Statement of Verification

BREG EN EPD No.: 000468 Issue 02

This is to verify that the

Environmental Product Declaration

provided by:

Backbone Connect Ltd

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

Backbone Connected Building Solution (measured in 1 Backbone Connected Building base unit and 1m of fibre)

Company Address

Backbone Connect Ltd
10 Dominion St
EC2M 2EF
London
UK

Backbone Connect

Signed for BRE Global Ltd	Emma Baker Operator	15 November 2022 Date of this Issue
14 November 2022 Date of First Issue		13 November 2026 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: 000468

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Backbone Connect Ltd 10 Dominion St EC2M 2EF London UK	Flavie Lowres/LINA
Declared Unit	**Applicability/Coverage**
1 base unit for Connected Building fibre enablement of a building up to 10 storeys high (including basement and ground floor) of a commercial office building 1 m of fibre distribution cabling required to connect the floors above the ground floor of a commercial office building	Other (please specify). For a complete installation, the user of this EPD needs to add up the results of 1m of base unit and 1 m of fibre cable multiplied by the distance between the basement cabinet and the riser closet on each floor
EPD Type	**Background database**
Cradle to Gate with options	Ecoinvent 3.2

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Pat Hermon
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building						
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
☑	☑	☑	☐	☑	☐	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

A site in central London, UK
The system is an on-site assembly of components

Construction Product

Product Description

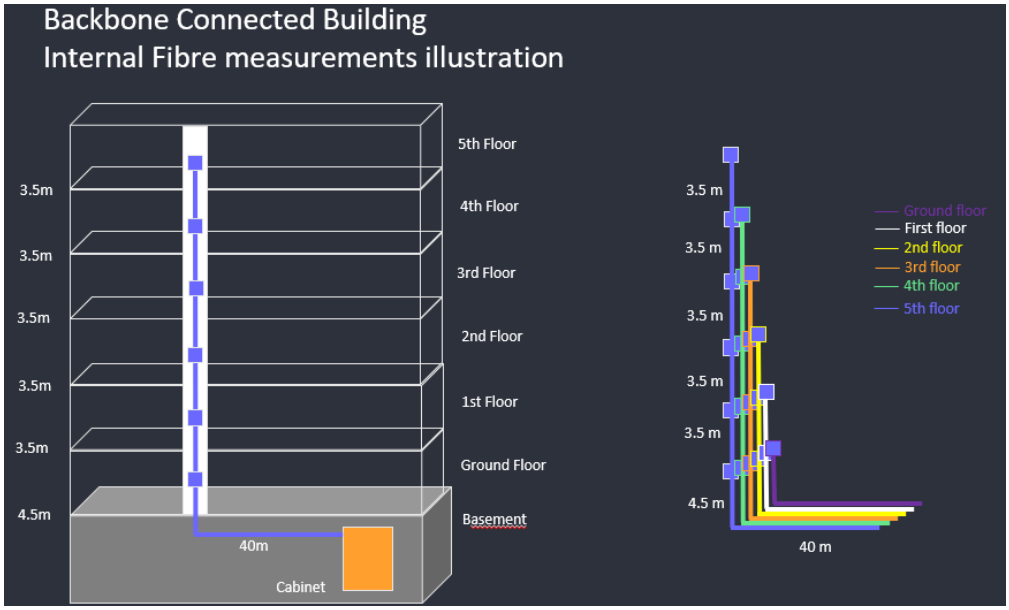
The Backbone Connected Building system is a high-performance, modular and scalable fibre enablement infrastructure designed to enhance the efficiency of a Commercial multi-tenant workspace. The system can be deployed into any commercial office in order to achieve rapid deployment, wayleave-free connectivity and deliver a range of services to occupiers and the landlord.

The Backbone Connected Building system can scale from single-floor deployments to offices of up to 100 floors, and can be delivered in a variety of flexible, modular configurations to meet the demands of occupiers, and offering a range of resilience and future capacity needs.

The Backbone Connected Building system comprises:

- A base unit which includes: one IT cabinet containing a high performance, energy-efficient, multi-tenanted fibre router, patch panel, telecoms carrier Network Terminating Unit, a Smart Building firewall and the fibre distribution cabling running to the ground floor
- fibre distribution cabling running horizontally from the base unit in the basement and then vertically through the riser to each floor above the ground floor.

