

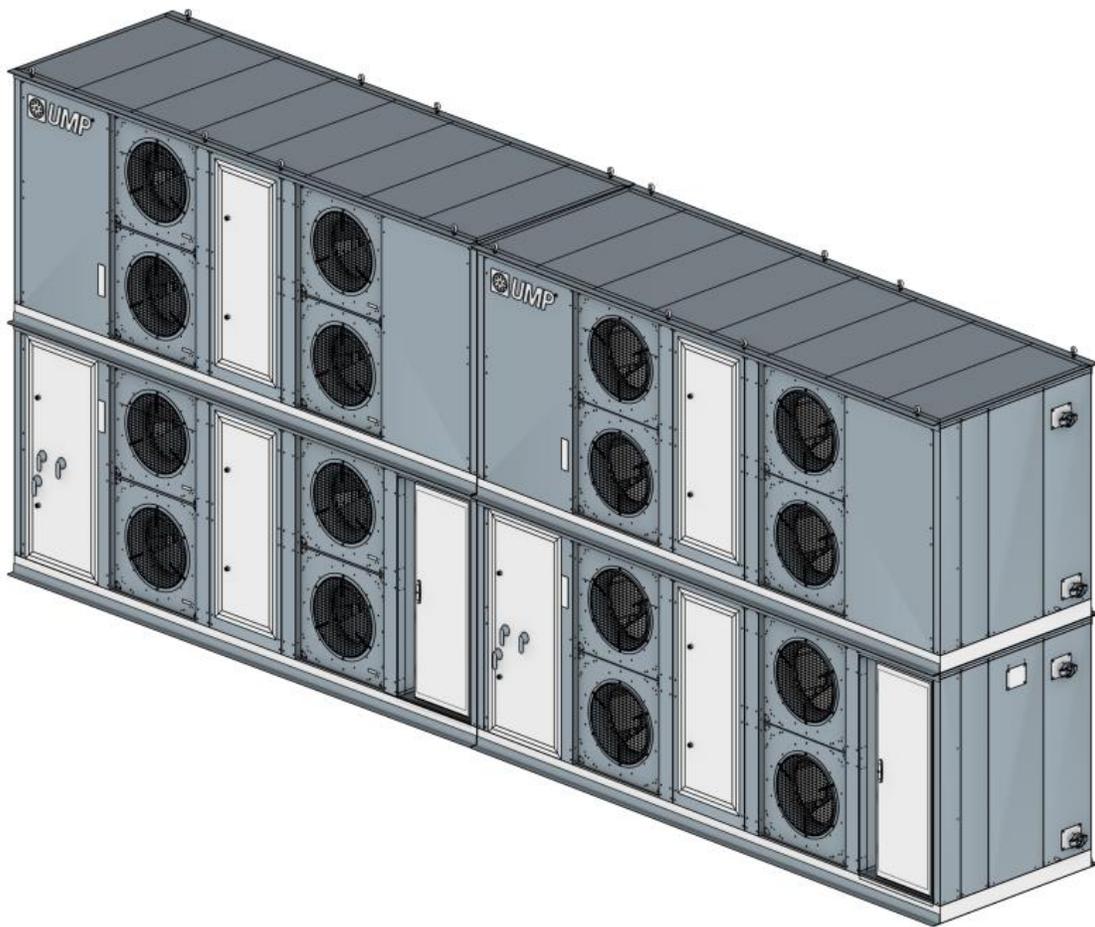
Environmental Product Declaration

According to ISO 14025:2006 and ISO 21930:2017



UMP[®]

Modular fan coil wall unit manufactured in Tempe, AZ



Environmental Product Declaration

According to ISO 14025:2006 and ISO 21930:2017



EPD Owner	United Metal Products® 1920 E. Broadway Road Tempe, AZ 85282 https://unitedmetal.com/	
Product Group	Modular fan coil wall	
Product Group Definition	A modular fan coil wall is a high-capacity air conditioning unit that floods a space with recirculated air from the room perimeter.	
Product Applicability	The modular fan coil wall addressed in this EPD is generally intended for data center applications.	
Production Location	1920 E Encanto Dr Tempe, AZ 85281	
Markets of Applicability	United States	
Period of reported foreground data	2021-2022	
Program Operator	ASTM International 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428-2959, USA https://www.astm.org/	
	For any explanatory material regarding this EPD, please contact the program operator. Note: The Project Report is not part of public communication).	
General Program Instructions	ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20 [3]	
Product Category Rules (PCR)	ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services [1]	
Declaration Type	Company- and facility-specific “cradle-to-gate” Type III environmental declaration (modules A1 to A3); reference service life n/a.	
Date of Issue	13/12/2024	
Period of Validity	5 years	
Declaration Number	EPD 800	
LCA Report Prepared By	Athena Sustainable Materials Institute 280 Albert Street, Suite 404 Ottawa, Ontario, Canada K1P 5G8 www.athenasmi.org	
Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006 [4]		
<u>Internal</u>	<u>External</u>	
	X	
Third party verifier: Thomas P. Gloria, Ph. D. Industrial Ecology Consultants		

