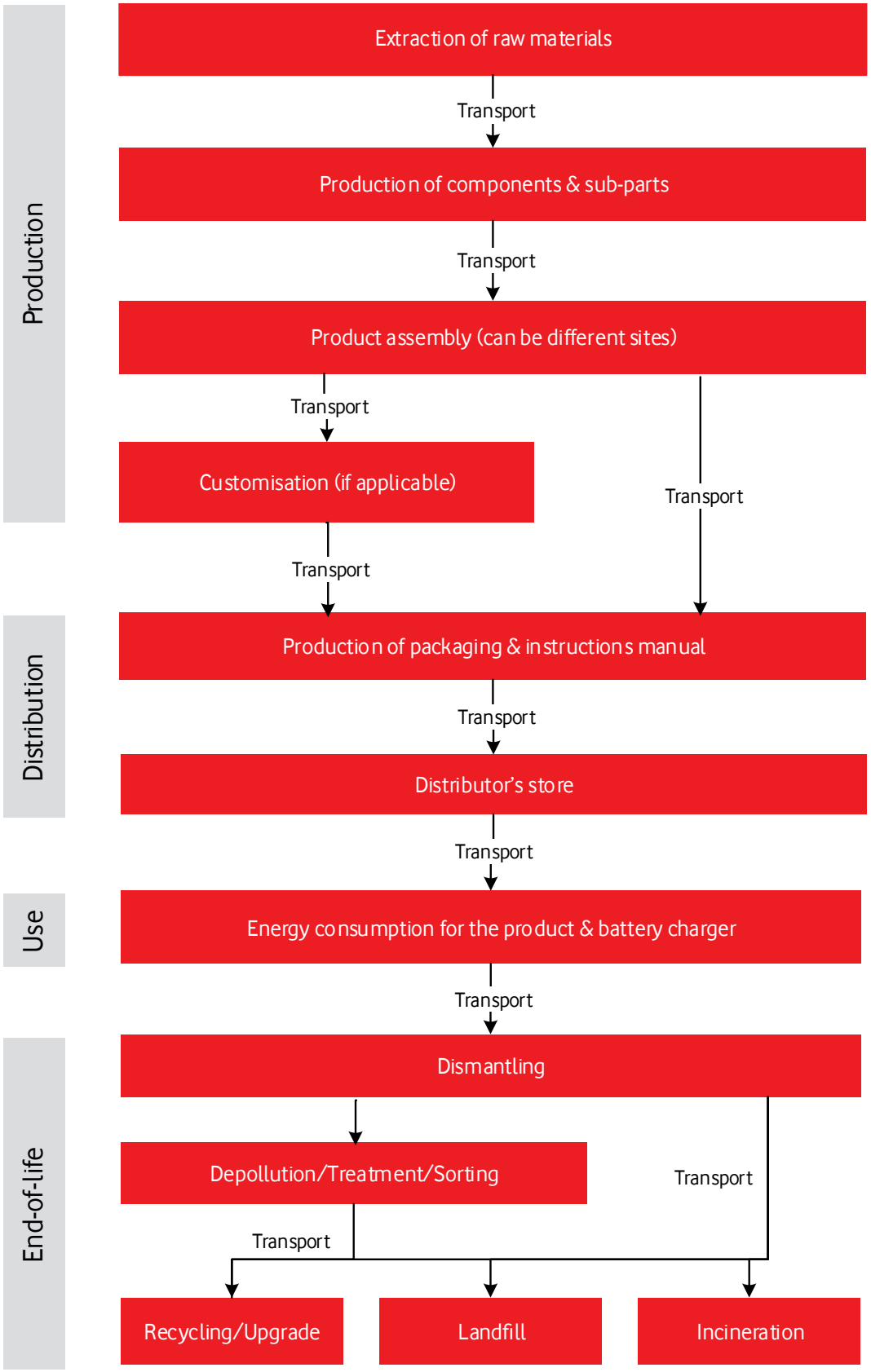


Figure 1 - Value chain analysis of handsets (Bureau Veritas, 2011)

Scoping

Figure 2 - Material impact areas and environmental indicators of Vodafone

Scoping

STEP 3: Collect data

Based on the defined scope, data is gathered. Data used in this E P&L is based on primary and secondary data. Primary data was collected from the direct operations of Vodafone. Based on this information, Vodafone was able to assess mostly of its own impacts. Secondary data sources and techniques were used to fill in gaps, especially deeper in the value chain.

Life cycle analyses (LCAs) are generally the preferred method of estimating impacts where primary data is unavailable. Vodafone had already conducted multiple LCAs over time and with the help of suppliers, other LCAs are included in this E P&L. The LCAs take into account regional differences, such as energy mix associated with electricity use.

When applicable, Vodafone has collected both negative and positive impacts of the business area. As a telecommunication company, Vodafone has a positive impact on the environment, by enabling customers to communicate effectively without having to travel to meet up.

STEP 4: Valuation

The results of the E P&L are shown as a monetary value. Expressing impacts in monetary terms gives Vodafone an understanding of the extent of the impact and the social consequences of its operations, on a regional basis. For example, water consumption in China has a different cost to water consumption in the Netherlands, due to differences in scarcity level.

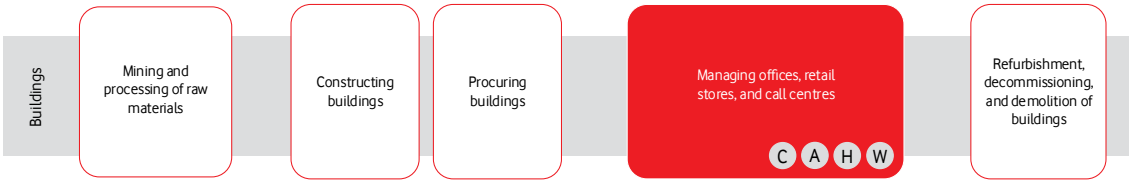
Environmental data was converted into monetary terms primarily by means of The Shadow Pricing Handbook of CE Delft (see Appendix B.2). This handbook uses detailed models to convert environmental data into euros and is commonly used in the Netherlands. Carbon emissions were valued using a study of the EPA (2013).

STEP 5: Calculating E P&L

The E P&L is calculated based on the valuation factors and gathered data. For instance, multiplying the amount of emitted CO_2 by a valuation factor.

3. Environmental impact

This chapter provides insights in the valuation of the four key elements of the E P&L (buildings, network, servicing customers by employees, and products). The E P&L includes the impact of the following products: (1) mobile handsets, (2) Vodafone Thuis, (3) dematerialisation, and (4) M2M connectivity. Detailed information on calculations can be found in Appendix B1. Each element of the E P&L is described based on the following framework:

Impact	General description of the negative and positive environmental impact created by this element
Impact area	**Scope**: shows the value chain area for which the impact is calculated (displayed in red) and the indicators that are included in the calculation. For example:  **Attribution**: the percentage of environmental costs and profits that can be attributed to Vodafone or to the value chain partners. For example: Vodafone **100%** Value chain **0%** **Limitations and assumptions**: the limitations and assumptions made in calculating the impact.
Calculations	Provides an overview of how the negative and positive impacts were calculated.

Environmental impact

3.1 Buildings

3.1.1 Impact

Negative impact

At 31 March 2015 Vodafone Netherlands leased 245 retail stores and seven offices. Managing these buildings includes energy use, heating, as well as the production of waste, water consumption, air conditioning and cooling, and a small amount of diesel consumption for the offices.

For the retail stores and offices, Vodafone procures renewable wind energy. Electricity generated by wind power is regarded as sustainable energy because no CO2 is emitted during the production of the electricity (CO2emissionfactoren.nl, 2015). Regarding heating the buildings, the two largest offices are connected to district heating, while the other buildings are heated by natural gas. In the summer, the buildings are cooled. For this, Vodafone uses cooling refrigerants. Finally, the people working in the buildings use water and produce a certain amount of waste. This is also taken into account. On the whole, these activities are therefore considered as having a negative impact.

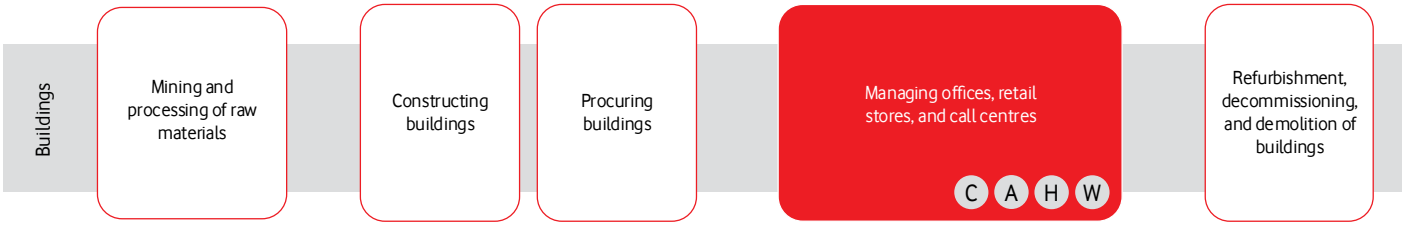
Due to the purchase of renewable wind energy, Vodafone reduces its negative environmental impacts. Further, Vodafone is committed to reduce, reuse and recycle its waste where possible. Vodafone provides recycling points in offices to encourage employees to work in an environmentally friendly way. Furthermore, Vodafone has introduced the "paperless office", a work environment in which the use of paper is greatly reduced.

Limitations and assumptions

- District heating is considered as "Heating other production facilities" (CO2-Prestatieladder, 2014).
- For heating NO_x, SO_x, and PM_{10} emissions are not included, due to a lack of information availability.
- Vodafone hands over collected paper to SITA. According to the Sustainability report of SITA[1], the company aims to separate and process waste into renewed, useful products. Therefore, recycling of paper is considered to have no waste impact.
- Paper that is not recycled because it is used for contracts, billing, or marketing purposes is assumed to have become household waste that is incinerated.
- Other waste is regarded as commercial waste and assumed to be incinerated. Only retail operations are included.

3.1.2 Impact area

Scope



Attribution

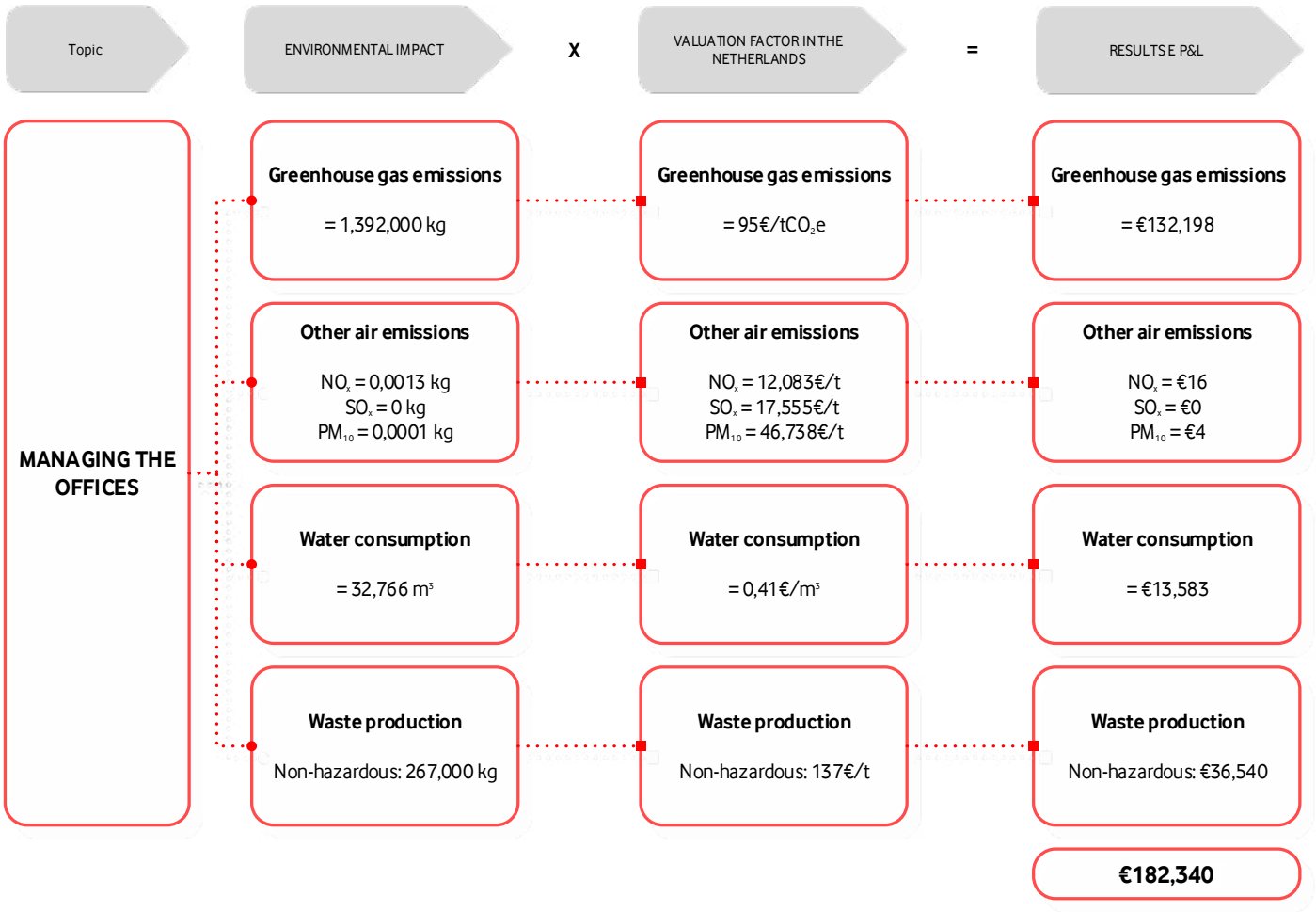
Vodafone **100%** | Value chain **0%**

[1]http://duurzaamheidsverslag.sita.nl/2013/resultaten/ketens-sluiten

Environmental impact

3.1.3 Calculations

In order to calculate the impact of Vodafone's buildings, the volumes (expressed in environmental volumes) are multiplied by the valuation factor applicable in the Netherlands. This results in an environmental impact of €182,340 for Vodafone's buildings.



