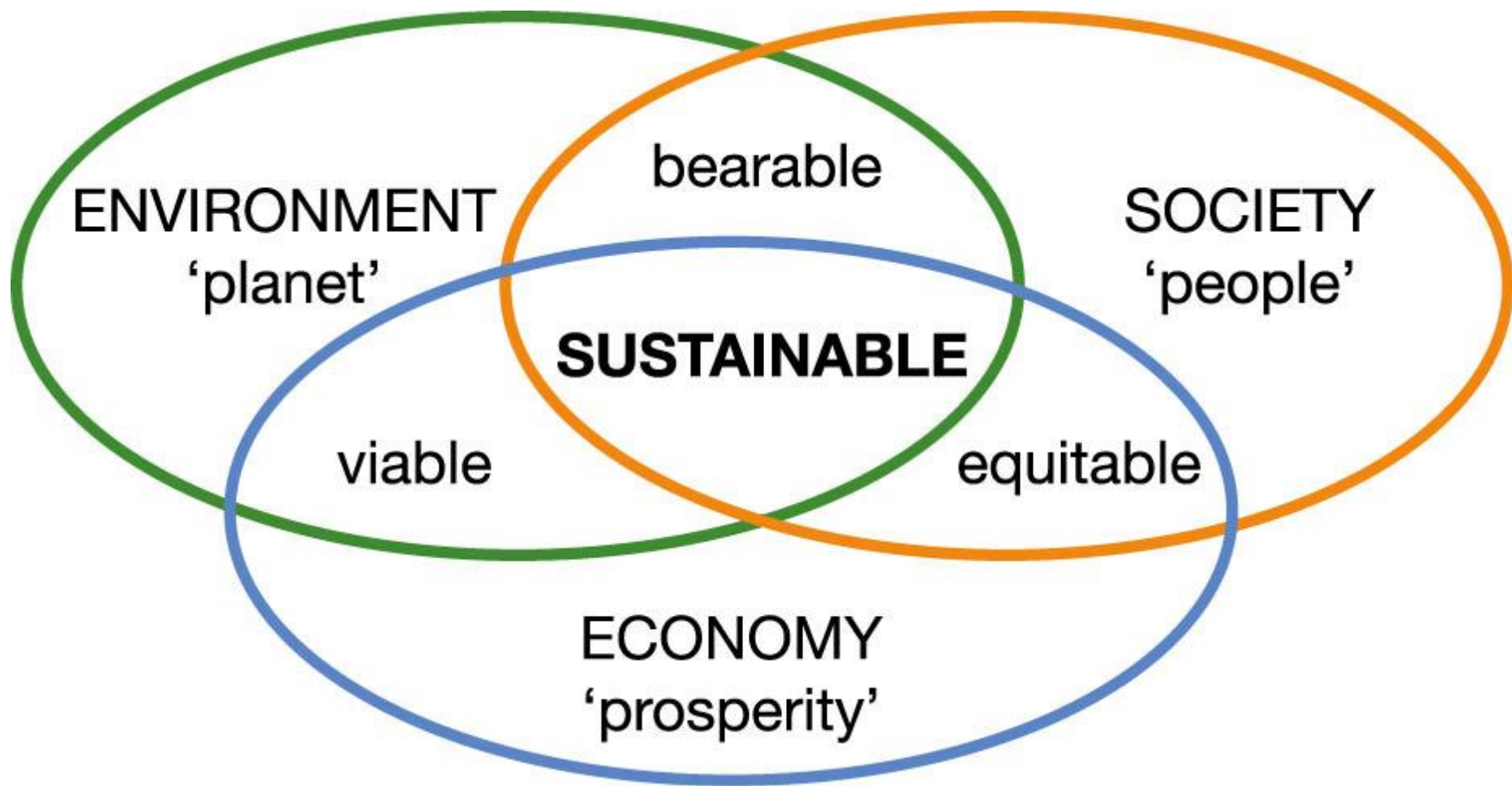


Sustainability of Concrete Roads

B D Perrie
C&CI

RPF
May 2012



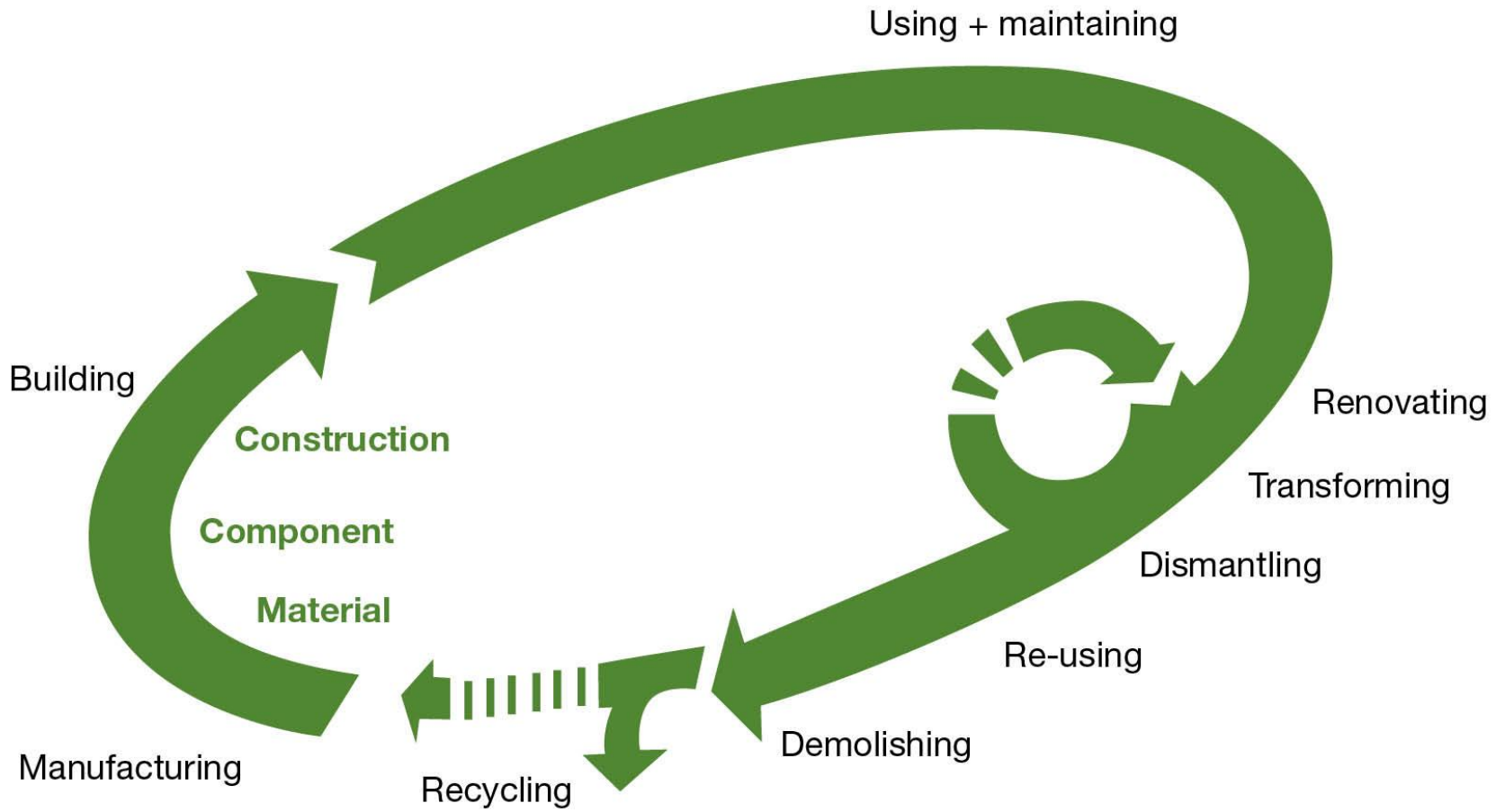
- Sustainability is critical
- Means designing and constructing structures to last longer
- More energy efficient designs
- Less use of materials
- Recycling
- Need for assessment tools

