

Industry

NAVIGATOR

SUSTAINABLE DEVELOPMENT
STRATEGIES FOR T&D

CONFERENCE 2025

Sustainable solutions for a Green Transformer

Matelec in Cooperation with Nynas & thyssenkrupp Electrical Steel GmbH

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April 10, 2025



About Matelec

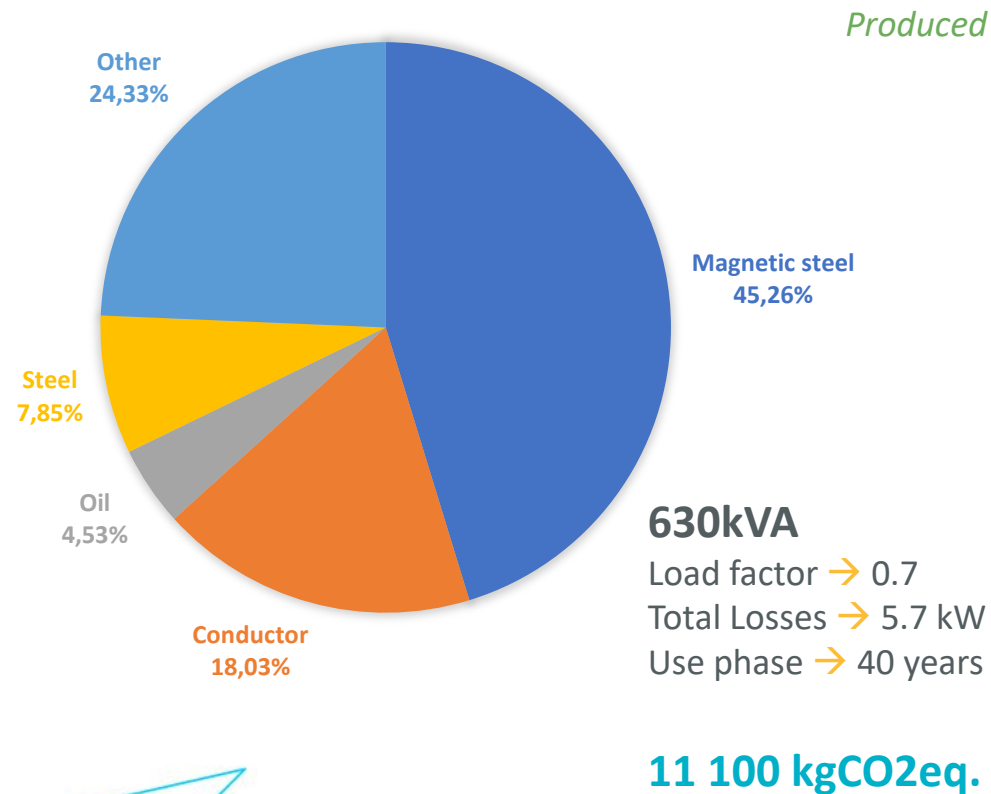
Leading manufacturer of reliable electrical products and a trusted provider of sustainable end-to-end energy services.

We provide comprehensive power solutions for Transmission & Distribution, Power Generation, and Renewables energy networks.

