

ENVIRONMENTAL PRODUCT DECLARATION



In accordance with ISO 14025:2016 and ISO 21930:2017 for:

92.9 m² (1,000 ft²) of Gypsum Board Products

Gboard R, Gboard MR, Gboard FR

ECOBAT BATEC ASK



Programme Operator

NSF Certification, LLC
www.nsf.org

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PROGRAMME INFORMATION

PROGRAMME OPERATOR

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The EPD owner, Ecobat for Industrial Development, has the sole ownership, liability, and responsibility for the EPD.

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PROGRAMME DETAILS

Product category rules (PCR): NSF International, Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products

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Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification (internal) EPD verification (external)

Third party verifier: Jack Geibig, jgeibig@ecoform.com



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Accredited or approved by: NSF Certification, LLC

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No

GENERAL INFORMATION

COMPANY INFORMATION

Ecobat, ASK, and Batec group is one of the largest manufacturing groups of finishing building materials and construction solutions in the Middle East, and North Africa who specialize in the design, manufacture, and distribution of gypsum board products. They operate three production sites in Saudi Arabia, Egypt and Syria. The Gboard R and Gboard MR gypsum boards are manufactured at all three locations, whereas the Gboard FR gypsum board is only manufactured at the Saudi Arabia and Egypt plants.

This cradle-to-gate environmental product declaration is for 92.9 m² (1,000 ft²) of the following gypsum board products, produced from the locations fully owned and operated by Ecobat for Industrial Development in Saudi Arabia, Egypt and Syria:

- Gboard R
- Gboard MR
- Gboard FR

Further information regarding Ecobat for Industrial Development can be accessed from www.gboardweb.com



PRODUCT INFORMATION

As per NSF PCR, gypsum board is the generic name for a family of sheet products consisting of a non-combustible core primarily of gypsum with paper facing. Gypsum board products are used in internal wall applications and provide multiple functions including aesthetics, load carrying capacity, water resistance and insulation to noise, temperature, and air.

The following curtain walling systems are covered by this LCA study:

- Gboard R - Gboard R is regular plasterboard which is ideal for general drywall and ceiling applications. Gboard R can accommodate any architectural design.



- Gboard MR - Gboard MR is a moisture resistant board with silicon oil in the core. The silicone oil acts as a water repellent rendering the core more resistant to moisture. Gboard MR is suited for application in areas of high humidity.



- Gboard FR - Gboard FR is fire resistant gypsum board which is reinforced with fiber glass. The fiber glass acts as a retardant and protection to the board, improving the performance of the system when exposed to fire. Gboard is suitable for application in indoor spaces where high fire protection is needed.



TECHNICAL SPECIFICATIONS OF PRODUCT

The technical and functional specifications for the three products are outlined in the tables below.

TECHNICAL SPECIFICATION FOR GBOARD R

Technical specification	Value	Unit
Density BS EN 520:2004	705.95	Kg/m ³
Weight per unit area BS EN 520:2004	8.76	Kg/m ³
Tolerance of length ASTM C 473-03, Section 16	2401	Mm
Tolerance of width ASTM C 473-03, Section 17	1201	Mm
Tolerance of thickness ASTM C 473-03, Section 18	12.5	Mm
Depth of taper ASTM C 1396/ C1396M-00 C.I.4.5.5	1.23	Mm
Width of taper ASTM C 473-03, Section 17	42.57	Mm
Squareness of edges ASTM C 473-03 Section 15	1.7	Mm
Core hardness ASTM C 1396/C1396M-00 CI.4.5.2	192	N
Edges hardness ASTM C 1396/C1396M-00 CI.4.5.2	144	N
Ends hardness ASTM C 1396/C1396M-00 CI.4.5.2	200	N
Flexural braking load long edge ASTM C 1396/C1396M-00 CI.5.1.1	517	N
Flexural braking load short edge ASTM C 1396/C1396M-00 CI.5.1.1	211	N
Nail pull strength ASTM C 1396/C1396M-00 CI.5.1.3	363	N
Bending radius ASTM C 473-03, Section 20	1875	Mm
Humidified deflection ASTM C 1396/C 1396M-00 CI.5.1.2	1.4	Mm
Thermal conductivity	0.1839	w/m.k