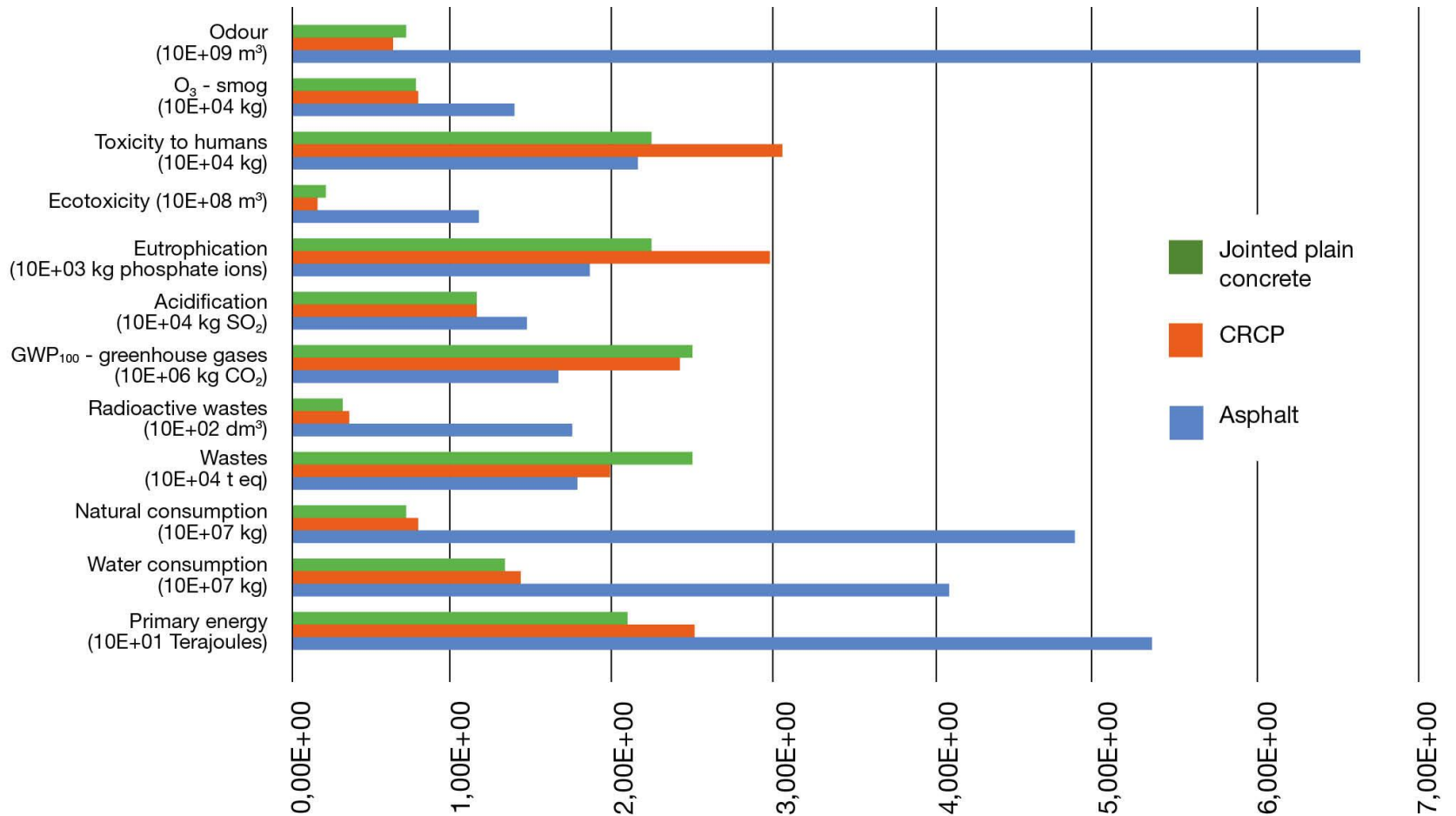
ENVIRONMENT

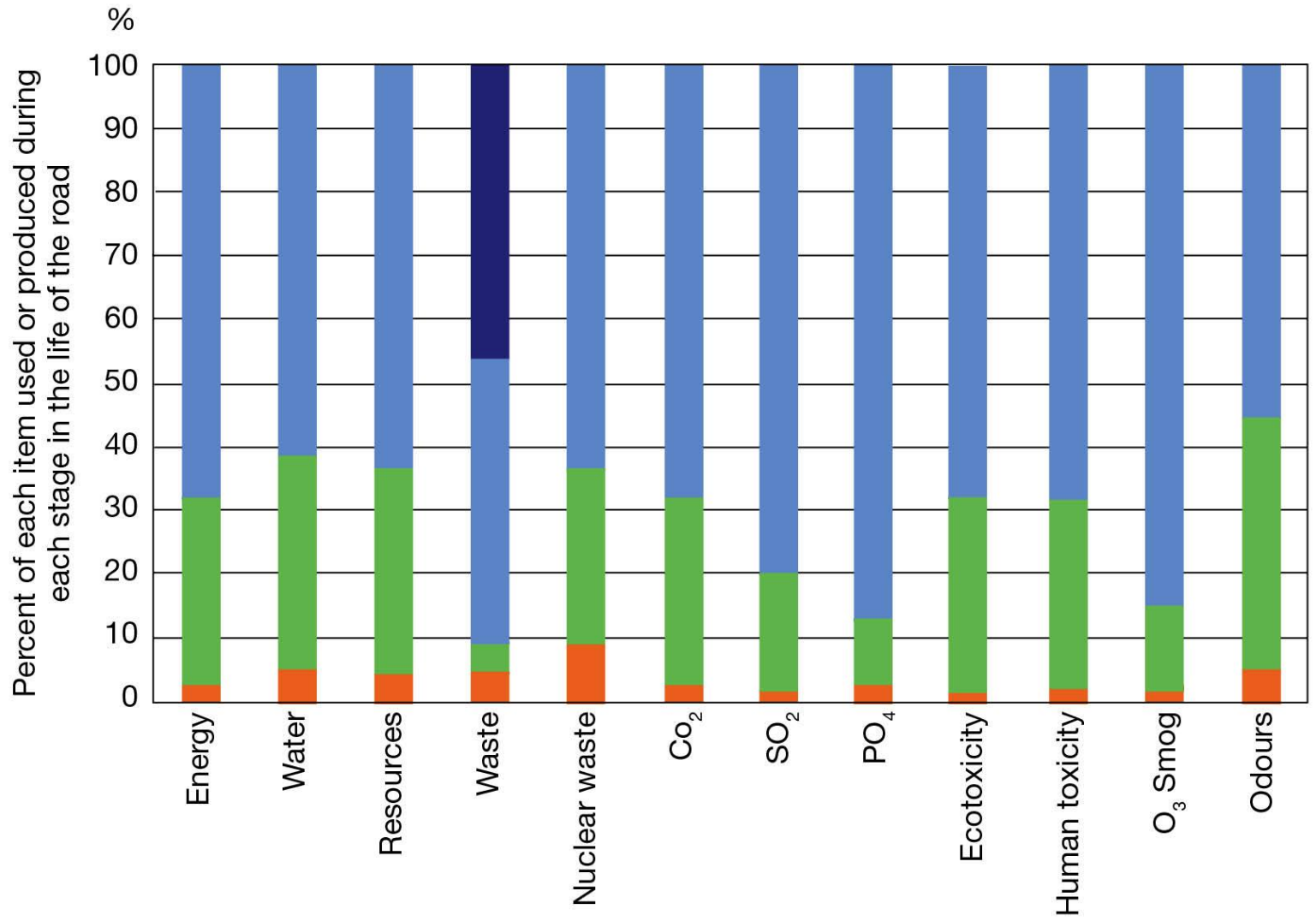
Environmental Aspects

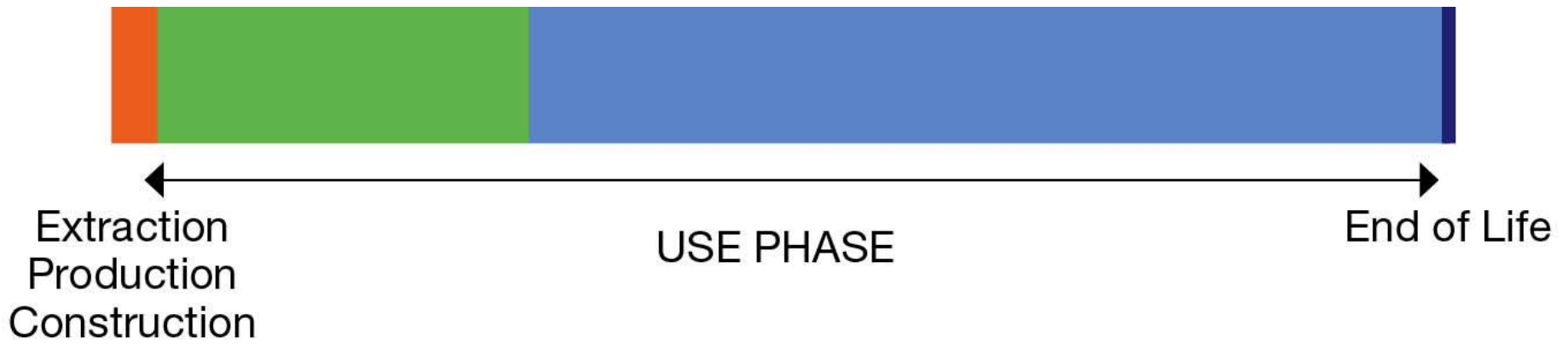