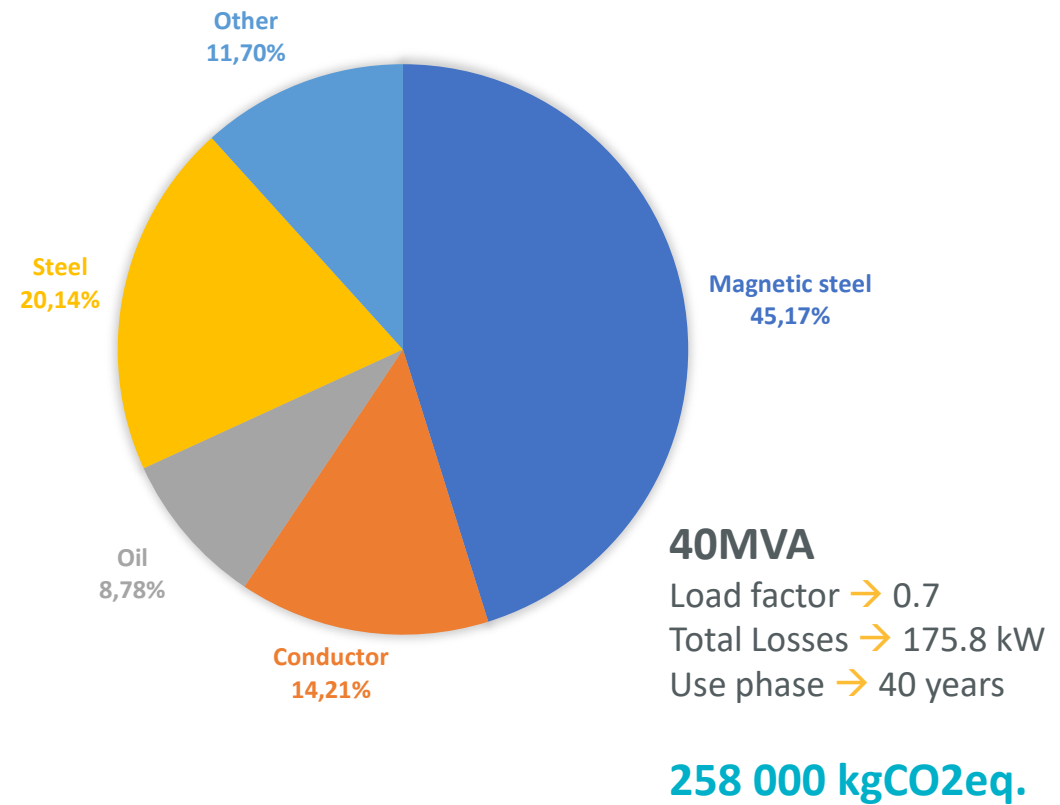
With **50+** years of expertise, operations in **35+** countries, and **300+** completed projects, we are a trusted global energy partner.



Cradle to Gate LCA of a Conventional Distribution Transformer Eco T2

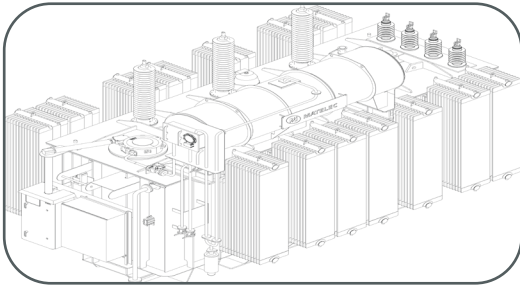


Cradle to Gate LCA of a Conventional Power Transformer Eco T2



How to Reduce CO2 Emissions During the Life Cycle

Design Phase



Optimized Design

Bio-Based Material

High Transformer Efficiency

Production Phase



Recycled/Recyclable Materials

Renewable Energy

Low Emission Transportation

CO2 Reduced Material

Use Phase



Load Monitoring

Transformer Health Monitoring

End of Life Phase



Reuse

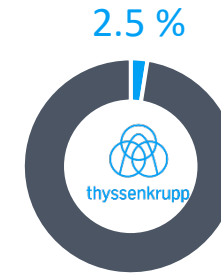
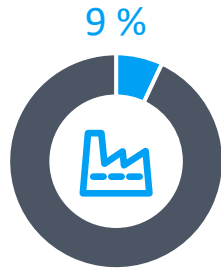
Remanufacture

Recycle



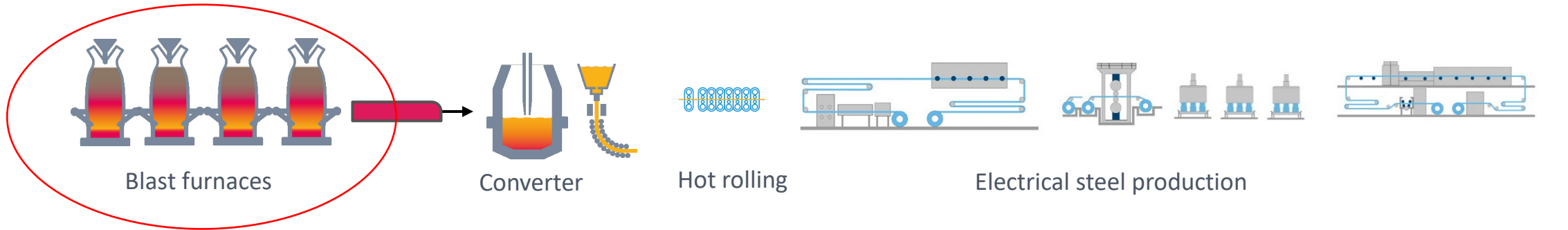
The steel industry has a major responsibility

