



A bright future for HDG in the circular economy





Earth is a community to which we belong and not a commodity for us to exploit





Kantoorbanen

2.236.850

2014 t.o.v. 2013

↓
0,9%

Opname

1.206.000 m²

2015 t.o.v. 2014

↑
13%

Aanbod

8.152.000 m²

2015 t.o.v. 2014

↓
1,9%

Leegstand

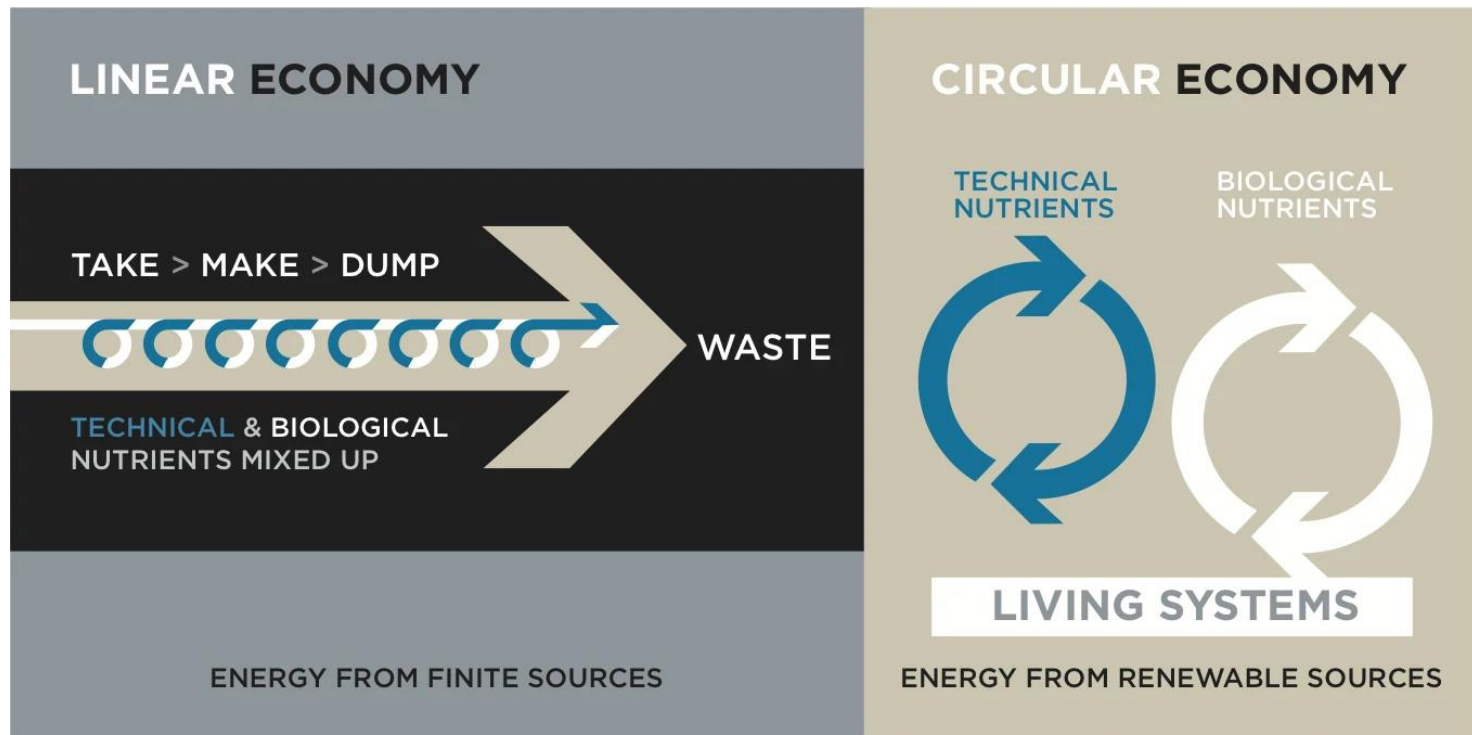
7.805.000 m² (15,8%)

