Table S1. Black mass composition.

Element	Content, %
Zn	24.9
Mn	29.7
C	8.0
Fe	1.0
Cl	3.1
K	3.5
Ni	0.7
Cu	0.0
Pb	0.0
Cd	0.1
Hg	0.0
S	0.4
Si	0.5
Al	0.4
Ca	0.1
Mg	0.1

Table S2. Waelz oxide (WOX) composition [28].

Element	Content, %
Zn	60.0
Pb	3.90
FeO	3.90
CaO	2.55
MgO	0.35
SiO_2	0.85
Cl	3.25
F	0.30
S	0.60
K_2O	1.98
Na_2O	1.70

Table S3. Summary of the inputs and outputs for the mechanical processing.

LCI	Per 1Mg of black mass:		
	Input	**Unit**	**Value**
Material consumption	Electricity	kWh	175
Products	Steel—for recycling	Mg	0.625
	Plastics—for recycling	Mg	0.458
	Black mass	Mg	1

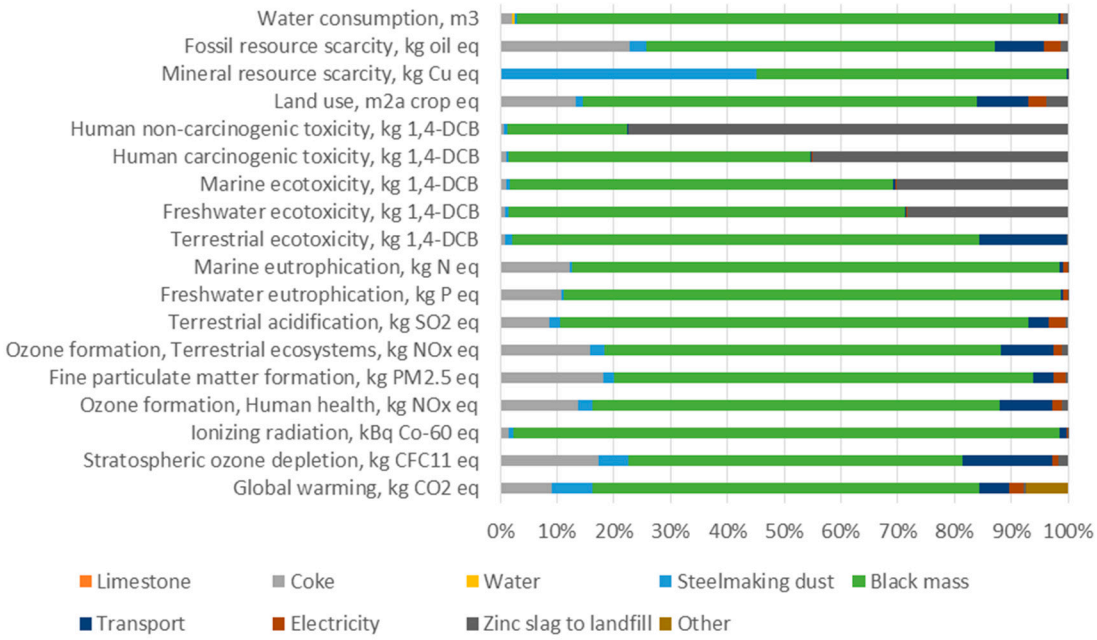

Figure S1. The contribution of the individual process to total impact scores as obtained for 18 different impact categories for Scenario 1.