The figure below provides an illustration of the calculation of the length of the fibres for floor height of 3.5 m and assuming a distance from cabinet to riser of 40 m:



Technical Information

Property	Value, Unit
Connected Building Core device - bandwidth capacity	10Gbps total
Number of optical fibre interfaces for tenant services	12 as standard (24 optional per core device)
Optical interface presentation	Single-mode fibre, LC connectors, 1Gbps
Smart Building Firewall – interfaces for smart building devices	4 x ethernet RJ45 ports
Smart Building Firewall – throughput	100Mbps design throughput
Connected Building System – Operating temperature range	0 – 40 degrees Centigrade
Connected Building enclosure – dimensions	600mm W x 800mm D x 1270mm H
Connected Building enclosure – Number of rack units (RU)	24U
Connected Building enclosure – weight	73kg fully populated, floor-standing
Internal optical fibre type	12-core OS2 ruggedised, 12 core
Riser termination unit	6 pair, LC presentation, lockable enclosure

Main Product Contents

For the base unit

Material/Chemical Input	% by mass
Powder coated steel casing and stainless steel parts	85.9%
Fibre optic	3.4%
Plastics	6.8%
Glass	2.1%
Printed circuit board	1.9%

1m of fibre distribution cabling

Material/Chemical Input	% by mass
Powder coated steel casing and stainless steel parts	0.8%
Fibre optic	60.8%
Plastics	38.4%

Manufacturing Process

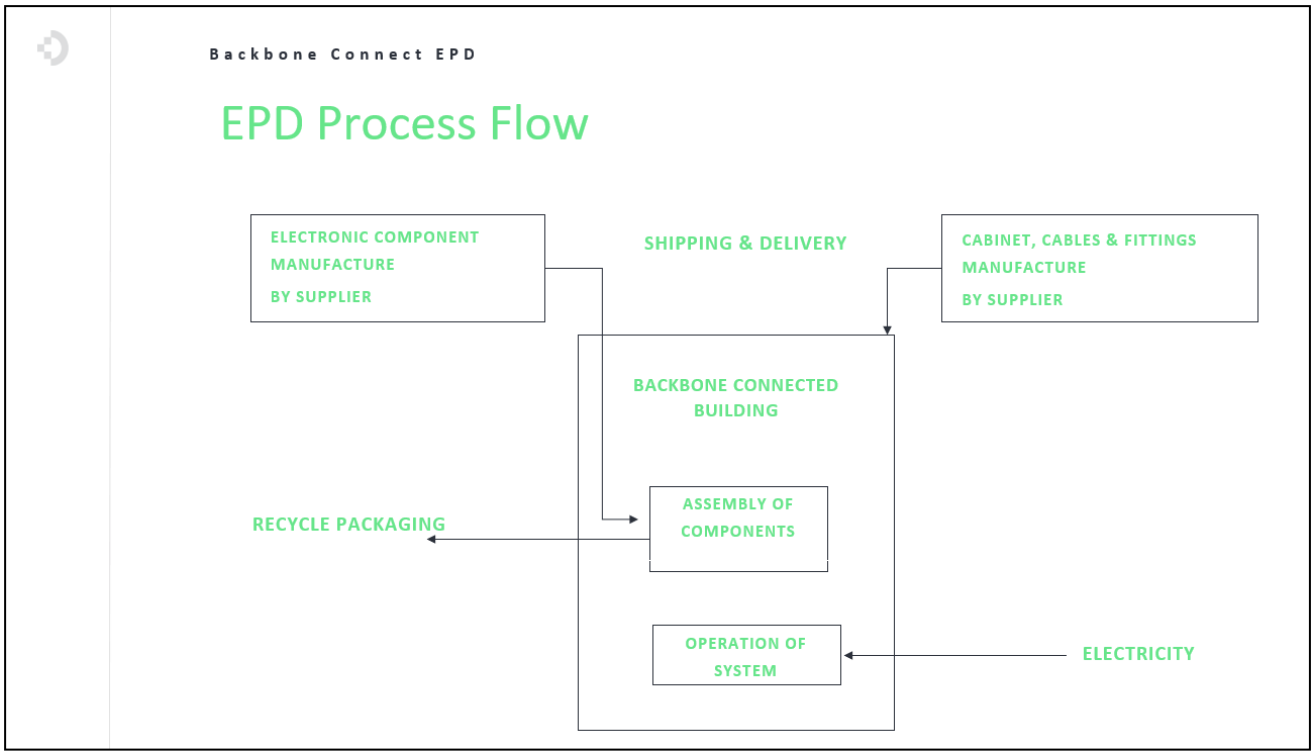
The Connected Building system comprises of a number of electronic components and fibre cables, delivered to site and assembled within an equipment cabinet, typically in the basement of a commercial building.