Environmental impact

3.2 Network

3.2.1 Impact

Negative impact

Extracting raw materials & manufacturing

On 31 March 2015, Vodafone had 4852 radio base station (RBS) sites in the Netherlands to ensure nationwide coverage. But sites are not the only items necessary to run the network. Control & core nodes, transmission & IP core network, and third party data centres are pivotal for offering a high speed data network. To calculate the impact of the manufacturing of those network components, the life cycle analysis (LCA) of Malmodin et al. (2014) is used. In this LCA, annual manufacturing impact of all network parts, including rolling out the network and extracting raw materials, is calculated.

Running the network

Generally, the most significant environmental impact from the operations of a mobile telecommunications company, is the impact of the energy it uses to run its network. However, Vodafone purchases only renewable wind energy for its network, which can be considered as not having an impact on the environment (CO2emissionfactoren.nl, 2015). This reduces the negative impact of Vodafone significantly. However, not all masts are connected to the grid. Off-grid masts operate on diesel generators and therefore have a negative impact.

End-of-life

Vodafone recycles almost all its network equipment. Only ≈1.5% of the network is not useful in terms of recycling or refurbishing. Based on internal documentation, this is mainly due to technical restrictions on circuit boards.

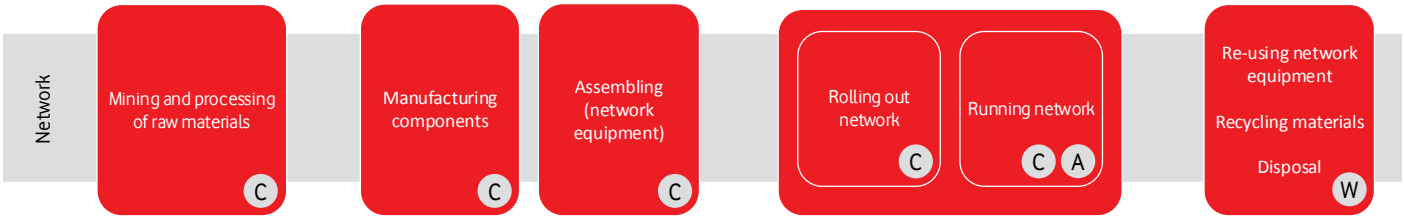
Limitations and assumptions

The LCA of Malmodin et al. (2014) is used to calculate the annual impact of manufacturing network equipment. This LCA includes the mining and processing of raw materials, manufacturing of components, assembly, and rolling out the network. The LCA only includes CO2 emissions.

- The calculation of the impact of base stations. All base station sites are assumed to be 3G, as there are no calculations yet for 4G base station sites.
- To improve accuracy of the LCA calculations, the LCA has been adapted to reflect Vodafone's operating activities, for example energy use and related emissions.
- Recycled or refurbished network equipment is considered to have no environmental impact. Hence, energy consumption needed to recycle the equipment is not taken into account in the calculations. Neither are the environmental benefits, such as the recovery of materials from the recycling process.
- The remaining network equipment is not recycled or refurbished and is therefore regarded as hazardous waste.

3.2.2 Impact area

Scope



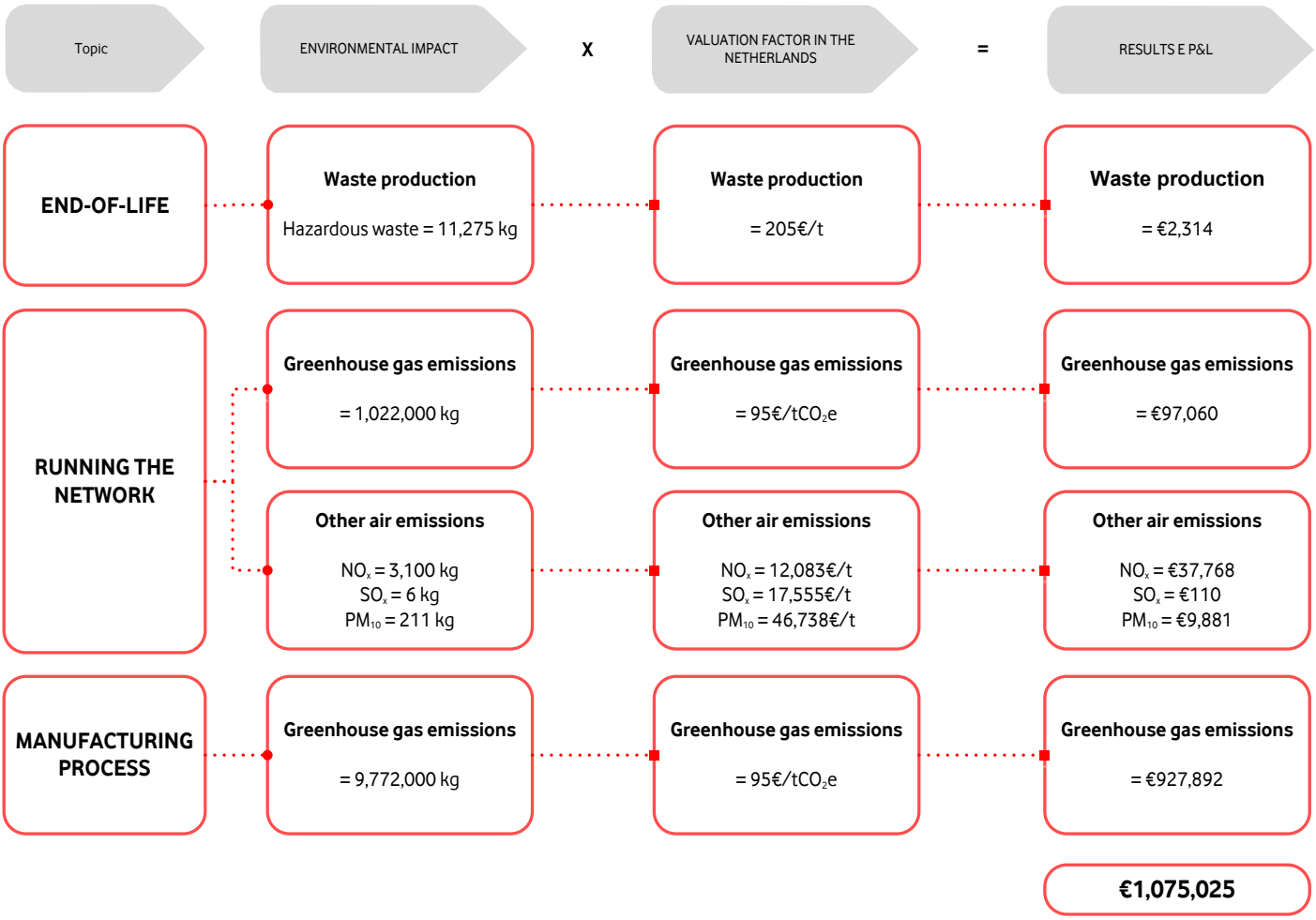
Attribution

Vodafone **100%** | Value chain **0%**

Environmental impact

3.2.3 Calculations

The impact of Vodafone's network is €1,075,025, and calculations are shown in the figure below.



Environmental impact

3.3 Servicing customers by employees

3.3.1 Impact

Negative impact

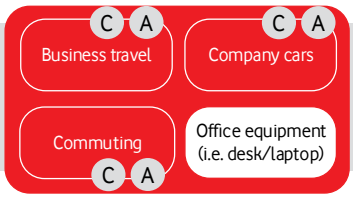
To serve its customers Vodafone employs 3,838 employees in the Netherlands, as of 31 March 2015. These employees work either in Vodafone retail stores or in the company's offices. Most of the people commute by car, scooter or public transport. In addition, Vodafone's employees travel for business purposes to customers and other (foreign) premises by aeroplane, cars or public transport. Furthermore, a number of Vodafone employees have a company car. Altogether, this has a negative impact on the environment.

However, Vodafone has reduced the negative environmental impact of its employees by enabling employees to work "smart". This implies that employees can work from wherever they want. Each employee is equipped with a laptop with mobile broadband, and a business phone. This reduces the need for employees to travel to work every day, and thus reduces CO2 emission.

3.3.2 Impact area

Scope

Servicing customers by employees



Attribution

Vodafone **100%** | Value chain **0%**

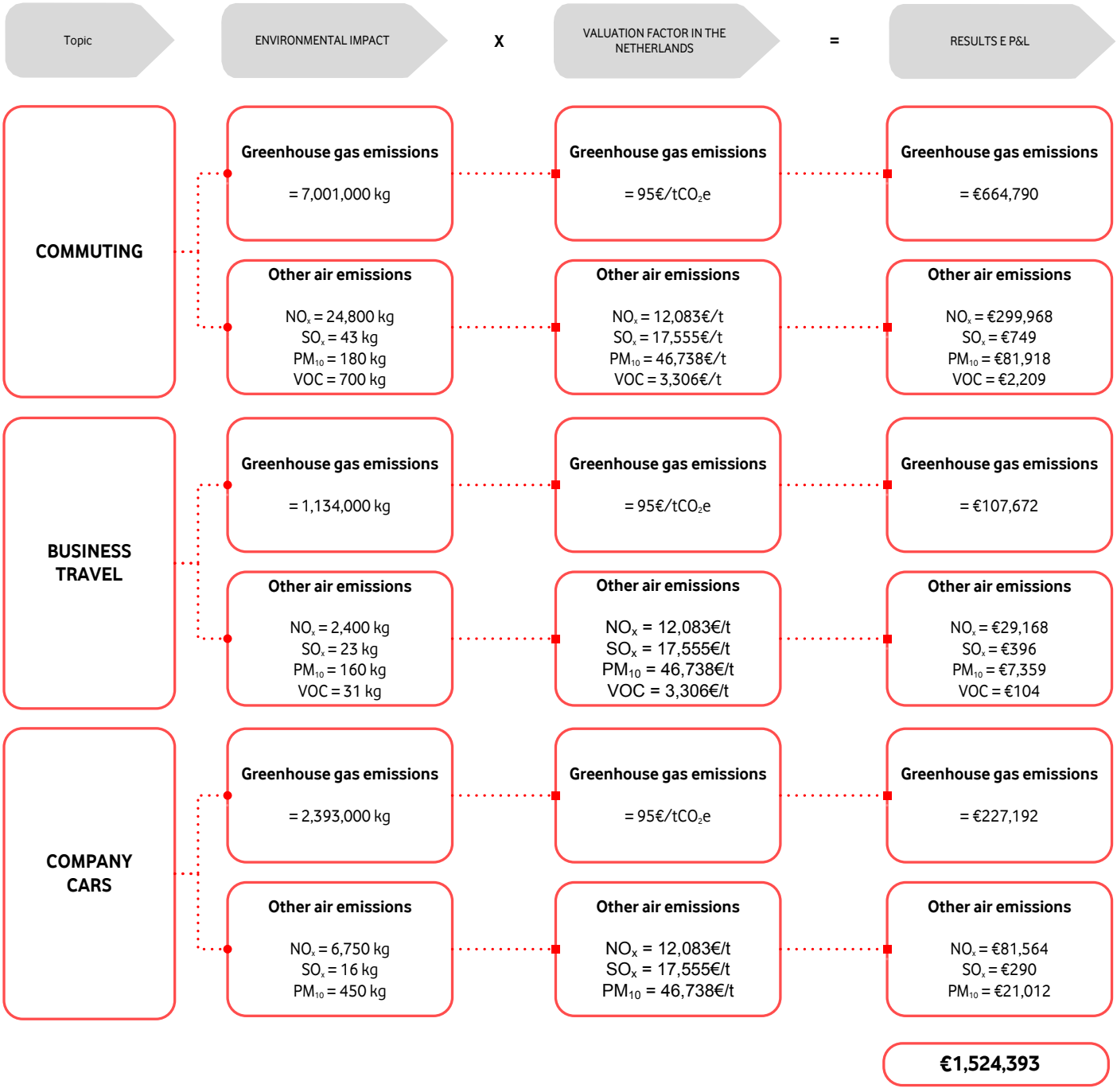
Limitations and assumptions

1. Commuter travel stated as "other public transport" is regarded as "OV algemeen" (CO2emissiefactoren.nl).
2. The type of train is not known. Hence, the emission factor is based on "Trein, treintype onbekend" (CO2emissiefactoren.nl).
3. There is a distinction between different types of air travel. Because the relatively highest amount of fuel is combusted during take-off, short-distance flights have a relatively higher impact on the environment than long-distance flights (CO2emissiefactoren.nl).
4. In calculating the other air emissions of business travel and commuting by personal car, it is assumed that a diesel car is used (CO2emissiefactoren.nl).
5. For travelling by plane and scooter, volatile organic compounds (VOC) are also taken into account as this has a relatively large impact compared to other air emissions (CE Delft, 2015).
6. Method of transport and distance is based on internal survey of Vodafone Netherlands April 2015. The number of staff at the start of the reporting year is used.