2015 t.o.v. 2014

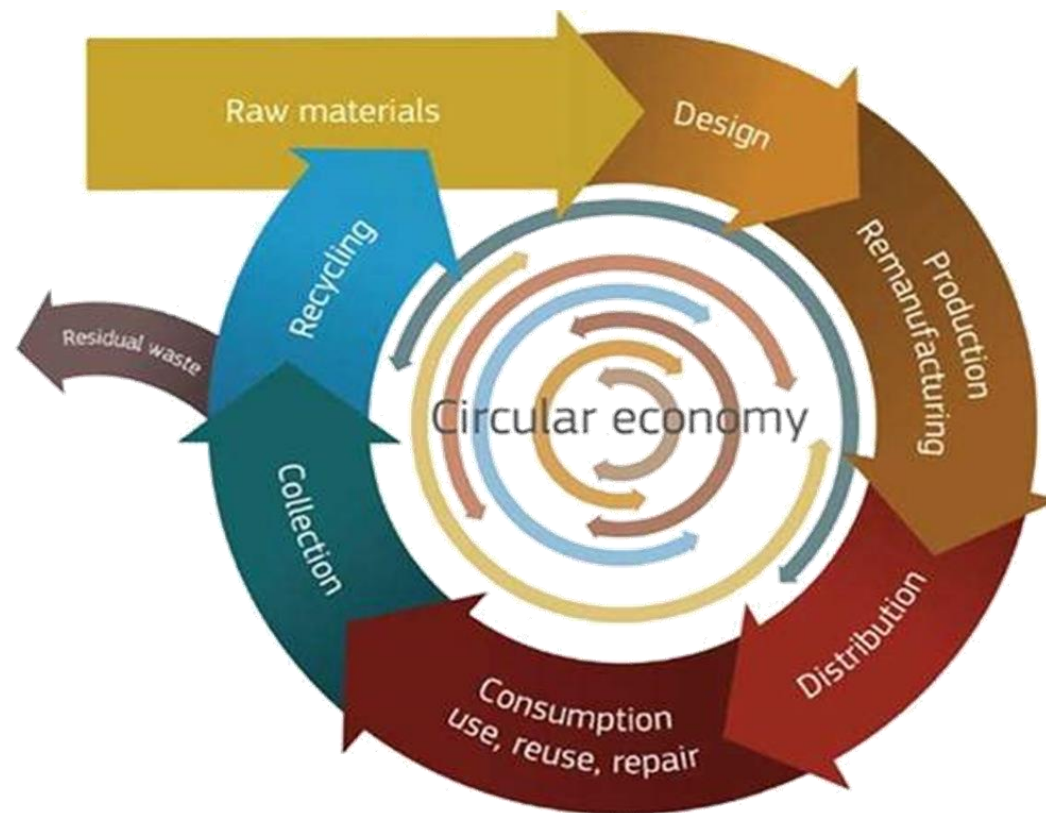
↓
1,7%



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AFTER W McDONOUGH AND M BRAUNGART



(Source: Bouke Bonnema – Tata Steel)



EU Policy : Drivers for circular economy

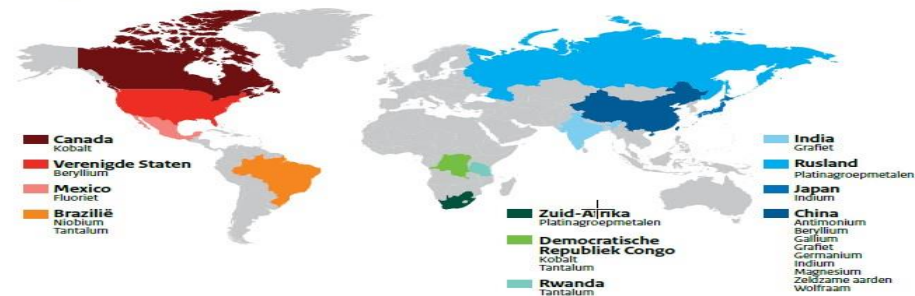
- ☐ world population growth + increase wealth.
- ☐ EU position on critical materials
- ☐ Increase of building & demolition waste
- ☐ Environmental impact mining
- ☐ *Depletion raw materials*
- ☐ Responsibility for future generations (moral duty)
- ☐ Economic advantages