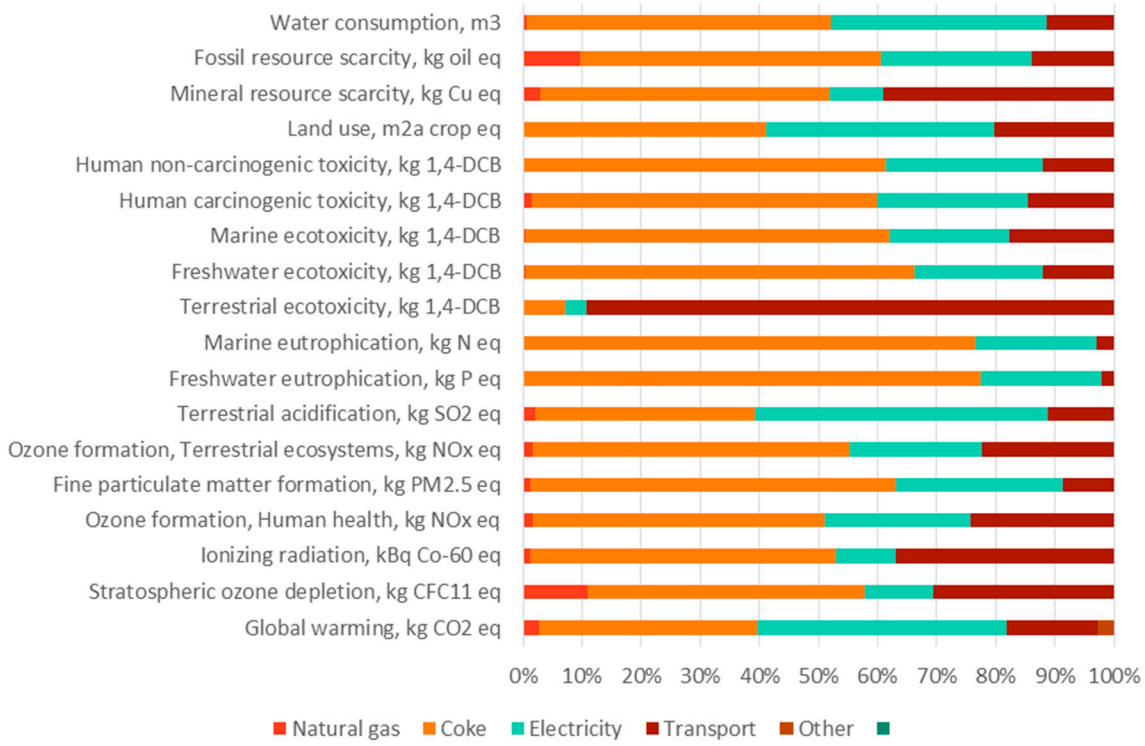

Figure S2. The contribution of various combined processes in total impact scores as obtained for 18 different impact categories for Scenario 2.

The substances with the greatest influence on terrestrial ecotoxicity for both scenarios are presented in Figure S3. The cut-off was set to 1000 kg 1,4-DCB eq.

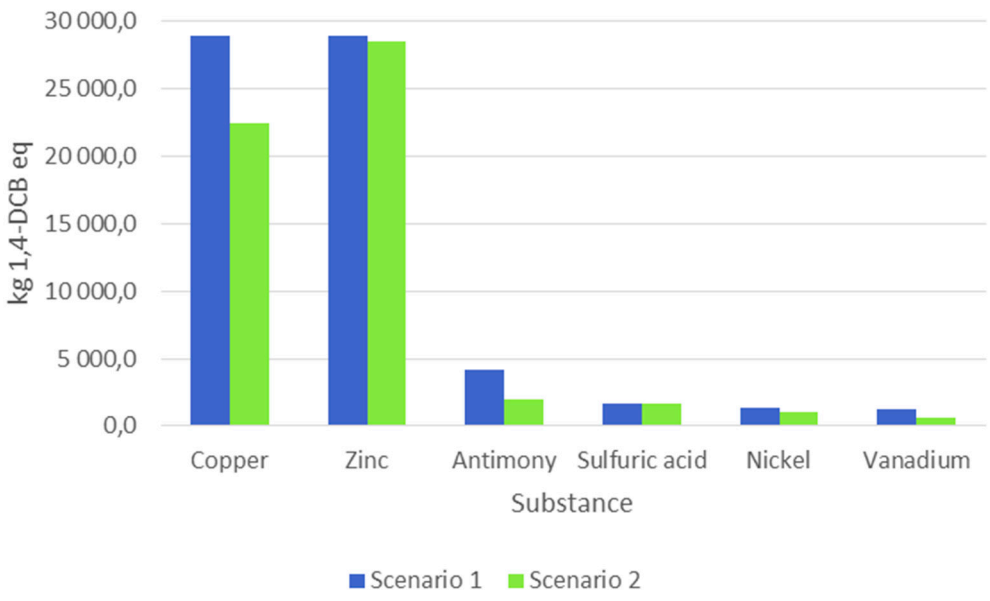

Figure S3. Terrestrial ecotoxicity.