Environmental impact

3.3.3 Calculations

The volumes (expressed in environmental volumes) are multiplied by the valuation factor applicable in the Netherlands in order to calculate the environmental impact expressed in monetary terms. The environmental impact of our employees for servicing customers €1,524,393.



Environmental impact

3.4 Handsets

3.4.1 Impact

Negative Impact

Life cycle analyses show that the production phase is the greatest contributor to the environmental impact of a handset (Apple, 2014; Bureau Veritas, 2011). Other environmental impacts come from transport, customer usage, and handset recycling. The entire value chain is included in the impact calculations of a mobile phone.

Extracting raw materials and manufacturing

During the production phase, raw materials are extracted and processed into components. The production of a mobile phone requires energy, precious and scarce metals, and a large amount of water. As most handsets are produced in Asia, the environmental costs for water use are assumed to be higher than in Europe, due to scarcity. Subsequently, all components of a mobile handset need to be assembled. When the handsets are completed, they are transported from Asia to the distribution centre of Vodafone Netherlands in Germany.

Operation phase

From the distribution centre in Germany, vans distribute the handsets across the Netherlands. The handsets are either delivered directly to the customer (i.e. online or telesales), to one of the 245 retail shops or to third party resellers. As the phone is delivered to the customer, the mobile has to be charged every day, which requires energy use.

End-of-life phase

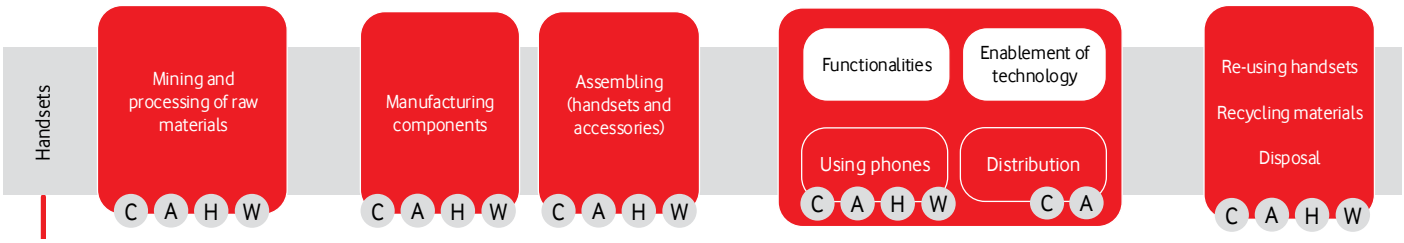
In the end-of-life treatment the mobile phones are collected, dismantled, and, if applicable, components depolluted. It is assumed that the remaining parts are incinerated, put into landfill, or recycled (Bureau Veritas, 2011).

Limitations and assumptions

- For the calculation of the value chain impact, this E P&L has used the results of the LCA which Vodafone uses for calculating its eco-rating. This LCA was conducted by Bureau Veritas in 2011 and includes the entire value chain of a handset, including the extraction of raw materials, production, distribution, operation, and end-of-life phase. All assumptions made in this LCA are listed in Appendix C.3. This LCA is currently still the base information used for eco-rating by Forum for the Future, a British not-for-profit organisation which works with companies to create sustainable networks, and therefore considered valid.
- The impact of the distribution of the handsets from the distribution centre to the customer is based on PostNL. PostNL provides CO2 calculations per package on their website[2]. It is assumed that these figures also apply to the other parties that deliver packages for Vodafone. In order to include air emissions as well, it is assumed that all vans distributing the packages for Vodafone run on diesel.
- All handsets sold by Vodafone are assumed to be smartphones. According to Bureau Veritas (2011), a smartphone is a mobile phone which can connect to the internet through the 3G network.
- Bureau Veritas (2011) also includes air and water toxicity in the impact of a mobile phone. However, because there is no definition or detailed description of what air and water toxicity comprise, it is impossible to convert this environmental impact into monetary terms. Therefore, air and water toxicity are excluded.
- In calculating the water costs of producing a smartphone, the production phase is assumed to take place in China. Furthermore, it is assumed that water is scarce and therefore higher social costs are taken into account.
- Decreased performance of batteries due to ageing has not been taken into account. Therefore, total energy

3.4.2 Impact area

Scope



Attribution

Vodafone **100%** | Value chain **0%**

[2]http://www.postnl.nl/zakelijke-oplossingen/post-versturen/verzendopties/groene-post/co2-calculator/

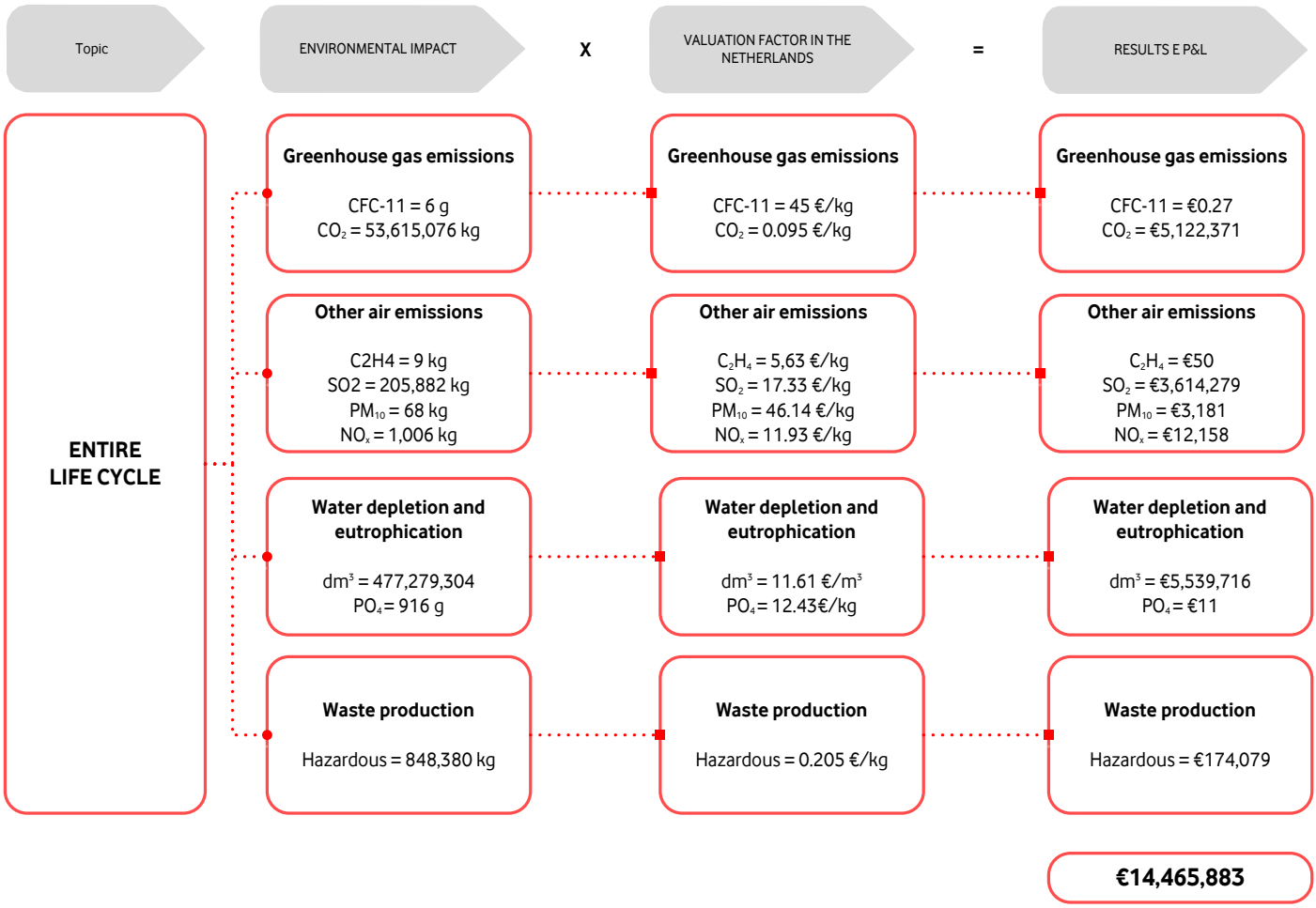
Environmental impact

consumption during the mobile handset's life cycle is underestimated. However, this estimation does not have significant impact on the total impact of handsets.

- All mobile phones sold in the financial year 2014 are included in this E P&L, even though a mobile phone can be used for more than one year. This is because Vodafone sells around the same number of mobile phones every year, which means it makes no difference if the impact of a mobile phone is spread out over its lifespan.
- The various uses of mobile phones (i.e. how they replace cameras, radios, alarm clocks, or watches) are not included due to a lack of information about the actual positive impacts, even though the functionality of mobile phones was material according to the selection criteria. Further research in the coming years might make it possible to include this in future E P&Ls.
- Bureau Veritas assumes that in the end-of-life phase, mobile phones are partially incinerated, put into landfill, and recycled. However, in the Netherlands the recycling ratio is relatively high. For example, Wecycle (2012) reports that 97% of a mobile phone is usefully recovered. Therefore the negative impact of a mobile phone is likely to be overestimated.
- The impact of water consumption and global warming potential is adjusted to the most recent impact measurement, based on the newest eco-score ratings.
- In calculating the impact of the mobile phones, each mobile phone is equally weighted. There is no distinction made based on sales figures. Therefore, the impact of mobile phones might be underestimated as large smartphones are sold more often and have a larger impact than smaller ones.
- As Apple does not co-operate with Vodafone to determine the eco score for iPhones, iPhones are not included in this analysis. However, Apple (2012, 2014) has reported greenhouse gas emissions for the iPhone 6 and iPhone 5 in an environmental report. These reported emissions are quite equal to similar smartphones. Therefore, the absence of the eco scores for iPhones is considered to have minimal impact on the final outcomes.

3.4.3 Calculations

The volumes (expressed in environmental volumes) are multiplied by the valuation factor. According to Trucost (2013), water prices rise when water becomes more scarce. Therefore, a high water price is applied. Other prices are based on the Netherlands. In order to express the environmental impact in monetary terms, the environmental impact is multiplied with the valuation factor. This results in a total impact for mobile handsets of €14,465,883.



Environmental impact

3.5 Vodafone Thuis

3.5.1 Impact

Negative impact

Since 2014, Vodafone has been offering its customers the Vodafone Thuis service. This is a fixed broadband connection that includes internet and television. Customers that have ordered Vodafone Thuis receive a setup box with an internet modem and TV box. According to Malmodin, Moberg, Lunden, Finnveden, and Lovehagen (2010), end user modems represent a small but important part of the electricity use of telecom end user equipment, partly due to rather high energy consumption in standby mode.

Extracting raw materials, manufacturing and operation phase

According to Malmodin et al. (2010) the manufacture of modems/routers with a short lifetime results in emission levels of 15 kg CO2-eq per device. This includes raw materials, production, assembly and transport to the distribution centre.

Operation phase

From the distribution centre in Germany, the set up boxes are either delivered directly to the customer (i.e. online or telesales), to one of the 245 retail shops or to third party resellers. When the setup box is installed, the average modem is estimated to consume 80 kWh/year (Malmodin et al., 2014).