A Backbone Connected Building comprises of:

- IT Equipment cabinet
- Electronic telecommunications and data service equipment
- Fibre-optic cabling, patch panels and cable terminations

Electronic equipment is manufactured outside the UK, with the cabinet, cabling and fittings delivered to site, assembled with hand tools.

Process flow diagram



Life Cycle Assessment Calculation Rules

Declared unit description

1 base unit for Connected Building fibre enablement of a building up to 10 storeys high (including basement and ground floor) of a commercial office building

1 m of fibre distribution cabling required to connect the floors above the ground floor of a commercial office building

System boundary

This cradle-to-gate with options EPD has been assessed in accordance with the modular approach as defined in EN15804:2012+A1:2013 and includes the processes covered in the manufacturing site and product stage A1 to A3, A5, B2-B3, B6, C1 and C4.

Data sources, quality and allocation

Specific quantities of items manufactured in China, Thailand and the UK for a specific building scenario, have been modelled using LINA v2.0 and the BRE LINA database v2.0.92. In accordance with the requirements of EN15804, the most current available data has been used. The information provided by the manufacturer-cover one specific (and typical) installation in central London. Secondary data has been obtained for all upstream and downstream processes that are beyond the control of the manufacturer (i.e. raw material production) from the ecoinvent 3.2 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN15804.

Specific UK datasets have been selected from the ecoinvent LCI for this LCA. The quality level of geographical and technical representativeness is therefore good. The quality level of time representativeness is good as the background LCI datasets are based on ecoinvent v3.2 which was compiled in 2015. Therefore,

there is approximately 7 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

Cut-off criteria

The manufacturing and transport of each component to a warehouse in the UK and then to a point of installation in London has been taken into consideration.

Packaging of each component has been taken into consideration. Upstream extraction and/or processing of inputs are included within the use of the background datasets within LINA.

LCA Results for the base unit

(MND = module not declared; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	3.08E+02	2.68E-05	1.93E+00	9.64E-01	3.60E-01	1.75E-02	4.43E+03
	Transport	A2	8.98E+01	1.53E-05	7.68E-01	1.44E-01	1.04E-01	2.37E-04	1.32E+03
	Manufacturing	A3	2.47E+00	1.63E-07	1.18E-02	5.16E-03	1.77E-03	2.35E-05	4.87E+01
	Total (of product stage)	A1-3	4.00E+02	4.23E-05	2.71E+00	1.11E+00	4.66E-01	1.78E-02	5.80E+03
Installation stage	Installation	A5	8.39E-01	2.40E-09	1.32E-04	6.35E-03	1.68E-04	1.78E-08	1.81E-01
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	4.13E-01	2.91E-08	2.02E-03	2.20E-03	4.08E-04	1.95E-05	3.87E+00
	Operational energy use	B6	4.23E+03	2.74E-04	2.30E+01	5.27E+00	1.31E+00	5.11E-03	6.52E+04
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	5.22E+00	2.65E-08	1.06E-03	2.54E-02	1.08E-03	2.09E-07	2.05E+00

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued) base unit

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	3.35E+02	1.57E-01	3.35E+02	4.68E+03	3.08E+01	4.71E+03
	Transport	A2	3.25E+01	2.16E-04	3.25E+01	1.34E+03	0.00E+00	1.34E+03
	Manufacturing	A3	1.46E+01	1.77E-03	1.46E+01	4.29E+01	1.03E+01	5.31E+01
	Total (of product stage)	A1-3	3.82E+02	1.59E-01	3.82E+02	6.06E+03	4.11E+01	6.10E+03
Installation stage	Installation	A5	1.84E-02	4.17E-08	1.84E-02	2.36E-01	0.00E+00	2.36E-01
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	3.28E-01	2.73E-05	3.29E-01	4.19E+00	0.00E+00	4.19E+00
	Operational energy use	B6	5.64E+03	1.02E-02	5.64E+03	8.69E+04	0.00E+00	8.69E+04
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	1.85E-01	4.66E-07	1.85E-01	2.55E+00	0.00E+00	2.55E+00

