



Ministerie van Verkeer en Waterstaat



Sustainability & procurement
Rijkswaterstaat



Rijkswaterstaat

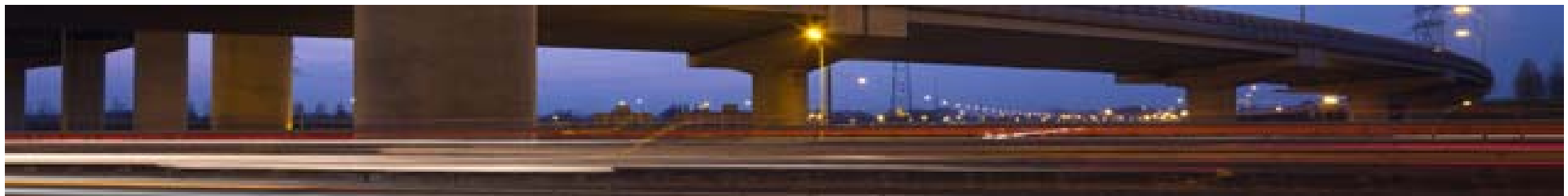
- Management main waterways
 - 3000 km riverbank, 150 locks, 17 weirs
- Management main roadnetwork
 - 3100 km highways
- Management watersystem
 - 63000 km² water
 - Coastal management





Sustainability: what do YOU mean?

- Energy & Climate
- Water-quality
- Water-quantity
- Water-use
- Soil (pollution)
- Natural resources
- Waste
- Biodiversity
- Spatial Planning
- Air quality
- Noise
- Safety
- Health
- Social issues
- Scenic value
- Historical-/ cultural value
- Mobility (traffic)
- Flexibility/ adaptability
- Quality of Life
- Lifecycle Costing
- Efficiency





Strategic targets RWS

- *“Rijkswaterstaat aims to be in 2012 the leading, public orientated and sustainable executive organisation of the Dutch government.”*
- Focus sustainability:
 - Reduction energy use and production of green energy
 - Sustainable (green) procurement
 - Sustainable area development





Sustainability: Not all new!

- Re-use of building materials: >99%
- Life-cycle cost management
- Building 'ready to demolish'
- Road-surface: silent and safe
- Dynamic lighting: less traffic, less lights
- Ecology (roadsides and banks of waterways)
- Environmental assessment proces and supportgroup





The Rijkswaterstaat Sustainability program

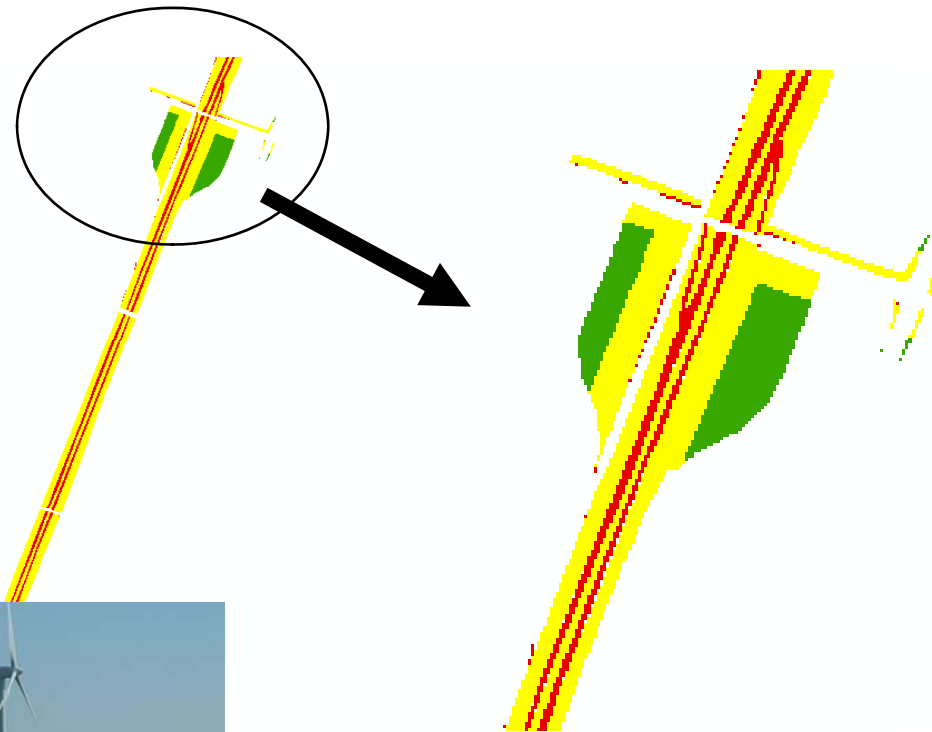
1. Rijkswaterstaat internal organisation
2. Production of sustainable energy
3. Sustainable procurement
4. Sustainable Regional planning
5. Electric cars – charging infrastructure