- Carbon footprint and LCA
- Fuel consumption
- CO₂ emissions
- Other eco-benefits

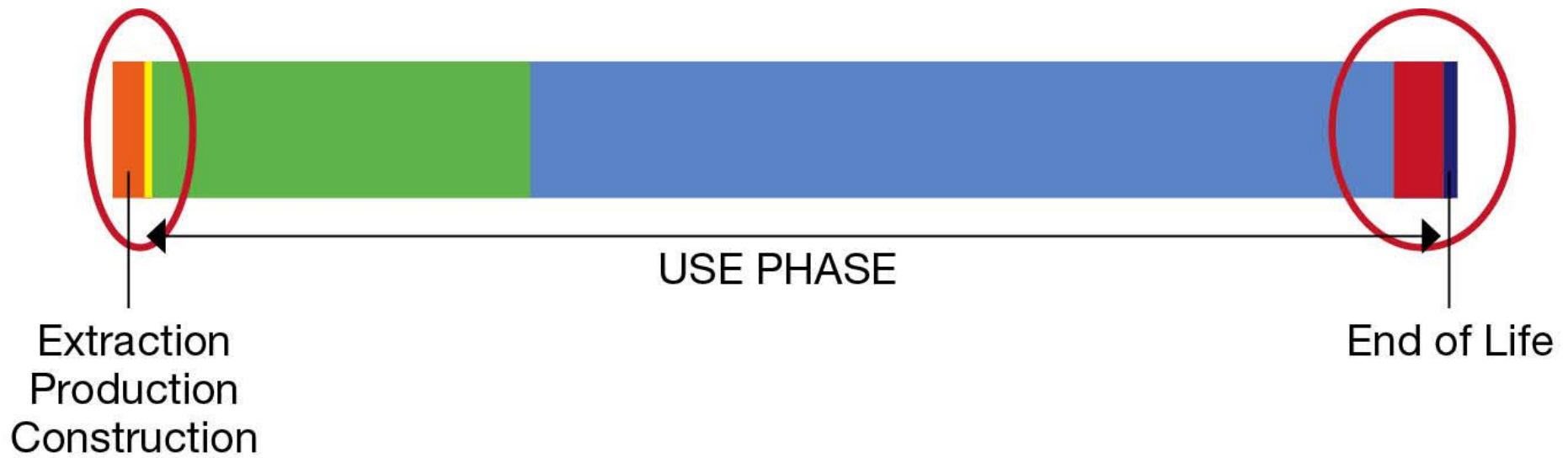
Carbon footprint and LCA











Fuel consumption

Fuel Consumption

- Number of studies
 - National research Council, Canada
 - TRL for Highways Agency
 - Sweden
 - Japan
 - Texas
- 0.8% to 3.9% saving
- Average 2.35%

