



1 February 2024

Towards net-zero emission of T&D grids



Cable design and decarbonization

Net Zero Emission Grid

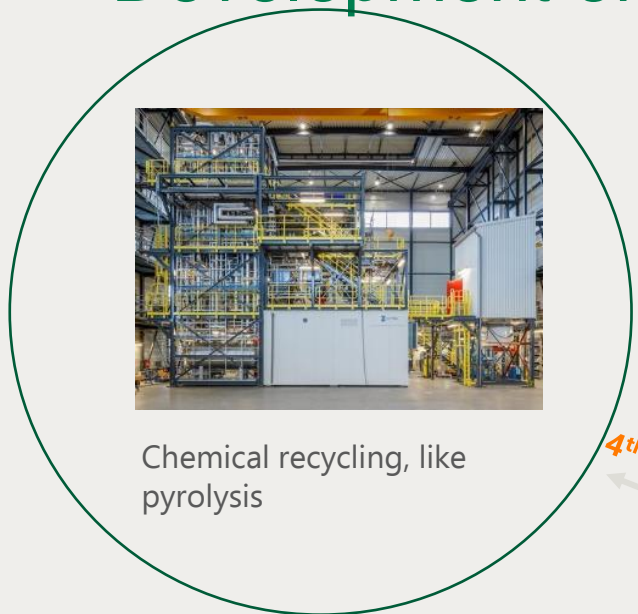


cigre

For power system expertise

Laurens Pots, TKF

Development of recycling of cable materials over time.



Chemical recycling, like pyrolysis



Energy recovery



Landfilling

4th generation

1st generation



3rd generation

2nd generation

rPE sheathing grades for MV cable

Mechanical recycling for downgraded products



Pyrolysis of XLPE & HDPE cable materials.

- Feedstock

- XLPE, incl. 15% semi conductive compounds
- HDPE



- Experiment

- Test by Suster Enschede.
- Thermal degradation without interaction with oxygen.

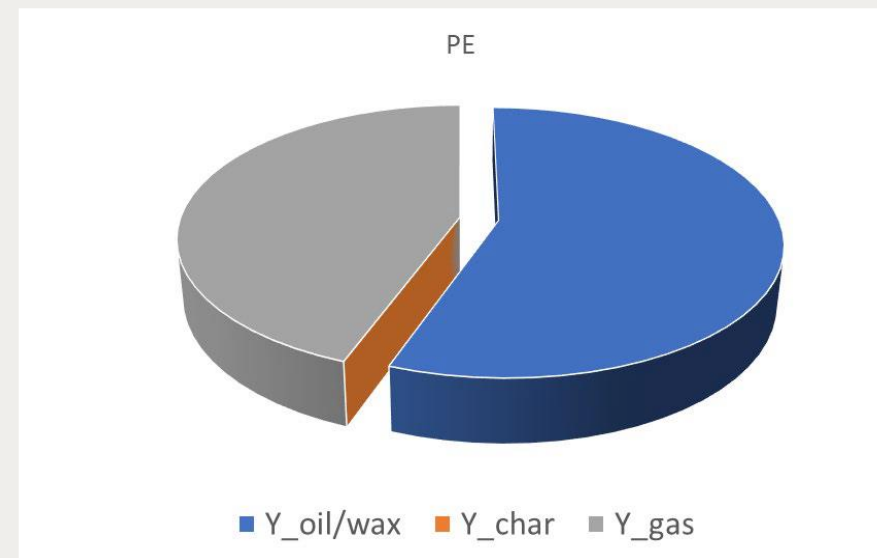
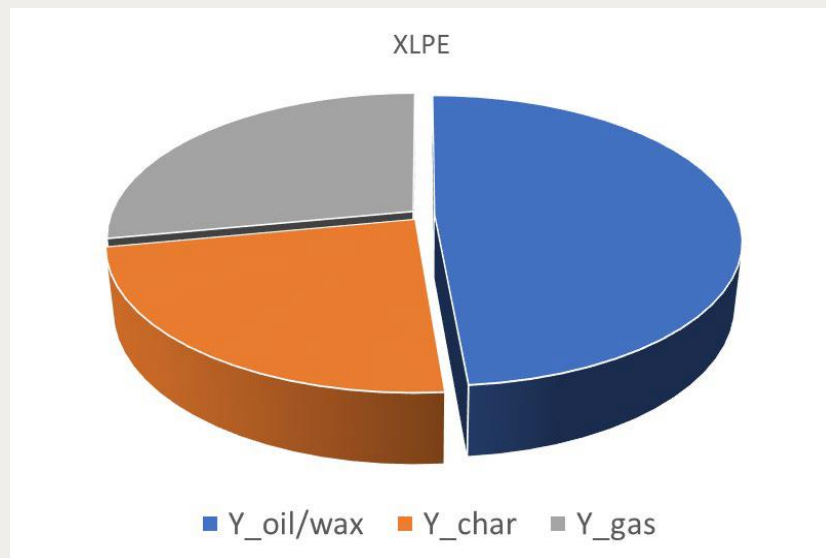


