TRANSFORMERS MAGAZINE'S
INDUSTRY NAVIGATOR

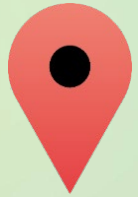
INVESTMENTS, ARTIFICIAL INTELLIGENCE AND SUSTAINABILITY
CONFERENCE 2024

R&S Group: Status of Sustainability and Digitalization in Cast Resin Transformers

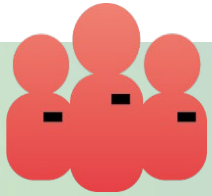
Rolf Fluri / Ulrich Voss

13 June 2024

The R&S Group



Headquarters in Sissach, Switzerland



Global workforce with 700+ employees

CHF 200 million in sales with strong growth

120+ distribution partners worldwide

Export to 75+ countries

Our Products

Cast Resin Transformers

Up to 52 kV and 25 MVA for different applications

- Energy distribution
- Industrial applications
- Buildings
- Metro and railway applications
- Renewables: solar, wind, hydro, etc..
- Data Centers
- BESS: Battery Electrical Storage System

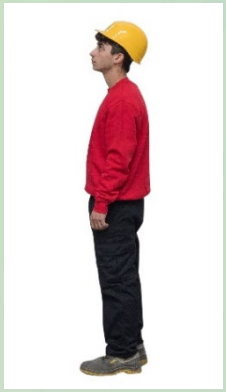
Designed according to latest standards

- Eco regulation EU548/2014 – EU2019/1783
- IEC 60076-11

Aimed to minimize environmental contamination and fire hazard

- Tested according to E4– C3 – F1

Maximum operating temperature 55°C and transport and storage down to -50°C



Metal housing customized for your needs

Protection

- IP 21
- IP 31
- IP 23
- Suitable for Indoor or outdoor application

HV & LV cable boxes

- located on the short or long sides of the enclosure
- as per the British Standard (principally supplied in Qatar)

EcoPlus2030

The new series of transformers with the lowest CO_2 emission ever manufactured

EcoPlus2030 – New Series of Transformers

In compliance with the guidelines of the european directive 2018/2002/EU, Tesar is committed to a continuous sustainability process improvement, through various initiatives which will further reduce CO_2 emissions:

- SUSTAINABILITY REPORT (ESG);
- ISO 50001: 2018 CERTIFICATION;
- PRODUCT EPD;
- CIRCULAR ECONOMY;
- SELF-PRODUCTION ELECTRICITY SYSTEMS;
- EFFICIENCY OF CURRENT PRODUCTION PLANTS;
- USE AND/OR REPLACEMENT OF PRODUCTS WITH LOWER CO2 EMISSION INTO THE ATMOSPHERE.

EcoPlus2030 – New Series of Transformers

"…the transformer that reduces the environmental impact without compromising effectiveness and efficiency…"

Why EcoPlus2030?

- The new designed transformer significantly reduce the quantity of CO2 emission comparing to existing European Tier2 regulation for Eco Design
- It follow the new European directives to meet 2030 targets

Reference transformers 1600kVA EcoDesign Tier 2

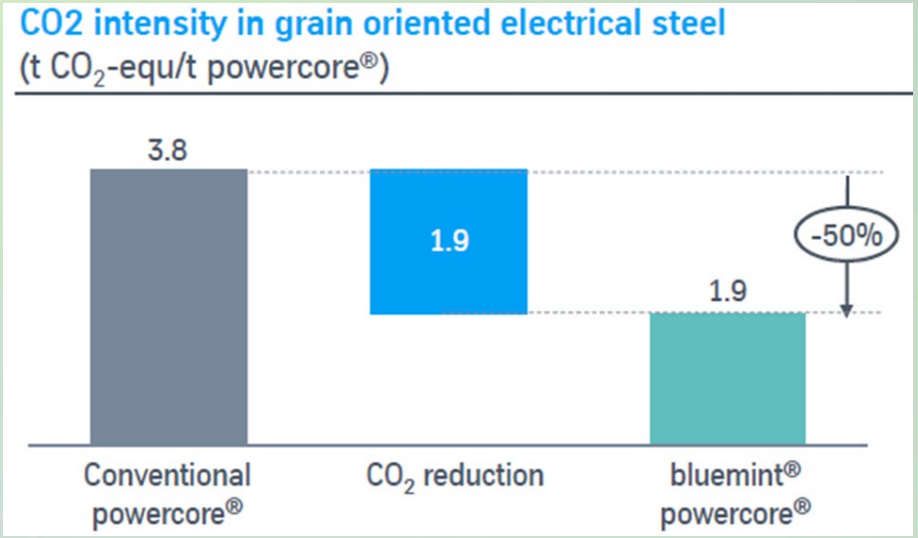
Description	UM	Value
Nominal Power	kVA	1.600
High Voltage	V	20.000
Tap Changer	-	2 x 2,5%
Low Voltage	V	400
Vector Group		Dyn11
No Load Losses (*)	W	1.980
Load losses @ 120°C (*)	W	13.000
Vcc @ 120°C	%	6