Freshwater ecotoxicity (only the substances with concentrations higher than 1 kg 1,4-DCB-eq) is presented in Figure S4:

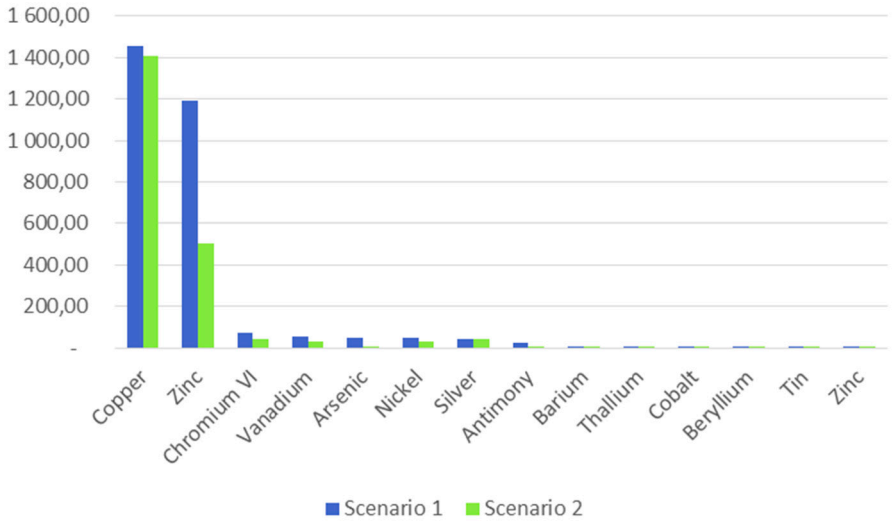

Figure S4. Freshwater ecotoxicity.

Marine ecotoxicity (only the substances with concentrations higher than 10 kg 1,4-DCB-eq) is presented in Figure S5:

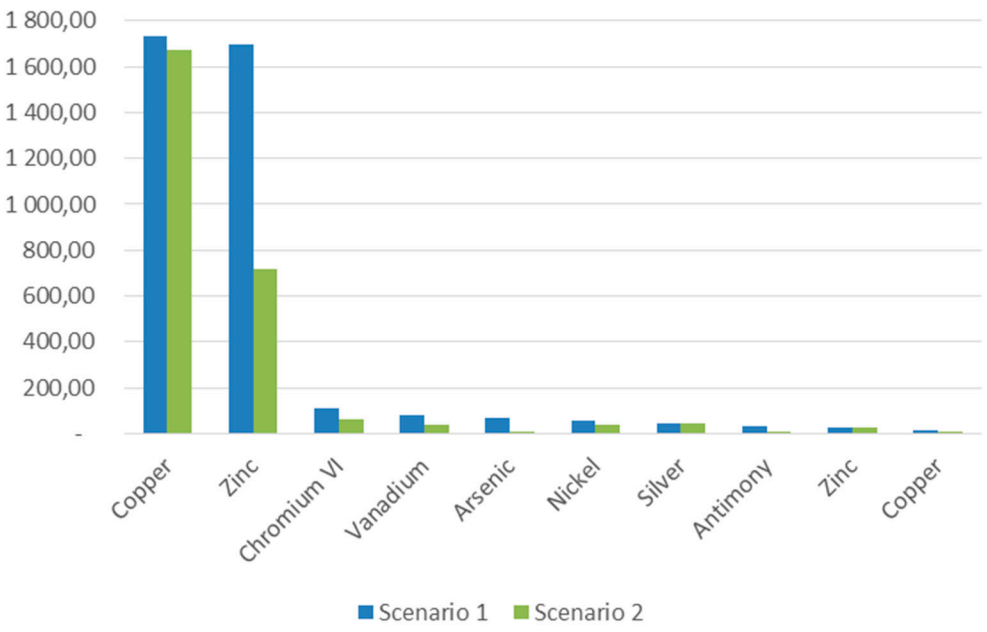

Figure S5. Marine ecotoxicity.