TECHNICAL SPECIFICATION FOR GBOARD MR

Technical specification	Value	Unit
Density BS EN 520:2004	785	Kg/m ³
Weight per unit area BS EN 520:2004	9.8	Kg/m ³
Tolerance of length ASTM C 473-03, Section 16	2401	Mm
Tolerance of width ASTM C 473-03, Section 17	1200	Mm
Tolerance of thickness ASTM C 473-03, Section 18	12.5	Mm
Depth of taper ASTM C 1396/ C1396M-00 C.I.4.5.5	1.21	Mm
Width of taper ASTM C 473-03, Section 17	42.23	Mm
Squareness of edges ASTM C 473-03 Section 15	1.7	Mm
Core hardness ASTM C 1396/C1396M-00 CI.4.5.2	231	N
Edges hardness ASTM C 1396/C1396M-00 CI.4.5.2	205	N
Ends hardness ASTM C 1396/C1396M-00 CI.4.5.2	221	N
Flexural braking load long edge ASTM C 1396/C1396M-00 CI.5.1.1	700	N
Flexural braking load short edge ASTM C 1396/C1396M-00 CI.5.1.1	310	N
Nail pull strength ASTM C 1396/C1396M-00 CI.5.1.3	380	N
Bending radius ASTM C 473-03, Section 20	1895	Mm
Humidified deflection ASTM C 1396/C 1396M-00 CI.5.1.2	1.2	Mm
Thermal conductivity	0.1701	w/m.k
Water absorption ASTM C 473-03, Section 20	H 2<10	%

TECHNICAL SPECIFICATION FOR GBOARD FR

Technical specification	Value	Unit
Density BS EN 520:2004	713.77	Kg/m ³
Weight per unit area BS EN 520:2004	8.83	Kg/m ³
Tolerance of length ASTM C 473-03, Section 16	2399	Mm
Tolerance of width ASTM C 473-03, Section 17	1200	Mm
Tolerance of thickness ASTM C 473-03, Section 18	12.5	Mm
Depth of taper ASTM C 1396/ C1396M-00 C.I.4.5.5	1.27	Mm
Width of taper ASTM C 473-03, Section 17	41.76	Mm
Squareness of edges ASTM C 473-03 Section 15	1.2	Mm
Core hardness ASTM C 1396/C1396M-00 CI.4.5.2	215	N
Edges hardness ASTM C 1396/C1396M-00 CI.4.5.2	186	N
Ends hardness ASTM C 1396/C1396M-00 CI.4.5.2	209	N
Flexural braking load long edge ASTM C 1396/C1396M-00 CI.5.1.1	509	N
Flexural braking load short edge ASTM C 1396/C1396M-00 CI.5.1.1	219	N
Nail pull strength ASTM C 1396/C1396M-00 CI.5.1.3	361	N
Bending radius ASTM C 473-03, Section 20	1920	Mm
Humidified deflection ASTM C 1396/C 1396M-00 CI.5.1.2	1.3	Mm
Thermal conductivity	0.1681	w/m.k

PRODUCT COMPOSITION

The product composition for the gypsum board products are provided in the Tables below. The gypsum powder used for the three boards is 100% naturally sourced and contains no synthetic gypsum (DSG). The boards do not contain any substances hazardous to health or the environment (in particular carcinogenic, mutagenic, toxic to reproduction, allergic, PBT5 or vPvB6 substances). No substances that are listed in the “Candidate List of Substances of very high concern for authorization” are contained in the gypsum board products.

The gypsum board products are primarily packaged using gypsum leg pallets and plastic wrap prior to shipping to installation sites.

PRODUCT COMPOSITION OF GBOARD R

Material	Contribution %
Ivory colored paper	4.91%
Gypsum powder	94.19%
Foam	0.10%
Starch	0.80%

PRODUCT COMPOSITION OF GBOARD MR

Material	Contribution %
Green colored paper	4.80%
Gypsum powder	93.8%
Foam	0.10%
Silicone	0.50%
Starch	0.80%

PRODUCT COMPOSITION OF GBOARD FR

Material	Contribution %
Pink colored paper	4.90%
Gypsum powder	94.3%
Foam	0.10%
Starch	0.70%
Fiberglass	0.10%

PRODUCT AVERAGE

The products covered by the scope of this average EPD are manufactured at a number of locations and therefore the results reflect a typical product, as a weighted average, produced from the following sites:

- Gboard R – produced at Saudi Arabia, Egypt and Syria sites
- Gboard MR – produced at Saudi Arabia, Egypt and Syria sites
- Gboard FR – produced only at the Saudi Arabia and Egypt sites

MANUFACTURING

All Ecobat for Industrial Development gypsum board products are manufactured, finished, and inspected for quality at the production sites in Saudi Arabia, Egypt, and Syria.

