Assessment of Corporate Carbon Footprint and Energy Analy-sis of Transformer Industry

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Table S1. Greenhouse gas inventory list.

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Table S1. Emission calculation methods from stationary and mobile combustion sources.

Emission Scope	Emission Type	Emission Source	Activity Data	Components
Direct Greenhouse Gas Emissions	Stationary Combustion Emissions	Natural Gas and Generator	Primary data	CO_2, CH_4, N_2O
	Moving Combustion Emissions - On Road	Diesel	Primary data	
	Moving Combustion Emissions - On Road	Gasoline	Primary data	
	Moving Combustion Emissions - Off Road	Diesel	Primary data	
	Refrigerant Equipment Leak Emissions	Cooling Equipment	Refrigerants Tracking	CO_2, HFC, CO_2 eq.
Purchased Energy Indirect Greenhouse Gas Emissions	Purchased Electricity		Bills	CO_2 eq.
Raw Materials and Material Transportation Indirect Greenhouse Gas Emissions	Emissions from Purchased Raw Materials and Goods Transportation		Raw Material Transportation	
	Emissions from Product Shipment		Product Transport	
	Employee Commuting Indirect Emissions		Staff service	
	Emissions from Business Travel		Transport	
	Emissions from Business Travel		Accomodation	
Raw Materials and Material Use Indirect Greenhouse Gas Emissions	Emissions from Raw Materials, Consumables and Goods Purchasing		Purchased Goods and Services	CO_2 eq.
	Use of Assets / Fixed Asset Emissions		Purchased Fixed Assets	
	Emissions from Waste		Wastes	
	Wastewater Indirect Emissions		Bills	
	Emissions from Service Procurement		Bills	CO_2, CH_4, N_2O
Indirect Greenhouse Gas Emissions from the Use of Products Sold	Emissions from the Use Phase of the Products Sold		Primary and Secondary data	CO_2 eq.
	Emissions from End-of-Life Products		Production Data	
Indirect Greenhouse Gas Emissions Not Included in Any Scope	Emissions from well to pump for fuel		Primary and Secondary data	
	Emissions from the transmission and distribution of electricity		Primary and Secondary data	

Table S2. Scope 1—emission factors [18].

Category	Subcategory	Fuel Type	CO_2 EF	CH_4 EF	N_2O EF
1. Direct Combustion	1.1. Steady Burning	Natural gas	56100	1	0,1
1. Direct Combustion	1.1. Steady Burning - Generator	Diesel	74100	3,9	3,9
1. Direct Combustion	1.2. Motion Burning - ON ROAD	Diesel	74100	3,9	3,9
1. Direct Combustion	1.2. Motion Burning - OFF ROAD	Diesel	74100	3,9	3,9

Table S3. Scope 2—emission factors [19].

Category	Subcategory	Fuel Type	CO_2 EF	CH_4 EF	N_2O EF
2. Indirect - Energy	2.1. Electricity consumption	Electric	0,439	-	-

Table S4. Scope 3—emission factors [20, 21].

Category	Subcategory	Fuel Type	CO_2 EF	CH_4 EF	N_2O EF
3.Transportation Sourced	3.1.Input Material Transportation - Highway - Trailer Status Unknown Vehicle (HGV-all HGV) - 100% full ton*km	Diesel	0,07125	0,00001	0,00089
3.Transportation Sourced	3.1.Input Material Transportation - Highway - Trailer Condition Unknown Vehicle (HGV-all HGV) - 100% full km	Diesel	0,97285	0,0001568	0,011951678
3.Transportation Sourced	3.3.Employees' Commuting to Work - Bus	Diesel	0,044099	0,0	0,001304

Table S5. Scope 4—emission factors [20, 21].

Category	Subcategory	Material Type	CO_2 EF	CH_4 EF	N_2O EF	Other GHG EF
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Mylar in various sizes	3,121	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Kraft paper in various sizes	0,771	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Sellak paper in various sizes	0,771	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Various sizes of electrical steel, plate sheet, wave wall sheet	0,373	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Insulated copper wire in various sizes	0,762	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Parallel copper ctc wire in various sizes	3,007	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Som copper in various sizes	3,007	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Copper foil in various sizes	5,026	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Aluminum foil in various sizes	0,646	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Insulated aluminum wire in various sizes	2,879	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Powder and acrylic paint	7,546	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Thinner	0,541	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Welding wire in various sizes	3,007	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Corner bar in various sizes	2,008	-	-	-