Internal organisation





Windmills along highways?



Invitation to place windmills



Carbon Footprint Rijkswaterstaat

■ Anchorstone (scope 1,2 and 3 = 818 kton CO₂)

■ Inland dredging

■ Marine Dredging

■ scope 1 and 2 energy use

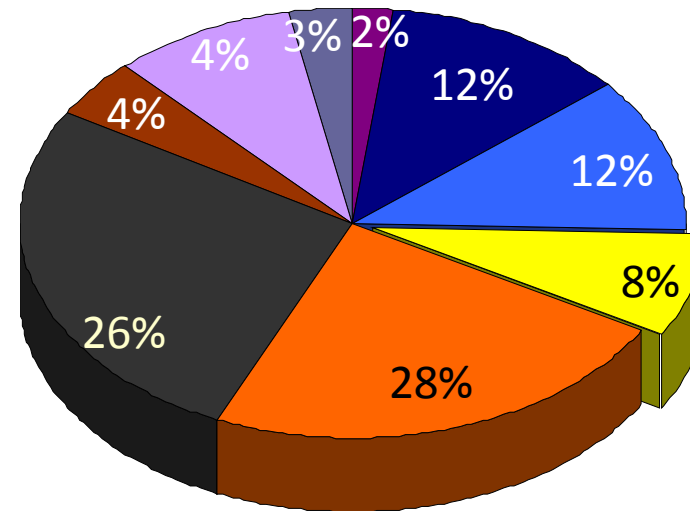
■ Groundworks roadbuilding

■ Asphalt

■ Road base materials

■ Concrete construction

■ Steel construction





Sustainable procurement – contract starting point

1. Functional specifications
 - no specific technical solutions demanded!!!
2. All decisions based on Lifecycle Costing and Total cost of Ownership.
 - designing, building and maintenance in 1 contract
3. National set of minimal technical requirements
4. Besides prize, sustainability is an awarding criterium
 - Focus on issues identified in planning phase



Specific Incentives

Ready for use in contracts

- Sustainable materials and construction (DuboCalc)
- Energy efficient installations (a) DuboCalc, (b) energy costs in contract
- CO₂ emission reduction (CO₂ ladder)
- CO₂ emission reduction – prevention of congestion

Under construction

- Sustainable Building Logistics
- Production of renewable energy
- Sustainable demolition
- Spatial Quality
- Flexible design / future-proof design



New Tools for sustainable procurement

- “CO2 ladder”
www.SKAO.nl
- Dubocalc
www.Rijkswaterstaat.nl/Duurzaaminkopen



CO₂ performance ladder

- CO₂ management in organisation and applied in projects
- 5 levels of Certification of company
 - Low level: within own company
 - High level: innovation with partners in supplychain

Level is awarding criterium

DuBoCalc, what is it?

