ENVIRONMENTAL PRODUCT DECLARATION

THINAIR® HAND DRYER

EXCEL DRYER

Hand dryers are electric devices used to provide a hygienic and sustainable method to dry hands in public washrooms.

EXCEL

Excel Dryer is a family-run company dedicated to innovation and cutting edge technology backed by handmade quality and personal service.

For more than 50 years, facilities around the world have used Excel's hand dryers to create clean, modern restrooms that set the standard for sustainability and efficiency.

Excel Dryer was the first hand dryer company to commission a peer-reviewed Life Cycle Assessment, become a member of the United States Green Building Council, use third-party testing to prove its products' performance, and manufactures the only hand dryers that are Made In USA Certified®.

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

Environmental Product Declaration

ThinAir® Hand Dryer
Excel Dryer

According to ISO 14025 and EN 15804

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

Program Operator	UL Provided
Declaration Holder	UL Provided
Declaration Number	UL Provided
Declared Product	ThinAir®, a hand dryer from Excel Dryer Inc.
Reference PCR	UL Provided
Date of Issue	UL Provided
Period of Validity	UL Provided
Contents of the Declarations	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	UL Provided UL Provided
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	UL Provided
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	UL Provided
USGBC PCR Guidance Conformant (Enhanced EPD Program)	X YES ☐ NO
Scope of EPD	☐ CRADLE TO GATE ☐ CRADLE TO GATE W/ OPTIONS x CRADLE TO GRAVE
Description of Functional or Declared Unit	The drying of 100,000 hand dryings, to dryness equaling 0.25 grams of residual water or less
Product Reference Service Life	Estimated at ten years at 73,000 uses per year
LCA Software Used and Version Number	SimaPro 8.3 software, developed by PRé Consultants
Age of Primary Data Used	One year
Impact Assessment Method(s) and Version Number	TRACI 2.1 (v1.03) and IPCC 2013 GWP 100a (v1.02)
Generic LCI Datasets Used and Version Number	ecoinvent database v3.3 recycled content allocation (SCLCI 2016)
% Primary and % Secondary Data Used	69% primary and 31% secondary

Product Definition and Information

Product Description

The ThinAir® Hand Dryer (TA-ABS, 120V, 60Hz and TA-ABSV, 230V, 50Hz) is a high-efficiency hand dryer model, surface-mounted and ADA-compliant. Facilities around the world use Excel hand dryers to save time, money, and the environment while creating a cleaner, more hygienic restroom.

Different models vary by cover type (ABS polymer or stainless steel), voltage, and accessories available. The results presented in this EPD are based on the ABS polymer cover model (most representative in terms of sales) but they also reflect the stainless-steel cover model (the cover choice does not influence the results more than 1%). This EPD presents results for two voltage models:120V (most common for North America market) and 230V (most common for international markets). These two models are similar, except for the use stage, in that the different voltage results in different dry time and power demand. Results presented here are shown separately, when relevant, for these product models without additional accessories.

Excel Dryer, Inc. is a family owned and operated business, acquired by the current owner, Denis Gagnon, in 1997. Excel Dryer manufactures hand dryers that are Made In USA Certified® and makes every effort to locally source materials.

Application

The purpose of this product is to dry hands. While it is possible that the system has secondary functions, such as hygiene, reduction of cost, maintenance and waste, for purposes of the present study it is assumed that any other functions are equivalent among different systems and that the systems can be evenly compared on the basis of the hand-drying function alone.

Dry time (average for 120V model): 14 seconds. Dry time and energy use testing performed by SGS International on standard ThinAir® Hand Dryer to 0.25g or less of residual moisture, pursuant to the UL Environment Global Product Category Rules (PCR) for Hand Dryers.

Dry time (average for 230V model): 13 seconds. Dry time and energy use testing performed by SGS International on standard ThinAir® Hand Dryer to 0.25g or less of residual moisture, pursuant to the UL Environment Global Product Category Rules (PCR) for Hand Dryers.