The manufacturing process comprises the following production stages:



The manufacturing process begins with mined gypsum powder which is mixed with water and product specific additives to form a slurry. Rolls of facing and backing paper are loaded onto the manufacturing line and the slurry is fed onto the backing paper and then lined by the facing paper, creating a mechanical bond between the paper and core. The wet board is rolled to ensure thickness and cut to length to be inserted into the dryer. The gypsum boards are trimmed, stacked onto pallets, and covered with protective film.

The gypsum board products are not expected to create exposure conditions that exceed safe thresholds for health impacts to humans or flora/fauna under normal operating conditions. Use stage is outside the scope of this EPD.

LCA INFORMATION

LIFE CYCLE ASSESSMENT – PRODUCT SYSTEM AND MODELING

A cradle to gate analysis using life cycle assessment (LCA) techniques was conducted for this EPD. The analysis was done according to the NSF product category rule (PCR) for gypsum panel products and followed LCA principles, requirements and guidelines laid out in the ISO 14040/12044 standards. EPDs are comparable only if they comply with NSF product category rule (PCR) for gypsum panel products, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

DECLARED UNIT

The declared unit for the EPD is 92.9 m² (1,000 ft²) of gypsum wall product. In line with the PCR, the thicknesses, and masses of the gypsum board products are indicated in the table below.

Product	Mass (Kg/FU)	Thickness (cm)
Gboard R	813.7	12.5
Gboard MR	870.6	12.5
Gboard FR	820.1	12.5

SYSTEM BOUNDARY

In line with the PCR, this cradle to gate analysis provides information on the Product Stage of the gypsum board products, comprising modules A1-A3 as shown in the table below.

Upstream			Core			Downstream											Other Benefits and loads beyond the environmental system boundary information
Product Stage			Construction process stage		Use Stage							End of Life stage					
Raw material supply	Transport	Manufacturing	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	D
MND																	

X = included in LCA; MND = Module not declared

ASSUMPTIONS

The following assumptions were made for the collection of the core process data:

- Specific transportation data was not provided for packaging materials. Therefore, as per the PCR, the default distance of 800km has been assumed.
- All waste is consumed within the production process or re-used as packaging material. No solid waste is removed from site for disposal.

ALLOCATION

No multi-output (i.e., co-product) allocation was performed in this study. In terms of generic data, the main database used, ecoinvent v3.6 (cut-off), defaults to an economic allocation for most processes. However, in some cases a mass-based allocation is used, where there is a direct physical relationship. The allocation approach of specific ecoinvent modules is documented on their website and method reports (see www.ecoinvent.org).

CUT-OFF CRITERIA

As required by ISO 21930, in case of insufficient input data or data gaps for a unit process the cut-off criteria were 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of that unit process. The total of neglected input flows per module was a maximum of 5% of energy usage and mass.

In practice, all input and outputs, for which data are available, have been included in the calculation. Data gaps have been filled by conservative assumptions with average or generic data. Capital items for the production processes (machines, buildings, etc.) were not taken into consideration.

DATA SOURCES AND QUALITY

Specific data for all core processes were collected from Ecobat for Industrial Development from their sites in Saudi Arabia, Egypt, and Syria for twelve months from 2020.04.01 to 2021.03.31. Selected generic data were collected for the upstream lifecycle stages from the LCI database ecoinvent v3.6 (cut-off).

The data quality can be considered as good. In this LCA the data relating to the manufacturing of the gypsum board products and the background processes for environmental impacts are recent (<2 years). The processes used in the production of the gypsum board products are geographically representative, meaning that the production location lies within the region for which the relevant Ecoinvent environmental records have been selected. The dataset is up-to-date and representative for the current technology used in the processes of manufacturing the product.

The LCA software SimaPro (version 9) was used to build a model for the product systems under investigation using specific and generic inventory data. In addition, SimaPro was used to apply characterization models and factors from the impact assessment methods to generate results.

DECLARATION COMPARABILITY LIMITATION STATEMENT

As per ISO 21930 section 5.5, and the NSF PCR for Gypsum Panel Products the comparability of this EPD is limited as following:

- Only EPDs prepared from cradle-to-grave life cycle results and based on the same function, RSL, 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.

ENVIRONMENTAL PERFORMANCE

The environmental performance of the assessed product is declared and reported using the parameters as specified in the PCR. These LCIA results and other environmental results are presented in the table below per declared unit to three significant figures.

