Philips SpeechMike Premium
Environmental Product Declaration (EPD)
self-declared, based on ISO 14025

This declaration intends to inform about the environmental impacts of a Philips SpeechMike Premium over its full life-time, including the total production of the SpeechMike Premium as well as the impacts of the assumed handling of the product after use. The Life Cycle Assessment (LCA) for the SpeechMike Premium has been performed by the ECODESIGN company GmbH - Vienna, Austria. Environmental data from Ecoinvent v3.1 (2015) databases and the impact assessment method ReCiPe v1.12 (2015) and Cumulative Energy Demand v1.09 (2014) have been used for the LCA. The LCA has not been verified by a third party organisation.

SpeechMike Premium

Philips' SpeechMike Premium is a "professional PC-dictation microphone". It is used for recording `spoken notes´ (dictates or "speech files") on a PC where they can be added to dossiers or database files about patients or clients. The recording can be also transformed in text through the use of dictation software. The SpeechMike Premium delivers excellent speech recognition capabilities and refined ergonomics for convenient operation. The SpeechMike Premium product range consists of ten product models grouped in two series, all involving similar materials and processes along their entire life cycles. One series covering five models is equipped with a track ball and grouped under the LFH label. The other series, under the SMP label, also covers five models equipped with a finger print sensor to control the device. The models differ slightly on the design of functions. This document is valid for both all ten models, grouped under the series names LFH and SMP, as shown below.

Push-button operation

Slide switch operation (record, stop, play, rewind)

Slide switch operation (fast forward, play, stop, rewind)

LFH 3500 and LFH 3600 with Barcode scanner

LFH 3510 and LFH 3610 with Barcode scanner

LFH 3520

SMP 3700 and SMP 3800 with Barcode scanner

SMP 3710 and SMP 3810 with Barcode scanner

SMP 3720

The average service life of the SpeechMike Premium is estimated to be 4 years, with 1,000 hours of use per year (4 hours per working day). This accounts for 4,000 hours of operation in on mode. The SpeechMike Premium also has a standby mode, contributing 4 hours per working day, with a total of 4,000 hours in 4 years. This combined active (on) and standby scenario for the product´s use defines the *functional unit* for the Life Cycle Assessment.

Speech Processing Solutions (SPS)

The manufacturer of the Philips SpeechMike Premium for the global market (Europe, the US and Australia) is:

Speech Processing Solutions GmbH
Gutheil Schodergasse 8-12
1102 Vienna, AUSTRIA.

The SpeechMike Premium is assembled in Vienna with parts and components from various parts of the world, e.g., Austria, Central and Eastern Europe, China, and the US.

Speech Processing Solutions GmbH is certified under the ISO 14001 standard for environmental management systems. Accordingly, structural monitoring of environmental performance (e.g., emissions) is established, with programs in place for achieving measurable improvements.

The SpeechMike Premium products fulfil the requirements of the Royal PHILIPS Electronics list of regulated substances, which can be found on the website of PHILIPS[1].

Regulations

WEEE

The SpeechMike Premium is a piece of electronic equipment subject to the European Union (EU) Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE). From 2016, member states must ensure a minimum collection rate of 45 % of the average weight of electric and electronic equipment (EEE) placed on the market in the three preceding years in that Member State. From 2019, the minimum annual collection rate shall be 65 % of the average weight of EEE placed on the market in the three preceding years in the Member State concerned, or alternatively 85 % of WEEE generated on the territory of that Member State. (Directive 2012/19/EU Article 7 p. L197/45).

This Directive further sets out minimum recovery targets for different categories of equipment. The minimum targets from 15 August 2015 onwards for category 5 & 6 (as applicable to the SpeechMike Premium) are: 75 % of the collected weight shall be recovered, and 55 % shall be prepared for re-use and recycled. (Directive 2012/19/EU ANNEX V p. L197/60).

Speech Processing Solutions GmbH supports the set-up of recycling infrastructures together with industry partners, where a common strategy is shared: creating sustainable financing schemes which guarantee the effective and environmentally sound collection and recycling of WEEE.