With around 20 Mt, thyssenkrupp Steel Europe accounts for 2.5 % of Germany's CO₂ emissions



Hot strip production

Further processing to grain oriented electrical steel (GOES)



The blast furnace process reveals the highest contribution to the Carbon footprint, which is app. 65 % for GOES



Replacing the blast furnace by a direct reduction plant reduces the CO₂ emission factor of GOES by 34 %

Today

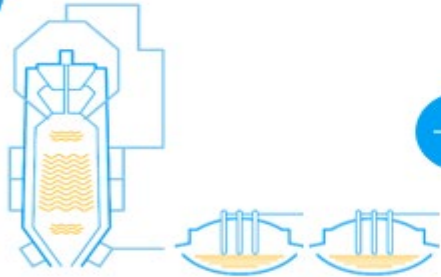


Blast furnace



Iron ore & coking coal

Tomorrow



Direct reduction plant with melting units

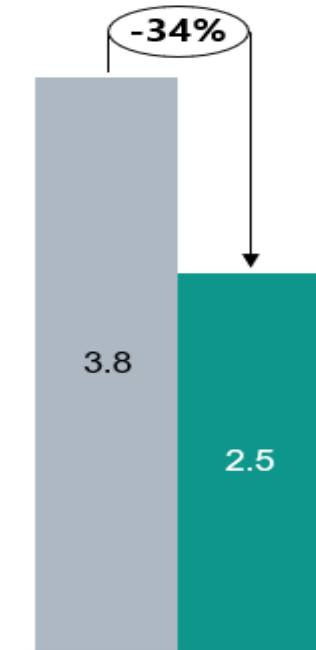


Iron ore, hydrogen & green electricity



Global Warming Potential Grain Oriented Electrical Steel

[kg CO₂ eq]



bluemint® powercore®

provides advantages and opportunities to reduce upstream emissions along the supply chain already today

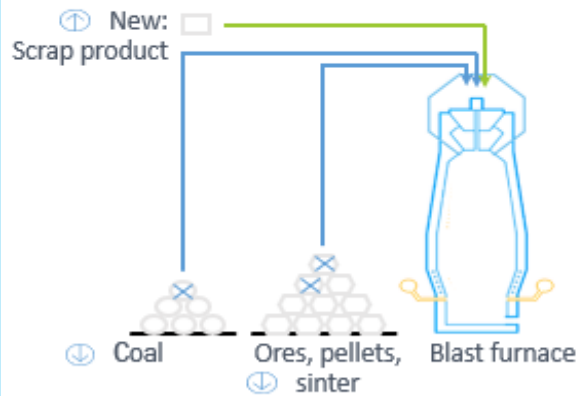
Conventional hot strip



2.1 t CO₂/t hot strip

Change of input materials

Less coal due to the use of a processed scrap product.
Less coal = Less CO₂



The scrap product is only smelted and does not have to be reduced by coal.

Certification of the genuine CO₂ savings by TÜV Süd

Balancing via an independent scrap product route in the blast furnace process, in which the scrap product is only melted down.

Output – physical



Output – mass-balanced



The parallel reduction process of the iron ores is balanced separately from this and leads to the footprint of the conventional material.

