cigre Nederland

1 February 2024

Towards net-zero emission of T&D grids

Decarbonization through procurement of components

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OUR STORY

Introduction of Stedin

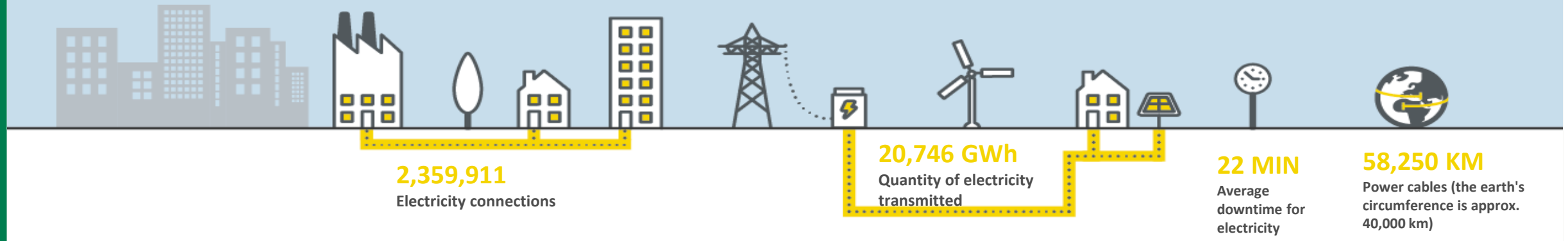
The procurement method

Results

Example / comparison

Decarbonization through procurement of components

Electricity



2,359,911
Electricity connections

20,746 GWh
Quantity of electricity transmitted

22 MIN
Average downtime for electricity

58,250 KM
Power cables (the earth's circumference is approx. 40,000 km)

Gas

2,100,134
Gas connections

81%
Of our customers found it easy to do business with us.

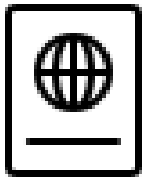
3,782 MLN M³
Quantity of gas distributed

50 SEC
Average downtime for gas

28,145 KM
Gas pipelines (the earth's circumference is approx. 40,000 km)

OUR SOLUTION: Material passport, CO2 price and carbon footprint tool to achieve our sustainability goals

2018



- Introduced raw material passport NETBEHEER NL

2019

- First tender at Stedin (MV-switchgear) completed with V1 of asset tool

2020

- NETBEHEER NL started an initiative to agree upon one CO2 marketprice

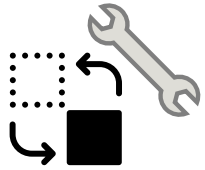
2021

- Tender at Stedin (MV/HV 24/36KV-switchgear) with asset tool 1.1

2023

- Multiple Tenders o.a transformer stations
- 2023 we further developed the CO2 tool

Future



- Learning by doing and updating the asset tool, raw material passport and CO2 price.

IMPLEMENTATION: The tools are incoporated in our procurement proces

Our awarding model

Total Cost of Ownership (TCO)

CAPEX
OPEX

Quality criteria are quantified in €
Q1: CO_2 footprint
Q2: Dimensions
Q3: Fullfilment additional technical requirements

Q1: CO2 footprint

- Carbon footprint tool (in kg CO2-eq)*
  - Based on Raw material passport
  - CO2 price of 150** euro ton CO2-eq

- Environmental Investment reduction (MIA, SF_6-free tax discount)
- Validation and verification by using audits and involvement of external specialists (CE Delft and DNV).

*The carbon foorprint tool uses the LCA methodology to determine the carbon footprint and circularity score of an asset (ISO 14040).
** 150 euros in 2023; Value revised every year by Netbeheer Nederland

RESULTS: The procurement of switchgear contributes to achieve our **2030 sustainability goals**

Insights and results

- Growing cooperation between market parties in the field of the application of LCA tooling
- Suppliers can give more insights in % recycled material used
- Suppliers accept our awarding model and tool within tenders

- Environmental Investment reduction has a significant role in achieving our goals
- Significant part of 24kV switchgear portfolio without SF6
- About 13.500 ton CO2 will be avoided during the contract period of 8 years
- About 12.000 kg SF6 less will be placed in our infrastructure during the contract period of 8 years

Points for improvement

- Expanding carbon footprint tool with more asset types
- Further development and improvement of award model together with the market
- Improve the verification and validation process
- Increasing the CO2 price