The member states implement this directive utilizing the 'producer responsibility' principle. Speech Processing Solutions GmbH cooperates with KERP (a partner of iPoint-Systems) to ensure compliance with even the new WEEE Directive as well as with upcoming national laws.

RoHS

The European Directive 2002/95/EC, known as the Restrictions on the use of Hazardous Substances in electronic equipment (RoHS) bans the sale of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl

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[1] http://www.philips.com/b-dam/corporate/about-philips/sustainability/sustainable-planet/green-operations/chemicals-management/rsl.pdf. Last accessed June 2016.

(PBB) and polybrominated diphenyl ether (PBDE) flame retardants. RoHS covers a vast spectrum of products that use electricity, including small and large household appliances, IT and telecommunications equipment, and consumer goods such as radios, TV sets, video cameras, and hi-fi systems.

The new RoHS Directive 2011/65/EU (also known as RoHS II) was published 1st of July 2011 and covers several categories of electrical and electronic equipment including household appliances, IT and consumer equipment, but has been extended to medical devices, monitoring and control instruments, and electric/electronic products not covered under the previous ten categories, unless specifically excluded. Cables and spare parts are also covered by the new Directive, which also introduces new CE marking and declaration of conformity requirements. After January 2013, electronic products bearing the CE marking must meet the requirements of this new directive.

The SpeechMike Premium already complies with RoHS II, as it has a lead free and halogen free printed circuit board, a halogen free housing, and a PVC free cable.

EuP/ErP

The Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy using (EuP) and energy related products (ErP), also known as Ecodesign Directive, defines the principles, conditions, and criteria for setting environmental requirements for energy using and energy related products placed on the market.

Mandatory requirements already exist or are underway for numerous categories of EuP and ErP, and for specific aspects, such as their standby energy consumption.

According to the Commission´s regulation (EC) No 1275/2008 of December 2008 with regard to Ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment, since 2013 the power consumption of equipment in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 0.5 Watt. The Philips SpeechMike Premium products have standby consumption well below this value.

REACH

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals, is also known as REACH. REACH entered into force on 1st of June of 2007, placing greater responsibility on industry to manage the risks that chemicals may pose to the health and the environment, through better and earlier identification of certain chemical substances. This legislation applies to all suppliers that want to sell, import or manufacture chemicals and/or products containing certain chemicals in the European Union.

REACH Article 33 on the "Duty to communicate information on substances in articles" indicates that any supplier of an article containing a substance meeting the criteria in Article 57 and identified in accordance with Article 59(1) in a concentration above 0.1 % weight by weight shall provide the recipient of the article with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name of that substance.

It is known that PVC cables of electric and electronic equipment may contain phthalates, which are substances in the candidate list of REACH. The USB cables, as well as all other components of the SpeechMike Premium are exempt of PVC, therefore compliant with REACH.

Description of the Life Cycle

1. Materials extraction and processing

The SpeechMike Premium is assembled from multiple parts. The extraction of all resources (e.g., metals or oil for plastics), up to the processing of these resources into the materials is covered by this phase of the Life Cycle. The overview with the materials in the SpeechMike Premium is provided in Table 2. Transport from the place of final processing of these materials to the manufacturing site of the SpeechMike Premium has been included in this assessment.

2. Manufacture

This phase of the Life Cycle deals with assembling of the various parts and components into the SpeechMike Premium. It also deals with the assembly of the final product with its accessories and packaging. Manufacturing wastes and their corresponding transport and treatment are included in this stage. Capital goods, such as buildings and machinery, were not included in this assessment.

3. Distribution

This phase includes the transport from the SpeechMike Premium manufacturing site to the consumer markets, considering that 67% of the products are sold in Europe, 26% in the US, 6% in Australia and 1% in other world regions. For the regions outside of Europe, freight transport by airplane is considered as well as road transport by small trucks inland.