* Guaranteed Losses according to European Law EU 548/2014 TIER 2 (max value)

CO_2 Reduction thanks to Bluemint material usage

Nominal Power (*)	Bluemint	CO_2 Reduction thanks to GOES material
		kg CO_2
1600 kVA	B	-5.795

(*) same transformer geometry, magnetic core included



CO_2 Reduction thanks to No Load Losses

Comparison of CO_2 reduction EcoDesign Tier2 vs EcoPlus2030

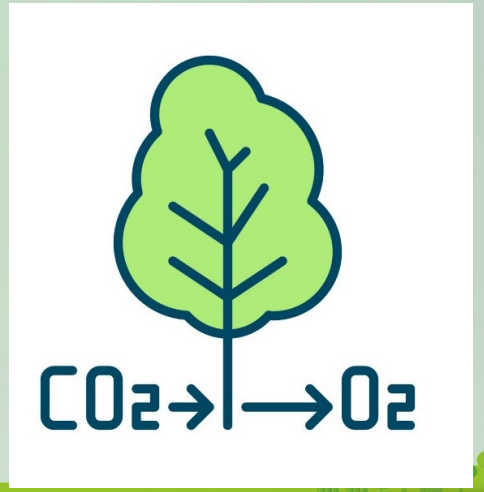
Nominal Power 1600kVA	No Load Losses (Po) W	Energy used (1 year) (**) kWh	Energy used (20 years) (**) kWh	CO_2 Reduction (1 year) (***) $kgCO_2$	CO_2 Reduction (20 years) (***) $kgCO_2$
Tier2	1.980	17.345	346.896	/	/
EcoPlus 2030	1.720	15.067	301.344	- 1.041	- 20.817

(**) The saving of the energy on No Load Losses is considered
(***) Valid for Italy, Sorce *«AIB 2022 Residual Mix Results»*

Total CO_2 Reduction (20 years)

Nominal Power	CO_2 Reduction thanks to GOES material	CO_2 Reduction thanks to No Load Losses (20 years)	Total CO_2 Reduction (20 years)
	kg CO_2	kg CO_2	kg CO_2
1600 kVA	- 5.795	- 20.817	- 26.612

