STEEL AT WORK

ENVIRONMENTAL IMPACT OF STEEL BRIDGE CONSTRUCTION

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Victor Buyck Steel Construction (Eeklo - B)
Vrije Universiteit Brussel (B)

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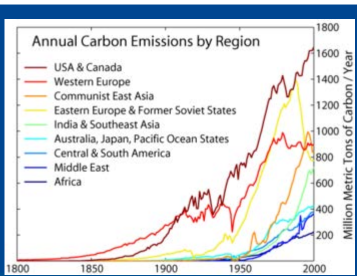
STEEL AT WORK

Vlaamse partijen scharen zich achter 30% CO2-reductie

In het Vlaams Parlement tekent zich een consensus af over de ondersteuning van de Europese doelstelling om de uitstoot van broeikasgassen tegen 2020 met 30 procent te verminderen. Meerderheid en oppositie hebben daarover een voorstel van resolutie klaar. De Vlaamse partijen vinden wel dat de reductiedoelstelling de Vlaamse concurrentiepositie niet mag aantasten.



The Telegraph

Chinese airlines refuse to pay EU carbon tax

China's biggest airlines warned on Thursday they will refuse to pay a new EU tax aimed at cutting carbon emissions.

European Union: Every airline will have to compensate their CO2 emissions

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STEEL AT WORK

1. PROJECTS WILL BE EXAMINED ON THEIR SUSTAINABILITY PERFORMANCE

TODAY: ALREADY REALITY

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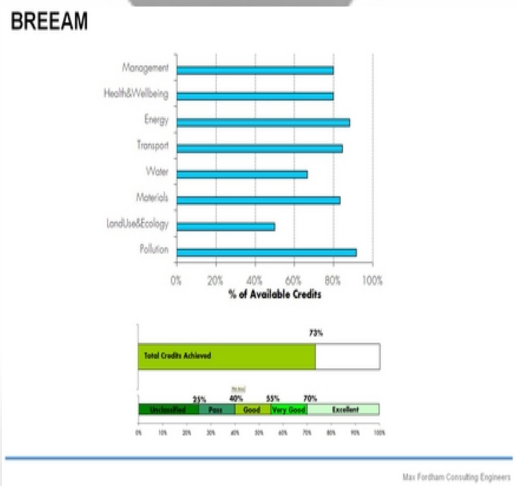
STEEL AT WORK

1. PROJECTS WILL BE EXAMINED ON THEIR SUSTAINABILITY PERFORMANCE



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STEEL AT WORK

2. ENVIRONMENTAL IMPACT OF CONSTRUCTION WILL BE DECISIVE IN TENDER REVIEWS

EXAMPLE 1

CO$_2$-PERFORMANCELADDER®

Samen zorgen voor minder CO$_2$

EXAMPLE 2

Ontwerp KB
Projet d'AR

Tot vaststelling van minimumeisen voor milieuboodschappen over bouwproducten // versie **juli 2012** // status ontwerp

Fixant les exigences minimales de l'affichage environnemental des produits de construction // version **juillet 2012** // statut projet

FOD Volksgezondheid – DGS Leefmilieu – dienst Productbeleid

SPF Santé publique - DGS Environnement - Service Politique des produits

Dieter De Lathauwer

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STEEL AT WORK

2. ENVIRONMENTAL IMPACT OF CONSTRUCTION WILL BE DECISIVE IN TENDER REVIEWS

EXAMPLE 2

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FOD Volksgezondheid – DGS Leefmilieu – dienst Productbeleid

SPF Santé publique - DGS Environnement - Service Politique des produits

Dieter De Lathauwer

from 1 January 2014 onwards,
it will be legally required
for ALL CONSTRUCTION PRODUCTS
to declare EPD:
Environmental Product Declaration

from 1 January 2016:
also transport component
from 1 July 2017: EOL + Module D
(EN 15804)

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STEEL AT WORK

2. ENVIRONMENTAL IMPACT OF CONSTRUCTION WILL BE **DECISIVE** IN TENDER REVIEWS

EXAMPLE 1

CO_2-PERFORMANCELADDER®
Samen zorgen voor minder CO_2

CRITERIA:

A. Insight (into own carbon footprint)
B. CO2 reduction (recorded ambition)
C. Transparency
(internal and external communication)
D. Participation in initiatives
(with colleague companies in the field of CO2 reduction)

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STEEL AT WORK

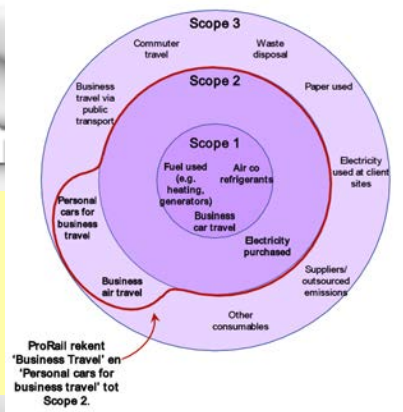
2. ENVIRONMENTAL IMPACT OF CONSTRUCTION WILL BE **DECISIVE** IN TENDER REVIEWS

EXAMPLE 1

CO_2-PERFORMANCELADDER®
Samen zorgen voor minder CO_2

CRITERIA LEVEL 3:

° report CO2 emissions scope 1 & 2
° objectives for reduction
° communicate internally + externally
° active role in (sector) initiatives



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STEEL AT WORK

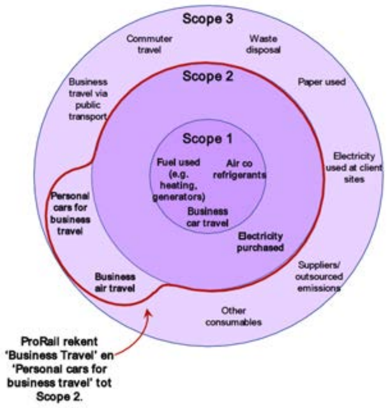
2. ENVIRONMENTAL IMPACT OF CONSTRUCTION WILL BE **DECISIVE** IN TENDER REVIEWS

EXAMPLE 1

CO2-PERFORMANCELADDER®
Samen zorgen voor minder CO_2

CRITERIA LEVEL 5:

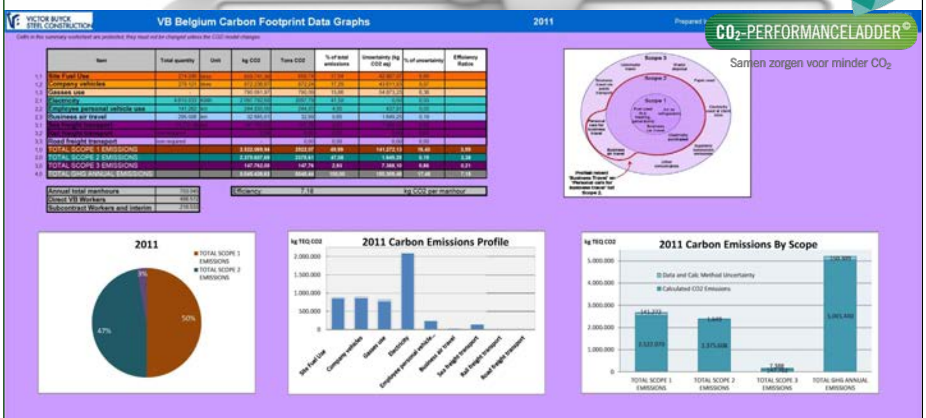
- report CO2 emissions scope 1 & 2 (including A suppliers)
- objectives for reduction fully incorporated + publicly committed
- communicate internally + externally
- participate in and initiate (sector) initiatives



STEEL AT WORK

2. ENVIRONMENTAL IMPACT OF CONSTRUCTION WILL BE **DECISIVE** IN TENDER REVIEWS

EXAMPLE 1



STEEL AT WORK

CONCLUSION

SOONER or LATER
the environmental impact of
all human actions & activities
will be required to be determined
and will be required to be reduced,
thus also for
the steel construction industry

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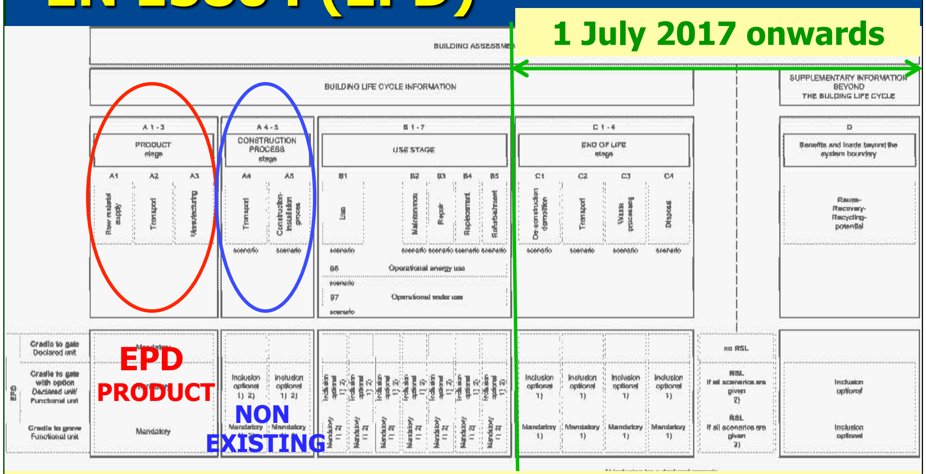
STEEL AT WORK

EN 15804 (EPD)



1 January 2016 onwards: transport component to be included !

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CHALLENGE FOR STEELWORK CONTRACTORS
STEEL AT WORK
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ENVIRONMENTAL IMPACT OF STEEL BRIDGE CONSTRUCTION
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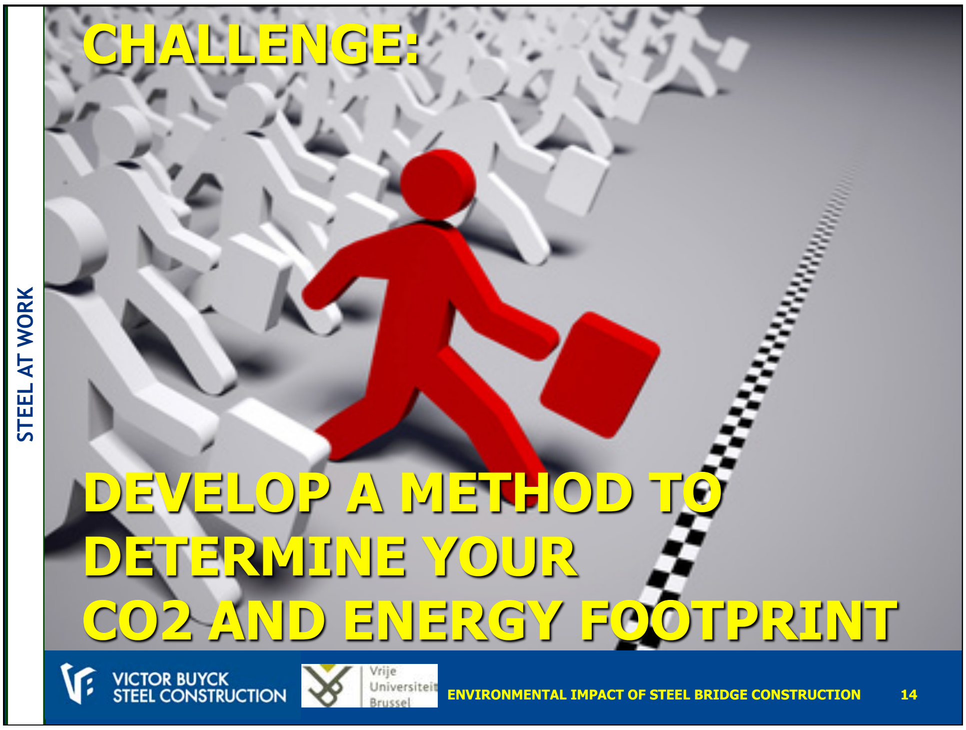
CHALLENGE:
DEVELOP A METHOD TO DETERMINE YOUR CO2 AND ENERGY FOOTPRINT
STEEL AT WORK
VICTOR BUYCK STEEL CONSTRUCTION
Vrije Universiteit Brussel
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STEEL AT WORK
CHALLENGE:
DEVELOP A METHOD TO
DETERMINE YOUR
CO2 AND ENERGY FOOTPRINT
ANALYSE THE PROCESS
+ APPLY ON REAL CASES
+ DETERMINE IMPROVEMENTS
= SET THE STANDARD
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STEEL AT WORK
CHALLENGE:
SET THE STANDARD
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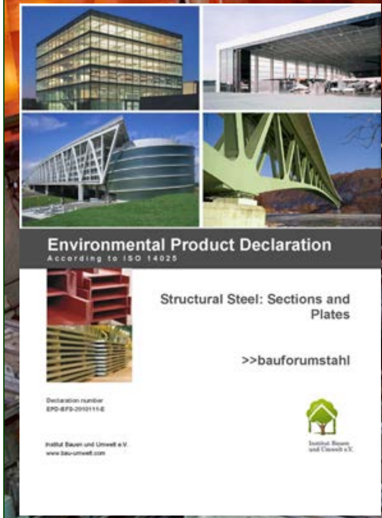
STEEL AT WORK

