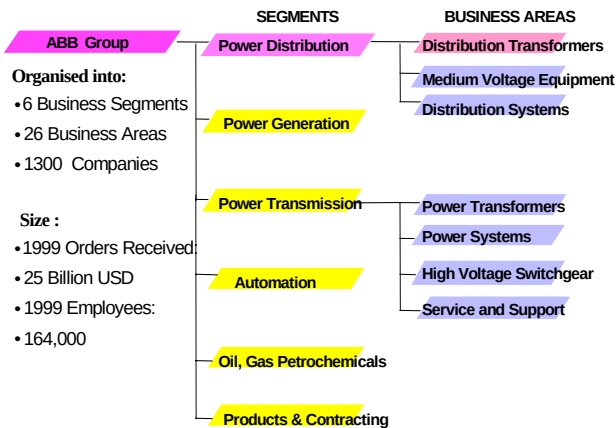




Distribution transformer 315kVA, 11kV, 3 phase, ONAN

Business area organisation



Description of Product

Distribution transformer is used to convert electrical energy of higher voltage (usually 11-22-33kV) to a lower voltage (250 or 433V) with frequency identical before and after the transformation. Application of the product is mainly within suburban areas, public supply authorities and industrial customers. With given secondary voltage, distribution transformer is usually the last in the chain of electrical energy supply to households and industrial enterprises.

There are 3 main parts in the distribution transformer:

1. Coils/winding – where incoming alternate current (through primary winding) generates magnetic flux, which in turn develop a magnetic field feeding back a secondary winding
- 2.
3. Magnetic core – allowing transfer of magnetic field generated by primary winding to secondary winding by principle of magnetic induction

First 2 parts are known as *active parts*

4. Tank – serving as a mechanical package to protect active parts, as a holding vessel for transformer oil used for cooling and insulation and bushing (plus auxiliary equipment where applicable)

Product range

Distribution transformers built by ABB Transmission and Distribution Ltd. cover the range:

Pole-mounted Transformers:

10 to 63 kVA, Single Phase and SWER
SWER Isolators and CSP Transformers
25 to 500 kVA, Three Phase*

Ground-mounted Transformers:

300 to 1500 kVA BS and Industrial Styles

Integrated Transformer Substations:

100 to 1500kVA, 11 and 22 kV, TPS1 or TPS2

Complete with HV and/or LV switchgear

Typical unit was selected for this Environmental Product Declaration:

Type: Distribution transformer, pole lid, galvanised tank

Rating: 315kVA

Voltage: Primary 11kV, Secondary 433V

Connection: Dyn11

Oil: Standard transformer oil according to AS 1767



ISO 14001 Status

Facilities of Distribution Transformer Division at Darra, Queensland and Osborne Park, Western Australia are both certified to ISO 14001:1996 standard.



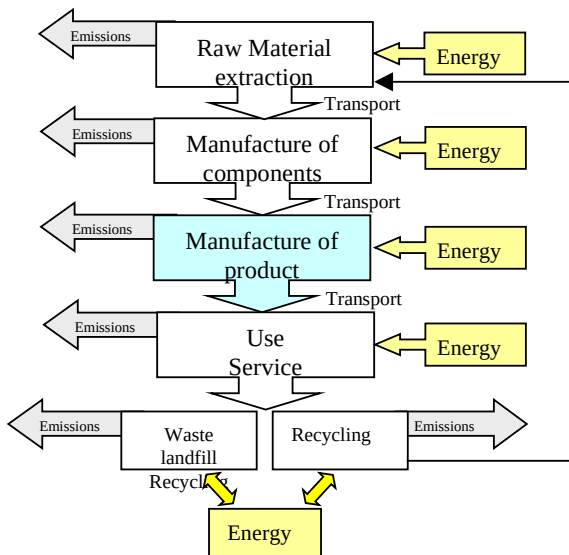


Life Cycle Assessment Study

This Environmental Product Declaration is based on LCA study performed at ABB Transmission and Distribution Ltd, Distribution Transformer Division, Darra, Queensland, Australia. The analysis was carried out with use of EcoLab software and “LCA activity” – ABB database developed in cooperation with CPM (Centre for Environmental Assessment of Product and Material Systems).