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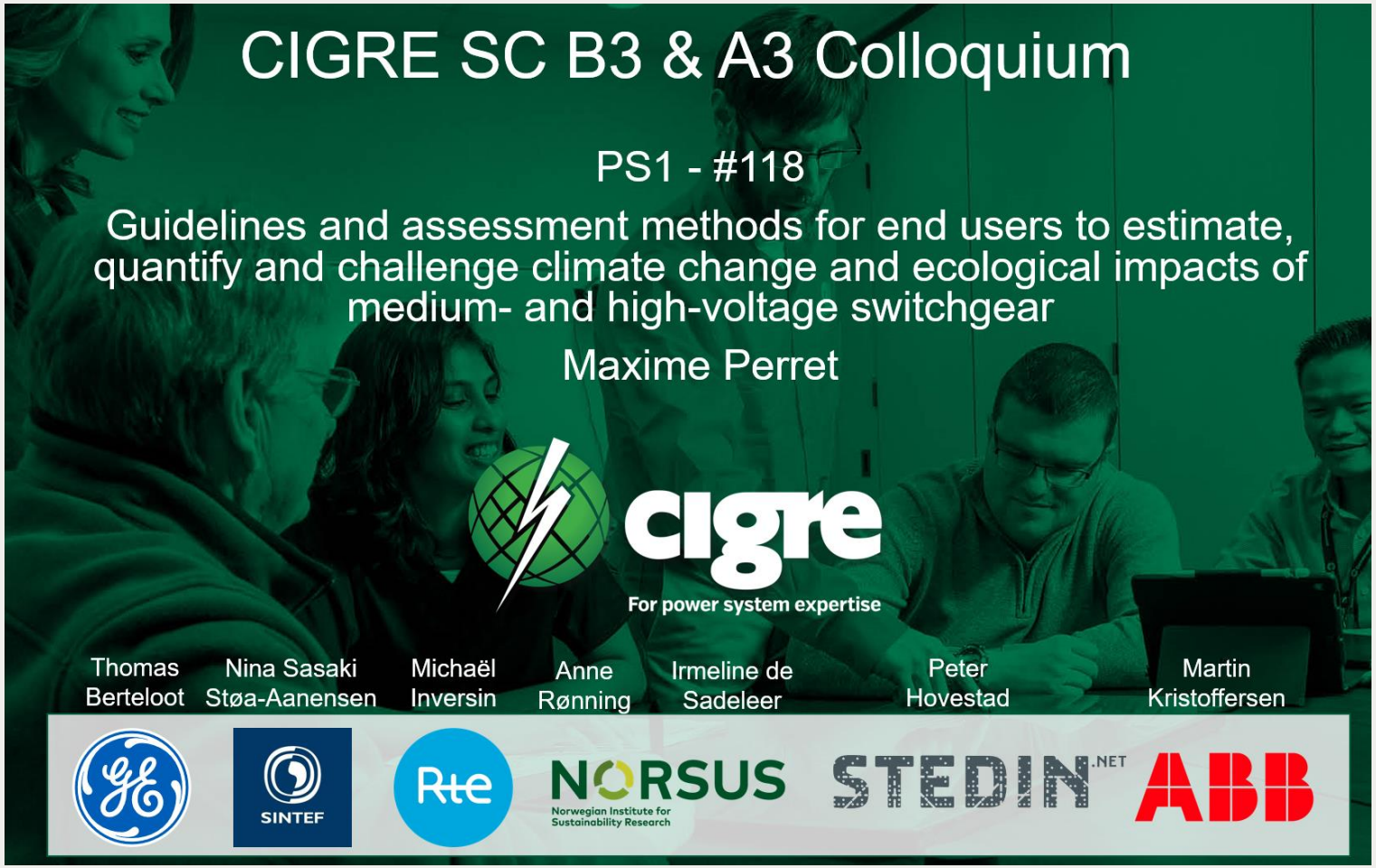
EXAMPLE: The carbon footprint tooling in Tenders



EXAMPLE: **The carbon footprint tooling in Tenders**

How to correctly evaluate the environmental impacts of a product?