Dry time, power, and energy consumption are based on average test results conducted by SGS in 2016 and are pursuant to the UL Environmental Global PCR (ULE 2016).

Product Specification

Product Specifications	Value
Width	9 $^{5/32}$" (233 mm)
Height	13 $^{15/16}$" (354 mm)
Depth	4" (102 mm)
Weight	5.26 lbs. (2.39 kg)

Volts	Amps	Watts	No Heat Amps	No Heat Watts	Hertz
120V	7.7A	915W	3.2A	390W	60Hz
230V	3.9A	890W	1.7A	375W	50Hz

	120 V	230 V
Average dry time (s)	13.926	12.638
Average run-on time per use (s)	1.12	1.09
Average operation mode power consumption (VA)	877.827	901.252
Average operation energy consumption per use	3.670 Wh = 0.013212 MJ	3.436 Wh = 0.0123696 MJ
Average standby mode power consumption (VA)	3.76	10.22

Technical Information

Construction:

All covers will be fastened to a base plate by one chrome plated tamper-proof bolt.

Cover shall be composed of:

- ABS – White polymer with SanaFor™ antimicrobial additive.
- SB – Brushed Stainless Steel.

Base plate shall be equipped with (3) 7/8" (22 mm) diameter knockouts, one of which is located on the right side and suitable for use with surface conduit.

All internal parts shall be coated per Underwriters' Laboratories, Inc. requirements.

Entire mechanism shall be internally grounded, per UL requirements, as well as per CE specifically for the 230V model.

Options:

89W (White), 89B (Black), 89S (Brushed Stainless Steel)

Mechanism:

Motor shall be a thermally protected, series commutated, through-flow discharge vacuum motor/blower (~½ hp / high-30,000 rpm, low-20,000 rpm) which provides air velocity of up to 16,000 LFM (linear feet per minute) at the air outlet. Includes a washable metal mesh filter for more reliable performance.

Heating element (550 W) is constructed of Nichrome wire and mounted inside the blower housing behind air baffle, thereby being vandal resistant. It shall be protected by an automatic resetting thermostat, which shall open whenever air flow is cut off and shall close when flow of air is resumed. It shall produce an air temperature of up to 141°F (61°C) at a 72°F (22°C) ambient room temperature at the outlet and 101°F (38°C) at the hands (4 inches [102 mm] below air outlet).Control assembly is activated by an infrared optical sensor located next to the air outlet. The dryer shall operate as long as hands are under the air outlet. Control includes a speed and sound control mechanism, adjustable heat control with High, Medium, Low and Off settings and a filter sensor which is activated should the filter become clogged. There is a 35-second lockout feature if hands are not removed. Sensor equipped with externally visible Red LED light that flashes error codes to assist in troubleshooting.

Raw material Supply and Manufacturing

Includes the processing and assembly of materials into finished hand-dryer products. Energy and ancillary materials required to manufacture dryers are included. Manufacturing takes place in the US in Massachusetts.

Product components are as follow:

Product Component	Weight (grams)	Percentage
ABS	1516.2	63.4%
Aluminum	146.7	6.1%
Copper	165.8	6.9%
Electronics (Non-PCB/IC)	1.9	0.1%
Glass reinforced resin	99.1	4.1%
IC on PCB, logic	0.3	0.0%
Iron	192	8.0%
LDPE	0.5	0.0%
Mica	15.2	0.6%
Paper	1.2	0.1%
PVC	4.2	0.2%
PCB (SM variety)	44.2	1.8%
Polyurethane foam	7.3	0.3%
Rubber	54.3	2.3%
SS	10.7	0.4%
Steel	132.6	5.5%

Packaging component	Weight (grams)	Percentage
Cardboard	689	76.7%
LDPE	19.7	2.2%
Molded pulp	180	20.0%
Paper	9.5	1.1%

Components were assumed to come 75% from the US and 25% from China.