PRODUCT STAGE (A1, A2, A3):



Structural steel: Sections and Plates				
Parameter	Unit per kg	Production	End-of-Life*	Total
Primary energy, non-renewable	[MJ]	19.48	-7.70	**11.78**
Primary energy, renewable	[MJ]	0.65	-0.08	**0.57**
Global Warming Potential (GWP 100 years)	[kg CO_2-eqv.]	1.68	-0.88	**0.80**
Ozone Depletion Potential (ODP)	[kg R11-eqv.]	3.19E-08	1.04E-08	**4.23E-08**
Acidification Potential (AP)	[kg SO_2-eqv.]	3.47E-03	-1.68E-03	**1.79E-03**
Eutrophication Potential (EP)	[kg PO_4^{3-}-eqv.]	2.89E-04	-1.31E-04	**1.58E-04**
Photochemical Ozone Creation Potential (POCP)	[kg C_2H_4-eqv.]	7.55E-04	-4.57E-04	**2.98E-04**

* In this EPD 100% recovery, 11% reuse and 1% loss are assumed.

Issued by: PE INTERNATIONAL, Leinfelden-Echterdingen
In cooperation with >>bauforumstahl

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STEEL AT WORK

PRODUCT STAGE (A1, A2, A3):

MILIEUPROFIEL CONSTRUCTIESTAAL

MILIEUPROFIEL constructiestaal; datakwaliteit goed						
Thema	eenheid	Constructie-staal voor zware toepassingen	Constructie-staal voor middelzware toepassingen	Constructie-staal voor lichte toepassingen	Constructie-staal voor binnen-wanden	Constructie-staal voor dak- en gevel-bekleding
Humane toxiciteit	kg 1,4DB	2,9E+01	4,4E+01	5,1E+01	8,5E+01	3,8E+01
Abiotische uitputting	kg Sb	2,8E+00	5,5E+00	5,6E+00	6,9E+00	4,4E+00
Ecotoxiciteit water (zoet water)	kg 1,4DB	5,7E+00	8,4E+00	1,0E+01	1,6E+01	7,5E+00
Ecotoxiciteit sediment (zoet water)	kg 1,4DB	9,2E+00	1,4E+01	1,6E+01	2,7E+01	1,2E+01
Ecotoxiciteit terrestrisch	kg 1,4DB	1,7E-01	2,6E-01	5,9E-01	6,0E-01	2,1E-01
Verzuring	kg SO_2	3,0E+00	5,2E+00	5,5E+00	7,3E+00	4,2E+00
Vermesting	kg PO_4^-	4,2E-01	6,5E-01	7,8E-01	1,1E+00	5,9E-01
Broeikaseffect	kg CO_2	4,8E+02	9,4E+02	9,5E+02	1,2E+03	7,6E+02
Fotochemische oxydantvorming	kg ethyl	5,1E-01	8,0E-01	1,0E+00	1,4E+00	7,4E-01
Aantasting ozonlaag	kg CFK11	1,1E-04	1,6E-04	2,0E-04	3,2E-04	1,5E-04

51/49/0 87/12/1

recycling/re-use/scrap

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STEEL AT WORK

CONSTRUCTION STAGE (A4, A5):

1. FABRICATION
2. CORROSION PROTECTION
3. TRANSPORT
4. ERECTION
5. OVERHEAD

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STEEL AT WORK

CONSTRUCTION PHASE:

1. FABRICATION
2. CORROSION PROTECTION
3. TRANSPORT
4. ERECTION
5. OVERHEAD

TOTAL No. OF ACTIVITIES: 85
TOTAL No. OF INDIVIDUAL FACTORS: 200

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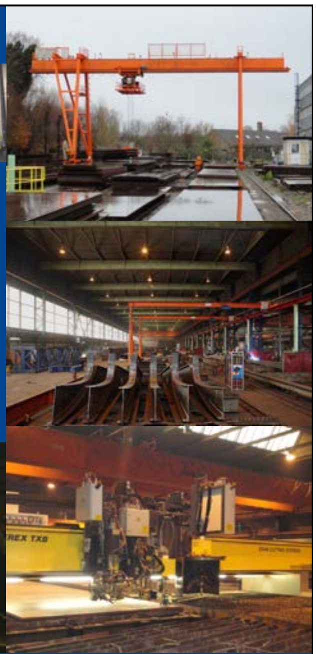
STEEL AT WORK

CONSTRUCTION PHASE:
1.FABRICATION

- grit-blasting
- cutting (plates and sections)
- drilling, punching, etc.
- welding
- manipulation
- diesel for various machines
- compressors

2.CORROSION PROTECTION
3.TRANSPORT
4.ERECTION
5.OVERHEAD

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ENVIRONMENTAL IMPACT OF STEEL BRIDGE CONSTRUCTION 21

STEEL AT WORK

CONSTRUCTION PHASE:
1.FABRICATION

2.CORROSION PROTECTION

- grit blasting
- painting
- metal spray

3.TRANSPORT
4.ERECTION
5.OVERHEAD

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ENVIRONMENTAL IMPACT OF

STEEL AT WORK

CONSTRUCTION PHASE

1.FABRICATION
3.CORROSION PROTECTION

3.TRANSPORT

- from rolling mill to factory
- internal transport factory
- from factory to construction site

4.ERECTION
5.OVERHEAD

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STEEL AT WORK

CONSTRUCTION PHASE

1.FABRICATION
3.CORROSION PROTECTION
5.TRANSPORT

4.ERECTION

- welding
- gases
- cranes, etc. : diesel

5.OVERHEAD

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STEEL AT WORK

CONSTRUCTION PHASE:

1.FABRICATION
3.CORROSION PROTECTION
5.TRANSPORT
7.ERECTION

5.OVERHEAD (not project related)

- electricity offices
- heating
- ventilation
- lighting

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STEEL AT WORK

CONVERSION FACTORS

Machines and tools (electricity)

$$E = n\, \varphi\, \lambda\, P\ [kWh] = 3.6\, n\, \varphi\, \lambda\, P\ [MJ]$$

P	declared power of the machine [kW];
n	total number of working hours reported by the operator [h];
λ	load factor: percentage of full capacity that has been used [%];
φ	effectivity: effective working time of the machine divided by reported working time of the operator [%].

$$GWP = 0.615\, n\, \varphi\, \lambda\, P\ [kgCO2eq]$$

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STEEL AT WORK

CONVERSION FACTORS

Machines and tools (electricity)

$$E = n\,\varphi\,\lambda\,P\ [kWh] = 3.6\,n\,\varphi\,\lambda\,P\ [MJ]$$

	Load factor λ	Effectivity φ
Cranes (workshop)	50%	60%
Compressor (workshop)	30%	100%
Ventilation (workshop)	100%	100%
Plate oxy-cutting (workshop)	40%	100%
Drilling, punching, sawing (workshop)	60%	70%

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STEEL AT WORK

CONVERSION FACTORS

Consumables

- propane
- natural gas
- acetylene
- diesel
- thinners
- zinc metal spray

Example: diesel

$E = 3.6\ c_{die}\ v_{die}$ [MJ]
$GWP = 3.135\ v_{die}$ [kgCO2eq]

calorific value : c_{die} = 11,61 kWh/l
volume v_{die} [l]

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STEEL AT WORK

CONVERSION FACTORS

Handbook CO2 performance ladder; edition 2.0 (23 June 2011)

110 pages

STEEL AT WORK

CONVERSION FACTORS

Handbook CO2 performance ladder; edition 2.0 (23 June 2011)

Electricity consumption

A	Grey power	2005 and earlier	500	g CO_2/kiloWatt hour	nH
		2006	500		nH
		2007 and 2008	500		nH
		2009	470		nH
		2010 and later	455		C
B	Green power "B"	Wind power	15	g CO_2/kiloWatt hour	R
		Hydro power	15		R
		Solar power	80		R
		Electricity from waste dump gas	80		nC
		Electricity from biomass	See section 4.4. Calculation method		R
C	Other green power consumed up to 1 July 2011		300	g CO_2/kiloWatt hour	H

was 615 in earlier version

Source A: The emissions factor of the Dutch fuel mix for electricity labelling 2009 as calculated on order of the Office of Energy Regulation is 460 g CO_2/kWh. See Achtergrondgegevens Stroometikettering 2009 [Background Data for Electricity Labelling 2009], CE Delft, the uncorrected fuel mix. This has been increased by around 2% due to the basic principle: emissions from extraction of raw materials and fuels through to combustion (source: CE Delft). For the other years mentioned before 2009, one average value (500) is adhered to. There is a large chance that a new, deviating conversion factor will be established for the emissions inventories for the years after 2010. SKAO aims to include this promptly in the handbook.
Source B: Gerdien van de Vreede, Ketenemissies hernieuwbare elektriciteit [Chain emissions of renewable electricity], Delft, CE, 2009. Updated in 2011 by CE Delft.
Source C: See Handbook 2.0 of 16 March 2011, appendix C Conversion factors, section 4.4.2, Source E.

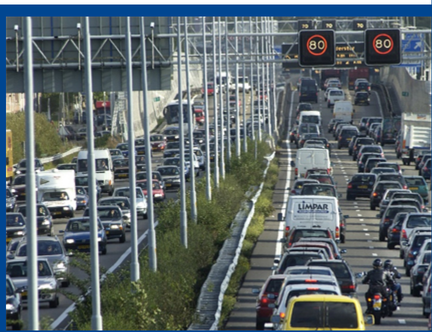
STEEL AT WORK

CONVERSION FACTORS

Handbook CO2 performance ladder; edition 2.0 (23 June 2011)

Freight transport in general				
A	Petrol	2,780	g CO_2/litre fuel	
	Diesel	3,135		
	LPG	1,860		
	Fuel oil	3,185		
	Bio-ethanol	1,600		nC

Source: CE Delft.



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STEEL AT WORK

CONVERSION FACTORS

Handbook CO2 performance ladder; edition 2.0 (23 June 2011)

Transport of bulk cargo					
B	Truck < 20 tonnes		295	g CO_2/tonne km	nC
	Truck > 20 tonnes		110		
	Tractor with trailer		80		
	Train	electric	25		
		diesel	30		
		combination *)	27		
	Inland shipping	350 tonnes	70		
		550 tonnes	70		
		1,350 tonnes	60		
		5,500 tonnes	30		
	Sea shipping	1,800 tonnes	75		
		8,000 tonnes	30		
		30,000 tonnes	13		

Source: STREAM Study on the Transport Emissions of All Modes, CE Delft, March 2008 v2.0, supplemented by more up-to-date figures for rail transport recommended by CE Delft. Updated in 2011 by CE Delft.
*) A combination means transport partly by electric and partly by diesel locomotives, or transport with unknown locomotive types. Recalculation not obligatory.

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CONVERSION FACTORS

STEEL AT WORK

Handbook CO2 performance ladder; edition 2.0 (23 June 2011)

Transport of containers / non-bulk cargo					
B	Delivery van		630	$g\ CO_2$ /tonne km	
	Truck	3.5 – 10 tonnes	480		
		10 – 20 tonnes	300		
		> 20 tonnes	130		
	Tractor with trailer		95		
	Train	electric	20		
		diesel	25		
		combination *)	22		
	Inland shipping	32 TEU	65		
		96 TEU	75		
		200 TEU	60		
		470 TEU	50		
	Sea shipping	150 TEU	85		
		580 TEU	45		
		4,000 TEU	23		nC

Source: STREAM Study on the Transport Emissions of All Modes, CE Delft, March 2008 v2.0, supplemented by more up-to-date figures for rail transport recommended
*) A combination means
Recalculation not obligat

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CONVERSION FACTORS

STEEL AT WORK

Handbook CO2 performance ladder; edition 2.0 (23 June 2011)