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued) base unit

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	6.81E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	3.70E-01
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	5.31E-02
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	7.23E+00
Installation stage	Installation	A5	0.00E+00	0.00E+00	0.00E+00	2.45E-04
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	6.16E-03
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	1.74E+01
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	2.69E-03

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued) base unit

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	4.87E+01	2.15E+01	9.73E-03
	Transport	A2	1.07E+00	2.76E+01	8.77E-03
	Manufacturing	A3	7.25E-02	1.62E-01	7.64E-05
	Total (of product stage)	A1-3	4.98E+01	4.93E+01	1.86E-02
Installation stage	Installation	A5	1.60E-04	6.65E-01	1.89E-06
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	2.65E-02	1.55E-01	1.17E-05
	Operational energy use	B6	9.92E+00	1.06E+02	4.79E-01
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	3.06E-03	7.52E+00	1.97E-05

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued) base unit

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation stage	Installation	A5	0.00E+00	1.08E+00	0.00E+00	0.00E+00
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	1.48E-01	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	7.57E+01	8.68E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

LCA Results for 1 m of fibre distribution cabling

(MND = module not declared; MND = module not declared; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	2.21E-01	3.62E-08	7.72E-04	1.83E-04	1.56E-04	9.55E-05	3.86E+00
	Transport	A2	1.61E-01	2.75E-08	1.33E-03	2.55E-04	1.84E-04	4.33E-07	2.37E+00
	Manufacturing	A3	-2.21E-02	7.15E-09	3.27E-04	1.69E-04	3.76E-05	5.44E-07	7.88E-01
	Total (of product stage)	A1-3	3.60E-01	7.09E-08	2.43E-03	6.07E-04	3.78E-04	9.65E-05	7.02E+00
Installation stage	Installation	A5	2.98E-02	8.29E-11	3.88E-06	7.64E-05	5.93E-06	6.66E-10	5.92E-03
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	6.97E-02	3.55E-10	1.41E-05	3.40E-04	1.44E-05	2.79E-09	2.74E-02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued) for 1 m of fibre distribution cabling

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	5.26E-02	1.86E-03	5.44E-02	3.31E+00	5.57E-01	3.87E+00
	Transport	A2	5.82E-02	3.95E-07	5.82E-02	2.40E+00	0.00E+00	2.40E+00
	Manufacturing	A3	2.09E+00	1.73E-07	2.09E+00	9.53E-01	0.00E+00	9.53E-01
	Total (of product stage)	A1-3	2.20E+00	1.86E-03	2.20E+00	6.66E+00	5.57E-01	7.22E+00
Installation stage	Installation	A5	7.20E-04	1.73E-09	7.20E-04	8.15E-03	0.00E+00	8.15E-03
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	2.47E-03	6.23E-09	2.47E-03	3.41E-02	0.00E+00	3.41E-02

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued) for 1 m of fibre distribution cabling

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	2.51E-03
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	6.66E-04
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	2.71E-03
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	5.89E-03
Installation stage	Installation	A5	0.00E+00	0.00E+00	0.00E+00	8.35E-06
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	3.59E-05

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued) for 1 m of fibre distribution cabling

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.03E-02	3.04E-03	2.11E-06
	Transport	A2	1.94E-03	5.06E-02	1.57E-05
	Manufacturing	A3	9.86E-04	5.26E-03	5.02E-06
	Total (of product stage)	A1-3	1.32E-02	5.89E-02	2.28E-05
Installation stage	Installation	A5	9.12E-06	2.11E-02	6.83E-08
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	4.09E-05	1.01E-01	2.64E-07

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued) for 1 m of fibre distribution cabling