Environmental and Health During Manufacturing

Excel Dryer believes in green technology and doing everything possible to reduce the carbon footprint and promote sustainability. Excel Dryer's products help others qualify for LEED credits, Green Globes and other green certifications. The manufacturer also employs environmentally responsible practices in the Excel Dryer offices, which have achieved LEED Gold certification.

Safety is of the utmost importance at Excel Dryer; there exist on file Material Safety Data Sheets (MSDS) for all plating materials, cleaning, lubricating and maintenance supplies. All waste including plastic, metal, paper, cardboard is recycled with some being returned for re-use; cardboard is sent to the company that produces cartons for Excel Dryer. In addition, environmentally safe janitorial cleaning supplies are used including trash bags and paper towels made from recycled materials.

Additionally, all employees are properly trained in their jobs to perform duties without incident and are overseen by an in-house safety department. Licensed employees remain in good standing with ongoing training opportunities. Work areas have special mats and lift equipment to make them ergonomically comforting.

Product Installation

The ThinAir® Hand Dryer is an electrical product. For proper electrical connections, local building codes should be consulted and the unit should be installed by a qualified, licensed electrician. Full installation instructions are available in the user's manual, found here: http://www.exceldryer.com/wp-content/uploads/2016/12/Excel-2017-ThinAir-Manual.pdf.

Environmental and Health during Use Stage

The ThinAir® Hand Dryer follows the required safety standards for the USA and Canada UL 499 Standard for Safety – Electric Heating Appliances and CE IEC 60335-2-23.

Reference Service Life

The estimated reference service life is 730,000 uses, equivalent to ten years at 73,000 uses per year.

Further Information

Excel Dryer
357 Chestnut Street
East Longmeadow, MA 01028
http://www.exceldryer.com

Life Cycle Assessment

Functional Unit

The functional unit used for the study was "The drying of 100,000 hand dryings, to dryness equaling 0.25 grams of residual water or less" (ULE 2016).

System Boundary

PRODUCT STAGE			INSTALLATION STAGE		USE STAGE			END OF LIFE STAGE			
Raw material supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance & Repair	Replacement	Removal	Transport	Waste processing	Disposal
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**C1**	**C2**	**C3**	**C4**
X	X	X	X	MND	X	X	X	MND	X	X	X

Modules B2 and B3 were considered to have zero impact and are therefore not shown in the results of this EPD. In the case of B2, the cleaning process involves blowing dust off the product and wiping down the cover as needed. These activities are expected to be inconsequential in the life cycle of the product system and therefore maintenance impacts are excluded. In the case of B3, maintenance is not relevant because the functional unit is shorter than the predicted reference service life (RSL), which is the cycles of operation over the estimated service life (ESL).

Study Information

Excel Dryer has commissioned Quantis to carry out an LCA of its top selling high-speed energy efficient hand dryers. The LCAs were used to develop an environmental product declaration (EPD) for each hand dryer, conforming to ULE Product Category Rules (PCR) for Hand Dryers (ULE 2016). Quantis Project Manager for this project was Melissa Zgola (melissa.zgola@quantis-intl.com), Excel Dryer contact is William Gagnon, Vice President of Marketing and Sales (bgagnon@exceldryer.com), and the verifier from UL Environment is Wade Stout, EPD Project Manager at UL Environment (Wade.Stout@ul.com).

SimaPro 8.3 software, developed by PRé Consultants was used to assist the LCA modeling, link the reference flows with the LCI database, and compute the complete LCI of the systems. For this project, life cycle unit process data is sourced from the ecoinvent database v3.3 recycled content allocation (SCLCI 2016). The ecoinvent database is the main source for secondary LCI data, most notably the electronics component and device LCI (Hischier, Classen, Lehman and Scharnhorst 2007). The study accepts the allocation method used by ecoinvent v3.3 with recycled content allocation for those processes, which is in alignment with the PCR.