Other energy carriers for purposes other than transport				
A	Petrol	2,780	$g\ CO_2$/litre fuel	
	Diesel	3,135		
	LPG	1,860		
	Fuel oil	3,185		
	Bio-ethanol	1,600		nC
B	Liquid fossil primary fuels			
	Crude petroleum	3,735	$g\ CO_2$/kg fuel	
	Orimulsion	2,610		
	Liquefied natural gas	3,400		
	Liquid fossil secondary fuels			
	Petroleum	3,710	$g\ CO_2$/kg fuel	
	Shale oil	3,150		
	Ethane	3,425		
	Naphtha	3,850		
	Bitumen	3,975		
	Lubricating oils	3,620		
	Petroleum coke	4,050		
	Refinery raw materials	3,920		
	Refinery gas	3,655		
	Chemical residue gas	3,655		
	Other oils	3,515		
	Solid fossil primary fuels			
	Anthracite	2,720	$g\ CO_2$/kg fuel	
	Coking coal	2,810		
	Coking coal (coke ovens)	2,850		
	Coking coal (base metal)	2,690		
	(other bituminous) coal	2,420		
	Sub-bituminous coal	2,070		
	Brown coal	2,105		
	Bituminous shale	1,040		
	Peat	1,190		
	Solid secondary fuels			
	Coal and brown coal briquettes	2,315	$g\ CO_2$/kg fuel	
	Wood chips	44,000	$g\ CO_2$ /m^3 fuel	nC
C	Gaseous fuels			
	Natural gas	1,825	$g\ CO_2$/Nm^3 fuel *)	
	Biogas (waste dump gas)	400		nC
	Biogas (co-fermentation of corn and manure)	1,300		nC
	Methane	2,000		
	Propane	1,530	$g\ CO_2$/litre fuel	nC

Source A: CE Delft

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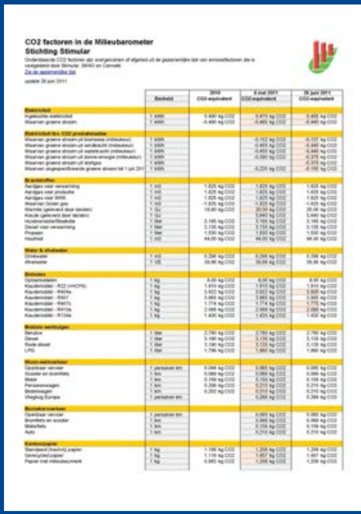
CONVERSION FACTORS

STEEL AT WORK

List emission factors via www.milieubarometer.nl



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RESULTS

STEEL AT WORK

5 STEEL BRIDGE PROJECTS,
all recently completed

Railway bridges over the river Nete – Duffel (B)

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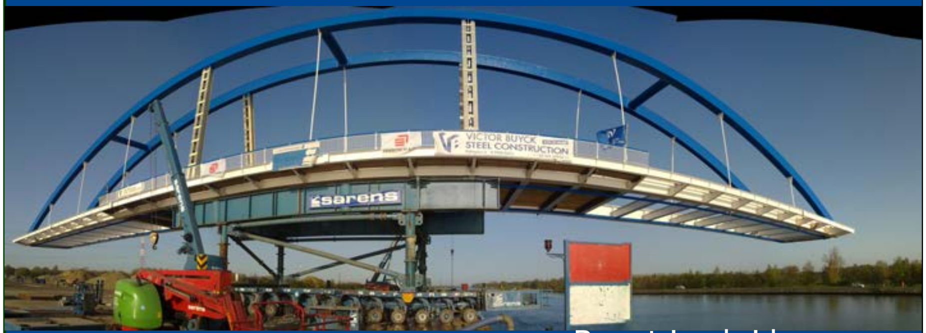
STEEL AT WORK

RESULTS

5 STEEL BRIDGE PROJECTS, all recently completed



Bowstring bridge over the Albert canal – Grobbendonk (B)

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STEEL AT WORK

RESULTS

5 STEEL BRIDGE PROJECTS, all recently completed

Bowstring bridge - Luxemburg

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STEEL AT WORK

RESULTS

5 STEEL BRIDGE PROJECTS, all recently completed

Bridge Madeleine over the river Loire – Nantes (F)

STEEL AT WORK

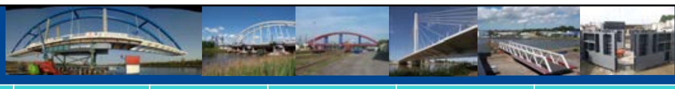
RESULTS

5 STEEL BRIDGE PROJECTS, all recently completed

Lock doors + bridge Kattendijk – Antwerp (B)

STEEL AT WORK

RESULTS



	Bridge Grobbendonk	Bridge Duffel	Bridge Luxemburg	Bridge Nantes	Kattendijk lock Antwerp
Steel consumption	573 t	2,280 t	1,954 t	2,527 t	(bridge) 254 t (doors) 417 t
Dimensions	L = 109 m B = 18 m H = 15.5 m	L = 110 m B = 13 m H = 20 m	L = 122 m B = 18.5 m H = 20.5 m	L = 210.5 m B = 27.4 m H = 57 m (pylon)	(bridge) L = 69 m B = 13 m H = 5.4 m
Description	Bowstring; Fully welded; Concrete deck on steel cross girders	Bowstring; Fully welded; Orthotropic deck	Bowstring; Bolted cross girders; Concrete deck	Cable stayed; Fully welded; Orthotropic deck	(bridge) Truss; Fully welded (gates) Fully welded
Fabrication hours	25.3 h/t	22.0 h/t	10.4 h/t	23.5 h/t	35.7 h/t
Corrosion protection system	3 layers (240 µm)	Zinc spray + 2 layers (150 µm to 240 µm)	Zinc spray + 2 layers (140 µm) or 3 layers (arch) (200 µm)	3 layers (230 µm); interior of pylon : 1 layer (40 µm)	(bridge) 4 layers (340 µm) (doors) 2 layers (500 µm)
Distance workshop to site	100 km	100 km	300 km	1,200 km (over sea)	100 km
Transport to site	Barge (over canals)	Truck	Truck	Barge (over sea)	Ship (doors) and barge (bridge)
Erection method	Float in	Launching	In situ	Float in: direct placing	Fully completed in situ
Erection hours	6.2 h/t	9.9 h/t	6.2 h/t	5.4 h/t	2.4 h/t