End-of-life phase

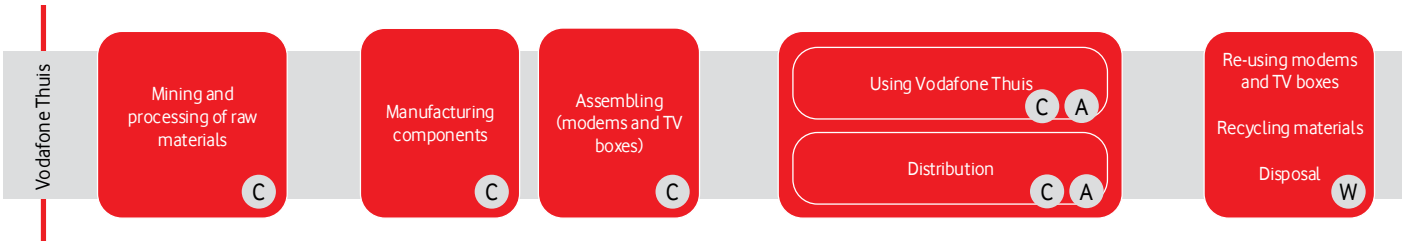
TV boxes and Wi-Fi modems are recollected when customers terminate their contract. As Vodafone has only recently gone operational with Vodafone Thuis, all returning TV boxes and Wi-Fi modems are still relatively new. Therefore, the devices are refurbished and used again. In the future, as this business will be more mature, end of life disposal should be included.

Limitations and assumptions

- Within Vodafone there is little research available on the environmental impact of Vodafone Thuis, due to the order of magnitude. Fewer than 10% of our customers are connected by Vodafone Thuis. Therefore, there is no LCA conducted by Vodafone yet.
- The LCA presented by Malmodin et al. (2010) is used to calculate the impact of manufacturing the modems/ routers. This LCA includes the mining and processing of raw materials, manufacturing of components, and the assembly. The LCA only reports CO2 emission levels. Hence the impact is underestimated, as the LCA does not include water use, hazardous waste, and air pollutants in the production process.
- Production of TV boxes is assumed to have the same negative impact as Wi-Fi modems. The same applies to the energy consumption. However, it should be noted that this overestimates the energy consumption of a TV box, because a Wi-Fi modem continuously consumes energy whereas a TV box is mostly turned off or in standby mode.
- The impact of the distribution of set up boxes is based on PostNL. PostNL provides CO2 calculations per package on their website[3]. It is assumed that these figures also apply to the other parties that deliver packages for Vodafone. In order to include air emissions as well, it is assumed that all vans distributing the packages for Vodafone run on diesel.
- The refurbishment of recollected TV boxes and Wi-Fi modems is considered to have no impact on the environment. Because Vodafone is a new player in the market, all returned devices are still new and are therefore refurbished. Hence, there is no environmental impact for the end-of-life of Vodafone Thuis.

3.5.2 Impact area

Scope



Attribution

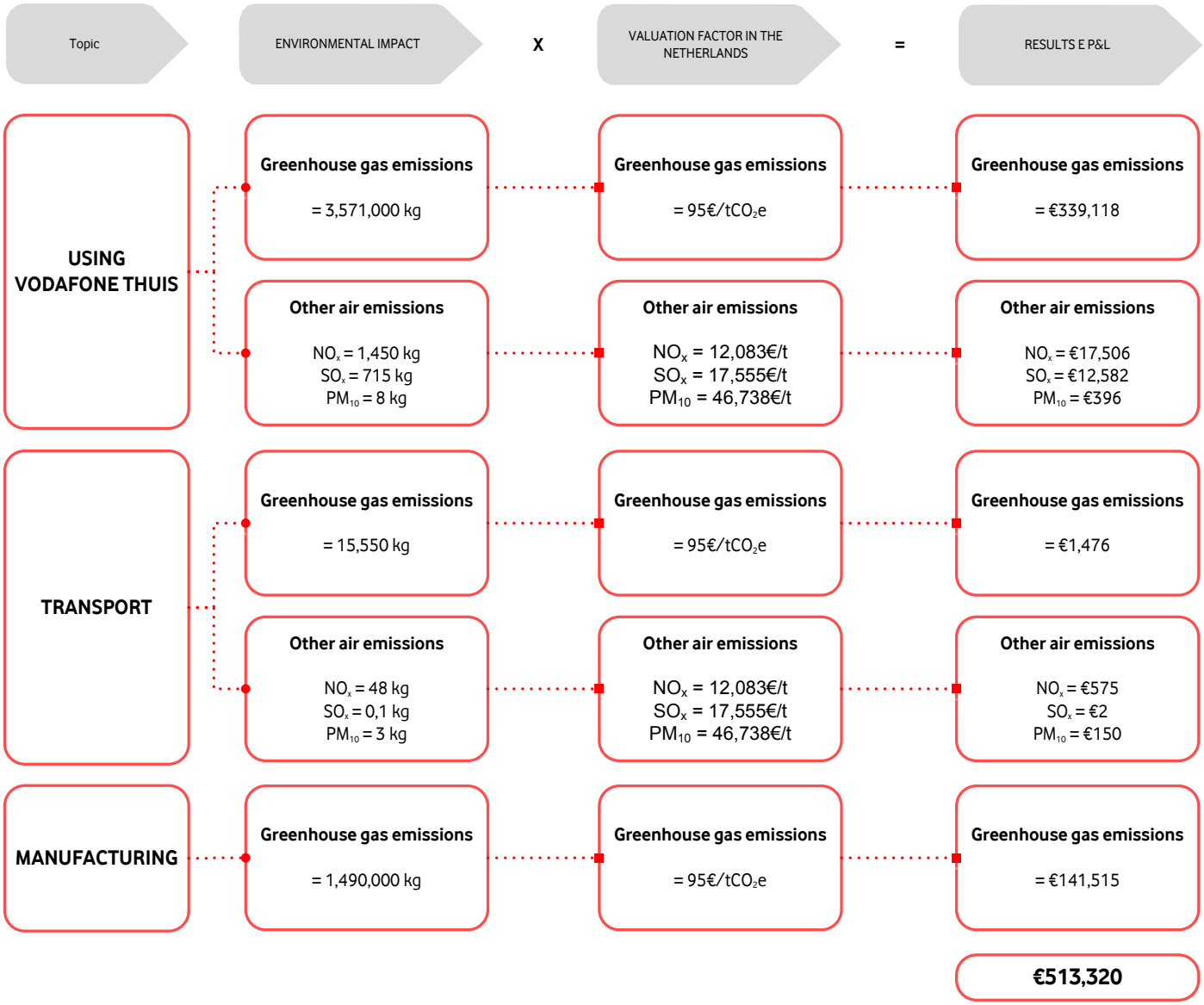
Vodafone **100%** | Value chain **0%**

[3]http://www.postnl.nl/zakelijke-oplossingen/post-versturen/verzendopties/groene-post/co2-calculator/

Environmental impact

3.5.3 Calculations

The impact of Vodafone Thuis is calculated by multiplying the volumes (expressed in environmental volumes) by the valuation factor applicable in the Netherlands. This results in an environmental impact of €513,320 for Vodafone Thuis.



Environmental impact

3.6 Impact of Vodafone's products and services

Vodafone offers a wide range of products and services. These products and services offer various opportunities to reduce carbon emission and energy costs. The advantages of these products and services are all described in detail in the Vodafone & Accenture Carbon Connections report (2009). Briefly, they include:

- Dematerialisation – replacing physical goods, processes or travel by 'virtual' alternatives, such as video conferencing or e-commerce (online shopping)
- Smart grid – improving efficiency of electricity grids through active monitoring and reducing reliance on centralised electricity production
- Smart logistics – monitoring and tracking vehicles and their loads to improve the efficiency of logistics operations by utilising vehicles more fully
- Smart cities – improving traffic and utilities management
- Smart manufacturing – synchronising manufacturing operations and incorporating communication modules in manufactured products.

Smart grid, smart logistics, smart cities, and smart manufacturing are all examples of smart applications, which enable customers to improve efficiency and achieve environmental benefits by using machine-2-machine (M2M) devices. The dematerialisation that occurs when people communicate or buy goods over the internet reduces the need to travel. These services will be discussed and quantified to address the positive impact other companies have due to Vodafone's products and services.

3.6A Dematerialisation

3.6A.1 Impact

Positive impact

Dematerialisation, in economic terms, is basically doing more with less. This occurs from a combination of different products and services Vodafone offers. It includes mobile telepresence, virtual office, and mobile delivery notifications for e-commerce. By embracing these products as an organisation, people do not have the urge to travel. They can join conferences from almost anywhere using handsets, or work remotely and from home. Without the necessity to travel to work, people can reduce the emissions caused by commuting. At the same time, offices can become smaller as more people work at home. Smaller office spaces also make a lower environmental impact.

Negative impact

The negative impact of dematerialisation is the increased energy use and heating needed in the home. These increased utilities have a negative impact and have been taken into account while calculating the benefits of dematerialisation.

3.6A.2 Impact area

According to Carbon Trust (2015), Vodafone Netherlands can attribute ≈6% of the dematerialisation benefits to its products and services. This calculation is based on ≈28% of people working from home for a full day. Of this 28%, approximately 20% consider that either their mobile phone, laptop, or Wi-Fi is important for them to work from home and this service is provided by Vodafone.

Scope

Attribution

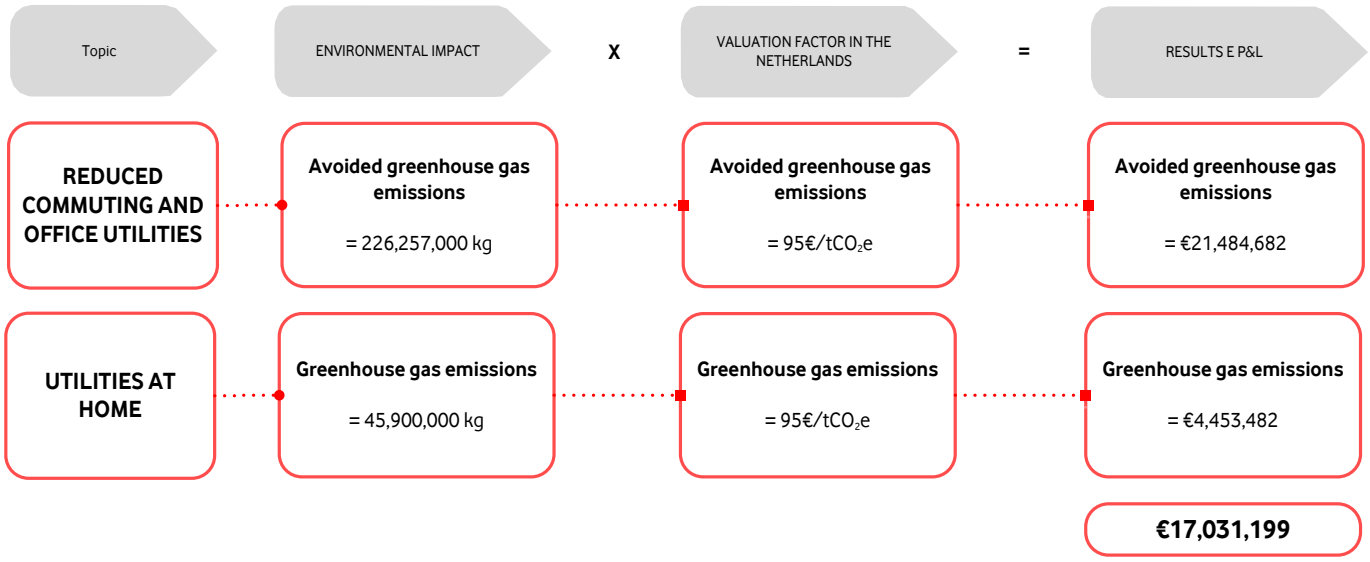
Environmental impact

Limitations and assumptions

- The positive impact of dematerialisation is only expressed in avoided CO2 emissions. Other avoided air emissions, for instance, are not included.
- Dematerialisation is enabled by a mobile phone, laptop, or Wi-Fi. Therefore, the negative impact is included in the calculations of the impact of handsets and Vodafone Thuis.
- Of smart workers, 73% feel their mobile phone is an enabler for smart working.
- Assumptions made by the Carbon Trust to calculate the benefits of dematerialisation are listed in Appendix C.4.

3.6A.3 Calculations

The impact of dematerialisation is calculated by multiplying the volumes (expressed in environmental volumes) by the valuation factor applicable in the Netherlands. This results in a positive environmental impact of €17,031,199 for dematerialisation.