Human carcinogenic toxicity (only the substances with concentrations higher than 10 kg 1,4-DCB-eq) is presented in Figure S6:

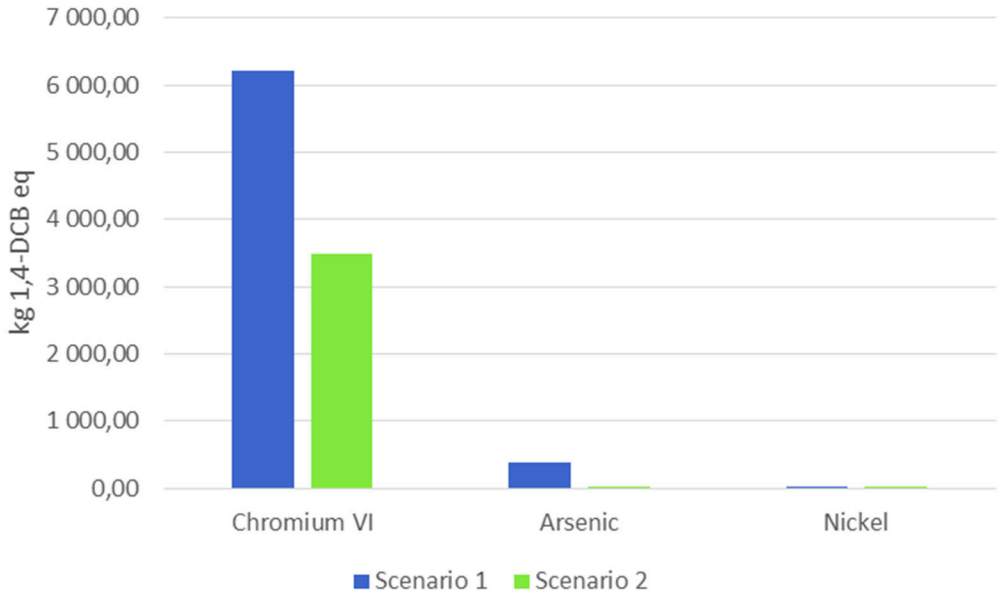

Figure S6. Human carcinogenic toxicity.

Human non-carcinogenic toxicity (only the substances with concentrations higher than 250 kg 1,4-DCB-eq) is presented in Figure S7:

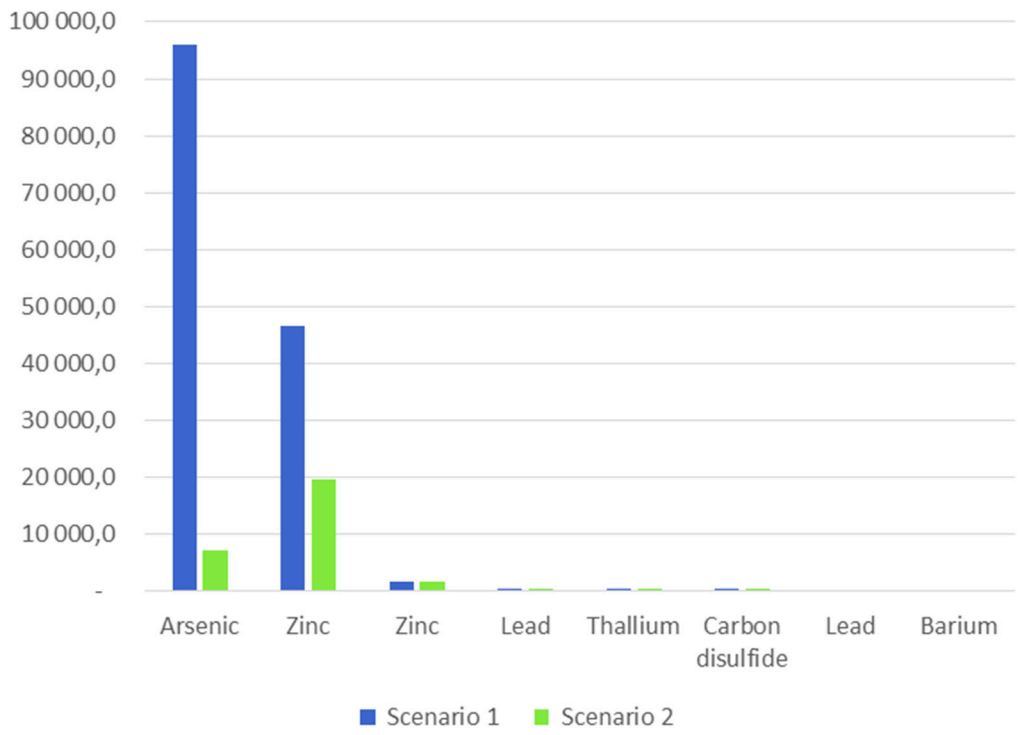

Figure S7. Human non-carcinogenic toxicity.