4. Product Use

Speech Processing Solutions GmbH indicates that the active use of the SpeechMike Premium corresponds to an average lifetime of 4,000 hours. Additionally, 4,000 hours of standby are considered. The device is connected to a computer using a USB cable. Energy consumption for the use of a computer is not included in this assessment. For more information, see the section "Electricity Use".

5. End of Life

In Europe, the SpeechMike Premium falls under the waste of electric and electronic products Directive (WEEE recast) and is processed accordingly after its end of life. In the US and Australia different programs exist at state or local level to recover IT devices, with different recovery rates. For this assessment a global end of life scenario has been considered, which includes likely treatment options, and a proportion of selected materials to be recycled.

Life Cycle Assessment Methodology and ISO14040

The ISO 14040 series of standards are the main guidelines to perform Life Cycle Assessments, providing careful indications on how to model a Life Cycle and to evaluate impacts. The general steps in an LCA are:

1. Goal and Scoping: defining the product system that will be studied, the methods and the calculation rules that will be used.
2. Inventory: gathering data and calculating inputs and outputs to and from the product system over all the life cycle processes.
3. Impact Assessment: calculating the resulting environmental impact according to specific impact categories for all processes in the life cycle.
4. Interpretation: evaluating the (impact) results for quality and uncertainties in data, the methodological choices (calculation method), and the choices in modelling and analyzing main contributions.

There is no specific product category rule (PCR) for digital recording products. The LCA performed for the SpeechMike Premium followed the guidelines of the ISO 14040 and ISO 14044 standards.

Material Composition of the SpeechMike Premium

The materials listed for the SpeechMike Premium include materials in the dictation microphone, USB cable, microphone holder (hanging bracket), basic accessories like the software CD, user information, as well as the product packaging. The total weight of the SpeechMike Premium dictation microphone in the LFH series with track ball is 200.74 g. The hanging bracket has a weight of 33.36 g, the accessories weigh 98.00 g, and the packaging 117.90 g. This corresponds to a total finished product weight of 450.00 g for the models in the LFH series. The total weight of the SpeechMike Premium dictation microphone in the SMP series with finger print sensor is 193.18 g. The hanging bracket, the accessories and the packaging are identical, while the device itself is 7.56 g lighter. This corresponds to a total finished product weight of 442.44 g in the SMP series, as shown in Table 1.

Table 1 Weight of the Digital SpeechMike Premium products with corresponding accessories and packaging.

	LFH series	SMP series
SpeechMike Premium (with accessories)	200.74 g	193.18 g
Hanging bracket	33.36 g	33.36 g
Operating manual	98.00 g	98.00 g
Packaging	117.90 g	117.90 g
Total weight (incl. packaging)	450.00 g	442.44 g

All relevant materials in the SpeechMike Premium range (SPS, 2012; SPS, 2016) are listed in Table 2:

Table 2 Materials in the SpeechMike Premium range.

Plastics		
Material	LFH series Mass [g]	SMP series Mass [g]
TPE	54.67	54.59
PC-ABS	42.48	42.63
ABS	42.42	42.42
PP	24.46	24.46
PC	19.59	19.20
EPDM	1.65	1.65
PU	1.50	1.50
POM	1.47	1.36
PA 6.6	1.38	1.18
PE	0.11	0.11
PTFE	0.05	0.00
Fleece	0.04	0.04

Metals		
Material	LFH series Mass [g]	SMP series Mass [g]
Cu	28.40	28.40
Niro (1.4310)	7.73	0.58
Steel	5.66	5.66

Others		
Material	LFH series Mass [g]	SMP series Mass [g]
Cardboard (Packaging)	114.40	114.40
Paper (Leaflets and manual)	80.00	80.00
Printed circuit assembly (PCA)	12.00	12.00
Electronic components	8.14	8.41
PE (Packaging film)	3.50	3.50

Hazardous Materials

Printed circuit assemblies (PCA) contain a variety of metals, of which iron, copper, and tin are known to have toxic effects in very high doses. Low amounts of beryllium oxide could be present as well. In the PCA production small amounts of arsine, a gaseous arsenic compound, and dipropylene glycol monomethyl ether might have be used. Both are known to be toxic even in small concentrations. Flame retardants for FR4 laminate materials in PCAs are also of environmental concern, especially for the disposal of the product.