bluemint® recycled

CO₂ saving
1.35 t CO₂/t



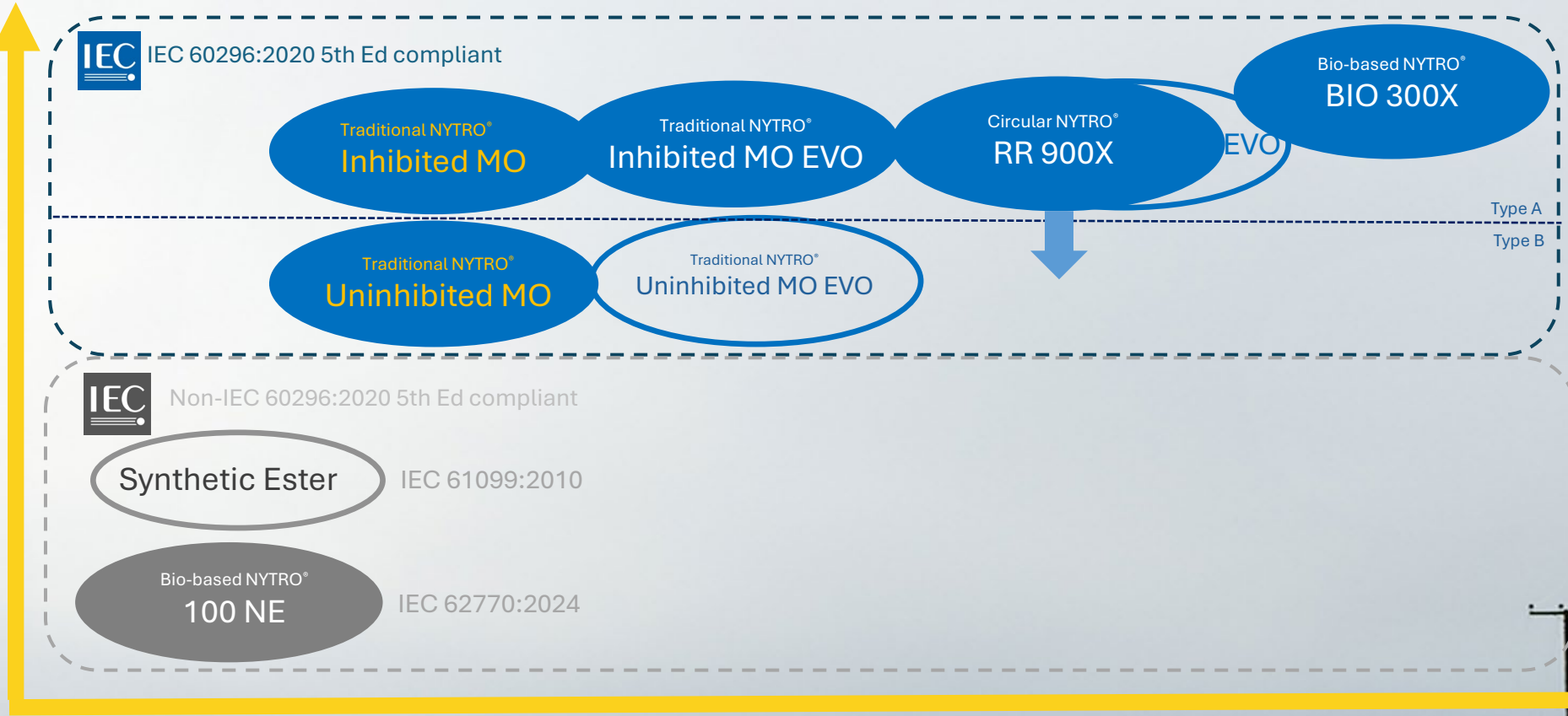
0.75 t CO₂/t hot strip

Balance-sheet recycling product



NYTRO® Portfolio Overview – Transformer Oils

Lifetime Liquid
(Oxidation
Stability)



Other Sustainability Credentials
(PCF, Load Losses, Recyclability, Compatibility D&M, Biodegradability)

NYTRO® Portfolio Overview – Transformer Oils

	Product name/type	Feedstock type	Product Carbon Footprint	Biogenic or Recycled Content	Compatibility Design	
NYTRO® Super Grades (TVAI+)	BIO 300X	Bio-crude	-400%	>99% biogenic		
	10XN	Naphthenic Crude				
	4000X	Naphthenic Crude				
	EVO (10XN and 4000X)	Naphthenic Crude	Up to -25%			
NYTRO® High Grades (TVAI)	RR 900X (Re-refined)	Used Transf. Oil	Up to -80%	>99% recycled		
	GEMINIX and LYRAX	Naphthenic Crude				
NYTRO® Standard Grades (TVBU)	LIBRA and TAURUS	Naphthenic Crude	Reference			
NYTRO® Special Grades	NE100	Vegetable Oil (HOS)	Up to -90%	>99% biogenic		
Non Nynas	Synthetic Ester	Mixed or full-synthetic				
Non Nynas	Paraffinic and Iso-paraffinic	Paraffinic Crudes or Gas				
Non Nynas	Recycled (Reclaimed)	Used Transf. Oil		>0% recycled		