United Metal Products

Founded in 1978, UMP® is the leading manufacturer of custom air handlers, outside air energy recovery, large-scale computer room air handling units (CRAHs), customized closed loop systems, and evaporative cooling solutions for data centers and all types of large-scale facilities. With a proven track record of excellence, UMP® is committed to providing the highest quality products and outstanding customer service. Our innovative solutions have been installed in facilities worldwide, including Latin America, the Middle East, and throughout the United States. We take pride in developing cutting-edge solutions to meet the specific needs of our customers. Our team of experts will work with you to design and customize air handlers that perfectly match your requirements. We believe in maintaining the highest standards of quality and are constantly pushing the boundaries of what's possible. At UMP®, we understand that exceptional customer service is just as important as the quality of our products. Our commitment to providing outstanding customer service has earned us a reputation as a trusted and reliable partner for businesses of all sizes.

Product Identification

The FCU unit as modeled (see Figure 1) is a modular fan coil wall that is comprised of four fan coil modules (two stacks of two modules with specific configurations for a bottom left, bottom right, top left, and top right) for the purpose of data center heat rejection. The total nominal capacity of the four combined modules is approximately 1000kW at central plant conditions typical of a chilled water application. The unit is designed for an indoor application that floods the data center space with recirculated conditioned air from the room perimeter. It functions as a cooling only unit, with no ability to heat or humidify. The electronically commutated fan assemblies provide the highest level of air movement efficiency. For optimal safety, the FCU is constructed, and ETL listed, to the UL 1995 standard. The electrical panel is UL listed to the UL 508a standard. Fan air performance is rated per ISO 5801 and DIN 24163. Coil performance is rated per ARI standard 410.

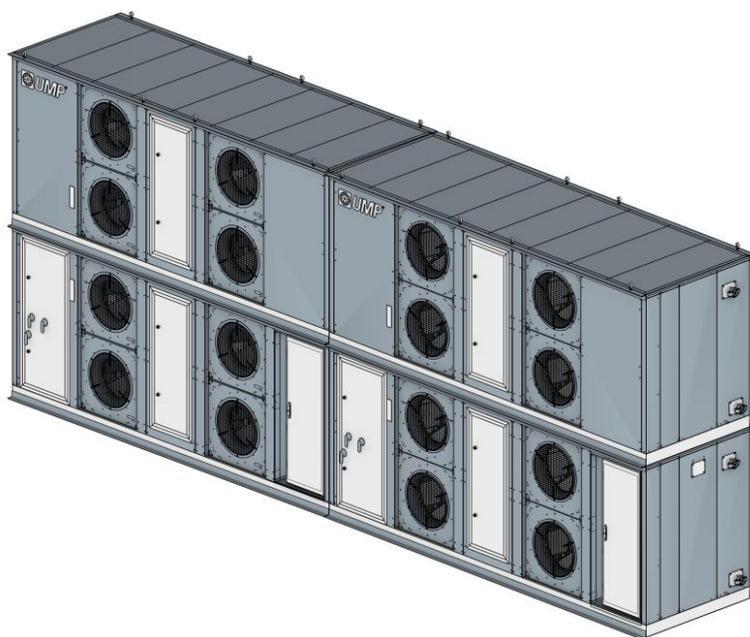


Figure 1: Rendering of a United Metal Products FCU



Declared Unit

The declared unit is the basic reference flow for the assessed products. The modular fan coil wall covered by this EPD has its own unique declared unit – see Table 1.

Table 1: Declared unit of UMP FCU

Declared unit	Mass (kg/unit)
1 FCU	11,306

Material Composition

The bill of materials of the FCU is comprised of over 200 different types of components – these were classified into input flows that broadly represent product type and processing prior to arriving at the Tempe, AZ facility. The resulting material compositions (in %) are provided in Table 2.