The SpeechMike Premium products do not contain lead or halogen compounds in the PCA and in the housing components, nor do they contain flame retardants. PVC has been eliminated from the USB cable and internal wires. The SpeechMike Premium range is compliant with the RoHS Directive 2011/65/EU.

Primary Energy Demand and Resources Use

One issue of environmental and economic concern is the depletion of resources. The Life Cycle Assessment performed on the SpeechMike Premium provides results on the consumption of selected resources such as metals, fossil fuels, and water, based on the ReCiPe method v1.12 (2015).

The Primary Energy Demand (PED) for the SpeechMike Premium has been calculated with the Cumulative Energy Demand method v1.09 (2014), for renewable and non renewable energy sources (Hischier and Weidema, 2010). Results are presented in Table 3 and Table 4, for all life cycle stages of the product series LFH and SMP, respectively.

Table 3 Primary Energy Demand (PED) and Resources Use for the SpeechMike Premium LFH series (CED 1.09 & ReCiPe v1.12).

Impact category	Total	Materials	Manufacture	Distribution	Product Use	End of Life	Unit
Non renewable (PED)							
Fossil	**106.75**	51.77	5.91	27.60	23.11	-1.65	[MJ eq]
Nuclear	**15.14**	7.60	0.83	-1.37	8.29	-0.22	[MJ eq]
Renewable (PED)							
Hydro	**4.47**	2.24	1.23	0.11	0.99	-0.10	[MJ eq]
Wind, solar, geothermal	**0.93**	0.42	0.10	0.02	0.40	-0.01	[MJ eq]
Biomass	**4.19**	3.42	0.59	0.76	0.63	-1.21	[MJ eq]
Water depletion	**0.05**	3.95E-02	5.02E-03	-1.28E-03	6.70E-03	-2.55E-03	[m^3]
Metal depletion	**2.10**	2.76	0.04	0.01	0.02	-0.72	[kg Fe eq]
Fossil depletion	**2.28**	1.09	0.13	0.59	0.50	-0.04	[kg oil eq]

Table 4 Primary Energy Demand (PED) and Resources Use for the SpeechMike Premium SMP series (CED 1.09 & ReCiPe v1.12).

Impact category	Total	Materials	Manufacture	Distribution	Product Use	End of Life	Unit
Non renewable (PED)							
Fossil	**91.59**	51.60	5.92	27.17	8.56	-1.65	[MJ eq]
Nuclear	**9.88**	7.60	0.83	-1.37	3.04	-0.22	[MJ eq]
Renewable (PED)							
Hydro	**3.85**	2.24	1.23	0.11	0.37	-0.10	[MJ eq]
Wind, solar, geothermal	**0.68**	0.42	0.10	0.02	0.14	-0.01	[MJ eq]
Biomass	**3.79**	3.42	0.59	0.76	0.23	-1.21	[MJ eq]
Water depletion	**0.04**	3.92E-02	5.03E-03	-1.32E-03	2.50E-03	-2.55E-03	[m^3]
Metal depletion	**2.09**	2.76	0.04	0.01	0.01	-0.72	[kg Fe eq]
Fossil depletion	**1.95**	1.09	0.13	0.58	0.19	-0.04	[kg oil eq]

Electricity Use

The Philips SpeechMike Premium LFH series draws a current of 67 mA in active use (On mode, tested by Speech Processing Solutions GmbH) and 90 mA for playback (at 5V). In stop and standby mode the current drawn is 63 mA (at 5V). The SMP series draws a current of 25 mA for recording, and 65 mA for playback (at 5V). In stop and standby mode the current drawn is 20 mA (at 5V).