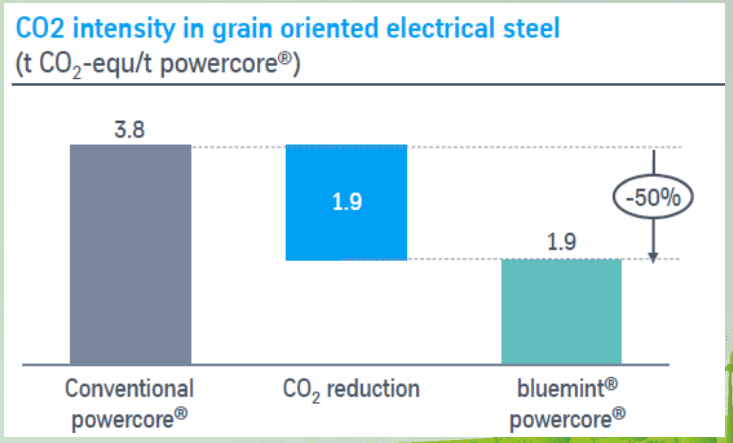
26 ton of CO_2 = 1.000 trees



Decarbonization approach – EcoPlus2030

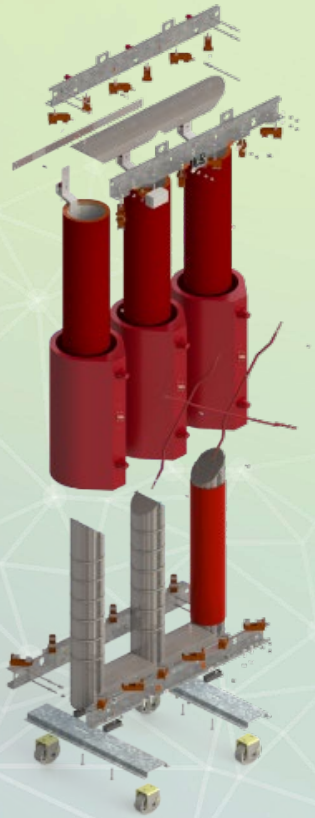
EcoPlus2030 vs EcoDesignTier2

EcoPlus2030	Po	Ipotesi di energia consumata Po in 1 anno	Ipotesi di energia consumata Po in 20 anni	Riduzione CO2				Peso della riduzione di CO2	
	Garantite			Riduzioni emissione CO2 per produzione GOES	Riduzioni emissioni CO2 per riduzione Po		Totale riduzione CO2	Dovuto a Po (20 anni)	Dovuto a GOES
Isolamento 12kV; 17,5kV; 24kV	W	kWh/year	kWh/20y	kg CO2	$kgCO_2$/ year	$kgCO_2$ 20 years	$kgCO_2$ 20 years	%	%
EcoDesign Fase 2 - 160kVA	360	3.154	63.072						
EcoPlus2030 - 160kVA	360	3.154	63.072	-1064	0	0	-1064	0,0	100,0
EcoDesign Fase 2 - 250kVA	468	4.100	81.994						
EcoPlus2030 - 250kVA	435	3.811	76.212	-1520	-132	-2642	-4162	63,5	36,5
EcoDesign Fase 2 - 400kVA	675	5.913	118.260						
EcoPlus2030 - 400kVA	585	5.125	102.492	-1948	-360	-7206	-9153	78,7	21,3
EcoDesign Fase 2 - 500kVA	812	7.113	142.262						
EcoPlus2030 - 500kVA	730	6.395	127.896	-1995	-328	-6565	-8560	76,7	23,3
EcoDesign Fase 2 - 630kVA	990	8.672	173.448	0					
EcoPlus2030 - 630kVA	835	7.315	146.292	-2755	-621	-12410	-15165	81,8	18,2
EcoDesign Fase 2 - 800kVA	1.170	10.249	204.984						
EcoPlus2030 - 800kVA	1.040	9.110	182.208	-2850	-520	-10409	-13259	78,5	21,5
EcoDesign Fase 2 - 1000kVA	1.395	12.220	244.404						
EcoPlus2030 - 1000kVA	1.190	10.424	208.488	-3610	-821	-16414	-20024	82,0	18,0
EcoDesign Fase 2 - 1250kVA	1.620	14.191	283.824						
EcoPlus2030 - 1250kVA	1.440	12.614	252.288	-4275	-721	-14412	-18687	77,1	22,9
EcoDesign Fase 2 - 1600kVA	1.980	17.345	346.896						
EcoPlus2030 - 1600kVA	1.720	15.067	301.344	-5795	-1041	-20817	-26612	78,2	21,8
EcoDesign Fase 2 - 2000kVA	2.340	20.498	409.968						
EcoPlus2030 - 2000kVA	2.055	18.002	360.036	-6460	-1141	-22819	-29279	77,9	22,1
EcoDesign Fase 2 - 2500kVA	2.790	24.440	488.808						
EcoPlus2030 - 2500kVA	2.525	22.119	442.380	-7695	-1061	-21218	-28913	73,4	26,6



Circular Economy

Regarding the production cycle of transformers, it should be considered that almost all the production waste of the materials used are recycled, such as metals (Al and Cu, iron, plastic, paper, wood, etc.).