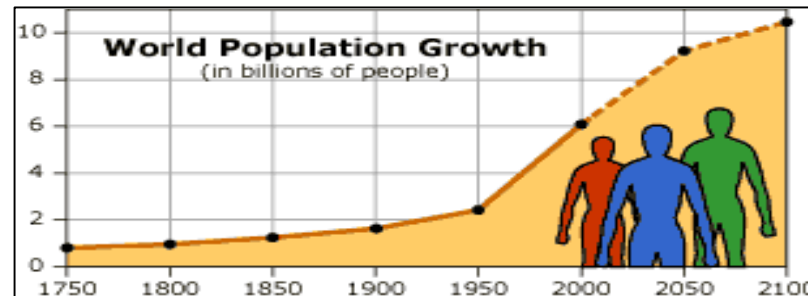
EU Policy : Drivers for circular economy

Productieconcentratie van kritieke materialen

Europa is afhankelijk van andere continenten



Bron: Europese Commissie, 2010



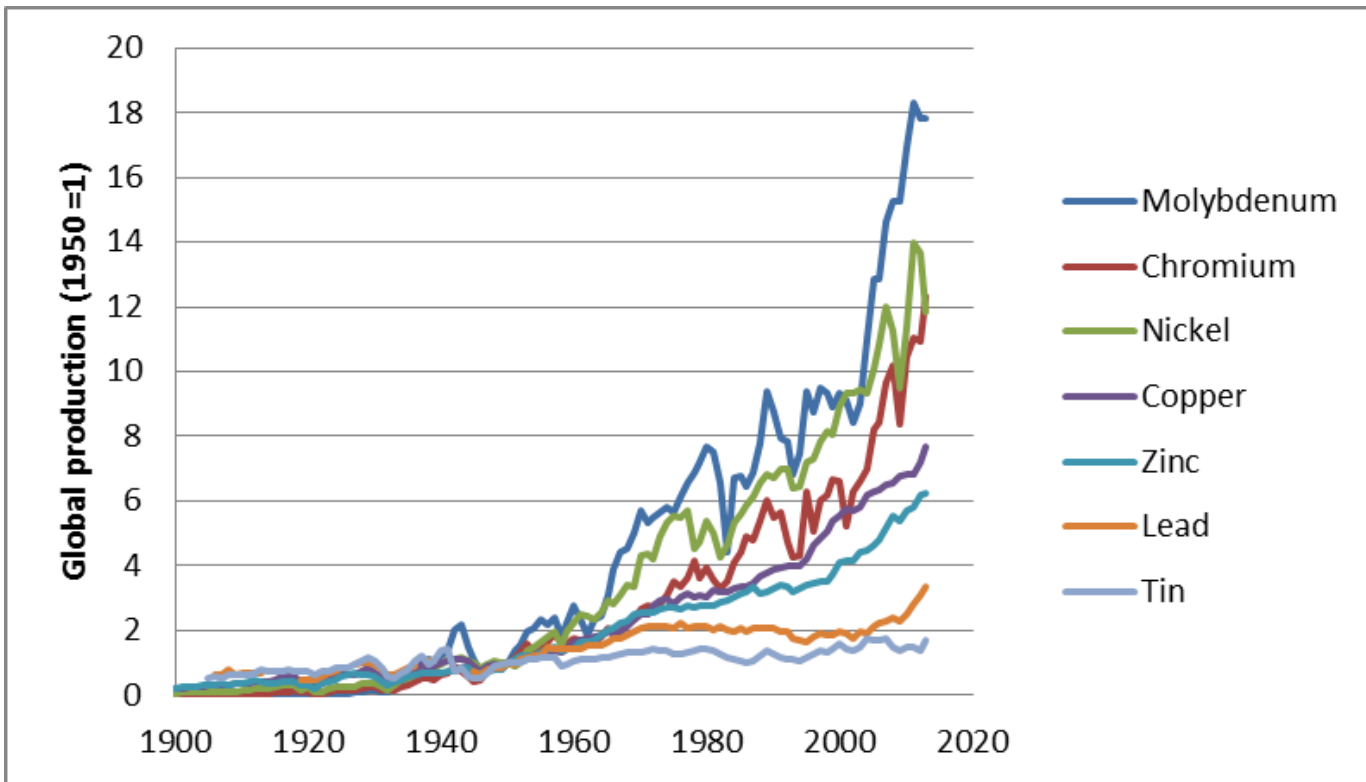
EU Policy: drivers for circular economy

❑ Environmental impact mining



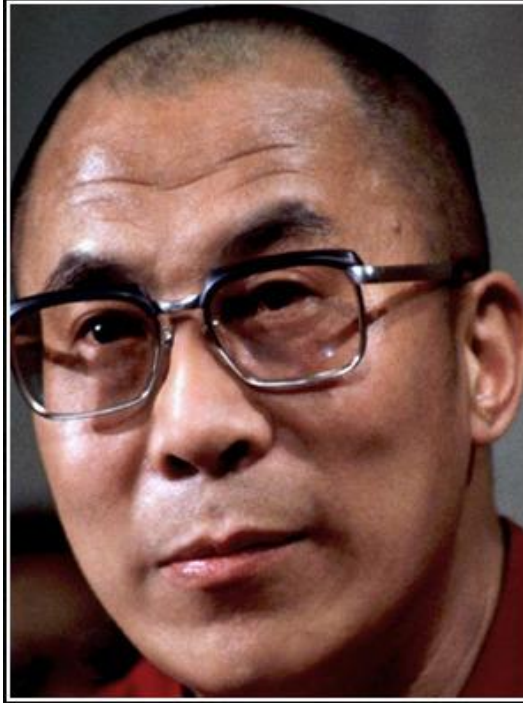
EU Policy : drivers for circular economy

☐ Depletion raw materials



EU Policy : drivers for circular economy

- ❑ Responsibility for future generations (moral duty)



As people alive today, we must consider future generations: a clean environment is a human right like any other. It is therefore part of our responsibility toward others to ensure that the world we pass on is as healthy, if not healthier, than we found it.

— Dalai Lama —

AZ QUOTES



EU Policy : drivers for circular economy

❑ economic advantages

- Cost reduction the EU 380-630 billion €/year (E. MacArthur Foundation)
- 7 billion/year in the Netherlands (TNO)
- Saving 2.9 – 3.7 trillion \$ in 2030 worldwide through increasing resource efficiency (McKinsey, 2011)
- NL: 83.000 extra jobs (RABO)



Role of the authorities

- initiate (through circular sourcing),
- stimulate innovation
- facilitate bottom-up initiatives (repairshops, etc.)
- adapt regulation



Why focus on the building industry ?

- Huge impact -> quick win
- Construction sector represents :
 - 40% of material use
 - 50% of CO² emissions
 - 20% of water use
 - 25% of all transport

Building the LEGO way





Another way of building

- Design flexible and adaptable buildings
- Design in a 're-functionable' way
- Make sure that components are re-usable
- Use resources with a high residual value (recycling instead of downcycling)