Environmental impact

3.6B M2M connectivty

3.6B.1 Impact

Positive impact

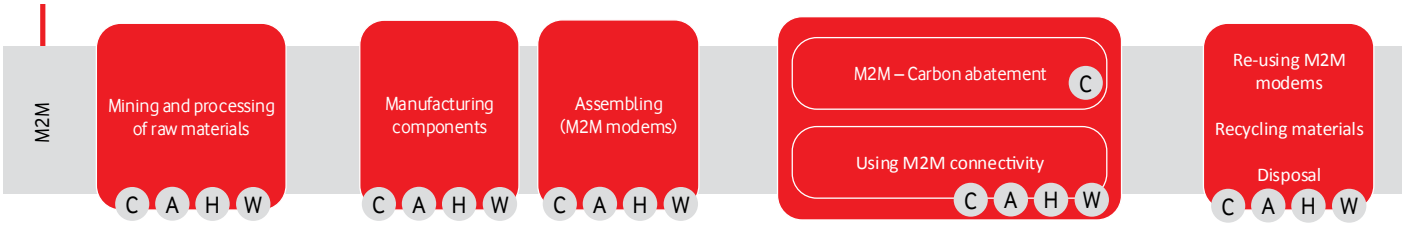
M2M connectivity includes smart grid, smart logistics, smart cities, and smart manufacturing. M2M connectivity enables business customers to achieve environmental benefits through improved efficiency. One example of how a firm can be more efficient and thus save money and reduce its carbon footprint is smart bins. Bins can communicate their capacity to the waste service company and send an alert when they are 80% full. This means that waste services can collect rubbish more efficiently and therefore reduce their energy use and related emissions.

Negative impact

Delivering these smart solutions comes at a cost for energy users, requiring investments in hardware and software to enable wireless connectivity. Each M2M connection requires a small M2M modem, in order to communicate with the customer's router. The production and use of both the modems and routers have a negative impact on the environment.

3.6B.2 Impact area

Scope



Attribution

Vodafone	100%	Other parties	0%

As Vodafone is the market leader in M2M connectivity, Carbon Trust (2015) has attributed all positive impacts to Vodafone due to the complexity of the solution. In many occasions the final solution is delivered by multiple parties. It's not clear which attribution part is the Vodafone average. Therefore Vodafone has also attributed all the negative impacts to itself.

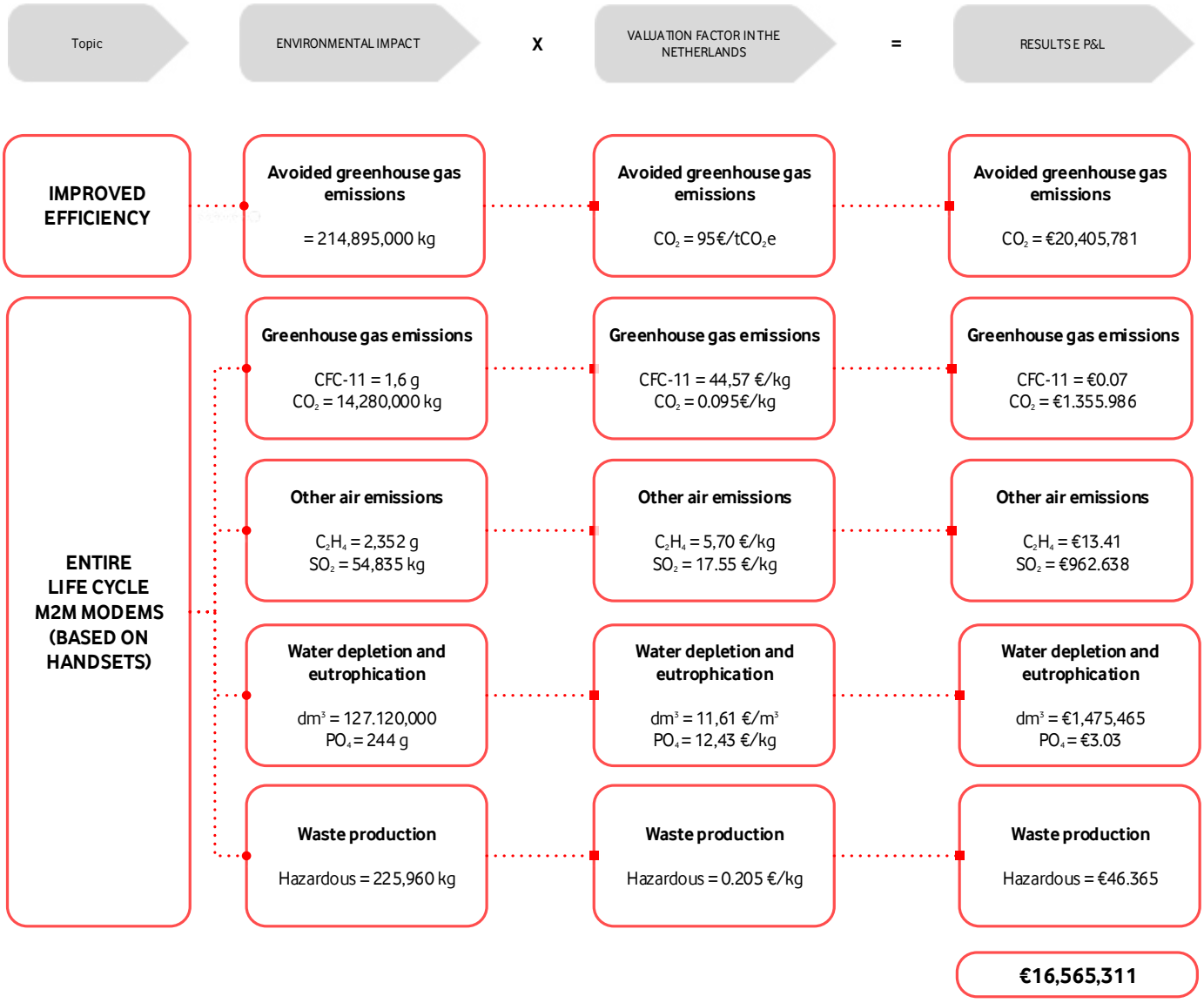
Limitations and assumptions

- As there is no life cycle analysis of M2M modems available yet, the environmental impact related to the production and use of those modems is calculated as equal to a smartphone. However, a M2M modem is much smaller than the average smartphone, so this calculation should also account for other impacts, such as equipment like a router on customer premises. Impacts include water consumption, hazardous waste production, air emissions, and GHG emissions. The assumptions made for calculating the environmental impact of smartphones are also applied to M2M modems.
- M2M is 100% attributed to Vodafone. However, often a second party is delivering the hardware for the solution. Therefore, the positive and the negative impact of M2M is most likely overestimated.
- Assumptions made by Carbon Trust to calculate the benefits of M2M connectivity are listed in Appendix C.5.

Environmental impact

3.6B.3 Calculations

The volumes (expressed in environmental volumes) are multiplied by the valuation factor. In order to express the environmental impact in monetary terms, the environmental impact is multiplied with the valuation factor. This results in a total impact for M2M of € 16,565,311.



4. Results and conclusions

The results of the E P&L are shown and discussed in this chapter. The strategic decisions that arise from the results are also described in this section. While a significant amount of time has been invested to produce the E P&L, there are still areas of improvement, which Vodafone will work on in the coming years.

4.1 The E P&L account 2014/2015

Two factors should be borne in mind when viewing these results: most of the environmental impacts are assessed via LCAs, which are by no means fully accurate. Consequently the report uses the approximately (≈) symbol to underline the approximate nature of the valuations. Secondly, the question of real environmental profit and loss is somewhat academic. While the negative impact is actually created, the positive impact is based on avoidance of negative environmental impact by customers using Vodafone products and services. This is therefore not a real profit, but more a 'what if our customers didn't use these products and services'.

The table shows that the positive impact of Vodafone's services by enabling other companies to reduce their carbon footprint is ≈€37.4 million. The negative impact includes the value chain of the four key elements: network, products, servicing customers by employees, and buildings. Within these elements, Vodafone's core operations have a negative impact of ≈€ 1,9 million, while the total negative value chain impact including Vodafone is ≈€ 21,6 million. Hence, only 9% of the total impact is associated with Vodafone's core operations.

Vodafone Netherlands will help our customers to save 25 times the amount of carbon we are generating though our own activities.

Results and conclusions

E P&L 2014/15

Loss

Buildings	Managing the offices	≈€182,340
Network	Production (incl. raw materials, distribution, manufacturing)	≈€927,892
	Running the network	≈€144,819
	End-of-life	≈€2,314
Servicing customers by employees	Commuting	≈€1,049,635
	Business travel	≈€144,699
	Company cars	≈€330,059
Handsets	Production (incl. raw materials)	≈€13,473,062
	Distribution	≈€761,074
	Operation	≈€164,556
	Distribution to customer	≈€46,620
	End-of-life	≈€20,570
Vodafone Thuis	Production modems and TV boxes (incl. raw materials, distribution, manufacturing)	≈€141,515
	Distribution to customer	≈€2,203
	Operation	≈€369,602
	End-of-life Vodafone Thuis	≈€0
Machine-2-machine	Production M2M modems (incl. raw materials)	≈€3,588,456
	Distribution M2M modems	≈€202,707
	Operation M2M modems	≈€43,828
	End-of-life M2M modems	≈€5,479
	TOTAL	≈€21,601,430

Profit

Dematerialisation	Dematerialisation services	≈€17,031,199
Machine-2-machine	M2M connections	≈€20,405,781
	TOTAL	≈€37,436,980

Results and conclusions

4.2 What do we learn from the results?

We have evaluated the results based on the five reasons for the calculation of an environmental Profit & Loss account defined in chapter 1.

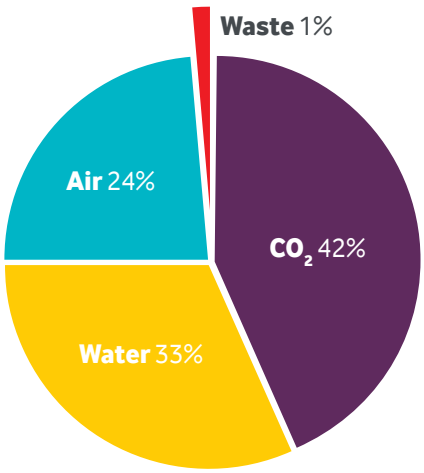
1. **Strategic insights on the environmental value of the full life cycle.**

   Vodafone is able to create a significant amount of positive impact by its smart working and M2M solutions. These results suggest that it would be a good idea to innovate further in these type of products and services. The biggest negative impacts are created in the embedded the manufacturing of handsets. As Vodafone does not directly manufacture handsets we have low visibility and control of this supply chain and they can span several tiers or layers. Our M2M solutions have the potential to help our customers and suppliers reduce their environmental impact such as smart metering and telematics. Circular business models can be adopted to decrease the negative impact of the production of handsets including promotion of our sim-only plans to increase the use of handsets for longer, selling refurbished devices and buying back customer's devices.

   In addition, Vodafone aims to improve its own environmental impact. When the environmental impact is compared with the actual costs paid, it makes clear these additional cost sometimes are relative low (eg € 13,72 per handset) or sometimes relative high (environmental costs of commuting appr 10%-20% of total spend). These comparisons enables underpinning of strategic decision making.

2. **Insights for internalisation**

   Carbon emissions account for 42% of the total negative environmental impact. Water for 33%, air for 24 % and waste for 1% of the total E P&L. The most material impacts are CO2, water and other air emissions. We aim to investigate what the potential future risks for our business are in relation to these areas. By identifying those water scarce areas which might impact its business continuity, the company is able to act effectively and open up the discussion with stakeholders. Furthermore, Vodafone will be able to anticipate new upcoming regulations and standards for emissions, which might impact its business. An example is already Vodafone's new carbon ambition: Vodafone Netherlands will help our customers to save 25 times the amount of carbon we are generating though our own activities.



Total environmental impact divided by indicator

3. **Forecasting**

   Vodafone aims to empower its customers. With the insights of this E P&L, the company aims to forecast how it can fulfil customer expectations based on the information it has gathered regarding the benefits the business creates for customers. With these insights, Vodafone can sharpen its risk strategies and eventually, make better investment decisions based on shared value.

4. **Clarity**

   With this publication, Vodafone is increasing the transparency of its impacts to its share- and stakeholders. Vodafone has already communicated intermediary results and the methodology with some of its stakeholders and they encouraged the company to investigate the inclusion of social impacts in the future. Not only external stakeholders, but also internal stakeholders have been given more transparency and awareness of Vodafone's environmental impacts across the value chain.

5. **Benchmarking**

   This is the first year Vodafone Netherlands has conducted an E P&L. By expressing the company's impacts in euros, the impacts across different life stages can be more easily compared. Vodafone expects more companies in its sector to publish their E P&L results. When available, the company can use these results for benchmarking. Further, it can benchmark their own performance in time.