CAST RESIN TRANSFORMER RECYCLE

The percentage of recyclable material on each of their main transformer components:

- Magnetic Core

95% Iron → Recyclable

5% Other material e.g. Straps, painted lamination, zinc → Disposal

- HV Windings

50% Aluminum → Recyclable

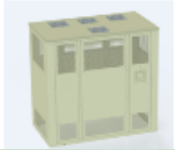
50% Resin/insulating → Disposal (according to Italian law)

- LV Windings

85% Aluminum → Recyclable

15% Insulating → Disposal

- Enclosure



95% Iron → Recyclable

5% Insulating/other component → Disposal

ACTIVITIES PERFORMED BY TESAR

1. Extension and improvement of product life cycle:

- Repairing
- Maintenance
- Refurbishment
- Remanufacturing

2. Production and end-life management cycle of the product

- Recycling

Certifications and Declarations

Energy management system ISO 50001 : 2018

IMQ
www.imq.it

CISQ is a member of
IQNET
The International Certification Network
www.iqnet-certification.com

CERTIFICATO N. **0121.2024**
CERTIFICATE N.

SI CERTIFICA CHE IL SISTEMA DI GESTIONE DELL'ENERGIA DI
WE HEREBY CERTIFY THAT THE ENERGY MANAGEMENT SYSTEM OPERATED BY

TESAR SRL

LOCALITA' CHIAVERETTO 37/B - FRAZ. BACCANO - 52010 SUBBIANO (AR) Italy
SITI/SITES

Vedere gli Allegati per gli altri Siti (n° 2 allegati)
View the Annexes for the other Sites (n° 2 annexes)

E' CONFORME ALLA NORMA / *IS IN COMPLIANCE WITH THE STANDARD*

ISO 50001:2018

PER LE SEGUENTI ATTIVITA' / *FOR THE FOLLOWING ACTIVITIES*

Progettazione, produzione e assistenza post vendita di trasformatori di potenza, di trasformatori di tensione e di corrente per misura e protezione per tensione massima del sistema Um <= 72,5 kV
Design, manufacture and maintenance of power transformers and measuring and protective transformers with highest voltage for equipment Um <= 72.5 kV

IL PRESENTE CERTIFICATO E' SOGGETTO AL RISPETTO DEL REGOLAMENTO PER LA CERTIFICAZIONE DEI SISTEMI DI GESTIONE
THE USE AND THE VALIDITY OF THE CERTIFICATE SHALL SATISFY THE REQUIREMENTS OF THE RULES FOR CERTIFICATION OF MANAGEMENT SYSTEMS

DATE:	PRIMA CERTIFICAZIONE *FIRST CERTIFICATION*	EMISSIONE CORRENTE *CURRENT ISSUE*	SCADENZA *EXPIRY*
	02/02/2024	02/02/2024	01/02/2027

IMQ S.p.A. - VIA QUINTILIANO, 43 - 20138 MILANO ITALY
Management Systems Division - Flavio Ornago

ACCREDIA

Third party audit for certification and release of the certificate to ISO 50001:2018 finished in February 2024 for Tesar IT

Environmental Product Declaration (EPD)

Environmental Product Declaration (EPD) nr. EPDITALY0587 - “Power Transformer TRP-012-1000-0020-B2” according to ISO 14025 & EN 50693 since end of February 2023

TESAR S.r.l

EPD ITALY

Tesar
A company of R&S

DICHIARAZIONE AMBIENTALE DI PRODOTTO

Nome del Prodotto	Siti produttivi
Trasformatore di potenza TRP-012-1000-0020-B2	Loc. Chiaveretto – 52010 Subbiano (AR) Loc. Castelnuovo – 52010 Subbiano (AR)