Exclusions and Cut-off Criteria

Several items are excluded from the foreground life cycle inventories used in the LCA:

- Capital equipment and infrastructure. These are expected to contribute negligibly (<1%) to the total impact of the hand dryer life cycle given the dominance of the use stage in the life cycle of a hand dryer;
- Seal stickers on primary and secondary packaging;
- Glues, laminates, and other coatings on packaging;
- Ink used to print on the products or packaging;
- Tertiary packaging, such as pallets;
- Handling of products at departure and arrival airports (such as quality testing);

- Storage and handling of products at distribution centers and at retail.

Allocation

A common methodological decision point in LCA occurs when the system being studied is directly connected to a past or future system, or produces co-products. When systems are linked in this manner, the boundaries of the system of interest must be widened to include the adjoining system, or the impacts of the linking items must be distributed—or allocated—across the systems. While there is no clear scientific consensus regarding an optimal method for handling this in all cases (Reap et al. 2008), many possible approaches have been developed, and each may have a greater level of appropriateness in certain circumstances.

ISO 14044 prioritizes the methodologies related to applying allocation. It is best to avoid allocation through system subdivision or expansion. If that is not possible, then one should perform allocation using an underlying physical relationship. If using a physical relationship is not possible or does not makes sense, then one can use another relationship.

Comparability

Environmental declarations from different programs may not be comparable. The comparison of the environmental performance of hand dryers using the EPD information shall be based on the product's use in and its impacts, and shall consider the complete life cycle.

Full conformance with the PCR for Hand Dryers ensures EPD comparability when all stages of a product's life cycle have been duly considered; however, variations and deviations are possible.

EPD applicability and Date and Validity of Declaration

This EPD applies to the North America region. The LCIs assembled through this study and impacts estimated by the LCAs represent those for Excel hand dryers produced in the US in 2015 and 2016. Data and assumptions reflect equipment, processes and market conditions for those years.

Life Cycle Flow Diagram

The study included all life cycle stages of HSEE dryers, from cradle to grave (extraction and processing of all raw materials through the end-of-life of all components).

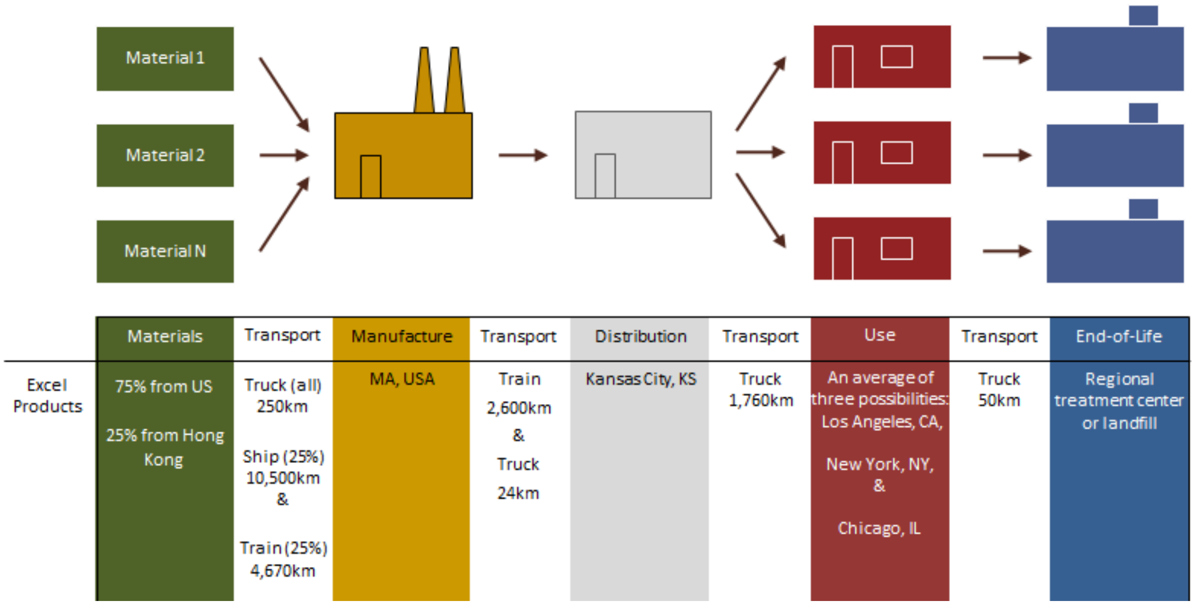

Figure 1. Diagram of life cycle system boundary for the hand dryer systems.