Table 2: Material composition of the declared product

Product flow	% unit mass
Aluminum, sheet product	1.7%
Chilled Water Coil	23.9%
Control Panel, type 1	0.5%
Control Panel, type 2	2.2%
Control Valve	0.9%
Electrical Cable	0.4%
Fan Assembly	19.6%
Fiberglass, batt	0.1%
Steel, black, plate	1.3%
Steel, galvanized, section	2.6%
Steel, galvanized, sheet	45.7%
Steel, zinc-plated, fastener/connector	0.7%
Other components, each contributing <0.1%	0.4%

System Boundary

The system boundary of this EPD is the Production Stage per ISO 21930 [1], i.e., “cradle-to-gate”, which includes the modules *A1 Extraction and upstream production*, *A2 Transport to factory*, and *A3 Manufacturing*. Construction, Use, and End-of-Life stages, and optional supplementary module D are excluded from the system boundary.

See Figure 2 for a schematic of the product system and the key input and output flows considered in analysis. Cut-off criteria as per ISO 21930, 7.1.8 were followed for this LCA – all input/output data collected at the Tempe, AZ facility was included in the life cycle inventory (LCI) modelling. The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the LCI. None of the inputs/outputs was knowingly excluded from the system boundary.

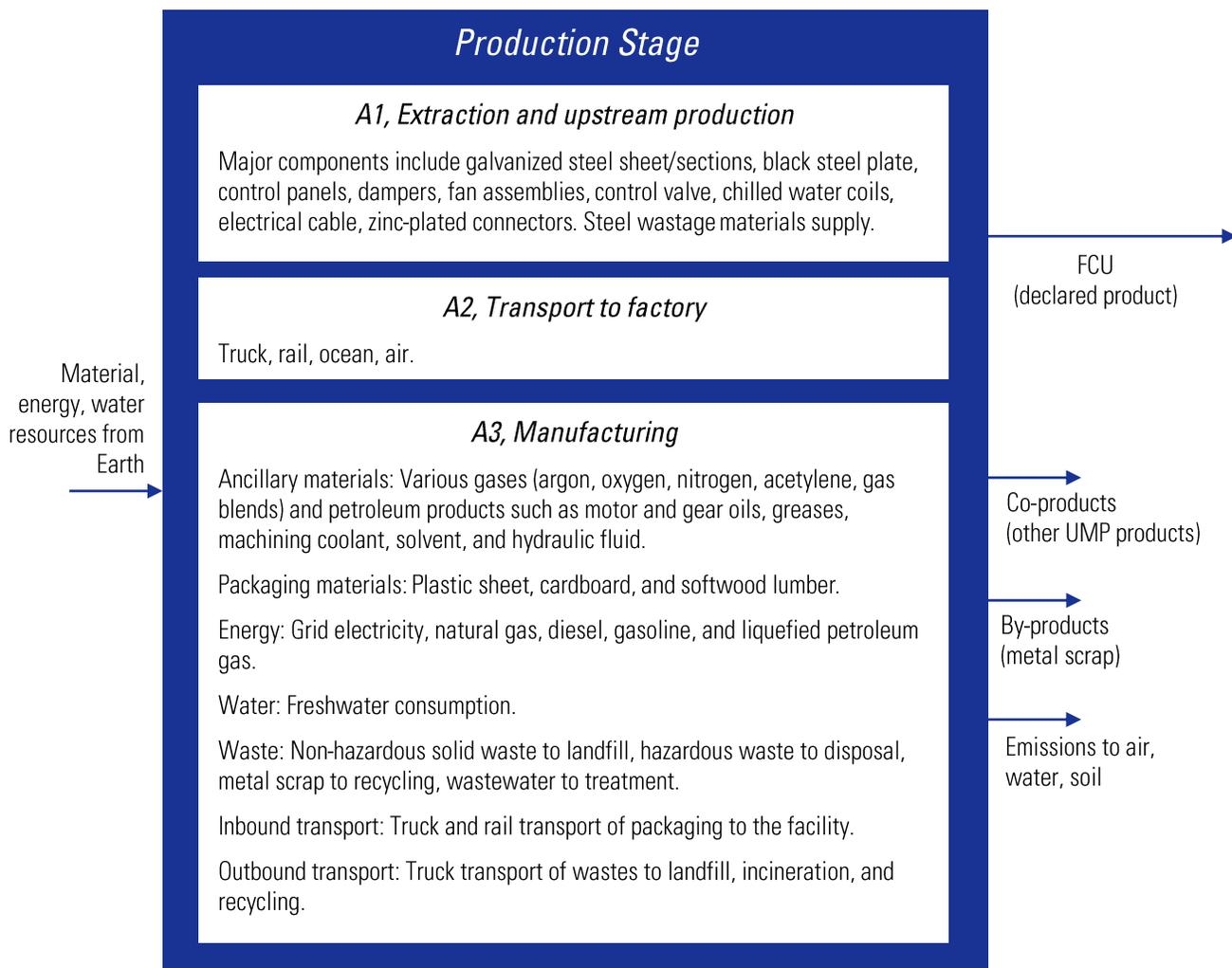


Figure 2: System boundary of the UMP FCU, with key inputs and outputs



Life Cycle Assessment Model

LCI data collection was based on a customized survey which covered foreground data of the Tempe, AZ facility for the July 2021-June 2022 reference period (12 consecutive months)— see Table 3 for a summary of data sources. Data calculation procedures follow ISO 14044 [2] and ISO 21930 [1].

Table 3: Foreground data sources summary

Type of Source	Applicability
Direct: Based on measurements or purchasing/selling records of the surveyed facilities.	<ul style="list-style-type: none"> – A1 HVAC unit component quantities from bills of materials, A1 steel waste amounts. – A2, A3 inbound/outbound transport distances and modes. – A3 energy and water use. – A3 packaging quantities, and ancillary materials and waste amounts not noted as coming from estimation.
Indirect: Based on calculations made by the personnel of the surveyed facilities and/or Athena.	<ul style="list-style-type: none"> – A1, A3: some HVAC unit component and packaging quantities were converted to kilograms with unit masses from product literature.