The functional unit has been set to:
3 phase distribution transformer 315kVA,
11kV/433V operational over the period of 30 years

Following diagram represents boundaries in the product life cycle



The energy consumption during the life cycle is based on 100% No Load Loss and 50% Load Loss over the period of 30 years. As the transformer is basically a maintenance free product with no moving parts, no further maintenance or additional materials have been included. End of service assumed 75% of major materials (Aluminium and steel) with 100% of transformer oil recycled.

Data sources

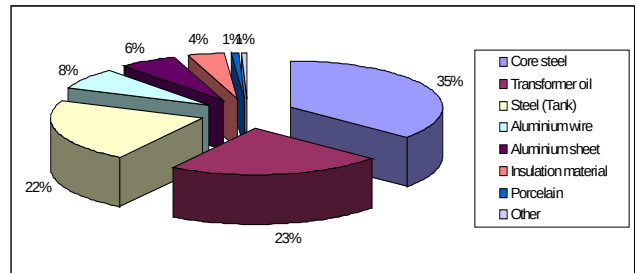
Materials or components have been allocated from ABB Bill of material data. Corresponding

emissions and natural resources have been set by using the EcoLab.

Production phase

The material content of transformer is:

Material	[kg]
Core steel	533
Transformer oil	340
Steel (Tank)	324
Aluminium wire	113.51
Aluminium sheet	86.3
Insulation material	59.9
Porcelain	11
Other	9



CO₂ emission contributes 98.23% of total 19.120kg of different gases emitted during raw material and assembly production. Water pollution consists of 50.8% sulphates, 18.9% of TOC and 10.5% of Nitrogen. Total mass of discharged pollutants is 94.2kg. Soil emissions consist mainly from mineral waste – 97.9% of total 1.850kg.

Use of natural resources is summarised in following table:

Resource	Amount	Unit
Coal (energy resource)	7541.93	kg
Oil (energy resource)	1476.12	kg
Fe (material resource)	708.18	kg
Gas (energy resource)	521.47	kg
Cu (material resource)	343.90	kg
Al (material resource)	265.85	kg
Hydro power	37.63	MJ
Si (material resource)	19.17	kg

Environmental Product Declaration

BA Distribution Transformers



Use phase

Average Australia electricity production scenario has been used for emission assessment.

Emissions to air consist of 98.7% CO₂ from total of 732.329kg different gases emitted during the operation period.

Water pollution consists in 87.4% from sulphates and in 9.6% from suspended solids out of total mass of 3.36kg.

Natural resources used are in following table:

Resource	Amount	Unit
Coal (energy resource)	414728.36	kg
Gas (energy resource)	14117.93	kg
Oil (energy resource)	12164.83	kg
U (energy resource)	0.33	kg

End of life phase

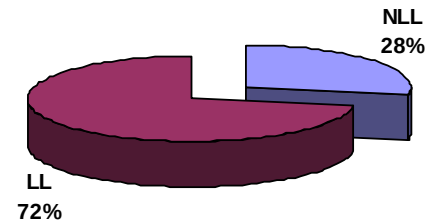
Most natural resources and emissions in the end of life scenario have negative value, as those are reclaimed as environmental profit.

Resource	Amount	Unit
Al (material resource)	-151.83	kg
Coal (energy resource)	-900.85	kg
Cu (material resource)	-22.33	kg
Fe (material resource)	-255.09	kg
Gas (energy resource)	-78.82	kg
Oil (energy resource)	-380.00	kg

Environmental Impact Assessment

Total environmental impact assessment has been performed with use of Tellus and Eco-Indicator95 evaluation methods. Both evaluation methods indicate that the use phase is the source of main environmental burden. Emissions from generation of electrical energy to cover the losses of transformer score the highest.

Detail of loss allocation between NLL and LL can be seen in following chart:



While NLL portion can be expected constant, Load Loss part can vary and will be highly dependent on transformer load during the use phase. There are, of course, other important technical aspects to be considered when making a transformer selection, which are out of this EPD scope.

Information to customer

Our products are manufactured under ISO 9001 and ISO 14001 standards. Transformer does not require maintenance, but relevant state legislation shall be observed for repair or emergency procedures.

Decommissioning and recycling

In order to offset environmental load, all major materials shall be recycled.

ABB Australia Pty Limited

Distribution Transformers

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