4. Sourced from Purchased Product	4.1. Purchased Goods Group	Edge strip in various sizes	4,042	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Number plate	0,373	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Transmission bar in various sizes	0,366	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Iron	2,223	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Scrap Iron, Copper, Aluminum	0,003	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Paint hardener	4,958	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Silica sand	0,043	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Floor cleaning drugs	4,010	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Shell transformer oil	1,205	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Nut And bolt	3,007	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Plug and valve	0,762	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Copper connection wire	0,263	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Tape	2,940	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Boron Oil	1,373	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Gasket And Stud Set	2,223	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Commutator	31,370	-	-	-

4. Sourced from Purchased Product	4.1. Purchased Goods Group	Thermometer	2,282	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Insulator	0,791	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Gun stud	2,223	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Box profile	2,024	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Small plastic fittings	2,600	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Plastic handcuffs	2,600	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Paint, Adhesive	3,547	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Link insert	9,273	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Pipe and profile	2,024	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Angle iron insulation board	2,657	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	SEAL (GASKET AND O-RINGS)	1,880	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Fiber glass	2,421	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Aluminum plate, bar	0,310	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Copper plate, Bar	0,530	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Metal parts (iron, steel profile pipe)	0,193	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Isolation cloth	2,657	-	-	-

4. Sourced from Purchased Product	4.1. Purchased Goods Group	Plastic material	10,019	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Tape	0,247	-	-	-
4. Sourced from Purchased Product	4.1. Purchased Goods Group	Glass fiber	2,421	-	-	-
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Computer terminals and other computer peripheral equipment	0,167	0,001	-	0,004
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Commercial and institutional building construction	0,222	0,000736	0,0000211	0,009459
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Cutting and machine tool accessory, rolling mill, and other metalworking machines	0,242	0,001	-	0,006
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Electronic capacitors/resistors/coils/transformers/connectors and other components (except semiconductors and printed circuit assemblies)	0,171	0,001	-	0,007
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Gasoline stations	0,226	0,001	-	0,004
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Industrial and commercial fan and blower and air purification equipment	0,239	0,001	-	0,019
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Machinery, equipment, and supplies	0,107	-	-	0,004
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Metal tank (heavy gauge) manufacturing	0,378	0,00105	0,0000185	0,006537
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Motor vehicle and motor vehicle parts and supplies	0,144	0,001	-	0,004
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Office furniture and custom architectural woodwork and millwork	0,303	0,002	-	0,009

4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Other electronic component manufacturing	0,146	0,000417	0,0000141	0,005869
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Other nonferrous metal foundries (except die-casting)	0,52	0,00134	0,0000274	0,05678
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Telephones	0,163	0,001	-	0,005
4. Sourced from Purchased Product	4.2. Emissions from Capital Goods	Vehicle bodies	0,232	0,001	-	0,011
4. Sourced from Purchased Product	4.3. Emissions from Waste	Other hydraulic oils	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Paper and cardboard packaging	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Plastic packaging	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Wooden packaging	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Packaging containing residues of or contaminated with hazardous substances	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Absorbents, filter materials (oil filters not otherwise specified), cleaning cloths, protective clothing contaminated with hazardous substances	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Wastes whose collection and disposal are subject to special treatment in order to prevent infection	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Metals	0,021	-	-	-
4. Sourced from Purchased Product	4.3. Emissions from Waste	Waste water	0,201	-	-	-
4. Sourced from Purchased Product	4.5. Emissions from Service Procurement	All other business support services	0,10	0,000439	0,0000148	0,002626

4. Sourced from Purchased Product	4.5. Emissions from Service Procurement	Medical services	0,000436	0,0000156	0,003093	0,116
4. Sourced from Purchased Product	4.5. Emissions from Service Procurement	Other management consulting services	0,07	0,000338	-	0,003
4. Sourced from Purchased Product	4.5. Emissions from Service Procurement	Security systems services (except locksmiths)	0,07	0,00029	0,0000088	0,001745
4. Sourced from Purchased Product	4.5. Emissions from Service Procurement	Vehicle rental and leasing	0,14	0,001	-	0,002

Table S6. Scope 5—emission factors [20, 21].

Category	**Subcategory**	**Parts that can be evaluated within the framework of End-of Life**	**Method**	**CO_2 EF**	**CH_4 EF**	**N_2O EF**
5. Use of the Product Sold	5.3. Post-Life Emissions	Transformer oil	Closed loop	21,28	-	-
5. Use of the Product Sold	5.3. Post-Life Emissions	Copper, aluminum, iron contents (Core, Structural elements, Windings, Other Metal Parts)	Closed loop	0,985	-	-
5. Use of the Product Sold	5.3. Post-Life Emissions	Copper, aluminum, iron contents (Core, Structural elements, Windings, Other Metal Parts)	Storage	1,264	-	-
5. Use of the Product Sold	5.3. Post-Life Emissions	Non-Metal Parts (insulation materials, insulation elements, kraft paper	Incineration	21,28	-	-