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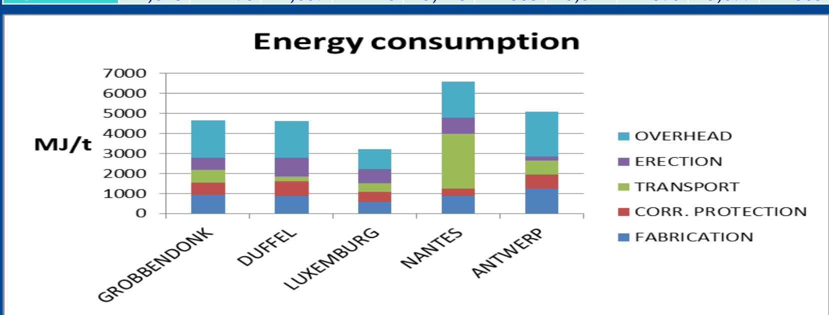
STEEL AT WORK

RESULTS

	Bridge Grobbendonk		Bridge Duffel		Bridge Luxemburg		Bridge Nantes		Kattendijk Antwerp	
	MJ/t	kg C02/t	MJ/t	kg C02/t	MJ/t	kg C02/t	MJ/t	kg C02/t	MJ/t	kg C02/t
Fabrication	951	150	868	133	572	88	867	129	1,257	194
Corrosion protection	592	139	755	137	516	70	393	96	702	172
Transport	625	47	224	17	416	31	2,722	204	678	51
Erection	626	51	941	77	701	57	818	63	202	16
Overhead	1,854	109	1,821	106	1,008	59	1,777	104	2,260	132
TOTAL	4,648	496	4,609	470	3,213	305	6,577	596	5,099	565



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ENVIRONMENTAL IMPACT OF STEEL BRIDGE CONSTRUCTION 42

STEEL AT WORK

RESULTS

	Bridge Grobbendonk		Bridge Duffel		Bridge Luxemburg		Bridge Nantes		Kattendijk Antwerp	
	MJ/t	kg C02/t	MJ/t	kg C02/t	MJ/t	kg C02/t	MJ/t	kg C02/t	MJ/t	kg C02/t
Fabrication	951	150	868	133	572	88	867	129	1,257	194
Corrosion protection	592	139	755	137	516	70	393	96	702	172
Transport	625	47	224	17	416	31	2,722	204	678	51
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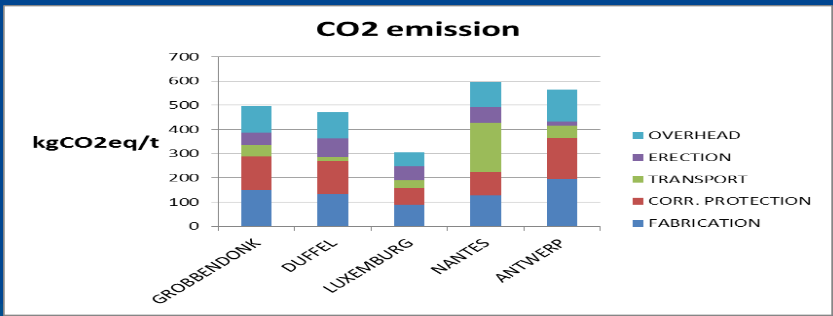
Overhead	1,854	109	1,821	106	1,008	59	1,777	104	2,260	132
TOTAL	4,648	496	4,609	470	3,213	305	6,577	596	5,099	565



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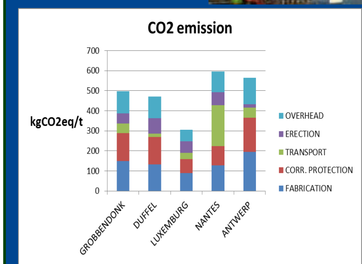
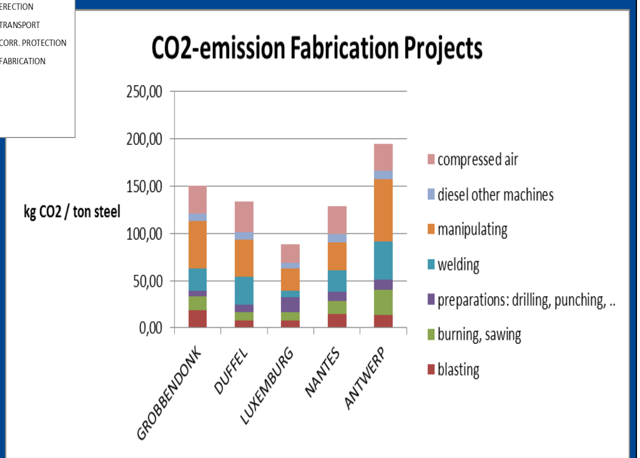
STEEL AT WORK

RESULTS





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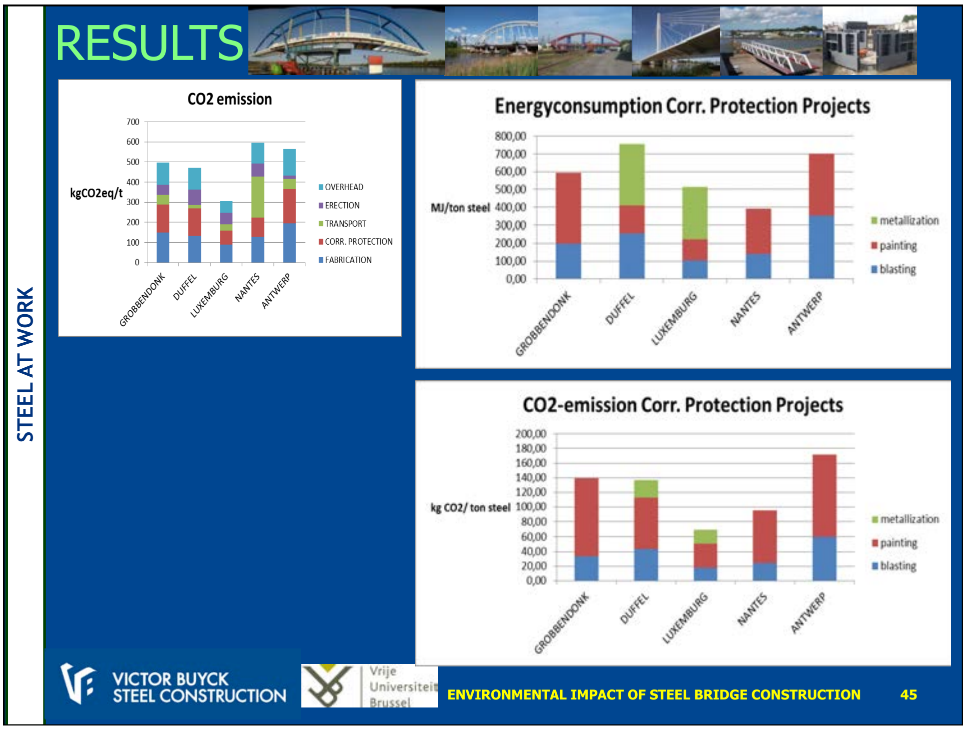
ENVIRONMENTAL IMPACT OF STEEL BRIDGE CONSTRUCTION 44