- Results

- Wax
- Char
- Oil



Results pyrolysis of cable compounds.



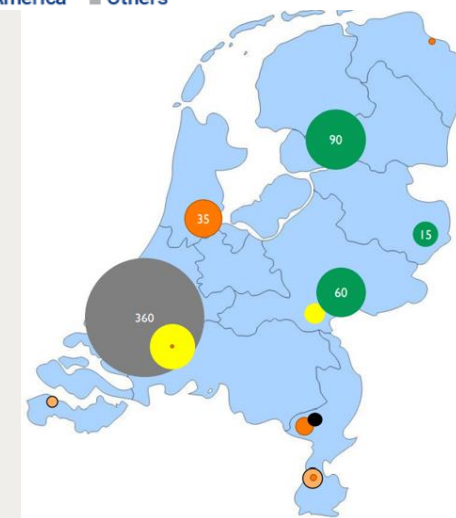
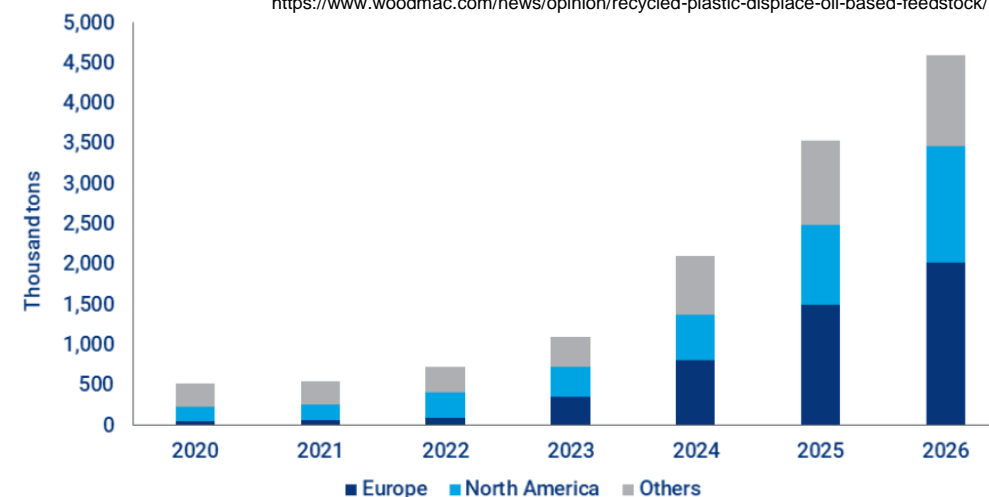
**Raw materials for
new compounds**

Pyrolysis capacity is increasing.



Pyrolysis capacity for waste plastic

<https://www.woodmac.com/news/opinion/recycled-plastic-displace-oil-based-feedstock/>



(XL)PE for cable production is <1% of global PE consumption.
Can we take advantage of this development?

Pyrolyze based compounds for power cable production.