Best solution
Certified LCAs with harmonized Product Category Rules (PCR)

- Identical system boundaries
- Harmonized functional unit definition and structure
- Defined used phase and end of life conditions

→ Truly comparable results

For HV switchgear: refer to the incoming IEC 62271-320, planned for mid-2024

Fallback #1
Existing LCAs adapted or reworked to match the defined PCR

- Existing LCAs may not match the (same) desired PCR
- Study should be reworked
- Utility must review and accept the new results

→ Comparable results

Fallback #2
Simplified estimations based on the LCA concepts

- No LCA available or that cannot be adapted
- Simplified estimations covering manufacturing and use phase at least

→ Qualitative comparison

EXAMPLE: The carbon footprint tooling in detail

Asset tool - Start Tender

Using the tool

Step 1: Read the instructions in the document "Manual Asset tool" carefully
Step 2: Fill out contact information
Step 3: Select the number of assets (max 3 per Excel)
Step 4: Fill out the datasheet(s). Make sure to fill out all fields.
Step 5: Save datasheet(s) and results as PDF- or Excel document.

Tender prepared by

Network operator	Stedin
Contact network operator	Edwin de Regt/Wilbert Blokhuis

This tool is prepared for the following asset

Asset	Switchgear
Subtype	Example

Step 2: Fill out contact information

Supplier / producer	Example
Contact supplier / producer	X

Step 3: Select the number of assets (max 3 per Excel)

Number of assets	3

Asset tool developed for Dutch distribution system operators, initiated by Alliander, Enexis and Stedin.
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Introduction | Start - Tender | Asset #1 | Asset #2 | Asset #3 | Results

EXAMPLE: The carbon footprint tooling in detail

Reset

Datasheet 1 - Switchgear (Example)

Product information

Asset	Switchgear	
Subtype	Example	
Unique identifier product	A	
Guaranteed lifespan of asset	40	years
Total weight of the asset	1130844	g/unit

Data source materials

Based on material passport?	yes
if 'yes': start date material passport	1-1-2023

Materials (per unit)	*Weight (g)*	*Recycled (%)**	*Recyclable (%)**	*Re/Down out**
ABS				
Aluminium (alloys)				
Aluminium (electronic purity)	19400	25%	100%	recycled
Brass				
Bronze				
Copper (electronic purity)	118000	35%	100%	recycled
Copper (mechanical purity)				
Epoxy resin	91100	0%	50%	downcycled
Gold				
Iron				
PA (nylon)	4560	0%	100%	recycled