- The DuBoCalc software
 - FREE for all
- The Library: reference database environmental data on building materials
 - LCA-data (ISO 1440) and productdata
- The project data



Environmental issues

- Climate change
- Effect on ozone layer
- Human toxicity
- Ecological toxicity, sweet aqua
- Ecological toxicity, salt aqua
- Ecological toxicity, land
- Photochemical reactivity (smog)
- Acidification
- Over fertilization
- Depletion of non renewable materials

Sustainable design as an awarding criterium

- Objective DuBocalc comparison of tender-bids or variants
- DuboCalc calculates the environmental effects of the different infrastructure designs, based on material en energy use during the whole lifecycle
- RWS will use this LCA-instrument by judging the environmental impact of the bids
- DuboCalc consists of LCA-data (ISO 1440) and productdata



Dubocalc for sustainable design

- LCA based tool based on materials and energy
- Environmental costs are calculated for each environmental criterion (=costs to compensate for the negative effect; also based on international standards)
- Costs are weighed and totalised= Environmental Cost Indicator (ECI)
- A national data base is made and a managing organisation is founded



- Design and realisation choices have a significant effect on the environmental impact of infrastructural Works; therefore Rijkswaterstaat developed the ICT Tool: DuboCalc
- DuboCalc calculates the environmental effects of the different infrastructure designs, based on material en energy use during the whole lifecycle
- RWS will use this LCA-instrument by judging the environmental impact of the bids
- Besides prize, sustainability is a awardingcriteria !
- DuboCalc consists of LCA-data (ISO 1440) and productdata

DuBoCalc Interface



Dubocalc - [C:\Documents and Settings\rvwfdorm01\My Documents\teast.pdc] - [Project C:\Documents and Settings\rvwfdorm01\My Documents\teast.pdc]

Bestand Bewerken Beeld Extra Venster Help

electr Snel Zoeken

Voorbeeld project

- Variant 1
 - Element 1
 - Asfalt AC 0/16 Surf D3 (DAB) 0 % PR
 - Asfalt AC 0/16 Surf D3 (DAB) 20 % PR
 - Betongranulaat 250 mm
 - Grond
 - Profielstaal (verzinkt)
 - Element 2
 - Betonstaal
 - Betonmortel C20/25 (CEMIII)
 - Betonmortel C30/37 (CEMIII)
- Variant2
 - Element 1
 - Asfalt AC 0/16 Surf D3 (DAB) 0 % PR
 - Asfalt AC 0/16 Surf D3 (DAB) 20 % PR
 - Betongranulaat 250 mm
 - Grond
 - Profielstaal (verzinkt)
 - Betonstaal
 - Betonmortel C20/25 (CEMIII)
 - Betonmortel C30/37 (CEMIII)
 - Element 2
 - Profielstaal (verzinkt)
 - Betonstaal
 - Betonmortel C20/25 (CEMIII)
 - Betonmortel C30/37 (CEMIII)

Prullenbak

Type	Naam	Hoeveelheid	Eenheid	Fase	Vrijkomend materiaal
	Asfalt AC 0/16 Surf D3 (DAB) 0	100	ton	Bouw	<input type="checkbox"/>
	Asfalt AC 0/16 Surf D3 (DAB) 2	100	ton	Bouw	<input type="checkbox"/>
	Betongranulaat 250 mm	300	m2	Bouw	<input type="checkbox"/>
	Grond	200	m3	Bouw	<input type="checkbox"/>
	Profielstaal (verzinkt)	10	ton	Bouw	<input type="checkbox"/>

Eigenschappen Omschrijving Brongegevens

Algemeen

Materiaal type	Asfalt
Afvalscenario	AFV_BU
Afval Scenario - Einde Levensduur	AFV_EL
Afval percentage	0 %
Utilval Percentage	2 %
Levensduur item (in jaren)	12
Levensduur (in jaren)	12
Actuele levensduur (in jaren)	12
Vervangingen	3,166666666666667
Primaire hoeveelheid	1
Primaire eenheid	ton

MKI waarden

MKI	5121,39
Bijdrage aan variant	5,96 %
Bouw MKI	922,07
Gebruik MKI	0
Onderhoud MKI	3892,26
Einde Levensduur MKI	307,06
MKI onderliggende objecten	5117,97
MKI Afvalscenario	3,43

Transportafstand

Transportafstand	30
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MKI
Milieu Kosten Indicator.