Legend

Best-in-class

Best

Good

Fair

NYTRO® Portfolio Overview – Transformer Oils

	Product name/type	Compatibility Materials	Oxidation Stability	Load Losses	Biodegrad.	Efficient Recyclability
NYTRO® Super Grades (TVAI+)	BIO 300X	Best-in-class	Best	Best	>90%	Best-in-class
	10XN	Best-in-class	Best	Good	20%	Best-in-class
	4000X	Best-in-class	Best	Good	25%	Best-in-class
	EVO (10XN and 4000X)	Best-in-class	Best	Good	25%	Best-in-class
NYTRO® High Grades (TVAI)	RR 900X (Re-refined)	Best-in-class	Good	Good	20%	Best-in-class
	GEMINIX and LYRAX	Best-in-class	Good	Good	30%	Best-in-class
NYTRO® Standard Grades (TVAU)	LIBRA and TAURUS	Best-in-class	Good	Good	35%	Best-in-class
NYTRO® Special Grades	NE100	Fair	Fair	Fair	>90%	Fair
Non Nynas	Synthetic Ester	Fair	Fair	Fair	>90%	Good
Non Nynas	Paraffinic and Iso-paraffinic	Good	Good	Fair	30-90%	Best-in-class
Non Nynas	Recycled (Reclaimed)	Good	Good	Fair	20%	Good

Legend

Best-in-class

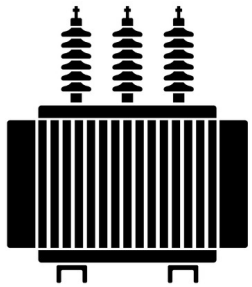
Best

Good

Fair

Sustainable Solutions from Matelec - 630kVA Cradle to gate

Conventional



11 100 kgCO₂eq.

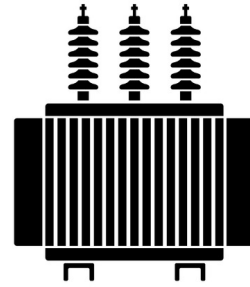


10% Reduced in CO₂ Emissions
5% Cheaper

Improved

Optimized Design

Renewable Energy



10 000 kgCO₂eq.



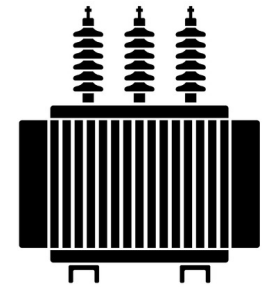
60% Reduced in CO₂ Emissions
18% Extra Cost