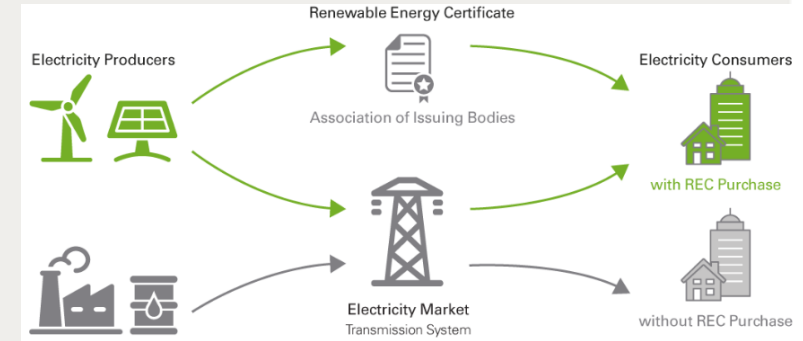
- The technology is ready, it is a choice.
- Borealis Bornewables™ compounds



ISCC, International Sustainability & Carbon Certification.



- Green electrons don't exist. Renewable power is controlled with REC, Renewable Energy Certificates.



- Green Ethylene for cable compounds is mass-controlled by ISCC.
 1. Control of mass non-fossil-based polymers going in our factory,
 2. Flow of batches used for certain cable production runs,
 3. Mass of polymers sold to customers.




- Audit & inspection of proper mass balance control (ERP system and production documentation).
- A certified CO₂ calculation method is required.



Validation of TKF circularity data is certified by KIWA.



COVENANT



kiwa


**Covenant certificate
K-0213107/01**

Issued: 2023-09-15
Replaces: -
Page: 1 of 2

**Products for primary assets of Energy Installations –
Validation of circularity data from Raw Material
Passport (RMP)**

STATEMENT BY KIWA
With this Covenant certificate, issued in accordance with the Kiwa Regulations for Certification, Kiwa declares that legitimate confidence exists that circularity data of the products as supplied by

B.V. Twentsche Kabelfabriek
and used as a primary asset of the energy network operators united in Netbeheer Nederland as specified in this Kiwa Covenant, may be relied upon to comply with the circularity data of the Raw Material Passports of the energy network operators united in Netbeheer Nederland.



Ron Scheepers
Kiwa

Publication of this certificate is allowed.
Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid.

Prysmian Group Linking the Future

LOCATIE NL / EN

HOME / CERTIFICERING VAN GRONDSTOFFENPASPOORTEN



Certificering van Grondstoffenpaspoorten

Categorieën: [Corporate](#) [Industries](#) [Innovation](#) [Products & Solutions](#) [Sustainability](#)

Prysmian Netherlands bijt spits af met certificering van grondstoffenpaspoorten

Resource passport and CO₂ passport per cable design.

Resourcepassport

Article number: CONF145338
 Design number: E-YAKrvdlwd 87/150 kV 1 X 2500 Al-Mill --- TenneT
 Product description: TKF (B.V. Twentsche Kabelfabriek)
 Supplier: TKF (B.V. Twentsche Kabelfabriek)
 Date: 08 February 2023
 Total weight: 14.959 kg/km

Material	Recycled [%]	Re/Down in	Recyclable [%]	Re/Down out	Supplier Tier 1
Aluminium (electronic purity)	0	N.A.	100	R	Various suppliers (EU)
PE	0	N.A.	95	D	Various suppliers (EU)
PE	0	N.A.	95	D	Various suppliers (EU)
Waterblocking tape	6	N.A.	0	N.A.	Various suppliers (EU)
XLPE Insulation (natural)	0	N.A.	97	D	Various suppliers (EU)
XLPE Semiconductive (black with carbon)	0	N.A.	97	D	Various suppliers (EU)

Resourcepassport CO₂

Article number: 58409
 Design number: CONF179835
 Product description: E-YAKrvdlwd 87/150 kV 1 x 2500 Al-Mill --- TenneT
 Supplier: TKF (B.V. Twentsche Kabelfabriek)
 Date: 30 januari 2024

Weighted average circularity score: 37%
 Total CO₂ emission for transporting cable [kg/km]: 123,7
 Total CO₂ emission for finished cable [kg/km]: 52809

Circularity and CO₂ calculations based on asset-tool for Dutch distribution companies / CE Delft 2021.