In practice: the 9 R's in the circular economy

Level of Priority

HIGH



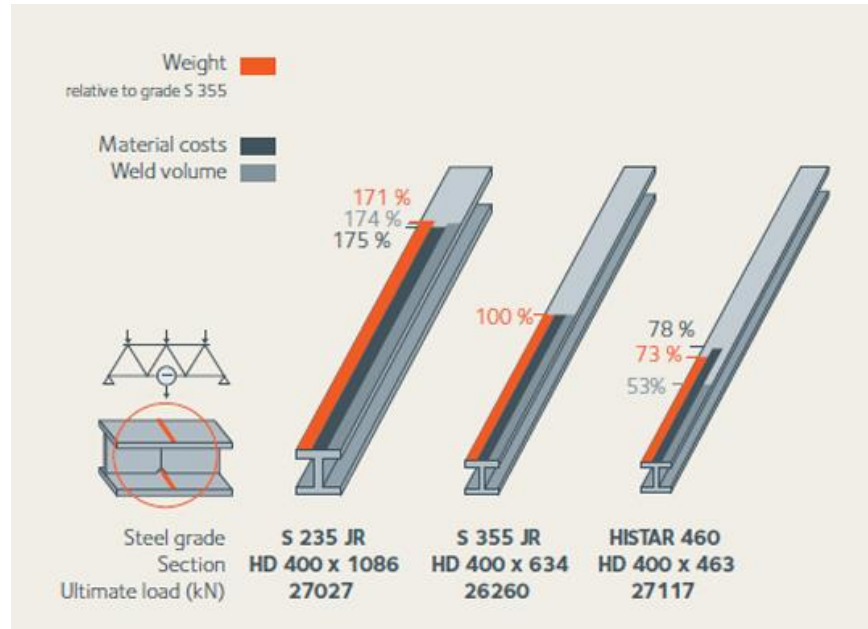
LOW

REFUSE:	PREVENT THE USE OF RESOURCES
REDUCE:	DECREASE THE USE OF RESOURCES
RE-USE:	FIND NEW PRODUCT USE (SECOND HAND)
REPAIR:	MAINTAIN AND REPAIR
REFURBISH:	IMPROVE PRODUCT
REMANUFACTURE:	CREATE NEW PRODUCT FROM SECOND HAND
RE-PURPOSE:	RE-USE PRODUCT FOR DIFFERENT PURPOSE
RECYCLE:	RE-USE RAW MATERIALS OF PRODUCT
RECOVER:	RECOVER ENERGY FROM WASTE

(Source: Jacqueline Kramer – Utrecht Sustainability Institute)

'The steel case'

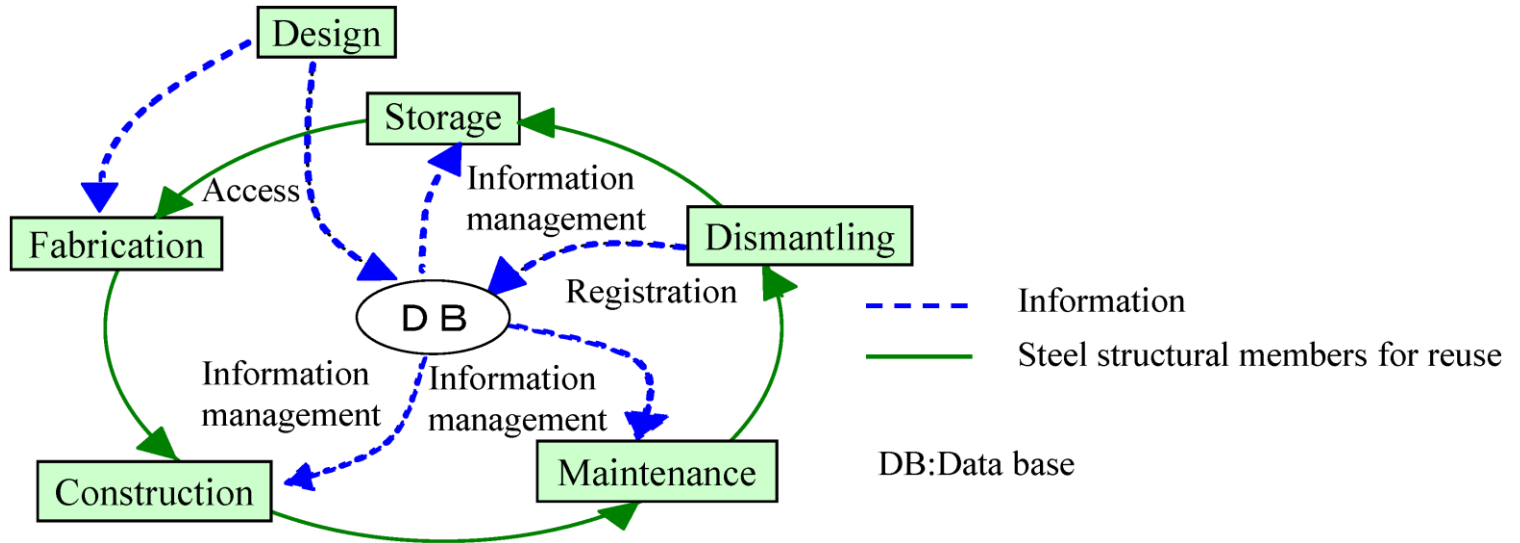
- REDUCE: weight reduction -> material use reduction