EXAMPLE: The carbon footprint tooling in detail

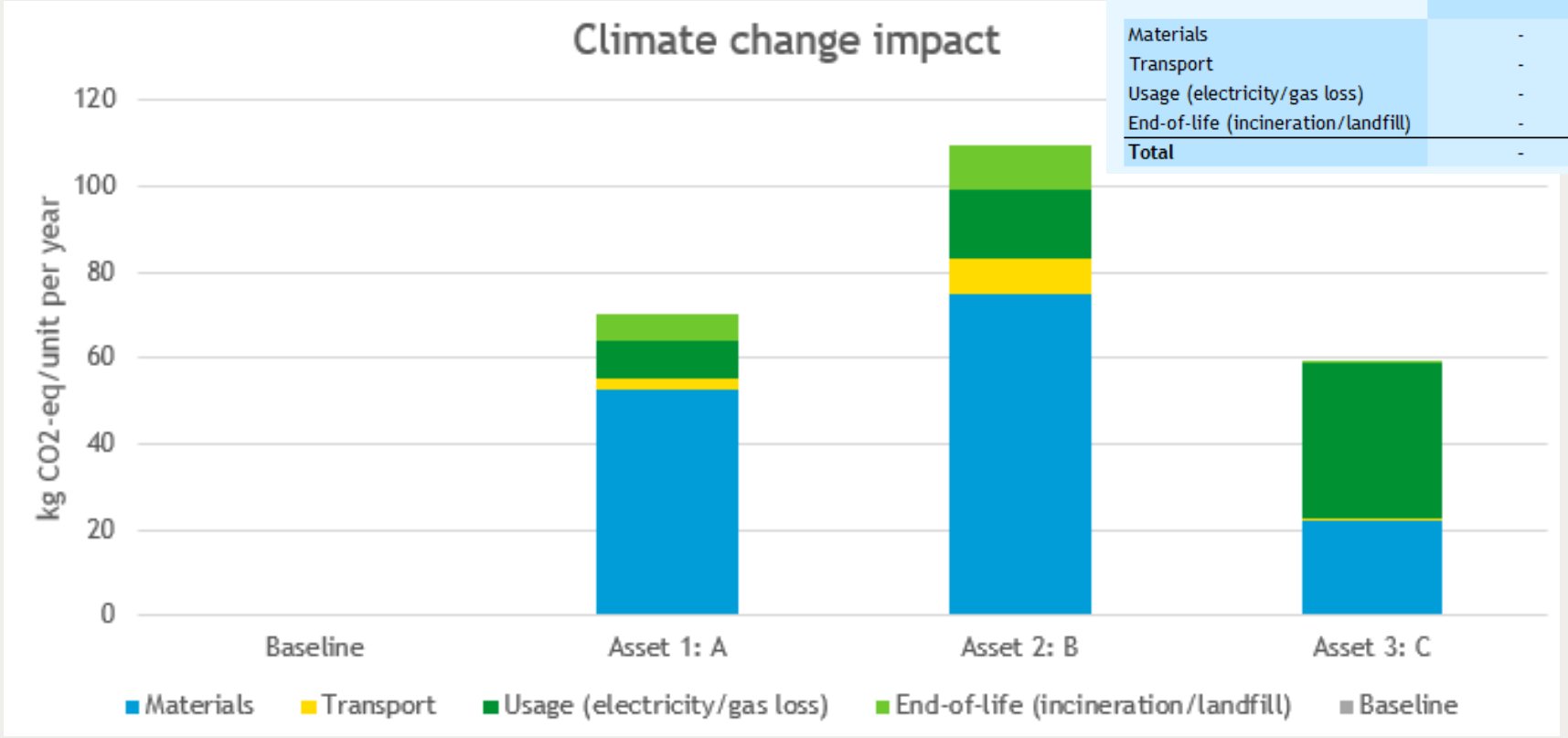
Save PDF

Save Excel

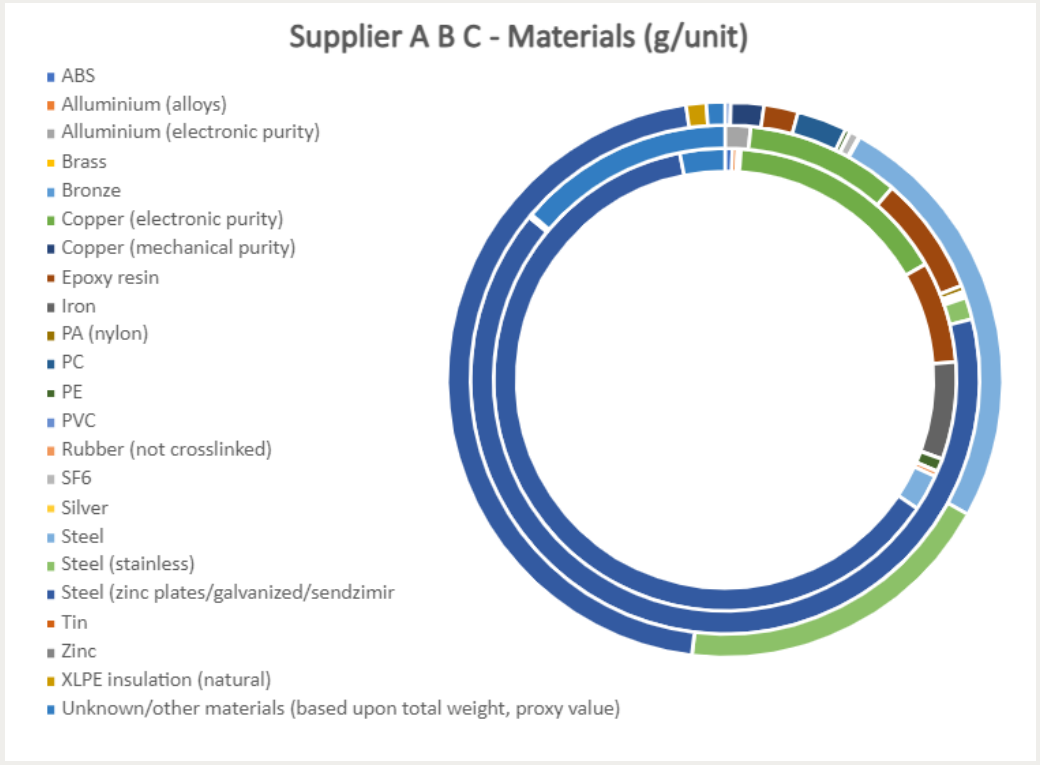
Results - Switchgear (Example)