92.9 M² (1,000 FT²) OF GBOARD R

ENVIRONMENTAL IMPACTS: TRACI 2.1

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Parameters describing environmental impacts					
Global warming potential (GWP) – total	kg CO ₂ equiv.	67.7	78.9	89.9	236.5
Ozone depletion Potential (ODP)	kg CFC-11 equiv.	6.90E-06	1.97E-05	4.37E-05	7.03E-05
Acidification potential (AP)	kg SO ₂ equiv.	0.403	0.327	0.479	1.21
Eutrophication potential (EP)	kg N equiv.	0.301	0.0817	0.0891	0.472
Smog formation potential (SFP)	kg O ₃ equiv.	6.10	7.00	5.37	18.5

RESOURCE USE AND OUTPUT / WASTE PARAMETERS

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Parameters describing use of resources					
Use of renewable primary energy resources – use as energy carrier	MJ, net calorific value	3010	15.7	18.7	3040
Use of renewable primary energy resources – use as raw materials	MJ, net calorific value	1240	2.99	1.95	1250
Use of non-renewable primary energy resources – use as energy carrier	MJ, net calorific value	1020	1210	2920	5150
Use of non-renewable primary energy resources – use as raw materials	MJ, net calorific value	0	0	0	0
Use of secondary material	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Recovered energy	MJ, net calorific value	0	0	0	0
Net use of fresh water	m ³	1.60	0.107	0.331	2.04
Abiotic depletion potential – ADP surplus (TRACI methodology)	MJ surplus	87.5	177	461	726
Abiotic depletion potential – ADP LHV (CML methodology)	MJ	804	1210	2990	5004
Parameters describing waste production					
Hazardous waste disposed	kg	0.00365	0.0114	0.0231	0.0382
Non-hazardous waste disposed	kg	9.40	102	13.7	125
High level radioactive waste, conditioned, to final repository	kg	1.63E-04	5.89E-04	1.18E-03	1.93E-03
Intermediate and low-level radioactive waste, conditioned, to final repository	kg	2.16E-03	7.83E-03	1.57E-02	0.0257
Parameters describing outputs flows					
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered energy exported from the product system	MJ	0	0	0	0

Note that the LCIA results are relative expressions and do not predict impacts on category end-points, the exceeding of thresholds, safety margins or risks.

92.9 M² (1,000 FT²) OF GBOARD MR

ENVIRONMENTAL IMPACTS: TRACI 2.1

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Parameters describing environmental impacts					
Global warming potential (GWP) – total	kg CO ₂ equiv.	84.1	68.9	93.7	247
Ozone depletion Potential (ODP)	kg CFC-11 equiv.	1.58E-05	1.72E-05	4.38E-05	7.68E-05
Acidification potential (AP)	kg SO ₂ equiv.	0.486	0.303	0.506	1.29
Eutrophication potential (EP)	kg N equiv.	0.350	0.0717	0.0895	0.511
Smog formation potential (SFP)	kg O ₃ equiv.	7.15	6.42	5.65	19.2

RESOURCE USE AND OUTPUT / WASTE PARAMETERS

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Parameters describing use of resources					
Use of renewable primary energy resources – use as energy carrier	MJ, net calorific value	3170	13.7	14.5	3200
Use of renewable primary energy resources – use as raw materials	MJ, net calorific value	1300	2.60	1.94	1310
Use of non-renewable primary energy resources – use as energy carrier	MJ, net calorific value	1310	1060	2920	5290
Use of non-renewable primary energy resources – use as raw materials	MJ, net calorific value	0	0	0	0
Use of secondary material	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Recovered energy	MJ, net calorific value	0	0	0	0
Net use of fresh water	m ³	2.16	0.1	0.325	2.59
Abiotic depletion potential – ADP surplus (TRACI methodology)	MJ surplus	115	154	459	728
Abiotic depletion potential – ADP LHV (CML methodology)	MJ	1040	1050	2980	5070
Parameters describing waste production					
Hazardous waste disposed	kg	0.00412	0.00991	0.0229	0.0369
Non-hazardous waste disposed	kg	10.4	87.9	13.7	112
High level radioactive waste, conditioned, to final repository	kg	1.87E-04	5.13E-04	1.17E-03	1.87E-03
Intermediate and low-level radioactive waste, conditioned, to final repository	kg	2.48E-03	6.81E-03	1.56E-02	2.49E-02
Parameters describing outputs flows					
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered energy exported from the product system	MJ	0	0	0	0

Note that the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

92.9 M² (1,000 FT²) OF GBOARD FR

ENVIRONMENTAL IMPACTS: TRACI 2.1

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Parameters describing environmental impacts					
Global warming potential (GWP) – total	kg CO ₂ equiv.	67.4	59.1	95.8	222
Ozone depletion Potential (ODP)	kg CFC-11 equiv.	8.00E-06	1.47E-05	4.20E-05	6.47E-05
Acidification potential (AP)	kg SO ₂ equiv.	0.406	0.256	0.493	1.16
Eutrophication potential (EP)	kg N equiv.	0.306	0.0614	0.0859	0.453
Smog formation potential (SFP)	kg O ₃ equiv.	6.32	5.45	5.55	17.3