All materials processing is assumed to occur in China or in the US. It is assumed that 75% of materials are sourced from the US and 25% are sourced from Hong Kong (NPR 2013). Excel's products are manufactured in MA, US. The finished products are then transported to one or more distribution centers, for which there is a lack of data. It is assumed that a single distribution center is located in Kansas City, KS. To arrive at the user, it is assumed that the finished product travels by truck 1,760 km, which is the average driving distance from Kansas City to Los Angeles, New York, and Chicago, which are three potential cities where users are located around the US.

In alignment with the hand dryer PCR (ULE 2016), recycling and recycled was modelled using the "cut-off" approach (Ekvall and Tillman 1997), which is represented in Figure 2. Use of the cut-off approach entails modeling input materials at the beginning of the system life cycle as a combination of virgin and secondary, depending on the average recycled content rate of a material in the relevant market.

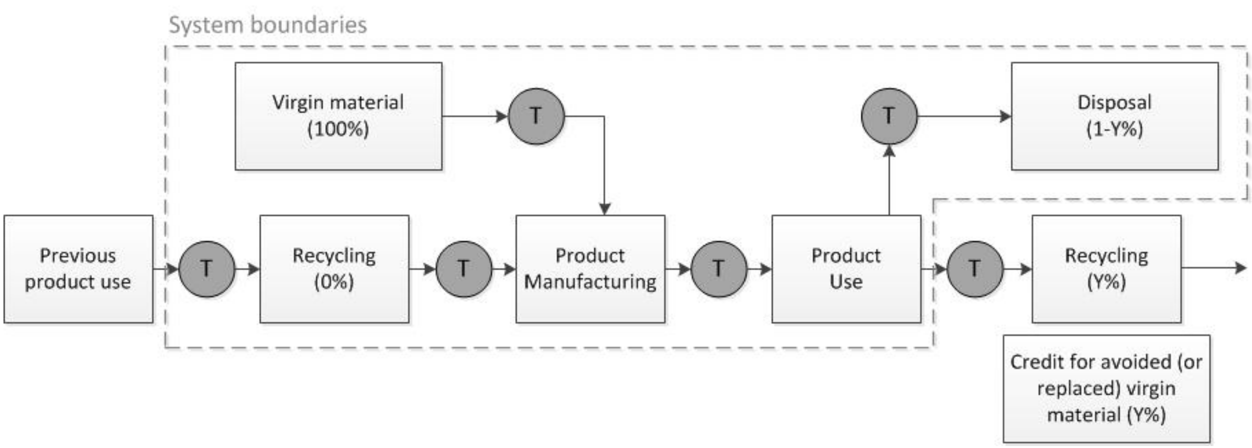

Figure 2. Graphic representation of cut-off allocation methodology

LCA Results

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT- 120V

Parameter	Unit	A1-A3	A4	B1	C2	C4
Global warming potential	kg CO_2 eq	5.75E+00	1.78E-01	2.85E+02	3.56E-03	3.55E-01
Ozone depletion potential (stratospheric)	kg CFC-11 eq	8.65E-07	3.78E-08	3.00E-05	8.50E-10	1.11E-08
Acidification potential (land and water)	kg SO_2 eq	3.53E-02	1.36E-03	1.07E+00	2.12E-05	4.83E-04
Eutrophication potential	kg N eq	3.74E-02	3.06E-04	2.33E+00	4.52E-06	2.93E-03
Photochemical oxidant creation potential	kg O_3 eq	2.47E-01	3.18E-02	7.31E+00	5.53E-04	6.53E-03
Abiotic resource depletion of non-renewable (fossil) energy resources	MJ surplus	1.09E+01	3.38E-01	2.15E+02	7.60E-03	1.57E-01