0.01.17112009 Versie:2.0b (Beta)



Dubocalc - [C:\Docum... Zoekresultaten





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electr Snel Zoeken

roject

Variant 1

Element 1

- Asfalt AC 0/16 Surf D3 (DAB) 0 % PR
- Asfalt AC 0/16 Surf D3 (DAB) 20 % PR
- Betonggranulaat 250 mm
- Grond
- Profielstaal (verzinkt)

Type	Naam	Hoeveelheid	Eenheid	Fase	Vrijkomend materiaal
	Asfalt AC 0/16 Surf D3 (DAB) 0	100	ton	Bouw	<input type="checkbox"/>
	Asfalt AC 0/16 Surf D3 (DAB) 2	100	ton	Bouw	<input type="checkbox"/>
	Betonggranulaat 250 mm	300	m2	Bouw	<input type="checkbox"/>
	Grond	200	m3	Bouw	<input type="checkbox"/>
	Profielstaal (verzinkt)	10	ton	Bouw	<input type="checkbox"/>



Dubocalc - [C:\Documents and Settings\wvform01\My Documents\teast.pdc] - [Library search]

Bestand Bewerken Beeld Extra Venster Help

Snel Zoeken

Type	Naam	Hoeveelheid	Eenheid
	Betonmortel C12/	1	m3
	Betonmortel C12/	1	m3
	Betonmortel C20/	1	m3
	Betonmortel C20/	1	m3
	Betonmortel C20/	1	m3
	Betonmortel C20/	1	m3
	Betonmortel C30/	1	m3
	Betonmortel C30/	1	m3
	Betonmortel C30/	1	m3
	Betonmortel C30/	1	m3
	Betonmortel C30/	1	m3
	Betonmortel C35/	1	m3
	Betonmortel C55/	1	m3
	Betonmortel C70/	1	m3

Eigenschappen Omschrijving Brongegevens

Algemeen

Actuele Levensduur (in jaren)	75
Afval percentage	0 %
Afval Scenario - Einde Levensduur	AFV_EL
Afvalscenario	AFV_BU
Levensduur item (in jaren)	75
Materiaal type	Beton
Primaire eenheid	m3
Primaire hoeveelheid	1
Uitval Percentage	5 %
Vervangingen	Object reference not set to an instance of an object.

MKI waarden

Bijdrage aan variant	0 %
Bouw MKI	147,94
Einde Levensduur MKI	13,01
Gebruik MKI	0
MKI	160,96
MKI Afvalscenario	1,75
MKI onderliggende objecten	159,21
Onderhoud MKI	0

Transportafstand

Transportafstand item	20
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Actuele levensduur (in jaren)
De actuele Levensduur is de Levensduur op basis waarvan de vervangingen in de Onderhoudsfase worden berekend. De actuele Levensduur wordt automatisch vastgesteld door DuboCalc en is altijd de kortste levensduur van alle objecten die boven het geselecteerde object hangen.

0.01.17112009 Versie:2.0b (Beta)

start Dubocalc - [C:\Docum...