(Source: ArcelorMittal)

'The steel case'

- REUSE





'The steel case'

- **Challenges for reuse**
 - Availability
 - Supply chain integration
 - Traceability and certification
 - Additional time required within construction programs
 - Uncommon practice

'The steel case'

- REMANUFACTURE

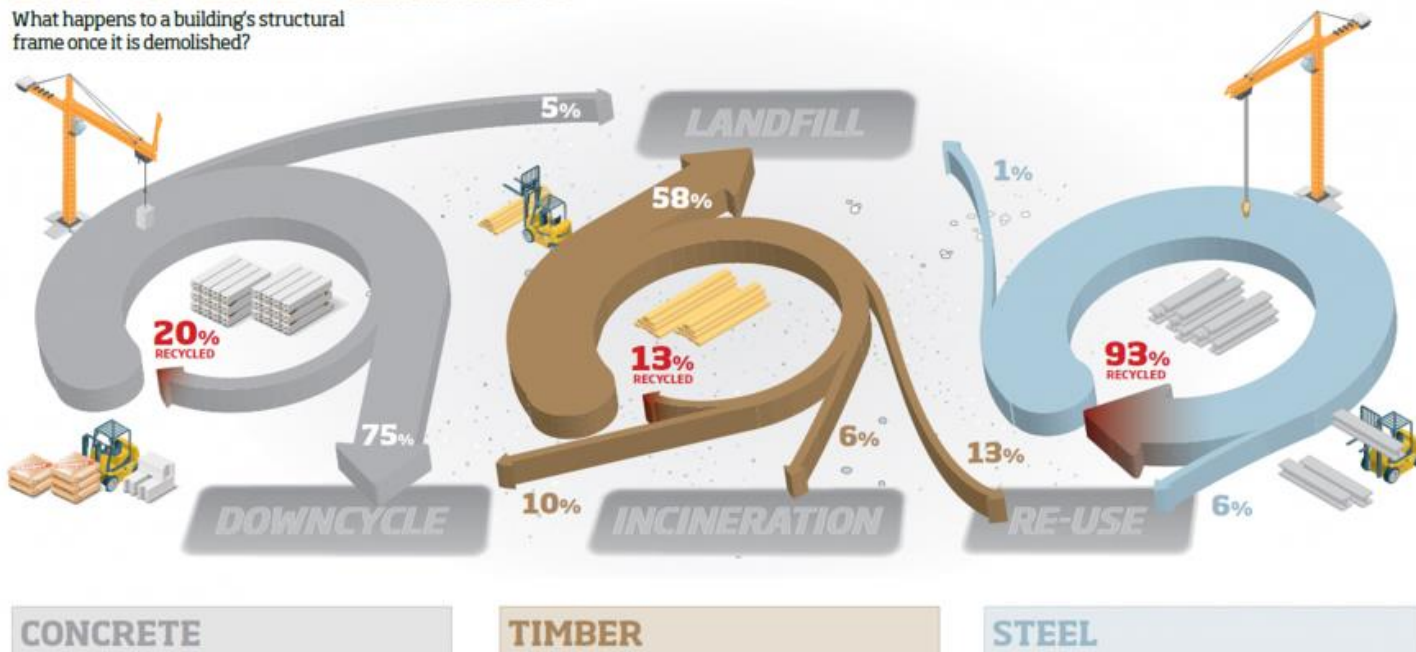


'The steel case'

- RECYCLE

END-OF-LIFE SCENARIOS

What happens to a building's structural frame once it is demolished?



'The steel case'

Steel in the circular economy



(Source: Bauke Bonnema – Tata Steel)



What about hot dip galvanizing?

- **REUSE**
 - Ideal coating system
 - No need for repair after demounting or remounting
 - Longer life time expectations → frequent reuse
- **REPAIR**
 - Easily repairable with available techniques
- **RECYCLE**
 - Zinc is recycled again and again with no loss in quality
 - Vs. other synthetic materials where recycling = downcycling



A strong case for steel and batch HDG

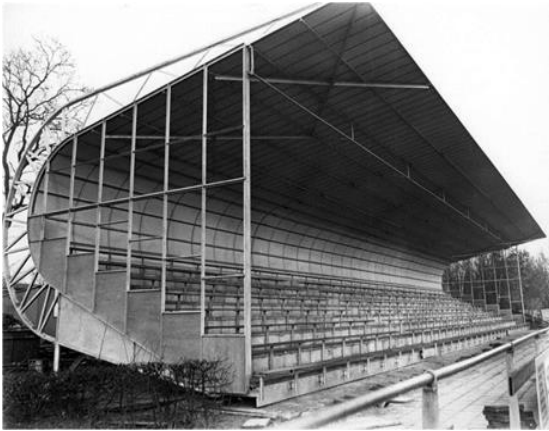
- easily demountable and remountable
- suited for designing prefabricated elements (more bolted connections)
- the highest % of recyclability compared with concrete or wood.
- HDG ensures low maintenance cost -> interesting for investors
- HDG steel: very limited or no repairs required before reuse