Estimated: Based on the industry average data and/or expert judgment.	<ul style="list-style-type: none"> – A3: some ancillary materials (mastics, sealants, motor and gear oils, greases, machining coolant) and waste (cardboard, to recycling and wastewater, to municipal sewer) amounts were estimated.

The life cycle modeling was performed using SimaPro v9.5.0.2, 2024 [5]. Regionally relevant environmental product declarations and LCAs of major material contributors were used as background data, where available [8]-[17]. All other background datasets for upstream, core, and downstream material and processes come from the ecoinvent v3.9.1, 2024 database [6] and the U.S. LCI Database, 2015 [7]. Some of the components required estimations of material composition, taken from literature or via expert judgement.

The allocation rules in general conform to ISO 14044, Clauses 4.3.4.1 and 4.3.4.2, and ISO 21930, 7.2.5 Allocation for co-products. The Tempe, AZ manufacturing facility produces various HVAC units and as such allocation was necessary. “Mass” was used as the physical parameter for allocating flows between the products of interest and other co-products to calculate the input energy flows (electricity, and natural gas), ancillary materials used at the facility, total water consumption, process emissions to air and water and waste flows.

Environmental Indicator Results

The environmental indicator results covered by this EPD, and the methods used to calculate them are summarized in Table 4. Table 5 then presents results for the FCU.

The following ISO 14025 [4] and ISO 21930 [1] statements indicate the EPD comparability limitations and intend to avoid any market distortions or misinterpretation of EPDs.

- Environmental declarations from different programs may not be comparable [4].
- Only EPDs prepared from cradle-to-grave life cycle results and based on the same function, Reference Service Life, quantified by the same functional unit, and meeting all the conditions for comparability listed in ISO 14025:2006 and ISO 21930:2017 can be used to comparison between products.

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Table 4: Environmental indicators reported in the EPD