RESULTS
STEEL AT WORK
CO2 emission
kgCO2eq/t
700
600
500
400
300
200
100
0
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
OVERHEAD
ERECTION
TRANSPORT
CORR. PROTECTION
FABRICATION
Energyconsumption Corr. Protection Projects
MJ/ton steel
800,00
700,00
600,00
500,00
400,00
300,00
200,00
100,00
0,00
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
metallization
painting
blasting
CO2-emission Corr. Protection Projects
kg CO2/ ton steel
200,00
180,00
160,00
140,00
120,00
100,00
80,00
60,00
40,00
20,00
0,00
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
metallization
painting
blasting
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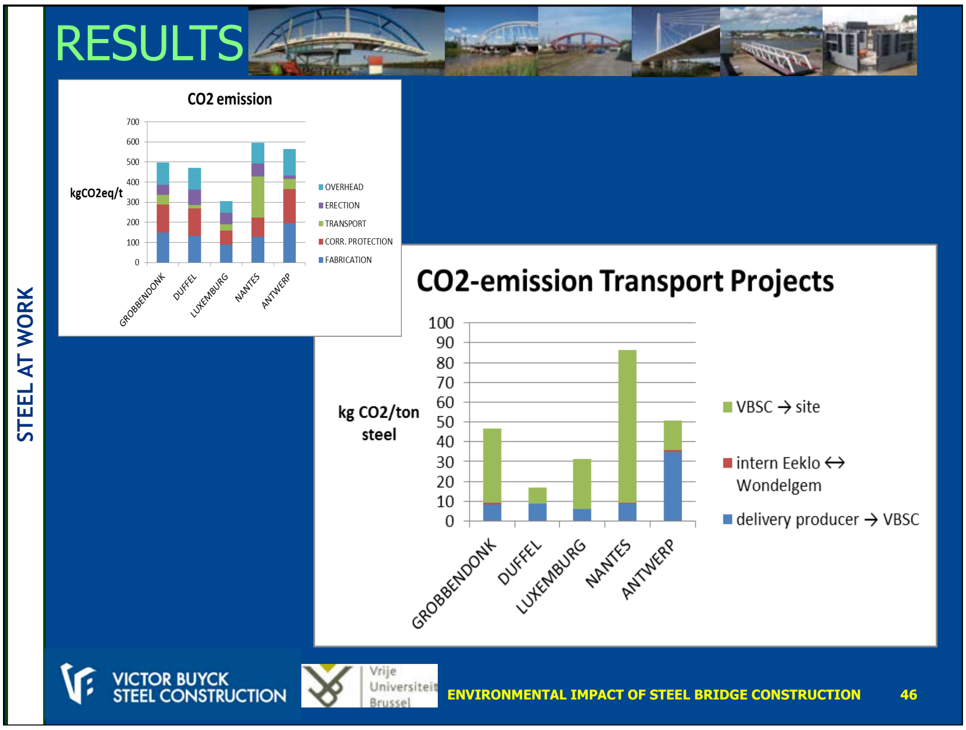
RESULTS
STEEL AT WORK
CO2 emission
kgCO2eq/t
700
600
500
400
300
200
100
0
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
OVERHEAD
ERECTION
TRANSPORT
CORR. PROTECTION
FABRICATION
CO2-emission Transport Projects
kg CO2/ton steel
100
90
80
70
60
50
40
30
20
10
0
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
VBSC → site
intern Eeklo ↔ Wondelgem
delivery producer → VBSC
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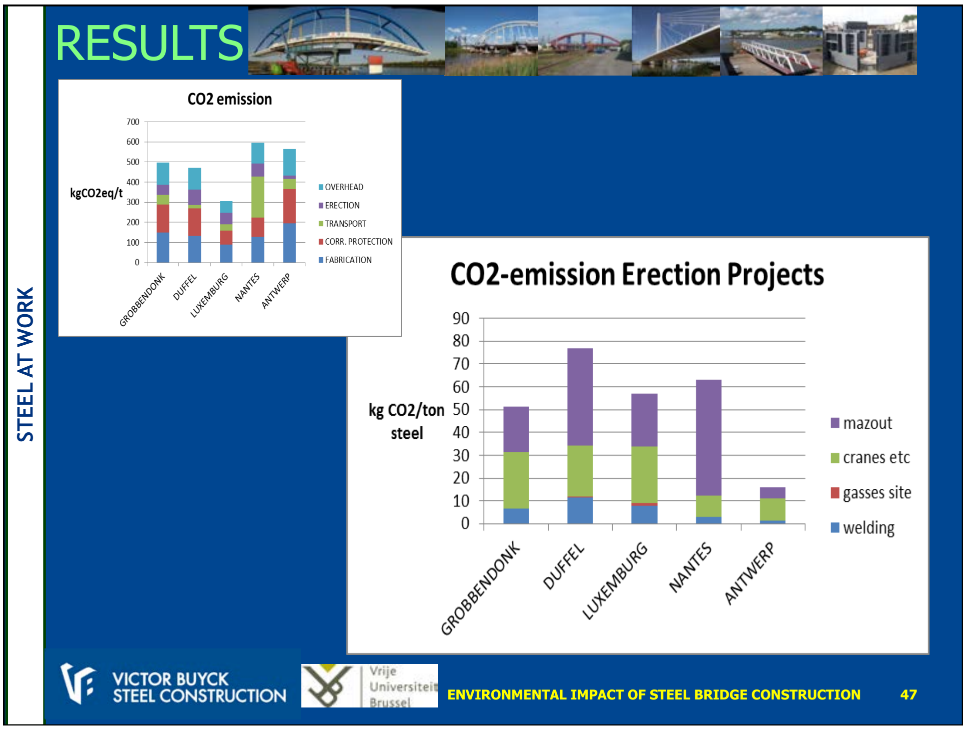
RESULTS
STEEL AT WORK
CO2 emission
kgCO2eq/t
OVERHEAD
ERECTION
TRANSPORT
CORR. PROTECTION
FABRICATION
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
CO2-emission Erection Projects
kg CO2/ton steel
mazout
cranes etc
gasses site
welding
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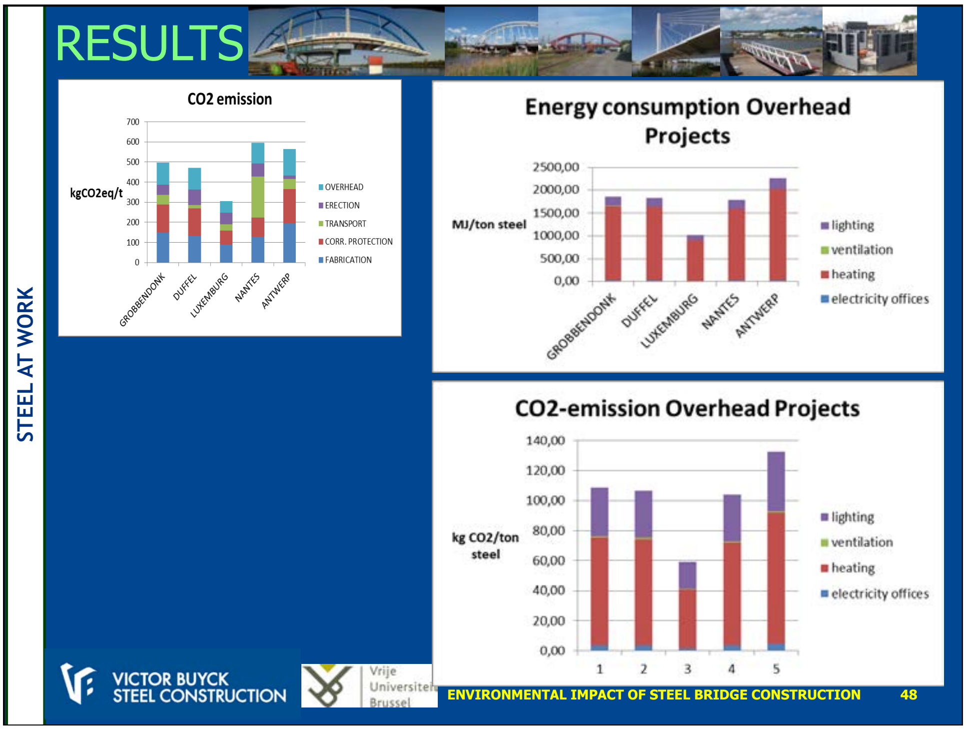
RESULTS
STEEL AT WORK
CO2 emission
kgCO2eq/t
OVERHEAD
ERECTION
TRANSPORT
CORR. PROTECTION
FABRICATION
Energy consumption Overhead Projects
MJ/ton steel
lighting
ventilation
heating
electricity offices
GROBBENDONK
DUFFEL
LUXEMBURG
NANTES
ANTWERP
CO2-emission Overhead Projects
kg CO2/ton steel
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STEEL AT WORK