- HDG steel: excellent TLCC compared to painted steel.

Case studies

1) Grandstand Gramsbergen (2013)



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(Source : SV Gramsbergen, Harry Haverkotte)

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Case studies

2) The Green House - Utrecht (2017)



(Source: Cepezed)

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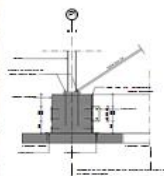


(Source: Cepezed)

Case studies

2) The Green House - Utrecht (2017)

circular building elements



foundations



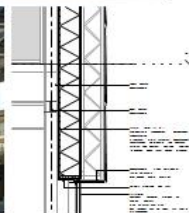
Hot-dip
Galvanized
Steel frame



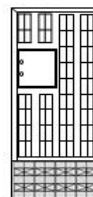
prefabunits
s.a. the
elevator and
the toilet block



Structural
Insulated Panels
(SIPs) for facade



Facade made
out of glass from
the former
Knoopkazerne;
the glass size
defined the
dimensioning



Roof: the fifth
facade

cepezed

Case studies

3) Temporary Car Park Morspoort – Leiden (2012)



(Source: Continental Car Parks)

Case studies

3) Temporary Car Park Morspoort – Leiden (2012)



Case studies

3) Temporary Car Park Morspoort – Leiden (2012)



Case studies

3) Temporary Car Park Morspoort – Leiden (2012)





4) SEGRO Office building & warehouse

Case studies



4) SEGRO Office building & warehouse