RESULTS OF THE LCA – RESOURCE USE – 120V

Parameter	Unit	A1-A3	A4	B1	C2	C4
Renewable primary energy as energy carrier	MJ	7.81E+00	2.21E-02	2.51E+02	7.24E-04	7.04E-01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	7.81E+00	2.21E-02	2.51E+02	7.24E-04	7.04E-01
Non-renewable primary energy as energy carrier	MJ	7.70E+01	1.86E+00	4.64E+03	5.70E-02	1.40E+00
Non-renewable primary energy as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	7.70E+01	1.86E+00	4.64E+03	5.70E-02	1.40E+00
Use of net fresh water	m³	6.93E-02	3.50E-04	1.33E+00	1.09E-05	8.17E-04
Parameter	Unit	A1-A3	A4	B1	C2	C4
Hazardous waste disposed	kg	n/a	n/a	n/a	n/a	n/a
Non-hazardous waste disposed	kg	0.574	n/a	n/a	n/a	3.290
Radioactive waste disposed	kg	n/a	n/a	n/a	n/a	n/a
Components for re-use	kg	n/a	n/a	n/a	n/a	n/a
Materials for recycling	kg	0.572	n/a	n/a	n/a	0.431
Materials for energy recovery	kg	0.000419	n/a	n/a	n/a	0.426
Exported electrical energy	MJ	n/a	n/a	n/a	n/a	n/a
Exported thermal energy	MJ	n/a	n/a	n/a	n/a	n/a

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT- 230V

Parameter	Unit	A1-A3	A4	B2	C3	C4
Global warming potential	kg CO_2 eq	5.75E+00	1.78E-01	3.21E+02	3.56E-03	3.55E-01
Ozone depletion potential (stratospheric)	kg CFC-11 eq	8.65E-07	3.78E-08	3.38E-05	8.50E-10	1.11E-08
Acidification potential (land and water)	kg SO_2 eq	3.53E-02	1.36E-03	1.20E+00	2.12E-05	4.83E-04
Eutrophication potential	kg N eq	3.74E-02	3.06E-04	2.62E+00	4.52E-06	2.93E-03
Photochemical oxidant creation potential	kg O_3 eq	2.47E-01	3.18E-02	8.23E+00	5.53E-04	6.53E-03
Abiotic resource depletion of non-renewable (fossil) energy resources	MJ surplus	1.09E+01	3.38E-01	2.43E+02	7.60E-03	1.57E-01

RESULTS OF THE LCA – RESOURCE USE – 230V

Parameter	Unit	A1-A3	A4	B1	C2	C4
Renewable primary energy as energy carrier	MJ	7.81E+00	2.21E-02	2.83E+02	7.24E-04	7.04E-01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	7.81E+00	2.21E-02	2.83E+02	7.24E-04	7.04E-01
Non-renewable primary energy as energy carrier	MJ	7.70E+01	1.86E+00	5.22E+03	5.70E-02	1.40E+00
Non-renewable primary energy as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	7.70E+01	1.86E+00	5.22E+03	5.70E-02	1.40E+00
Use of net fresh water	m^3	6.93E-02	3.50E-04	1.50E+00	1.09E-05	8.17E-04

Parameter	Unit	A1-A3	A4	B1	C2	C4
Hazardous waste disposed	kg	n/a	n/a	n/a	n/a	n/a
Non-hazardous waste disposed	kg	0.574	n/a	n/a	n/a	3.290
Radioactive waste disposed	kg	n/a	n/a	n/a	n/a	n/a
Components for re-use	kg	n/a	n/a	n/a	n/a	n/a
Materials for recycling	kg	0.572	n/a	n/a	n/a	0.431
Materials for energy recovery	kg	0.000419	n/a	n/a	n/a	0.426
Exported electrical energy	MJ	n/a	n/a	n/a	n/a	n/a
Exported thermal energy	MJ	n/a	n/a	n/a	n/a	n/a

SENSITIVITY OF RESULTS TO ALTERNATIVE COVER OPTION

The ThinAir® Hand Dryer is available in a stainless steel cover option in addition to the ABS cover option analyzed here. To test the sensitivity of the analysis results to the choice of cover, the analysis was performed with the stainless steel option. The results for the stainless steel option were within 1% of the results for the ABS model and therefore this EPD is valid for both cover options.