EN

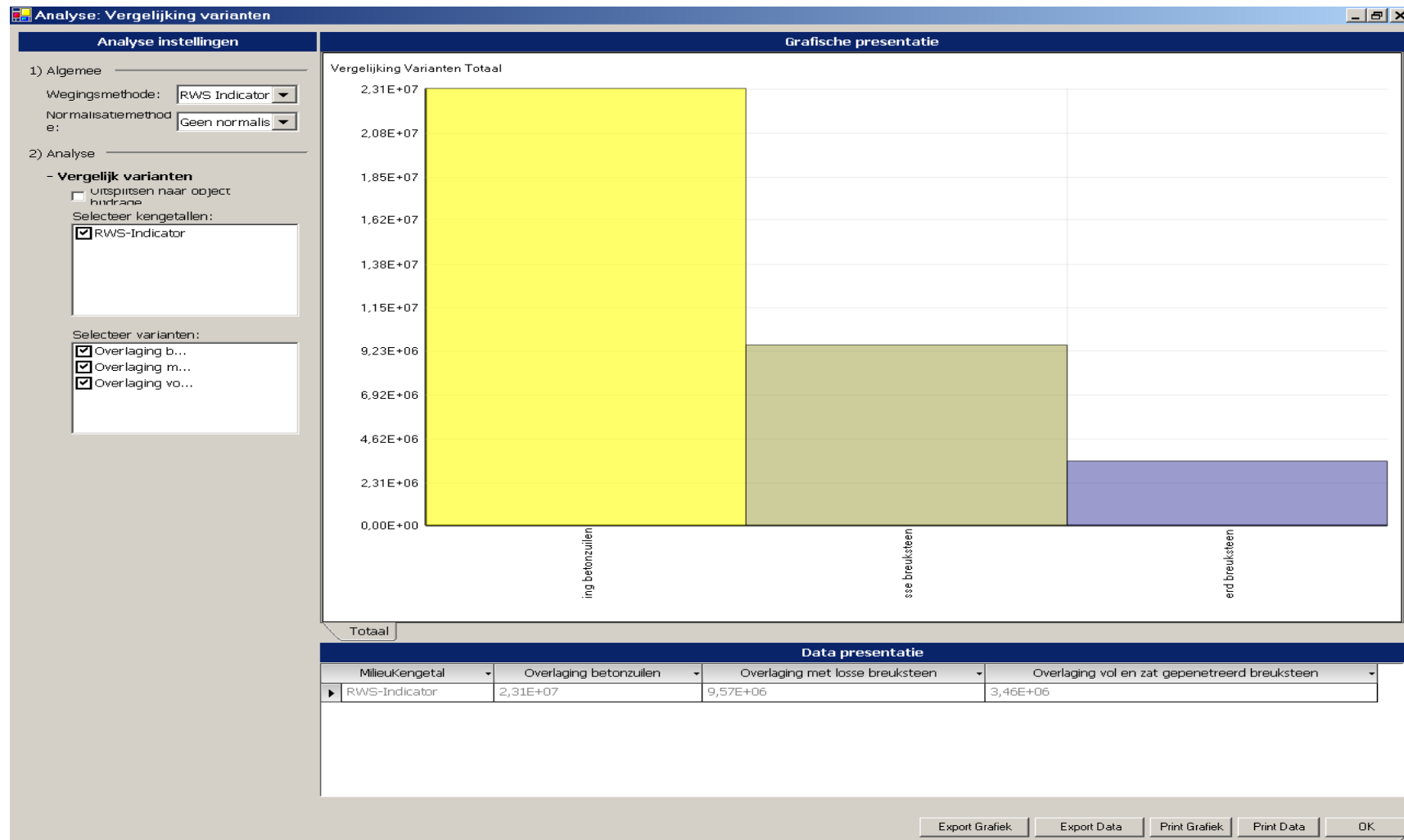


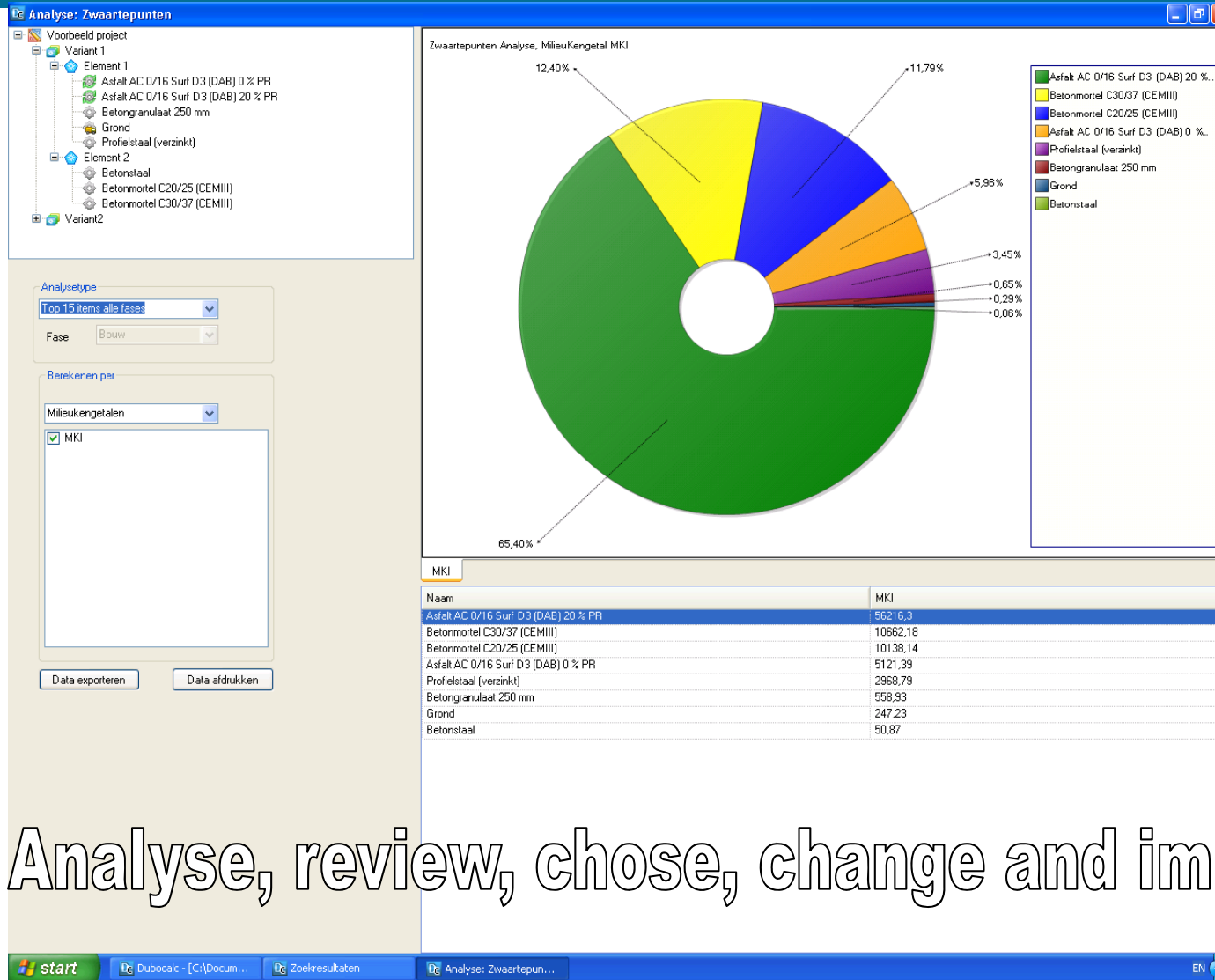
- ...SLAGEN
- ...VERHARDING I
- 42 BETONCONSTRUCTIES
- 42.21 BETON**
- Betonmortel C12/15 (CEM I)
- Betonmortel C12/15 (CEMIII)
- Betonmortel C20/25 (CEM I)
- Betonmortel C20/25 (CEMIII)
- Betonmortel C20/25 met 100 % beton/menggranulaat
- Betonmortel C20/25 met 20 % beton/menggranulaat
- Betonmortel C30/37 (CEM I)
- Betonmortel C30/37 (CEMIII)
- Betonmortel C30/37 met 100 % beton/menggranulaat
- Betonmortel C30/37 met 20 % beton/menggranulaat
- Betonmortel C35/45 (CEMIII)
- Betonmortel C55/67 (CEM I-CEMIII)
- Betonmortel C70/85 (CEM I-CEMIII)
- 42.34 ONDERWATERBETON
- 42.41 BETONSTAAL
- ...11 BEKISTING
- ...APENINGSNETTEN
- ...PANELEMENTEN
- ...ARD
- ...S
- ...TIES

Eigenschappen	Omschrijving	Brongegevens
Algemeen		
Actuele levensduur (in jaren)		75
Afval percentage		0 %
Afval Scenario - Einde Levensduur		AFV_EL
Afvalscenario		AFV_BU
Levensduur item (in jaren)		75
Materiaal type		Beton
Primaire eenheid		m3
Primaire hoeveelheid		1
Uitval Percentage		5 %
Vervangingen		Object reference not
MKI waarden		
Bijdrage aan variant		0 %
Bouw MKI		147,94
Einde Levensduur MKI		13,01
Gebruik MKI		0
MKI		160,96
MKI Afvalscenario		1,75
MKI onderliggende objecten		15
Onderhoud MKI		
Transportafstand		
Transportafstand item		