In conformità alla ISO 14025 e alla EN 50693

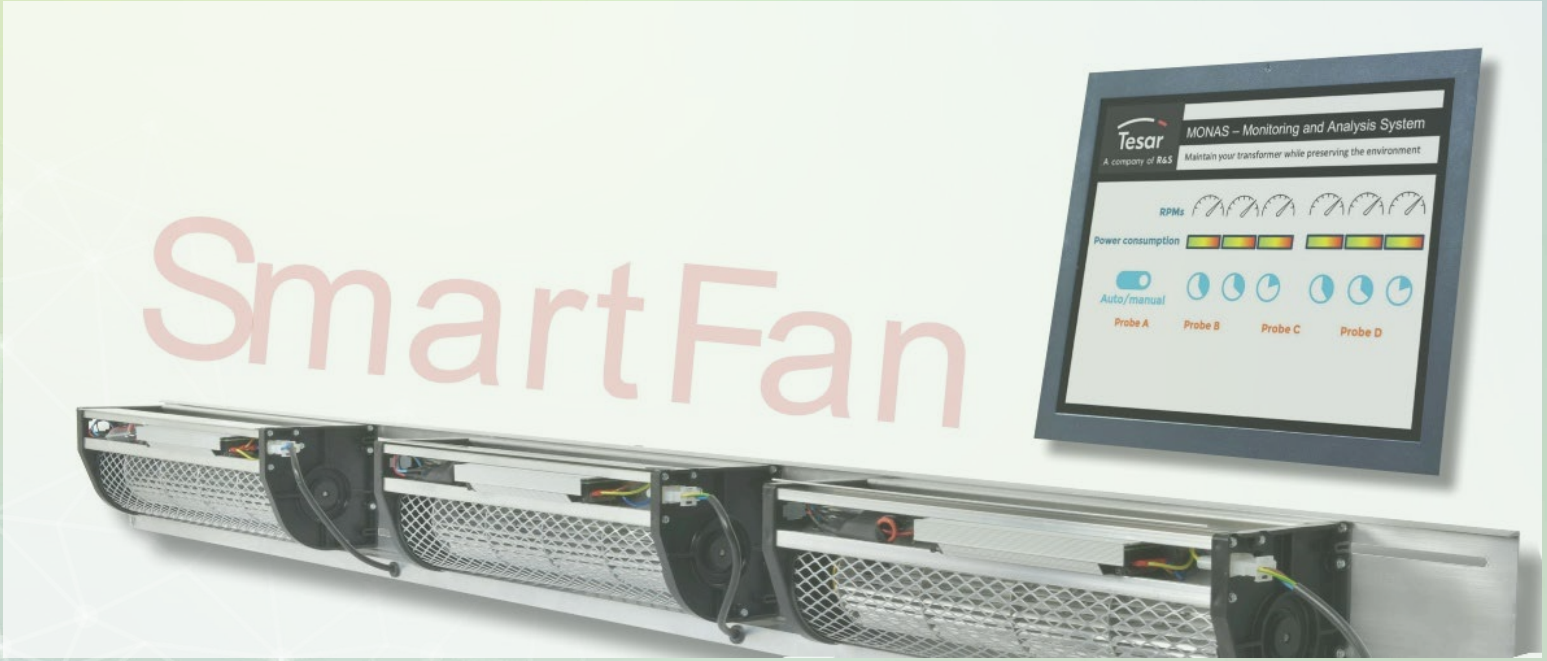
Program Operator:	EPDItaly
Editore:	EPDItaly
Numero Dichiarazione:	TESARTRP01210 000020B2
Numero di Registrazione EPDItaly:	EPDITALY0587
Data di emissione:	29/02/2024
Validità:	29/02/2029

Rev. 01 del 29/02/2024

Digitalization

SmartFan

SmartFan is the innovative cooling system for your cast resin transformer to lower the environmental impact of your power solution even more!



Easy to install, SmartFan is composed of six cooling fans that **regulate the transformer's temperature with one click**. Unlike traditional cooling systems, the transformer's thermal gradient is regulated by SmartFan **through a variable fan speed** that allows it to produce the optimal air volume.

SmartFan

SmartFan is the **ideal solution to enable effective predictive maintenance** as it is powered by MilkyDataWay[1)] , the cutting-edge Internet of Things solution developed according to the W3C Web of Things Standards that are promoted by major ICT players.

The integrated management system makes it possible **to control with accuracy the delivered power to each single fan**, in order to implement monitoring policies aimed at **optimising your cast resin transformer management**.

Once the installation is completed and the parameters you need to monitor are set, the integrated system **detects in real time the relevant data** for efficient operations enforcing corrective actions if anomalies occur “Fan” as the breeze of innovation brought by the SmartFan ecosystem which allows you to oversee the overall condition of your cast resin transformer through **fully customizable dashboards**. All the information you need are **visualised in charts, boards and graphs** to give you meaningful insights.

Based on a modular infrastructure with MilkyDataWay you can build up your eco-friendly smart factory starting from your cast resin transformer!

1) MilkyDataWay Platform developed by VAIMEE, a spin-off of the University of Bologna

Q & A

We guarantee energy

R&S International Holding AG
Reuslistrasse 32
4450 Sissach
Switzerland