Greener

Bio-Based Material

Recycled/Recyclable Materials

CO₂ Reduced Material



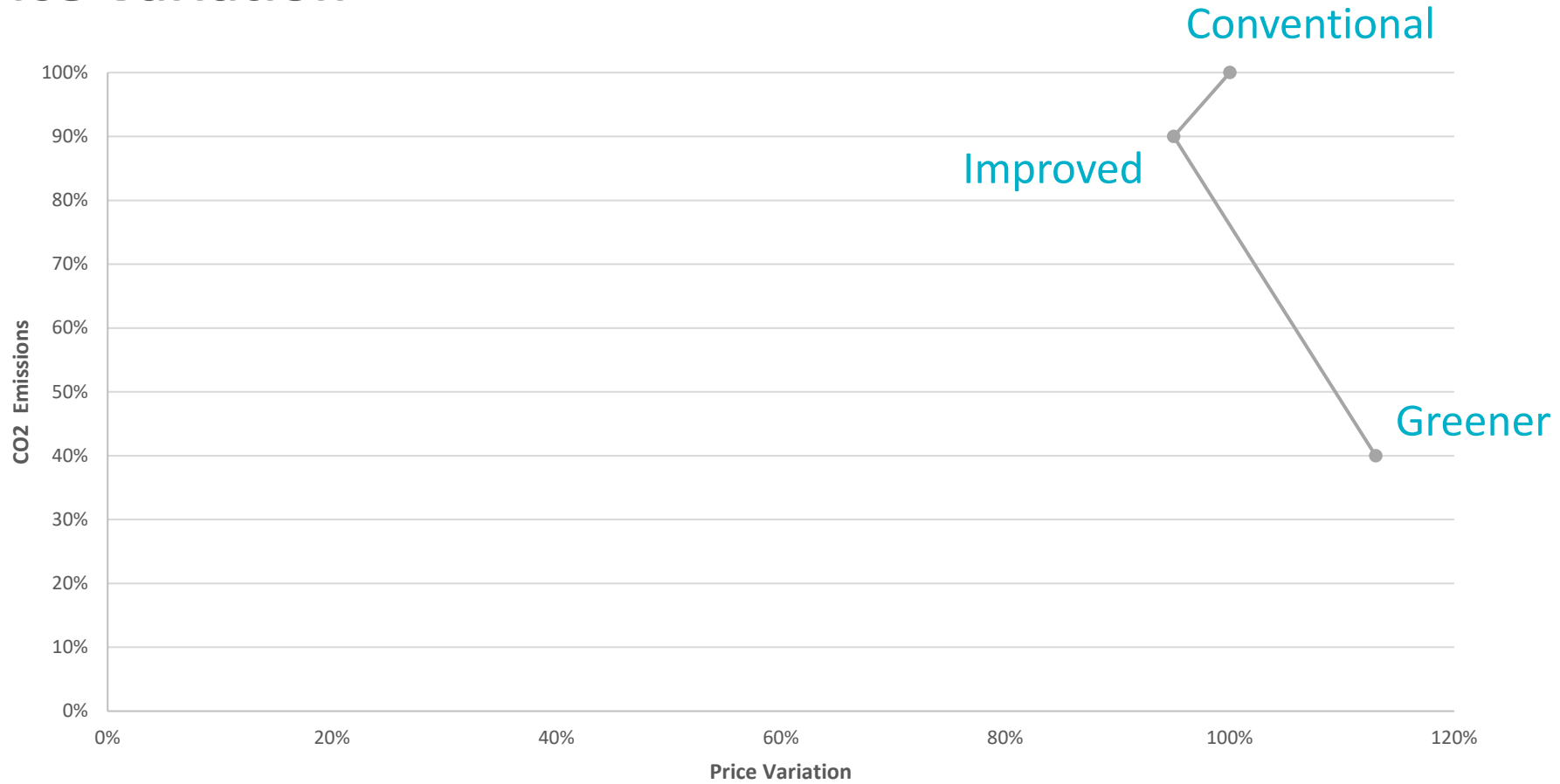
4 010 kgCO₂eq.

- Less Material
- 50% Energy from Solar Panels

	CO ₂	Cost
tkES bluemint	-26%	+4%
Nynas Bio 300X	-14%	+11%
Greener Aluminum	-14%	+1.5%
Greener Steel	-6%	+1.5%



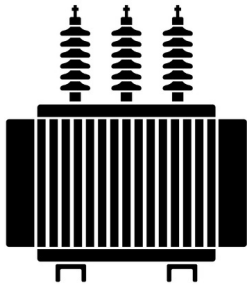
CO2 Vs Price Variation



Sustainable Solutions from Matelec - 40MVA

Cradle to gate

Conventional



258 000 kgCO₂eq.



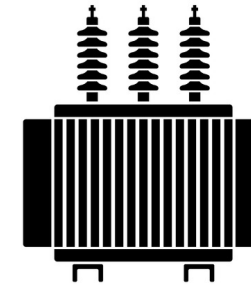
60% Reduced in CO₂ Emissions
20% Extra Cost

Bio-Based Material

Recycled/Recyclable Materials

CO₂ Reduced Material

Greener



98 100 kgCO₂eq.

	CO ₂	Cost
tkES bluemint	-23%	+2.2%
Nynas Bio 300X	-23%	+17.4%
Greener Steel	-14%	+0.4%



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Thank you