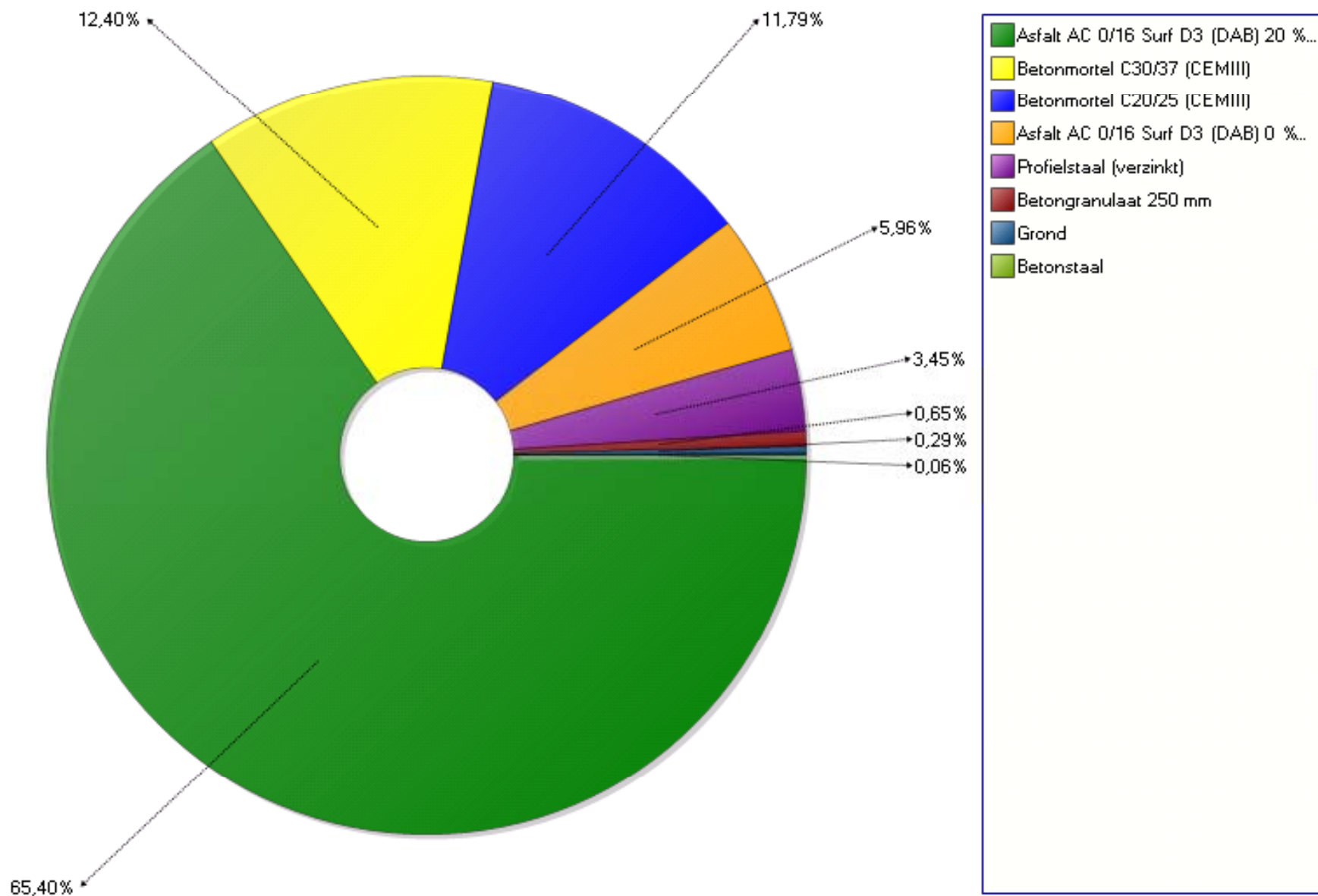
Different designs; different environmental impact; different ECI scores





Analyse, review, chose, change and improve!