RESOURCE USE AND OUTPUT / WASTE PARAMETERS

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Parameters describing use of resources					
Use of renewable primary energy resources – use as energy carrier	MJ, net calorific value	2620	11.7	14.2	2646
Use of renewable primary energy resources – use as raw materials	MJ, net calorific value	1210	2.23	1.88	1214
Use of non-renewable primary energy resources – use as energy carrier	MJ, net calorific value	1070	907	2840	4820
Use of non-renewable primary energy resources – use as raw materials	MJ, net calorific value	0	0	0	0
Use of secondary material	kg	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0
Recovered energy	MJ, net calorific value	0	0	0	0
Net use of fresh water	m ³	1.83	0.0795	0.324	2.23

Parameter	Unit	A1	A2	A3	A1-A3 (Total)
Abiotic depletion potential – ADP surplus (TRACI methodology)	MJ surplus	95.0	132	449	676
Abiotic depletion potential – ADP LHV (CML methodology)	MJ	828	904	2910	4640
Parameters describing waste production					
Hazardous waste disposed	kg	4.43E-03	8.51E-03	2.16E-02	3.45E-02
Non-hazardous waste disposed	kg	10.9	75.9	13.6	1.00E+02
High level radioactive waste, conditioned, to final repository	kg	2.17E-04	4.40E-04	1.11E-03	1.77E-03
Intermediate and low-level radioactive waste, conditioned, to final repository	kg	2.89E-03	5.85E-03	1.47E-02	2.34E-02
Parameters describing outputs flows					
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered energy exported from the product system	MJ	0	0	0	0

Note that the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

BIOGENIC CARBON

The table below shows the cradle-to-gate biogenic CO₂ removals associated with bio-based products used in the gypsum board products. As per the PCR, for the gypsum panel products, recycled raw materials used to produce paper are not counted as biogenic carbon whereas starch is counted.

BIOGENIC CO₂ REMOVALS (RAW MATERIALS) – 92.9 M2 (1 FU) OF GBOARD R, GBOARD MR, GBOARD FR

Product	Inputs	Chemical Formula	C-Content	Biogenic CO ₂ removals (in kg CO ₂ /FU)
Gboard R	Starch	(C ₆ H ₁₀ O ₅) _n	44%	-10.5 = -6.50 kgx0.44x44/12
Gboard MR	Starch	(C ₆ H ₁₀ O ₅) _n	44%	-11.2 = -6.96 kgx0.44x44/12
Gboard FR	Starch	(C ₆ H ₁₀ O ₅) _n	44%	-9.27 = -5.75 kgx0.44x44/12

Notes: 44 and 12 is the molar mass of CO₂ and C (in g/mol) respectively.

BIOGENIC CO₂ REMOVALS (PACKAGING) 92.9 M2 (1 FU) OF GBOARD R, GBOARD MR, GBOARD FR

Product	Inputs	Chemical Formula	C-Content	Biogenic CO ₂ removals (in kg CO ₂ /FU)
Gboard R – Gypsum legs	Starch	(C ₆ H ₁₀ O ₅) _n	44%	-0.149 = -0.092 kgx0.44x44/12
Gboard MR – Gypsum legs	Starch	(C ₆ H ₁₀ O ₅) _n	44%	-0.149 = -0.092kgx0.44x44/12
Gboard FR – Gypsum legs	Starch	(C ₆ H ₁₀ O ₅) _n	44%	-0.130 = -0.081 kgx0.44x44/12

Notes: 44 and 12 is the molar mass of CO₂ and C (in g/mol) respectively.

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Intertek is a leading Total Quality, Safety and Sustainability Assurance provider to industries worldwide. Through our network of more than 1,000 laboratories and offices and over 44,000 people in more than 100 countries, we are re-refining the industry with our innovative and bespoke Assurance, Testing, Inspection and Certification solutions for our customers' operations and value chains.

Intertek's Total Sustainability Assurance (TSA) proposition recognizes that with increasing value chain complexity, our clients need a trusted partner and integrative sustainable solutions. Powered by our independent technical expertise and supply chain management tools our sustainability services enable our customers to uniquely and authentically demonstrate their end-to-end commitment to sustainability, building stakeholder trust and corporate value.

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