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation stage	Installation	A5	0.00E+00	4.00E-02	0.00E+00	0.00E+00
Use stage	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	1.00E-02	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A5 - Installation	The equipment is installed using hand tools, so there is zero energy and water for the installation. No items are disposed at installation as they are checked at the warehouse prior to being dispatched. The packaging of the units is disposed of during the installation of the combined units. The packaging recycling rates are below (source: recycling rates from Defra UK_stats_on_waste_dataset_July_2021_accessible_rev_v4.xlsx (live.com)) – the remaining packaging is sent to landfill:		
	Cardboard (% recycled)	%	65.6
	Foam (% recycled)	%	47.2
	Paper (% recycled)	%	65.6
	Plastic (% recycled)	%	47.2
B2 – Maintenance	There is no planned maintenance schedule for Backbone Connected Building System. A preventive, scheduled maintenance visit to undertake a visual inspection of the Backbone Connected Building conducted every 5 years has been modelled for the purposes of the EPD. The engineer will be conducting a visual inspection of the overall installation, quality of cabling, labelling and note any material changes to the environment within which the installation resides. Results will be recorded on Backbone's cloud-based asset management system.		
	Maintenance frequency	Per year	0.2
B3 – Repair	Based on the manufacturer data, Connected Building core device has a published MTBF (Mean Time Between Failures) of 407,230 hours – approx. 46.5 years. The repair scenario therefore considers one physical repair visit as part of the study. The Connected Building firewall within the central infrastructure has an MTBF of 1.6 million hours (approx. 183 years) and thus will not require repair during the study period. Three components are considered for repair (and therefore replaced) once in 46.5 years: cisco ASR920-12; SFP fibre 10 Gb and SFP fibre 1 Gb. the impact of the replacement of the SFP fibre 10 Gb and SFP fibre 1 Gb is below the cut-off limit of 1% and was therefore not included. it was assumed that if these units needed to be repaired, then they would be disposed, likely to landfill. packaging waste: Packaging includes (recycling rates from Defra UK_stats_on_waste_dataset_July_2021_accessible_rev_v4.xlsx (live.com)): cardboard: 0.625 kg - 65.6% recycled foam: 0.175 kg - 47.2% recycled		
	Repair frequency	Per year	0.02
	Cardboard packaging to landfill	Kg	0.108
	Foam packaging to landfill	Kg	0.09
	Cardboard packaging to recycling	Kg	0.205
	Foam packaging to recycling	Kg	0.083
Reference service life	No end of life is specified by the vendor, the service life for the product has been assumed to be based on a reasonable assumption that the device will remain fit for purpose for this period		
	Reference service life	years	15

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
B6 – Use of energy	The Connected Building core infrastructure comprises of three main devices, which are powered by mains electricity and that are all accounted for in the base unit. Other elements of this infrastructure are completely passive such as optical fibre cabling). The scenario for B6 operational energy in use is based on the measurement of actual power consumption for the two Connected Building devices and the telecoms carrier's Network Terminating Unit (NTU) – The Compact Core Small, Smart Building Bundle and Carrier NTU. Each of these devices has a mains power cord for which a direct power measure has been made. The power readings for these devices has been recorded and used for the scenario modelling as follow: Device: Power (W) C1111-4P: 7.2 ASR920: 26.4 ADVA FSP150CC: 20		
	Energy use calculated over 15 years of the base unit	kWh	7,047.2
C1 – Deconstruction	The deconstruction of the Backbone Connected Building system is done manually		
	No impact	N/A	N/A
C4 – Disposal	In the event of the Backbone Connected Building platform requiring deconstruction and removal from its location, this exercise would be undertaken by Backbone Connect engineers using hand tools. The equipment would be safely powered off, disconnected from the electricity supply and each of the rack-mounted items of equipment removed (Connected Building core router and firewall). Fibre and copper data cables would be disconnected from within the cabinet and withdrawn through the base. The IT cabinet would be collected by a delivery service and sent to another London location, for re-use & installation, as would any PDU's, cable management bars, patch panels and patch leads. Equipment (core router and firewall) would be boxed up and returned by courier to our London stock room, awaiting redeployment to another site. Fibre cabling within the building would be removed by our cabling engineers, and the riser-mounted fibre splice units recovered for re-use at another site. These splice units would be returned to our London stock room, with the core router & firewall. Fibre cabling within the building would be inspected for its suitability for redeployment elsewhere. If undamaged, the internal fibre cabling would be coiled up and returned to our London Stock room. Any damaged cable, or lengths which cannot be re-used would be recycled		
	Items not recyclable – landfill – base unit	kg	7.5
	Items for reuse – base unit	Kg	75.7
	WEEE recycled – base unit	Kg	8.7
	Items not recyclable – landfill – cable	kg	0.1
	Items for reuse – base unit – cable	Kg	0.01

References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A1:2013. London, BSI, 2013.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006. London, BSI, 2006.