> *"Establishing a profit and loss account for environmental issues influenced by Vodafone's business, is a fine initiative. It will make it possible better to understand the interrelated environmental interests of both company and society and to realize as a company an actual weighting of social costs and benefits. Future business processes and investments can be therefore stimulated in the direction of creating true shared value, both for Vodafone and society as a whole."*
>
> - Karel Zeldenrust, Dutch Ministry of Infrastructure and the Environment

4.3 Areas for improvement

Vodafone has identified the following areas of improvement which it will work on in the coming years:

- Several LCAs have been used in the E P&L. Some of them can be updated to improve the accuracy of our E P&L.
- Insights in the value chain could be improved by more dedicated LCAs including a range of indicators, next to CO2. This applies to the network, M2M modems, and SIM cards. Ericsson will publish more extensive reports about the network in the near future, which can be included in future E P&Ls.
- Major parts of Vodafone's services are not included in this E P&L including the benefits of calling and the access to the internet. The negative impacts are already included, namely handsets and the network. Vodafone aims to investigate these positive impacts in the near future.
- The scope determination can be improved. For example, the enterprise fixed lines business is currently not included in this E P&L as a separate product. The direct negative impact is included of buildings and network. The indirect negative impact (end user equipment like routers) and any positive impacts are not part of this E P&L yet. In addition, the environmental indicators, biodiversity and land use, are excluded in this E P&L.
- Vodafone attributes all negative impacts solely to itself. More specific attribution can be investigated. Further, avoidance of carbon emissions from M2M connectivity is solely attributed to Vodafone. In the future more realistic attributions can be investigated.
- End of life of e-waste is considered very low. For network equipment, there is a full ownership of Vodafone an therefore in direct control, the recycling end of life is 100% and therefore no e-waste.. As for handsets and other customer equipment the ownership is more indirect. Based in market figures (ICT Environment Monitor 2014) in the Netherlands the assumption is that this kind of equipment is not being disposed but recycled. Additional research should make clear if this assumption is valid. All waste figures in the E P&L are related to the manufacturing of handsets, m2m equipment and Vodafone Thuis. Waste originated from to the manufacturing of Network equipment is not included due to the lack of figures.
- The monetary value of industrial final waste could be improved. Currently, a more general approach has been used to calculate the impact of the waste Vodafone creates. Vodafone can investigate whether the incineration of network equipment has higher social costs than the number that is used in this E P&L.
- Vodafone has not included externalities related to depletion of resources, due to a lack of information. Vodafone will investigate whether they can include these in the future.

Acknowledgements

Amsterdam, 30 June 2015

We would like to express our appreciation to all those who provided us with the opportunity to complete this report. Many thanks especially to KPMG, whose contribution in stimulating suggestions and encouragement helped us to coordinate the project and to write this report.

Furthermore, we would also like to acknowledge Ericsson's assistance in providing the necessary information regarding the network, which has been very much appreciated. A special thanks goes to Carbon Trust, that has calculated and helped with the attribution factors of dematerialisation and smart application savings. Moreover, Forum for the Future has helped substantially with their article "Earth calling" to determine the environmental impacts within the mobile telecommunication industry and the eco-rating LCA together with Bureau Veritas. Last but not least, many thanks go to the stakeholders who have helped Vodafone to improve accuracy and completeness of the scope and material areas of the E P&L.

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5. Appendix

Appendix A - Material impact areas

The elements are assessed using six criteria:

- Environmental impact indicates whether or not the area has significant impact on the environment in the mobile telecommunication industry. This information is derived from Forum for the Future (2006).
- The order of magnitude for products is based on sales figures of Vodafone. The order of magnitude for buildings and network is based on the number of buildings and radio base stations.
- Does the impact area relate to Vodafone's mission, vision and strategy? (based on the Integrated Report of Vodafone[4])
- The key interest of stakeholders: whether the stakeholders view this impact area as crucial. This is based on the materiality matrix and verified during the stakeholder dialogue that was organised to discuss the E P&L.
- The influence of Vodafone is based on whether Vodafone is able to influence this impact area. This is derived from Forum for the Future (2006). Forum for the Future has reported the spheres of control and influence of a mobile telecommunications operator.
- Ownership is derived from whether Vodafone has ownership in this impact area and if it can be directly attributed to Vodafone.

Originally, elements with three or more green check marks are included in the E P&L. However, in order to identify missing elements, the shortlist was crosschecked with the crucial stakeholder interests (from the materiality matrix[5]) and the strategy (based on the sustainability strategy of Vodafone[6]). In this crosscheck, the importance of value chain responsibility was considered crucial. Therefore, Vodafone has chosen to include the value chain of the network and the products as well.

It should be noted that the criteria to determine the scoping of the E P&L was an iterative process. The environmental impact and influence of Vodafone are based on Forum for the Future (2006). The final assessment is done by Vodafone Netherlands alone. This method can be improved by including stakeholders. Not only as one of the criteria but also in the whole process.

[4]https://www.vodafone.nl/over-vodafone/wie-zijn-wij/feiten-en-cijfers/
[5]http://vodafoneintegratedreport.html5magazine.nl/2012_2013/externe_omgeving#
[6]https://www.vodafone.nl/over-vodafone/wie-zijn-wij/duurzaamheid/strategie-en-management/duurzaamheidsvisie-en-strategie.shtml

Appendix A - Material impact areas

		Elements	EI	OM	MVS	SI	IVF	O
Buildings		Processing raw materials	✗	✓	✗	✗	✗	✗
		Constructing buildings	✓	✓	✗	✗	✗	✗
		Procuring buildings	✓	✓	✗	✗	✗	✗
		Managing offices	✗	✓	✓	✓	✓	✓
		Refurbishment buildings	✗	✓	✗	✗	✓	✗
Network		Mining and processing raw materials	✓	✓	✗	✓	✗	✗
		Manufacturing components	✗	✓	✗	✓	✗	✗
		Assembling	✗	✓	✗	✓	✗	✗
		Rolling out network	✗	✓	✓	✓	✓	✗
		Running network	✓	✓	✓	✓	✓	✓
		End-of-life phase	✓	✓	✓	✓	✓	✓
Servicing customers		Commuting	✓	✓	✓	✗	✓	✓
		Business travel	✓	✓	✓	✗	✓	✓
		Company cars	✓	✓	✓	✗	✓	✓
		Offices equipment (i.e. desk, laptops)	✗	✗	✗	✗	✓	✗
		Paper	✗	✗	✓	✗	✓	✓
Products	**Handsets**	Mining and processing raw materials	✓	✓	✗	✓	✗	✗
		Manufacturing components	✓	✓	✗	✓	✗	✗
		Assembling	✓	✓	✗	✓	✗	✗
		Using phones	✓	✓	✓	✓	✓	✗
		Enablement of technology	✓	✓	✗	✓	✓	✗
		Functionalities	✓	✓	✗	✓	✗	✗
		Distribution	✓	✓	✗	✗	✓	✓
		Reusing / recycling materials	✓	✓	✓	✓	✓	✗
	Tablets	Mining and processing raw materials	✓	✗	✗	✓	✗	✗
		Manufacturing components	✓	✗	✗	✓	✗	✗
		Assembling	✓	✗	✗	✓	✗	✗
		Using tablets	✓	✗	✗	✓	✗	✗
		Functionalities	✓	✗	✗	✓	✗	✗
		Distribution	✓	✗	✗		✓	✓
		Reusing / recycling materials	✓	✗	✗	✓	✓	✗
	Vodafone Thuis	Mining and processing raw materials	✓	✗	✗	✓	✗	✗
		Manufacturing components	✓	✗	✗	✓	✗	✗
		Assembling	✓	✗	✗	✓	✗	✗
		Using Vodafone Thuis	✓	✗	✓	✓	✓	✗
		Distribution	✓	✓	✗	✗	✓	✓
		Reusing / recycling materials	✓	✗	✓	✓	✓	✓
	Dematerialisation	Mining and processing raw materials	✗	✓	✗	✗	✗	✗
		Manufacturing components	✗	✓	✗	✗	✗	✗
		Assembling	✗	✓	✗	✗	✗	✗
		Using dematerialisation applications	✓	✓	✓	✓	✓	✗
		Reusing / recycling materials	✗	✓	✗	✗	✓	✗
	M2M	Mining and processing raw materials	✗	✓	✗	✗	✗	✗
		Manufacturing components	✗	✓	✗	✗	✗	✗
		Assembling	✗	✓	✗	✗	✗	✗
		Using smart solutions	✓	✓	✓	✓	✓	✗
		Reusing / recycling materials	✗	✓	✗	✓	✓	✗

EI = Environmental impact
OM = Order of magnitude
MVS = Mission, Vision and Strategy
SI = Stakeholder interest
IVF = Influence of Vodafone
O = Ownership

Appendix B - Calculations

This Appendix shows how calculations to calculate monetary impacts were performed. In B.1 volumes are converted into environmental impacts. The method and sources used to convert environmental impacts into euros is presented in B.2.

B.1 Environmental impact calculations

B.1.1 Buildings

Volume	Calculations
GHG emissions	(total gas usage Nm^3 * gCO_2/Nm^3 emission factor) + (kWh grey electricity consumption * gCO_2/kWh emission factor) + (kWh renewable electricity consumption * gCO_2/kWh emission factor) + (total litres diesel consumed * gCO_2/litre emission factor) + (GWP of refrigerants * gCO_2e/GWP emission factor) + (total GJ consumed for district heating * gCO_2/GJ emission factor)
Air emissions	(total litres diesel consumed * gNO_x/litre emission factor) + (kWh grey electricity consumed * gNO_x/kWh emission factor)
	(total litres diesel consumed in offices * gSO_x/litre emission factor) + (kWh grey electricity consumed * gSO_x/kWh emission factor)
	(total litres diesel consumed * gPM_{10}/litre emission factor) + (kWh grey electricity consumed * gPM_{10}/kWh emission factor)
Water	(total m^3 water used)
Waste	(total kg other waste)

B.1.2 Network

Volume	Calculations
GHG emissions	+ (total litres diesel fuel consumed * CO_2/litre diesel emission factor) + (kWh renewable electricity used * CO_2/kWh emission factor) + (total number of subscribers * CO_2-eq/annual manufacturing per subscriber)
Air emissions	(total litres diesel fuel consumed * NO_x/litre diesel emission factor)
	(total litres diesel fuel consumed * SO_x/litre diesel emission factor)
	(total litres diesel fuel consumed * PM_{10}/litre diesel emission factor)
Waste	(% network that is not recycled or refurbished * total kg network equipment removed)

Appendix B - Calculations

B.1.3 Servicing customers by employees

Volume	Calculation
CO_2	(total litres diesel consumed * gCO_2/litre diesel) + (total litres petrol consumed * gCO_2/litre petrol) + (total km travelled by train * gCO_2/km) + (total km travelled by other public transport * gCO_2/km) + (total km travelled by scooter * gCO_2/km) + (total km travelled for short-distance business trip * gCO_2/km) + (total km travelled for medium-distance business trip * gCO_2/km) + (total km travelled for long-distance business trip * gCO_2/km)
NO_x	(total litres diesel consumed * gNO_x/litre diesel) + (total litres petrol consumed * gNO_x /litre petrol) + (total km travelled by train * gNO_x/km) + (total km travelled by other public transport * gNO_x/km) + (total km travelled by scooter * gNO_x/km) + (total km travelled for short-distance business trip * gNO_x/km) + (total km travelled for medium-distance business trip * gNO_x/km) + (total km travelled for long-distance business trip * gNO_x/km)
SO_x	(total litres diesel consumed * gSO_x/litre diesel) + (total litres petrol consumed * gSO_x /litre petrol) + (total km travelled by train * gSO_x/km) + (total km travelled by other public transport * gSO_x/km) + (total km travelled by scooter * gSO_x/km) + (total km travelled for short-distance business trip * gSO_x/km) + (total km travelled for medium-distance business trip * gSO_x/km) + (total km travelled for long-distance business trip * gSO_x/km)
PM_{10}	(total litres diesel consumed * gPM_{10}/litre diesel) + (total litres petrol consumed * gPM_{10}/litre petrol) + (total km travelled by train * gPM_{10}/km) + (total km travelled by other public transport * gPM_{10}/km) + (total km travelled by scooter * gPM_{10}/km) + (total km travelled for short-distance business trip * gPM_{10}/km) + (total km travelled for medium-distance business trip * gPM_{10}/km) + (total km travelled for long-distance business trip * gPM_{10}/km)
VOC	(total km travelled for short-distance business trip * gVOC/km) + (total km travelled for medium-distance business trip * gVOC/km) + (total km travelled for long-distance business trip * gVOC/km) + (total km travelled by scooter * gVOC/km)

Appendix B - Calculations

B.1.4 Handsets

The environmental impact of handsets is calculated over four key life stages. According to Bureau Veritas (2011) the relative contribution of each phase of the life cycle is shown in Table 1. The table shows that most impacts are caused by the production phase. Note that Bureau Veritas (2011) has used other environmental indicators that have not been used in the rest of the E P&L. These other indicators are included, as these influence results of the environmental impact on the production of handsets.