Zwaartepunten Analyse, MilieuKengetal MKI





Application of Dubocalc in contracts

- As a minimum sustainability demand
- As a process demand; during design process optimisation; lower ECI for (parts of) the design
- As an award criterion in the tender process;
 - tender with lowest ECI get highest value in EMVI

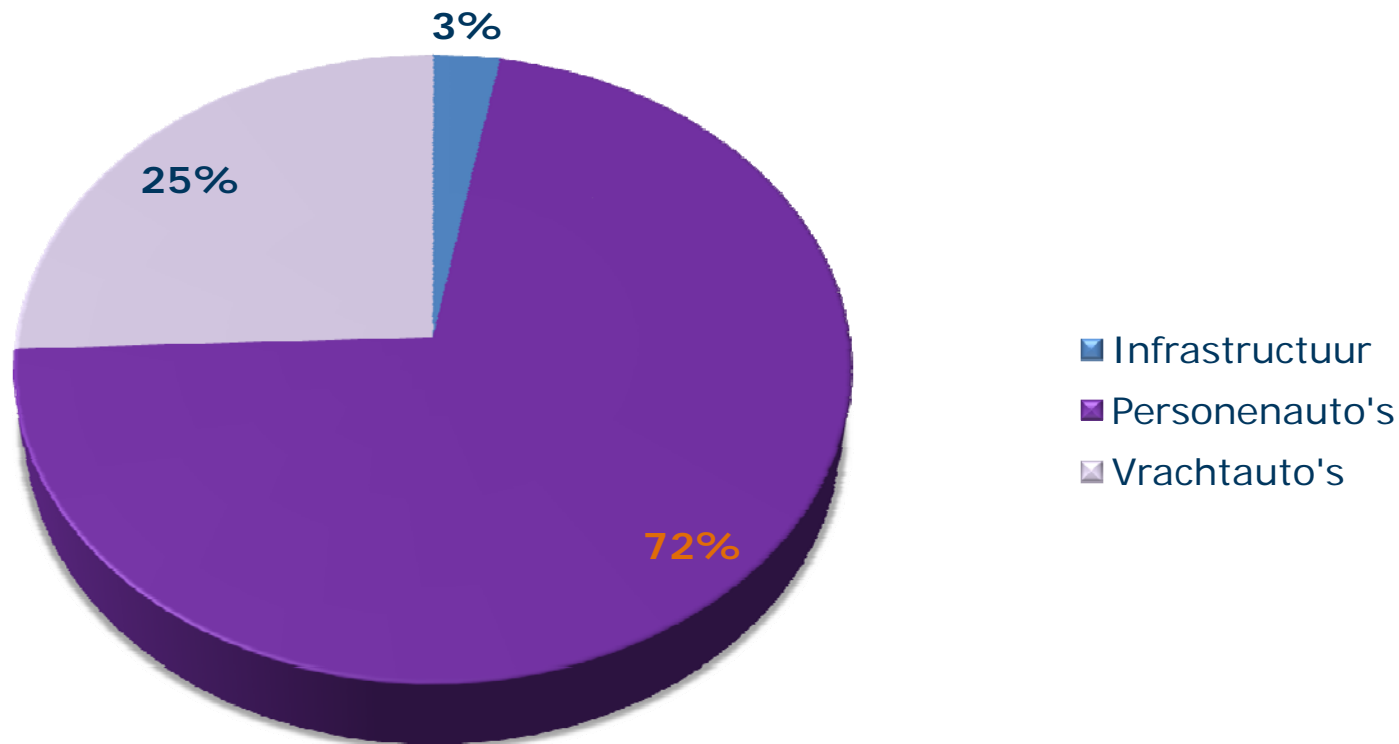


Conclusions pavements

- Dubocalc applied; life cycle approach, CO2 emission over 30 years including maintenance.
- Diminishing amount of tons is dominant
 - Thinner constructions (E.g EME) 20%
 - Longer lifetime (durability, quality) 15-25%
 - increasing life time (sealing of PA) 15%
 - High level of recycling (PA) 15-20%
- Low temperature asphalt (with recycling) 5-10%
 - Of course to be applied, but less tonnes is far more relevant
- Concrete for roads (use blast furnace cement in stead of Portland cement)



Relevance of infrastructure – emission of co2 over 20 year period



Can infrastructure help to reduce fuel consumption?