CONCLUSIONS

1. Difference fully welded bridge vs bolted bridge:

   300 kgC02eq/t vs 200 kg kgCO2eq/t
   (fabrication + erection + overhead)
   (excluding corrosion protection + transport)

   14 kgCO2eq/h vs 16.5 kgC02eq/h
   (overall)

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STEEL AT WORK

CONCLUSIONS

2. Transport

   It is ecological MADNESS to import large fabricated steel structures from far overseas.

EXAMPLES:


5 container cranes Zeebrugge harbour


12,000 tons lock doors + bridges
for the new lock in Antwerp Waasland harbour

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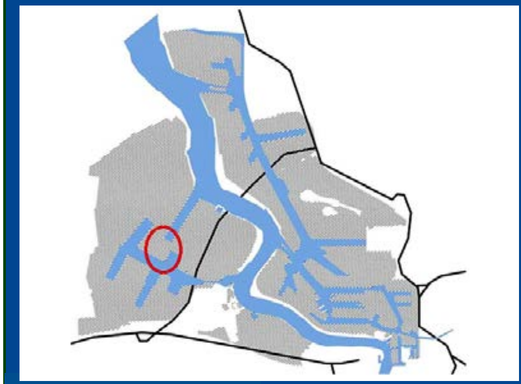
STEEL AT WORK

CONCLUSIONS

EXAMPLE:

12,000 tons lock doors + bridges
for the new lock in Antwerp
(Waasland harbour) …. made in China



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STEEL AT WORK

CONCLUSIONS

EXAMPLE:

Norway: Hardanger bridge
…. made in China

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STEEL AT WORK

CONCLUSIONS

EXAMPLE:

Germany: Wilhelmshafen
.... made in China

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STEEL AT WORK

CONCLUSIONS

EXAMPLE:

12,000 tons lock doors + bridges
for the new lock in Antwerp
(Waasland harbour)

Key figures:

° Direct gain of 8 million EUR
° Indirect loss of 14 million EUR
° Resulting loss of 6 million EUR

° transport: 850 kgCO2eq/t
or 10,000,000 kgC02eq !

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STEEL AT WORK

CONCLUSIONS

3. It is possible to determine the ecological footprint of the steel construction industry

4. There is a relationship between the ecological footprint and the complexity of the structure (hours)

5. Research can be further fine tuned:

a. More data -> challenge for the sector
b. More precise data -> registration, measuring
c. Wider range -> other type of structures
d. Effective actions -> reduction programmes
e. Wider perspective -> immediate effects

STEEL AT WORK

Victor Buyck is ready to make the (next) step,

what about you ?


STEEL AT WORK
Remember:
steel fabrication is only a small part after all
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STEEL AT WORK
FRAGILE
HANDLE WITH CARE
Planet earth thanks you !
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