Indicator	Unit	Production	Distribution	Use	End-of-life
GHG	CO_2	88%	10%	1%	<1%
	CFC-11	96%	2%	2%	<1%
Air	SO_2	91%	8%	2%	<1%
	NMVOC	94%	6%	<1%	<1%
Water	dm^3	91%	8%	2%	<1%
	PO_4	96%	3%	1%	1%
Waste	kg	99%	<1%	<1%	<1%

Table 1: Relative contribution of each phase of the life cycle for the average smartphone

The impacts together multiplied by the total number of mobile phones that Vodafone sold in 2014 form the total impact of handsets.

Volume	Calculation
GHG emissions	(total number of mobile phones sold * gCFC-11/average smartphone)
	(total number of mobile phones sold * gCO_2/average smartphone)
Air emissions	(total number of mobile phones sold * gSO_x/average smartphone)
	(total number of mobile phones sold * gNMVOC/average smartphone)
Water	(total number of mobile phones sold * dm^3/average smartphone)
	(total number of mobile phones sold * gPO_4/average smartphone)
Waste	(total number of mobile phones sold * kg hazardous waste/average smartphone)

Appendix B - Calculations

B.1.5 Vodafone Thuis

Customers that order Vodafone Thuis receive a set up box with two devices, a TV box and a WiFi-modem. Therefore, the total number of Vodafone Thuis subscriptions is multiplied by two devices. All volume calculations are shown in the table below:

Volume	Calculation
GHG emissions	(total number of Vodafone Thuis subscriptions * 2 devices * kWh per year/device * gCO_2/kWh emission factor) + (total number of Vodafone Thuis subscriptions * 2 devices * CO_2/manufacturing device) + (total number of new subscribers * CO_2 emissions per package)
Air emissions	(total number of Vodafone Thuis subscriptions * 2 devices * kWh per year/device * gNO_x/kWh emission factor) + (total number of new subscribers * CO_2 emissions per package * NO_x/CO_2 ratio)
	(total number of Vodafone Thuis subscriptions * 2 devices * kWh per year/device * gSO_x/kWh emission factor) + (total number of new subscribers * CO_2 emissions per package * SO_x/CO_2 ratio)
	(total number of Vodafone Thuis subscriptions * 2 devices * kWh per year/device * gPM_{10}/kWh emission factor) + (total number of new subscribers * CO_2 emissions per package * PM_{10}/CO_2 ratio)

B.1.6 Dematerialisation

The positive impact volume calculation is shown in the table below:

Volume	Calculation
GHG emissions	(CO_2 reduction per subscriber * total amount of subscribers)

Appendix B - Calculations

B.1.7 M2M Connectivity

The negative impact volume calculations are shown in the table below:

Volume	Calculation
GHG emissions	(new M2M connections in FY14/15 * gCFC-11/M2M modem)
	(new M2M connections in FY14/15 * gCO_2/M2M modem emission factor)
Air emissions	(new M2M connections in FY14/15 * gSO_x/M2M modem)
	(new M2M connections in FY14/15 * gNMVOC/M2M modem)
Water	(new M2M connections in FY14/15 * dm^3/M2M modem)
	(new M2M connections in FY14/15 * gPO_4/M2M modem)
Waste	(new M2M connections in FY14/15 * kg hazardous waste/M2M modem

The positive impact volume calculation is shown in the table below:

Volume	Calculation
GHG emissions	(total CO2 emissions avoided due to M2M connectivity)

Appendix B - Calculations

B.1.8 Sources environmental impact calculations

Volume	Source	Notes
gCO2/Nm3 emission factor	CO2emissiefactoren.nl (2015)	
gCO2/kWh emission factor		
gCO2e/GWP emission factor		
gCO_2/litre diesel emission factor		
gCO_2/litre petrol emission factor		
gCO_2/km emission factor other public transport		
gCO_2/km emission factor train		
gCO_2/km emission factor airplanes less than 700 km		
gCO_2/km emission factor airplanes between 700-2500 km		
gCO_2/km emission factor airplanes above 2500 km		
gNO_x/litre diesel emission factor	CE Delft (2015); CO2emissiefactoren.nl (2015)	Take the CO_2 emission per e.g. litre diesel of CE Delft and calculate the ratio between CO_2 (CE Delft) and NO_x, SO_x, PM_{10}, VOC of CO2emissiefactoren.nl (2015). Then apply these ratios to the CO_2 emission factor of CO2emissiefactoren.nl (2015) in order to align the air emissions with the CO_2 emissions of CO2emissiefactoren.nl (2015)
gNO_x/litre petrol emission factor		
gNO_x/km emission factor other public transport		
gNO_x/km emission factor train		
gNO_x/km emission factor airplanes less than 700 km		
gNO_x/km emission factor airplanes between 700-2500 km		
gNO_x/km emission factor airplanes above 2500 km		
gSO_x/litre diesel emission factor		
gSO_x/litre petrol emission factor		
gSO_x/km emission factor other public transport		
gSO_x/km emission factor train		
gSO_x/km emission factor airplanes less than 700 km		
gSO_x/km emission factor airplanes between 700-2500 km		
gSO_x/km emission factor airplanes above 2500 km		
gPM_{10}/litre diesel emission factor		
gPM_{10}/litre petrol emission factor		
gPM_{10}/km emission factor other public transport		
gPM_{10}/km emission factor train		
gPM_{10}/km emission factor airplanes less than 700 km		
gPM_{10}/km emission factor airplanes between 700-2500 km		
gPM_{10}/km emission factor airplanes above 2500 km		
gVOC/km emission factor airplanes less than 700 km		
gVOC/km emission factor airplanes between 700-2500 km		
gVOC/km emission factor airplanes above 2500 km		

Appendix B - Calculations

gNO_x/kWh emission factor gSO_x/kWh emission factor gPM_{10}/kWh emission factor	Emissieregistratie CBS Elektriciteitsbalans	Go to emissieregistratie.nl > emissies 2013 > create own kaart or grafiek > select in 1.a zwaveloxiden, stikstofoxide, fijnstof > 2013 > select in 1.b emissiebronnen: elektriciteitsproductie (onder kopje energiesector) ; look up the total electricity production in the Netherlands in 2013 on CBS.nl and divide.
gCFC-11/average smartphone emission factor gSO_x/average smartphone emission factor gNMVOC/average smartphone emission factor dm^3/average smartphone emission factor gPO_4/average smartphone emission factor hazardous waste/average smartphone emission factor	Bureau Veritas (2011)	The LCA of the eco-score is used to calculate the average environmental impact of a smartphone.
gCO_2/GJ emission factor	CO_2-Prestatieladder 2.2	
$kgCO_2$/annual manufacturing per subscriber base station sites $kgCO_2$/annual manufacturing per subscriber control & core nodes $kgCO_2$/annual manufacturing per subscriber transmission and IP core network $kgCO_2$/annual manufacturing per subscriber 3rd part data centres $kgCO_2$/modem 80 kWh per year/modem	Malmodin, Lunden, Andersson, and Nilsson (2014)	

Volume data is based on internal data collection systems of Vodafone. Information that is gathered from external sources is described below. The calculations in B.1.1 to B.1.6. are based on these sources.

Appendix B - Calculations

B.2.1 Valuation calculations

Valuation	Calculation
GHG emissions	(gCO_2 emissions * price (€) per gCO_2 emission) + (gCFC-11 emissions * price (€) per gCFC-11 emission)
Air emissions	(gNO_x emissions * price (€) per gNO_x emission) + (gSO_x emissions * price (€) per gSO_x emission) + (gPM_{10} emissions * price (€) per gPM_{10} emission) + (gVOC emissions * price (€) per gVOC emission) + (gNMVOC emissions * price (€) per gNMVOC emission)
Water	(total m^3 water used in offices/retail shops * price (€) per m^3) + (total m^3 water used for handsets * price (€) per m^3) in China) + (gPO_4 * price (€) per PO_4)
Waste	(total kg commercial waste produced * price (€) per kg) + (total kg household waste produced * price (€) per kg) + (total kg hazardous waste * price (€) industrial final waste per kg)

B.2.2 Sources

Valuation	Source	
€ 95/tCO_2 conversion	EPA (2013)	The social cost of carbon Vodafone has used, is based on a low discount rate, because Vodafone believes future generations should be rated equally as present generations. EPA data has been used[1]. Social costs of CO_2 in 2015, 116_{2011}$ (3%, 95th percentile). Numbers were adjusted for inflation: 126_{2015}$[2] and an average exchange rate 2014[3] was applied, leading to a price of €95.
€ 12,083/tNO_x conversion € 17,555/tSO_x conversion € 46,738/tPM_{10} conversion € 3,306/tVOC conversion € 45/kgCFC-11 € 6/kgNMVOC € 12/$kgPO_4$	CE Delft (2010)	Numbers have been inflated based on World Bank data.
€ 0.4/m^3 water in the Netherlands € 12/m^3 water in China	Trucost (2013)	Adjusted for inflation based on World Bank data and average 2014 currency conversion based on oanda.com
€ 137/incineration tonnes commercial or household waste € 205/tonnes industrial final waste conversion	CE Delft (2010) Annex	Numbers have been inflated based on World Bank data.

[7]http://www.epa.gov/climatechange/EPAactivities/economics/scc.html
[8]http://data.worldbank.org
[9]The $/€ exchange rate is based on the average exchange rate in 2014, see http://www.oanda.com/currency/average

Appendix C - Assumptions

C.1 General E P&L assumptions

For Vodafone's E P&L, the following general assumptions were made:

- **Impact:** Vodafone creates both negative and positive impacts. Negative impact reflects the societal costs caused by Vodafone's direct and indirect emissions. Positive impact is mostly avoided impact, due to the enablement of customers.

  Negative impact is partially reduced by Vodafone, for instance by purchasing renewable energy for the network. These initiatives are not labelled as positive impact, but as avoided negative impact. Hence, avoided negative impact is not calculated separately, but is included in the negative impact calculations. On the other hand, Vodafone's products and services can have a positive impact on the environment, due to increased efficiency of customers or less need to travel.
- **Attribution:** this E P&L attributes all the negative impacts to Vodafone, as the company wants to show its impact through the value chain and improve its impact together with the value chain partners. However, the positive impact is more difficult to attribute solely to Vodafone. For example, smart working is only partially attributed to Vodafone since other factors, such as laptops or Wi-Fi, also enable people to work smartly. If an attribution factor is applied, this factor is based on research conducted by Carbon Trust (2015).
- **Calculation and valuation:** In Appendix B.1, the calculations of volumes (i.e. kWh grey electricity use) to environmental impact (i.e. CO2/kWh) are shown. In Appendix B.2. the environmental impact is converted in monetary terms (€/CO2). The sources used are listed in these appendixes as well. In cooperation with experts in this field, Vodafone has attempted to use the most appropriate volume and valuation factors.
- **Sources:** the most recent research in the field is used to underpin the calculations and valuation. If applicable prices have been corrected for inflation.

C.2 General content assumptions

Considering the content of the E P&L, the following assumptions were made:

- **Tablets:** The sales figures of tablets in 2014 account for less than 1% of the total number of devices sold. Therefore, the total impact of tablets is considered to be not significant and is therefore excluded in this E P&L.
- **Renewable energy:** Wind energy is assumed to have no environmental impact, as the production of wind energy does not emit CO2 (CO2emissionfactoren.nl, 2015). The emissions resulting from construction of a wind farm are not included, as the emissions of construction are neither included for grey energy (i.e. the production of a coal plant is not included in the emission factor of grey electricity).
- **Customer energy:** Energy consumed by customers is regarded as grey energy (CO2-Prestatieladder, 2014).
- **Resource depletion:** According to CE Delft (2010), depletion of resources is not an externality as scarcity is enshrined in the market price. Therefore this E P&L will not value depletion of resources such as raw materials or energy. Vodafone aims to investigate future possibilities to include potential externalities caused by resource depletion.
- **Hazardous waste:** Hazardous waste is regarded as industrial final waste.
- **SIM cards:** the production of SIM cards is not included in the E P&L, due to a lack of information.
- **Biodiversity** impacts are only included through the LCA calculations of Bureau Veritas (2011), which include water eutrophication.
- **Land use** was not included in this E P&L. We expect not to have a significant land use impact, because most base station sites are situated on buildings, while cables for fixed connections are below street level. The only land Vodafone uses is that on which the buildings the company rents are situated.
- **Carbon price:** The social cost of carbon Vodafone has used, is based on a low discount rate (3%), because Vodafone believes future generations should be rated equally as present generations. This means Vodafone does not significantly discount future costs, leading to a higher social cost of carbon overall.