Environmental Indicator	Unit	Calculation of Results
Core mandatory impact indicators		
GWP: Global warming potential	kg CO ₂ eq.	Calculated from the LCI per TRACI 2.1 v1.05 [5], updated with IPCC 2013 AR5 [19], and from EPD results. 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report.
ODP: Depletion potential of the stratospheric ozone layer	kg CFC-11 eq.	Calculated from the LCI per TRACI 2.1 v1.05 and from EPD results.
AP: Acidification potential	kg SO ₂ eq.	Calculated from the LCI per TRACI 2.1 v1.05 and from EPD results.
EP: Eutrophication potential	kg N eq.	
SFP: Smog formation potential	kg O ₃ eq.	
Indicators describing use of primary resources		
RPR _E : Renewable primary resources used as energy carrier (fuel)	MJ, LHV	Calculated from the LCI per Cumulative Energy Demand, LHV (NCV) v1.0 [5] and from EPD results.
RPR _M : Renewable primary resources with energy content used as material	MJ, LHV	Calculated from the LCI per ACLCA ISO 21930 Guidance [18]. Packaging not included.
NRPR _E : Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	Calculated from the LCI per Cumulative Energy Demand, LHV (NCV) v1.0 [5] and from EPD results.
NRPR _M : Non-renewable primary resources with energy content used as material	MJ, LHV	Calculated from the LCI per ACLCA ISO 21930 Guidance (plastic components only). Net calorific values (MJ/kg) come from Walters et al [20].
Indicators describing use of secondary resources		
SM: Secondary materials	kg	Calculated from the LCI and from EPD results per ACLCA ISO 21930 Guidance. LCI data gaps filled with information from relevant EPDs. Packaging not considered.
RSF: Renewable secondary fuels	MJ, LHV	Calculated from the LCI and from EPD results per ACLCA ISO 21930 Guidance.
NRSF: Non-renewable secondary fuels	MJ, LHV	
RE: Recovered energy	MJ, LHV	
Mandatory inventory parameters		
FW: Consumption of freshwater	m ³	Calculated from the LCI per RECIPE H v1.08 [5] and from EPD results.
ADP _f : Abiotic depletion potential, fossil	MJ, LHV	Calculated from the LCI per CML-IA Baseline v3.09 [5] and from EPD results.
Indicators describing waste		
HWD: Hazardous waste disposed	kg	Calculated as the sum of relevant LCI flows and from EPD results.
NHWD: Non-hazardous waste disposed	kg	
HLRW: High level radioactive waste, conditioned, to final repository	m ³	
ILLRW: Intermediate and low level radioactive waste, conditioned, to final repository	m ³	
Output Flows		
CRU: Components for re-use	kg	Calculated from the LCI and from EPD results per ACLCA ISO 21930 Guidance.
MR: Materials for recycling	kg	
MER: Materials for energy recovery	kg	
EE: Exported energy	MJ, LHV	

Table 5: Production Stage results – 1 FCU

Environmental Indicator	Unit	A1	A2	A3	Total
Core mandatory impact indicators					
GWP	kg CO ₂ eq.	5.81E+04	2.12E+03	5.17E+03	6.54E+04
ODP	kg CFC-11 eq.	5.13E-03	8.61E-08	3.88E-05	5.17E-03
AP	kg SO ₂ eq.	4.14E+02	3.18E+01	2.36E+01	4.70E+02
EP	kg N eq.	1.05E+02	1.85E+00	5.26E+00	1.12E+02
SFP	kg O ₃ eq.	3.56E+03	8.65E+02	2.43E+02	4.67E+03
Indicators describing use of primary resources					
RPR _E	MJ, LHV	1.00E+05	0.00E+00	1.53E+04	1.16E+05
RPR _M	MJ, LHV	0.00E+00	n/a	n/a	0.00E+00
NRPR _E	MJ, LHV	7.31E+05	2.96E+04	8.20E+04	8.43E+05
NRPR _M	MJ, LHV	5.19E+03	n/a	n/a	5.19E+03
Indicators describing use of secondary resources					
SM	kg	6.68E+03	n/a	0.00E+00	6.68E+03
RSF	MJ, LHV	n/a	n/a	0.00E+00	0.00E+00
NRSF	MJ, LHV	n/a	n/a	0.00E+00	0.00E+00
RE	MJ, LHV	n/a	n/a	0.00E+00	0.00E+00
Mandatory inventory parameters					
FW	m ³	7.20E+02	0.00E+00	9.48E+01	8.15E+02
ADP _f	MJ, LHV	6.54E+05	2.92E+04	7.26E+04	7.56E+05
Indicators describing waste					
HWD	kg	2.75E+02	0.00E+00	5.58E+00	2.81E+02
NHWD	kg	8.08E+03	3.26E+01	1.34E+03	9.45E+03
HLRW	m ³	6.02E-05	0.00E+00	4.63E-06	6.48E-05
ILLRW	m ³	3.94E-03	0.00E+00	4.14E-05	3.98E-03
Output flows					
CRU	kg	n/a	n/a	n/a	n/a
MR	kg	n/a	n/a	1.88E+03	1.88E+03
MER	kg	n/a	n/a	0.00E+00	0.00E+00
EE	MJ, LHV	n/a	n/a	0.00E+00	0.00E+00



References

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