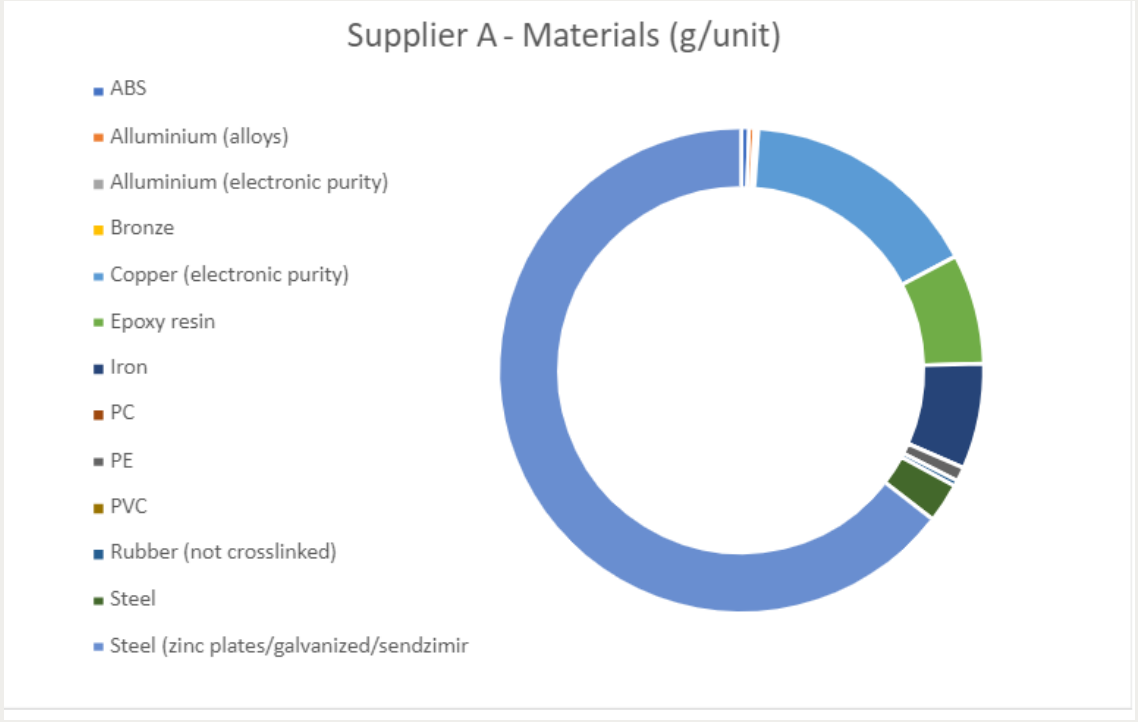
Climate change impact per year (kg CO2-eq/unit per year)

	Baseline	Asset 1: A	Asset 2: B	Asset 3: C
Materials	-	52,5	75,0	22,4
Transport	-	2,7	8,2	0,5
Usage (electricity/gas loss)	-	9,1	16,0	35,8
End-of-life (incineration/landfill)	-	6,0	10,3	0,9
Total	-	**70,2**	**109,5**	**59,6**



EXAMPLE: **The insights**





Materials (per unit)	*Weight (g)*	*Recycled (%)**	*Recyclable (%)**	*Re/Down out**
Steel (zinc plated/galvanized/sendzimir)	780900	40%	100%	recycled
Steel (zinc plated/galvanized/sendzimir)	706280	18%	95%	recycled

Asset Tool: **Further development v1.x (short term)**

Calculation of energy losses on asset ‘cables’

$$Loss = \frac{Ph * I^2 * R * T * Pl^2 * (1 + \lambda)}{1000} \Rightarrow E_L = \frac{n * I^2 * R_C * t * (1 + \lambda)}{1000}$$

Update of database (Ecoinvent) regarding the climate impact of metals

Update of material list: added materials thinned copper, HDPE, lead, PET and carbon steel

Asset Tool: **Further development v2 (long term)**

Add electrical transport by road and water
New possibility to calculate impact of assets that have a longer LCA than intended
Update the tool with more assets, for example contracting/construction projects
Include integration of short-circuit losses in the tool.

Thank you

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