Material	Circularity score	CO ₂ emissions materiale [kg/km]	CO ₂ emissions EOL [kg/km]
PE	24%	3127,8	112,7
Waterblocking tape	0%	480,2	79,3
Aluminium (electronic purity)	50%	33441,5	0,0
XLPE Semiconductive (black with carbon)	24%	1263,0	31,5
XLPE Insulation (natural)	24%	6758,2	163,0
Aluminium 1050	50%	7028,1	0,0

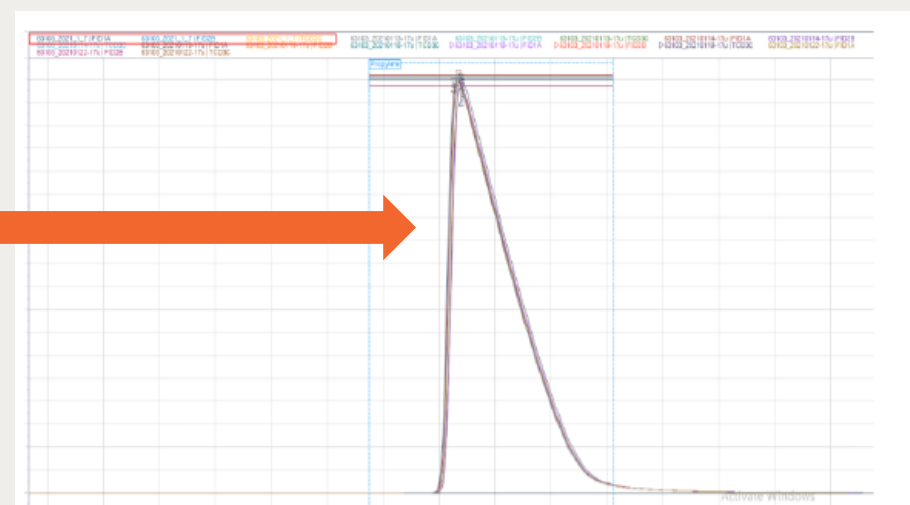
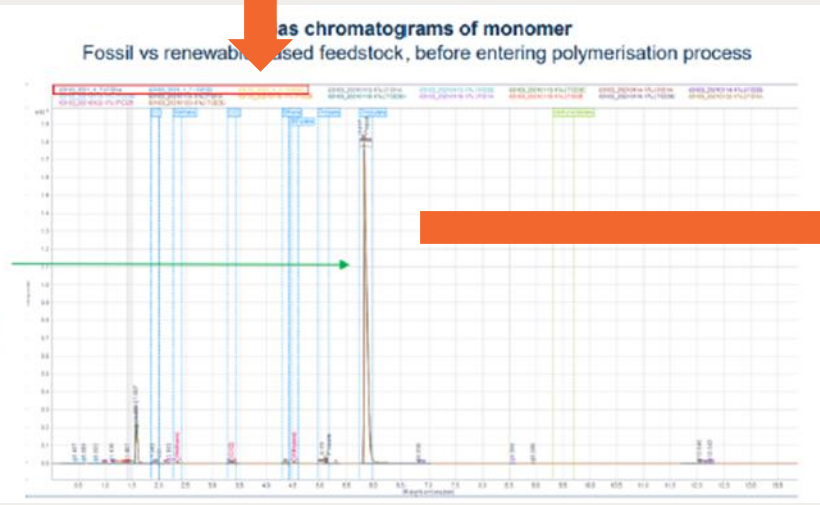
	CO ₂ FP		
	kg CO ₂ /kg	kg CO ₂ /km	
XLPE	2,1	6758	
HDPE	2,5	3128	
			9886
Bornewable XLPE	0,3	965	
Bornewable HDPE	0,7	876	
			1841
			8045
CO2 reduction 8 ton CO2/km			

No type test required, only ISCC certification and control.