C.3 LCA Bureau Veritas (2011) – Environmental impact of handsets

To calculate the impact of handsets, this E P&L has used the LCA used for calculating the eco-score rating, which was conducted by Bureau Veritas in 2011. The following assumptions per life-stage were made:

- The production phase includes extraction of raw materials, production of components and sub-parts, product assembly, customisation (if applicable), and transport between the different stages. The production phase includes, among other things, the LCD display, printed circuits, electronic components, battery, battery charger, and casing.
- The distribution phase includes:
  1. The production of the packaging (cardboard box, plastic films, and user manual)
  2. The transport of the packaged end product between the assembly sites and the final countries of destination.
- In the operation phase, the scenario of use considered is the following:
  1. Receive or send out calls during 4.12 hours per month
  2. Exchange data: 155.30 MB of data per month for mobile phones connected to 3G network
  3. After each charge (the battery is 100% charged):
     1. The charger, connected to the mobile phone handset, still plugged in during 6.5 hours

Appendix C - Assumptions

2. The charger, not connected to the mobile phone handset, still plugged in during 5 hours
3. Standby: when not calling, not exchanging data, not charging, with no connection to the charger
4. Battery charger energy consumption (battery charger plugged in, no handset).

- In the end-of-life phase, the wastes taken into account are the mobile handset, the battery and the charger. The packaging wastes are not taken into account. This phase includes:

1. Collection: 500 km

2. Dismantling:

1. The separation of printed circuits larger than 10 cm², the cables and the batteries from the other sub-parts sent to depollution
2. The dismantling stage is followed by shredding and automated sorting of the different raw materials
3. Once the handsets and their different components have been separated they are sent to appropriate treatment facilities.

3. Depollution

1. Specific End Of Life Treatments (SEOLT) to the cables, batteries and printed circuits
2. Handset LCD displays are not included since their surface area is smaller than 100 cm².

4. Transport to recycle, incineration, or landfill location: 200 km

5. Incineration, landfill or recycling

1. Incineration: ≈ 8% of total weight (handset + battery charger) is incinerated.
2. Landfill: 64% of total weight (handset + battery charger) is landfilled.
3. Recycling: recycling is not taken into account in the potential impact of the EoL process. The benefits of recycling are attributed to the product actually using the recycled raw material.

C.4 Carbon trust (2015) – Carbon impact of smart working

Smart working achieves carbon savings from reduced commuting and office energy consumption, but increased carbon emissions from increased home energy consumption. Carbon Trust (2015) has conducted a survey to estimate the carbon impact of smart working. The following results and assumptions are applied:

Commuting

- Carbon savings from avoided telecommuting only apply to those working from home for a full day. Approximately 28% of survey respondents work from home at least one full day per month.
- Approximately 20% of survey respondents who work from home consider that
  - either their mobile phone, laptop or wifi is important for them to work from home
  - AND this service is provided by Vodafone
- An average telecommuter working full days from home works from home for 1.4 days per week
- The average annual carbon saving from avoided commuting is 443 kg CO2e

Domestic energy

- Telecommuters only heat a single room of their house
- From survey responses, for 50% of the time spent working at home, another household member is present and therefore no additional energy for heating is incurred.
- Extra carbon emissions per year from working at home
  - Heating: 36 kg CO2e
  - Electricity: 71 kg CO2e

Office energy

- An average office consumes 84 kWh/m2/year electricity and 175 kWh/m2/year natural gas. An average full time employee (FTE) occupies 12 m2 gross area.
- An FTE in the office is responsible for 3 kg CO2e/day
- It is assumed that where an FTE works from home on a permanent basis, there is a 20% likelihood that the office will reduce in size to reflect this. Energy savings only occur where the office reduces in size, since the energy consumption associated with personal equipment (e.g., laptops) is minimal compared with HVAC and lighting. This factor is used to estimate savings from actual home-working patterns

C.5C Carbon trust (2015) – Carbon impact of M2M

M2M solutions consist of smart grids, smart logistics, and smart metering

- Smart Grids - Charging stations e-cars
  - Assumes electric cars replace petrol cars, savings calculated from the difference in emissions between electric and petrol cars. Calculated for all electric vehicles in Netherlands, then allocated to total number of charging points to give a carbon abatement figure per charging point.
  - Note: hybrids are included as electric cars (although with a higher emission factor). It could be questioned whether charging points are essential for hybrids, as they can also be refuelled with petrol. An alternative calculation approach would be to base the savings on the annual electricity charge per charging point. This would likely give a much smaller carbon abatement figure.

Appendix C - Assumptions

- Smart Logistics - Fleet management
  - This applies to cars (rather than LGV or HGV).
  - An average fuel saving of 10% has been used.
- Smart Logistics - Optimised routing
  - This is sat nav for cars
  - Assumed an average fuel saving of 8%.
- Smart Logistics - Smart bins
  - Based on the Mic-O-Data case study
- Smart Logistics - Taxi computers: connection central
  - Savings due to optimising dispatch of taxis
  - Assumed a fuel saving of 5%
  - Unexplained anomaly that the number of M2M connections is 55% greater than the total number of taxis in the Netherlands. Have therefore arbitrarily reduced the savings by half.
- Smart Logistics - Track and trace
  - This relates to tracking goods vehicles and cargo.
  - It is debatable whether there is any saving associated with this.
  - A scenario has been assumed that this gives a 2% fuel saving, which is applied to the annual emissions of a goods vehicle. (The emissions is calculated as a weighted average of all the LGVs and HGVs registered in the Netherlands, considering their average annual distance travelled).
  - Due to this uncertainty and the large value for the savings, the total results are presented with and without the carbon abatement from 'Track and Trace'
- Smart Logistics - Usage based car insurance
  - This is based on previous Carbon Trust research.
- Smart Metering - Domestic – Electricity
  - Assumes a 3% saving in household electricity due to installation of a smart meter.
- Smart Metering - Domestic – Gas
  - Assumes a 3% saving in household gas due to installation of a smart meter.

Excluded categories

- Other categories for M2M connections have been excluded from the calculation of the carbon abatement. This is generally because:
  - **Either:** the number of M2M connections is small and the carbon abatement would not be significant
  - **Or:** we have not developed a methodology (or have no data) to support the carbon abatement calculations
  - **Or:** there is no carbon abatement associated with the category
- **Note 1. e-health.** We can review this after completion of the analysis for the GeSI report, when we may have managed to source some data to calculate this. However, the number of connections is currently very small (less than 0.5%).
- **Note 2. Automation of Industrial processes.** We can review this after completion of the analysis for the GeSI report, when we may have managed to source some data to calculate this. The number of connections is significant (about 10% of the total M2M connections).

Appendix D - Report stakeholder dialogue

On 21 April 2015, Vodafone entered into a dialogue with a varied group of external stakeholders. During this dialogue, Vodafone's activities with regard to drawing up an Environmental Profit & Loss (E P&L) statement were discussed.

Participants

Following a word of welcome by Vodafone, a short introductory round was made among the stakeholders to identify what each participant intended to contribute to the dialogue and expected to gain from it. The following participants attended:

Organisation	Name
Ecofys	Jeroen Scheepmaker
EY	Tom Emmelkamp
KPMG	Arjan de Draaijer
	Frits Klaver
Ministry of Infrastructure and the Environment	Karel Zeldenrust
Natuur & Milieu	Koenraad Backers
Nederland ICT / ICT Milieu	Jeroen van der Tang
RHDHV	Juriaan Mieog
RVO	Frank Hartkamp
True Price	Michel Scholte
TU Delft	Marcel den Hollander
UTZ Certified	Sven Drillenburg Lelijveld
Vodafone	Martin de Jong
	Tjeerd Hoes
	Tom Adriaanse (minutes)

Background

Vodafone creates value for our society: financially, socially as well as environmentally. This value is primarily qualitative in nature: people connecting with each other because of a mobile network, a company improving its efficiency due to integrated communication processes, or a 'smart' electricity meter enabling a power company to have a better insight in the actual energy consumption by a customer or a location. By quantifying such value, we can determine in which areas value is created and to what extent. This will provide relevant information for Vodafone

Appendix D - Report stakeholder dialogue

to manage and improve its social impact. This is also the prime reason for Vodafone to draw up an environmental profit and loss account (E P&L).

In addition to this E P&L, Vodafone also aims to draw up an S (social) P&L and an FE (financial and economic) P&L in the coming years. This will quantify the entire social impact of Vodafone. Vodafone chose to start with the environment, first, because of the company's big ambitions in this area. Second, because it was expected that Vodafone's environmental impact would be positive and third, because quantifying the environmental impact is relatively easy due to the availability of data.

Goal

Vodafone's goal in talking to stakeholders was to use the dialogue to discuss the process and the preliminary results of the E P&L and to collect input and feedback from the stakeholders in order to optimise the E P&L.

In cooperation with KPMG, Vodafone is currently mapping its environmental impact and converting this impact into euros. Vodafone will incorporate the E P&L in its annual report 2014-2015 (expected July 2015) and will ask EY to endorse the report. However, drawing up such an E P&L is new, not only for Vodafone, but also for many organisations worldwide. It is therefore conceivable that choices and assumptions are made now that in hindsight would have been assessed differently. However, for Vodafone this is by no means a reason not to continue with this method of value appraisal.

Process E P&L Vodafone

During the dialogue, Vodafone explained how the first version of the E P&L was arrived at. Specific attention was given to the choices and assumptions adopted during the process. Two key choices were made:

- The scope of the E P&L: which activities are and are not taken into account (customer usage, Vodafone operations and further down the supply chain)
- The environmental indicators: which ones quantify the environmental impact (water, CO2-e, air pollution, waste).

1. **The scope of the E P&L**

   Vodafone's work to determine the scope of the E P&L was the subject of animated discussion. Vodafone's social impact has three elements: buildings, products and the network. Vodafone pointed out that in each area, it can influence its own impact to a greater or lesser extent.

   Furthermore, Vodafone pointed out that attribution is an important factor; which impact can be attributed to Vodafone? Can the whole supply chain be attributed to Vodafone? For example, energy consumption in the network is to a large degree determined by Vodafone itself, in contrast to the decision regarding which raw materials are used in handsets. Vodafone aims to map the entire value chain of both the network and mobile handsets in its E P&L, despite the fact that Vodafone's influence in the chain is often more limited than in its direct operations.

2. **The environmental indicators**

   An important element of the dialogue was clarifying the choices and assumptions made by Vodafone during the process of the E P&L. This led to some discussion regarding the environmental indicators that were chosen. The chosen indicators (GHG emissions, air emissions, water use and waste) as well as other indicators (biodiversity) were discussed. Vodafone explained that the preliminary results are mainly driven by the indicator CO2. This is because data on carbon dioxide emission is widely available and because the environmental impact of Vodafone, its suppliers and its customers is mainly in the field of CO2 emission. The indicators chosen were given monetary values, based on CE Delft methodology and other parties.

Positive and negative impacts

Transparency was the key word for the participants. They wanted to know why certain choices were made during the scoping and defining of the E P&L process.. As an example, the use of materials was referred to. Stakeholders wanted to know about the recycling process of materials within Vodafone. They asked where used materials go to and what is Vodafone's role in using and collecting these materials? They also wished to know which form these materials largely occur in, whether they are mostly end products or sub-parts.

The idea of putting a monetary value on environmental impact was also subject to discussion. Some stakeholders asked if impact should be conveyed as a monetary value at all, because details may get lost when everything is reduced to one scale of measurement – ie value in euros. In contrast, other stakeholders in contrast said that monetising makes for better comparisons between indicators because interrelations are made clear.

Also discussed were the positive environmental impacts that could be attributed to Vodafone. Examples are avoided CO2 emissions by services like 'Smart Working', aimed at mobility in the workplace, and M2M (Machine to Machine) solutions. At least part of these impacts can be attributed to Vodafone.

A productive discussion took place regarding the added value of mapping the positive and negative environmental impacts. Vodafone explained why distinguishing between the two is interesting. A lot of focus during the discussion was given to the manner of reporting of these positive and negative impacts. It was suggested that Vodafone should start with describing its own negative impact first, before comparing this to the positive impact Vodafone has on other companies. Transparency was again the key word, with regard to being credible as a company when publishing an E P&L. It was even suggested that the

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company should call the report an impact calculation, rather than an E P&L. Another suggestion was to draw up a CO2 P&L in light of the CO2 impact in the E P&L.

Reporting

As described in the previous paragraphs, the manner of reporting is considered to be very important. The concept of transparency was raised several times, especially referring to clarity and transparency of choices and assumptions during the process. If the final outcome is presented as a single figure (as opposed to a range of values), it should be clarified that an E P&L cannot produce an exact total because it always relies on certain assumptions. A suggestion was made to present Vodafone's negative impact next to its positive impact.

Drawing up a methodology document was considered as valuable by the stakeholders. Stakeholders expect this document to describe the key assumptions that were made, for example how LCA results were interpreted, and whether these results are specific for Vodafone or more general in nature. In short, when it comes to reporting, the stakeholders' main input was that Vodafone should be explicit and transparent in its communications.

Conclusion

The stakeholder dialogue that took place on 21 April 2015, was very useful and worthwhile in Vodafone's view. Several important insights, from different stakeholder angles, were brought to the table and these will help optimise Vodafone's E P&L.