For both series the energy is provided over the USB cable connected to a computer. It is considered that the computer is already in use. The use of the SpeechMike Premium takes into account 4 hours of active use, and 4 hours of standby during 250 days a year, for 4 years. The result is 4,000 hours of active use (with 70% of time allocated for recording, 20% for stop, and 10% to playback). In addition, the result includes 4,000 hours of standby. The SpeechMike Premium has no "hard switch" to turn the product off, and consequently no off mode energy consumption is present.

The total electricity consumption of the SpeechMike Premium LFH series for 4 years of average lifetime is 2.63 kWh (SPS, 2012). The total electricity consumption of the SpeechMike Premium SMP series is 0.96 kWh for 4 years (SPS, 2016).

Environmental Impacts

The ReCiPe v1.12 (2015) method has been used for this Life Cycle Assessment. ReCiPe translates the inventory data of the examined product system into potential contributions to a number of impact categories, offering results at both the mid-point and end-point level. Each level (mid-point and end-point) contains factors according to three cultural perspectives (Individualist, hierarchist and egalitarian). These perspectives represent a set of choices on issues like time perspective or expectations that proper management or future technology development can avoid future damages (Hischier and Weidema, 2010).

For this assessment the mid-point level impacts and the hierarchist (H) perspective in ReCiPe (based on scientific consensus) have been chosen. Table 5 and Table 6 include the results under three of the 18 mid-point impact categories, for all stages of the SpeechMike Premium.

Table 5 Selected impact categories over all Life Cycle stages of the SpeechMike Premium LFH series, using the ReCiPe v1.12 method (At mid-point level, hierarchist perspective).

LFH range	Total	Materials	Manufacture	Distribution	Product Use	End of Life
Climate change [kg CO_2 eq]	**7.53**	3.52	0.42	1.75	1.59	0.25
Ozone Depletion [kg CFC-11 eq]	**9.29E-07**	4.52E-07	4.16E-08	3.07E-07	1.85E-07	-5.74E-08
Terrestrial acidification [kg SO_2 eq]	**3.08E-02**	2.24E-02	1.19E-03	6.28E-03	5.11E-03	-4.18E-03

Table 6 Selected impact categories over all Life Cycle stages of the SpeechMike Premium SMP series, using the ReCiPe v1.12 method (At mid-point level, hierarchist perspective).

SMP range	Total	Materials	Manufacture	Distribution	Product Use	End of Life
Climate change [kg CO_2 eq]	**6.49**	3.51	0.42	1.72	0.59	0.24
Ozone Depletion [kg CFC-11 eq]	**8.07E-07**	4.53E-07	4.15E-08	3.02E-07	6.88E-08	-5.75E-08
Terrestrial acidification [kg SO_2 eq]	**2.76E-02**	2.25E-02	1.19E-03	6.18E-03	1.91E-03	-4.18E-03

Notes to the tables:
- The materials that leave manufacture as waste stream have been included in this assessment. Data on manufacturing wastes were provided by Speech Processing Solutions GmbH (SPS 2012; SPS 2016).
- Distribution includes inter-continental transport by airplane from Europe to the US and Australia. Road distribution inland is considered with the use of small size trucks. Data on distribution were provided by Speech Processing Solutions GmbH (SPS, 2012; SPS 2016).
- For the use phase a combination of electricity mixes has been used to represent the electricity mix of the EU and of Australia. Data available from Ecoinvent for the US electricity mix has been chosen. The percentages of product distribution in these three different regions were also considered in the use phase.
- Recycling of materials in the product at the End of Life (E-o-L) was taken into account considering percentages of product recovery for three world regions (EU, US, and Australia), with specific rates of recycling for selected materials.

End of Life

The European WEEE Directive prescribes minimum recovery and recycling rates for electronic waste. As such, after its use the material in the SpeechMike Premium products shall go to a separation process where a portion of metals and plastics, as well as packaging materials, are to be recycled. For these selected groups of materials recycling rates were estimated in an overall End of Life scenario, assuming reasonable waste recovery rates for the EU, US, and Australia.