Interpretation

The findings of this project highlight the dominance of the use stage in the life cycles of the ThinAir® Hand Dryer. Key activities driving use stage emissions include dry time, power demand and electricity fuel grid mix, all of which offer opportunities to reduce emissions. For instance,

- Consumers may try to minimize the time spent drying hands and use low heat settings, if available,
- The manufacturer may consider opportunities to lower power demand through technology and design improvements,
- Customers may explore the possibility of rendering their electricity fuel mix less polluting by opting into low-carbon fuel sources through their utility or through direct service agreements with energy producers.

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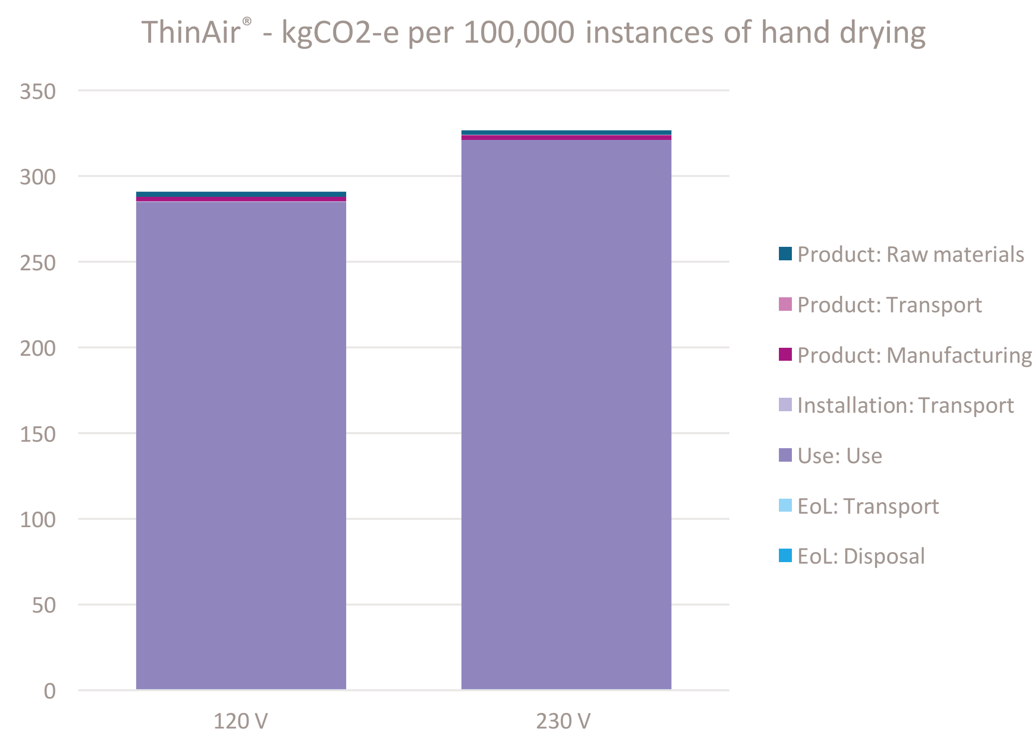
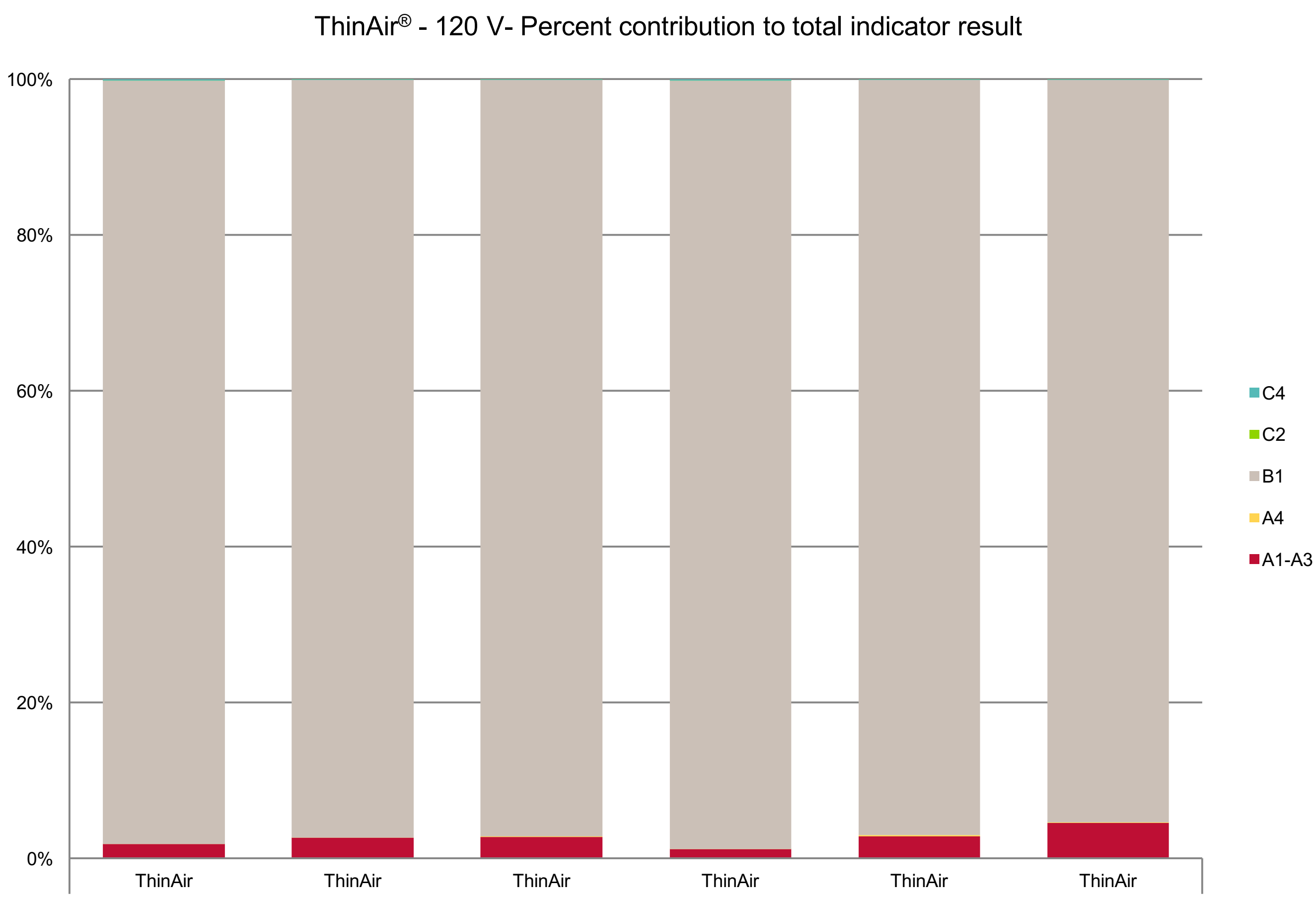
Graphs


ThinAir® - kgCO2-e per 100,000 instances of hand drying
350
300
250
200
150
100
50
0
120 V
230 V
Product: Raw materials
Product: Transport
Product: Manufacturing
Installation: Transport
Use: Use
EoL: Transport
EoL: Disposal


ThinAir® - 120 V- Percent contribution to total indicator result
100%
80%
60%
40%
20%
0%
ThinAir
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ThinAir
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C4
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B1
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