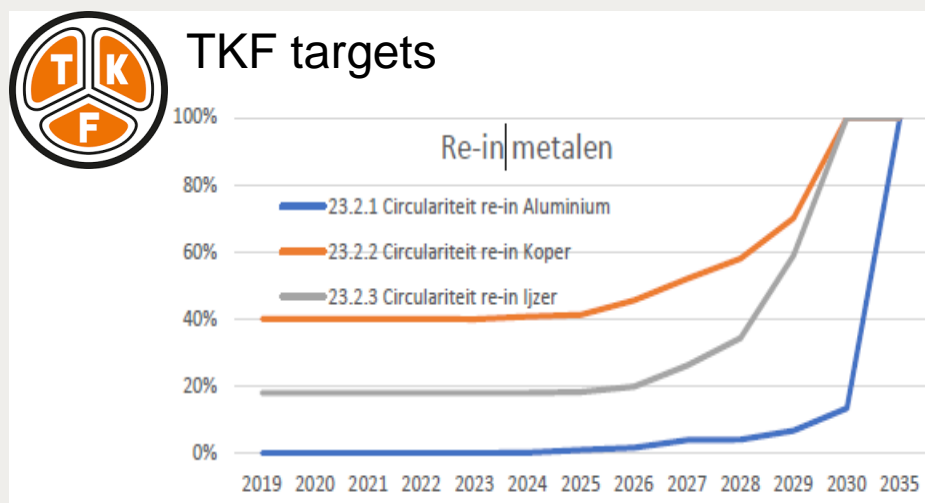
No differences in peaks: neither amounts nor heights
 Main component is propylene

NO CHANGE in monomer purity and specification



Further decarbonization developments.

- Low Carbon Aluminum, based on green energy (Hydro).
- Low Carbon Copper, increase Recycled copper in from 40% to 100%.
- Increase Recycled steel in from 18% to 26%.
- Recycling of Aluminum alloy.
- Green Energy power supply.
-



Build up supplier declarations dossier on Recycled-In.



Mass Balance control,
who gets the recycled part.

TRINECKÉ ŽELEZÁRNY

Bekaert Hlohovec, a.s.
Mierová 2317,
SK-920 28 Hlohovec
Slovak Republic

DECLARATION

Using 2020 calendar year data of production in the company TRINECKÉ ŽELEZÁRNY, a.s., steel products contain approximately 26,23% recycled materials (scrap) - about 8,96% of pre-consumer and 17,27% of post-consumer.

Třinec, November 29, 2021

TRINECKÉ ŽELEZÁRNY, a.s.
Průmyslová 1000, Staré Město
Ing. Radim Klimša
Head of the department
PB – Estate and Environment

Processed by:
Mgr. Romana Cyprichová
Tel. +420 558 536 067
E-mail: romana.cyprichova@trz.cz

TRINECKÉ ŽELEZÁRNY, a.s. / Průmyslová 1000 / Staré Město / 739 61 Třinec / Czech Republic
ID / 18050646 / VAT ID / CZ699002812 / Entered into the Commercial Register kept by the Regional Court in Ostrava, Section B, Insert 146
PHONE / +420 558 531 111 / FAX / +420 558 331 831 / http://www.trz.cz / IČ/DB / mwpcia

Aurubis

Aurubis AG • P.O. Box 10 48 40 • 20033 Hamburg, Germany

Twentsche Kabelfabriek B.V.
Daan Kuipers
Spinnerstraat 15
7481 KJ Haaksbergen
Netherlands

Aurubis AG
Hovestrasse 50
20539 Hamburg
Germany
Phone +49 40 7883-2281
Fax +49 40 7883-2215
r.grunwaldt@aurubis.com

www.aurubis.com
2021-09-09

Sustainability Declaration Copper Content from Recycled Materials

Dear Sir or Madam,

For the last Fiscal Year we confirm that, on average, 40% of the copper content of our copper cathodes is derived from recycled materials. Please note that this number applies to the total cathodes production of the Aurubis Group.

Best regards

Aurubis AG

Tanja Winter
i.V. Tanja Winter
Head of Sales Rod
Product Sales & Marketing
Commercial

R. Grunwaldt
i.V. Robert Grunwaldt
Area Sales Manager
Product Sales & Marketing
Commercial

Depending on cable design and your choices, we are able to reduce the carbon footprint by 20% – 50%.

Considerations:

- Collecting waste, cleaning, pyrolysis etc. is today more expensive than the major O&G production processes.
- If market demand for low carbon product increases, price for low carbon products is expected to increase.
- Ditto for Recycled-In materials.
- To what extent does one accept bio-based products?
- Recycled-In can negatively affect the CO₂ footprint. What do you prioritize?
- Recycled-In, do you accept only post consumer waste, or is pre-consumer waste acceptable?



**you don't get
oat for nowt**



1 February 2024

Towards net-zero emission of T&D grids