An average transport distance to the disposal facility was included, as well as an estimate of the energy required for recycling selected materials in the products. The waste streams remaining after separation of selected materials were modelled with a separate scenario, combining landfill and municipal waste incineration.

Context for Interpretation

The objective of the sensitivity analysis is to assess the reliability of the results and conclusions, with respect to the uncertainties and the choices of data and calculation approaches. In this assessment, changing the way materials in selected assemblies, the end of life scenario, or the electricity mixes were modelled (e.g. in absence of specific data), may cause variations in the results. Datasets from the Ecoinvent database v3.1 contain uncertainty specified as a log normal distribution.

A Monte Carlo analysis was completed for the SpeechMike Premium products considering a 95% confidence interval. The coefficients of variation for three impact categories of the ReCiPe v1.12 method, for the LFH series are shown in Table 7. The coefficients of variability (CV) are 3.3 % for climate change; 27.2 % for ozone depletion, and 7.1 % for terrestrial acidification.

Table 7 Sensitivity analysis of three impact categories for the SpeechMike Premium LFH series.

Impact category	Mean	Median	Std. Dev.	CV (Coeff. of variation) [%]	2.5%	97.5%	Standard error of mean
Climate change [kg CO_2 eq]	7.54	7.52	0.248	3.29	7.1	8.08	7.84E-03
Ozone Depletion [kg CFC-11 eq]	9.31E-07	8.86E-07	2.53E-07	27.2	5.77E-07	1.58E-06	8.00E-09
Terrestrial acidification [kg SO_2 eq]	3.08E-02	3.06E-02	2.18E-03	7.09	2.70E-02	3.58E-02	6.91E-05

The coefficient of variability (CV) for the same three impact categories in the case of the SMP series are presented in Table 8, showing a CV of 3.6% for climate change; 27.8% for ozone depletion, and 7.2 % for terrestrial acidification.

Assumptions for the modeling of processes within Ecoinvent, as well as assumptions within the characterization of the ReCiPe 2015 v1.12 method were out of the scope of this sensitivity analysis.

Table 8 Sensitivity analysis of three impact categories for the SpeechMike Premium SMP series.

Impact category	Mean	Median	Std. Dev.	CV (Coeff. of variation) [%]	2.5%	97.5%	Standard error of mean
Climate change [kg CO_2 eq]	6.8	6.79	0.243	3.57	6.36	7.32	7.68E-03
Ozone Depletion [kg CFC-11 eq]	8.48E-07	8.01E-07	2.36E-07	27.8	5.49E-07	1.4E-06	7.47E-09
Terrestrial acidification [kg SO_2 eq]	2.98E-02	2.96E-02	2.14E-03	7.19	2.60E-02	3.42E-02	6.77E-05

Product Improvements

The following product improvement efforts have been undertaken by Speech Processing Solutions GmbH in the development of the Philips SpeechMike Premium products:

- Light weight design for the product, accessories, and packaging.
- Energy efficient components for lower energy consumption in active (on) and standby modes.
- Replacement of trackball with finger print sensor, with a significant reduction of the overall energy consumption (over a half).
- Halogen and PVC free USB cable.
- Halogen free dictation microphone housing and all plastic parts.
- Halogen free and lead free printed circuit assembly.
- Brominated flame retardant – free.

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Dates and Updates

The LCA of the Philips SpeechMike Premium product range was completed by the
"ECODESIGN company**"** engineering & management consultancy GmbH in July 2016.
This LCA is based on technical data from Speech Processing Solutions GmbH from October 2012, and
updated data from February 2016.

ECODESIGN company GmbH

The **"ECODESIGN company"** engineering & management consultancy GmbH provides high-level
services in developing and marketing of eco-products. Their services are based on a globally
recognized expertise and knowledge in product related environmental issues together with a strong
international network. Their clients are key industrial players in Europe, Asia and North America.

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