CO₂ Emissions

Cement type	Average emission values (kg CO_{2e}/ton)
CEM I	985
CEM II A-L	840
CEM II A-S	815
CEM II A-V	790
CEM II B-L	720
CEM II B-S	730
CEM II B-V	690
CEM III A	560
CEM IV A	640
CEM IV B	570
CEM V A	590
CEM V B	415

Extender type

**Average emission values
(kg CO_{2e}/ton)**

FA

2

GGBS

130

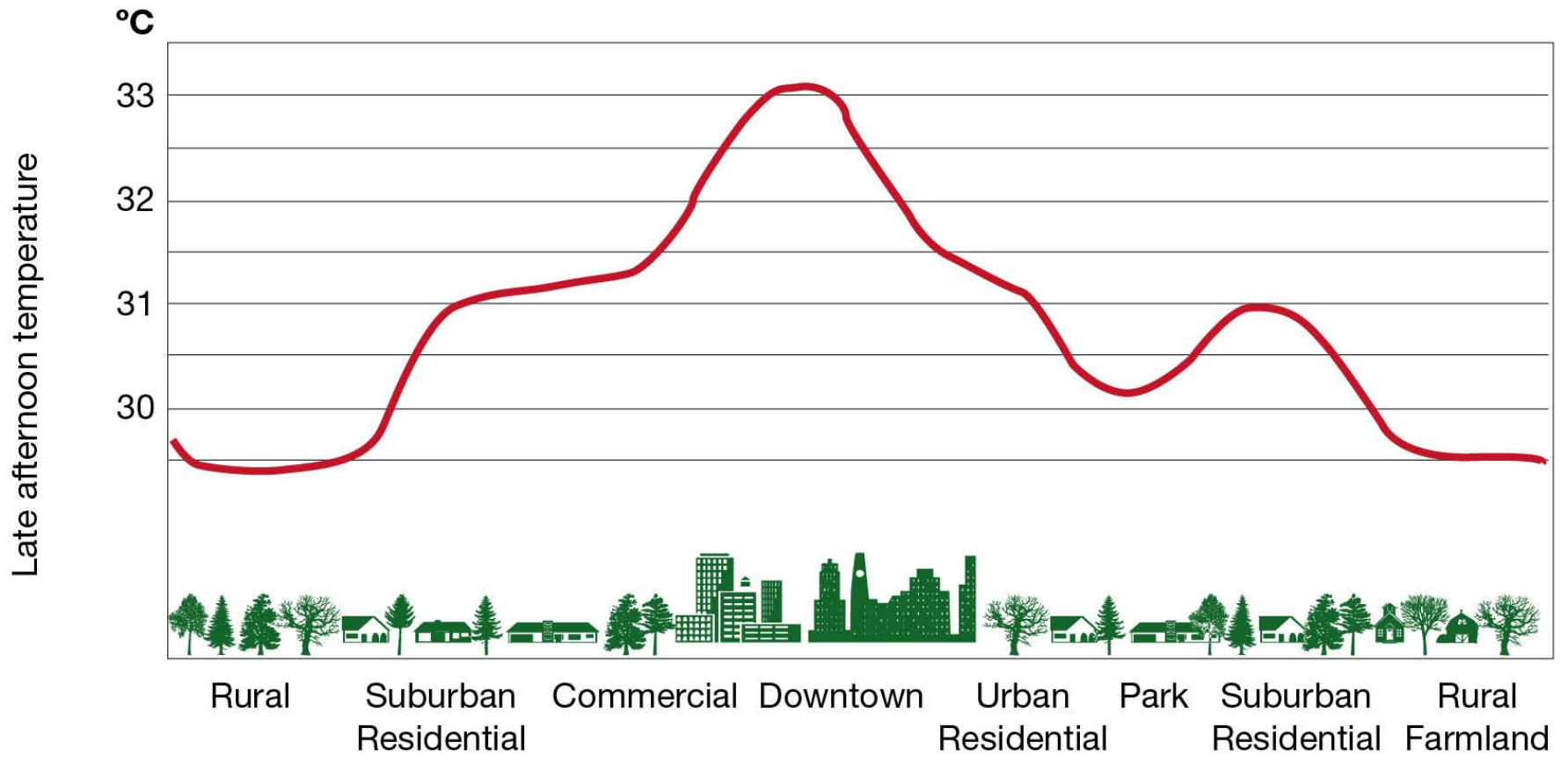
Model

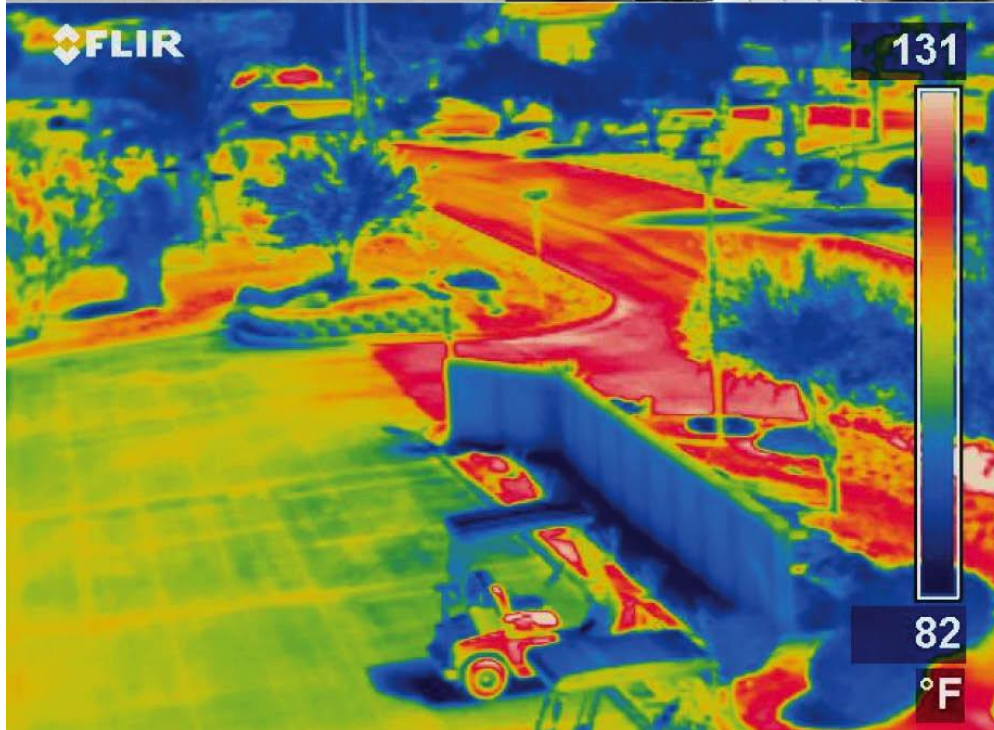
- CEM I – 985 kg CO₂e per ton
- CEM I Concrete – 300-350 kg CO₂e m³
 - 125 – 146 kg CO₂e per ton
- 50:50 Concrete - 200-230 kg CO₂e m³
 - 84 – 96 kg CO₂e per ton

Other Eco-benefits

Environmental Aspects

- Permeable pavements
- Pollution reduction
- CO₂ uptake
- No hazardous leachates
- Local material
- Recyclable
- Heat islands





ECONOMY

Economical Aspects

- Life-cycle cost analysis

Asphalt**Concrete**

Initial costs

R6 102 000

R7 547 000

Maintenance costs

R1 434 000

R 669 000

PWOC

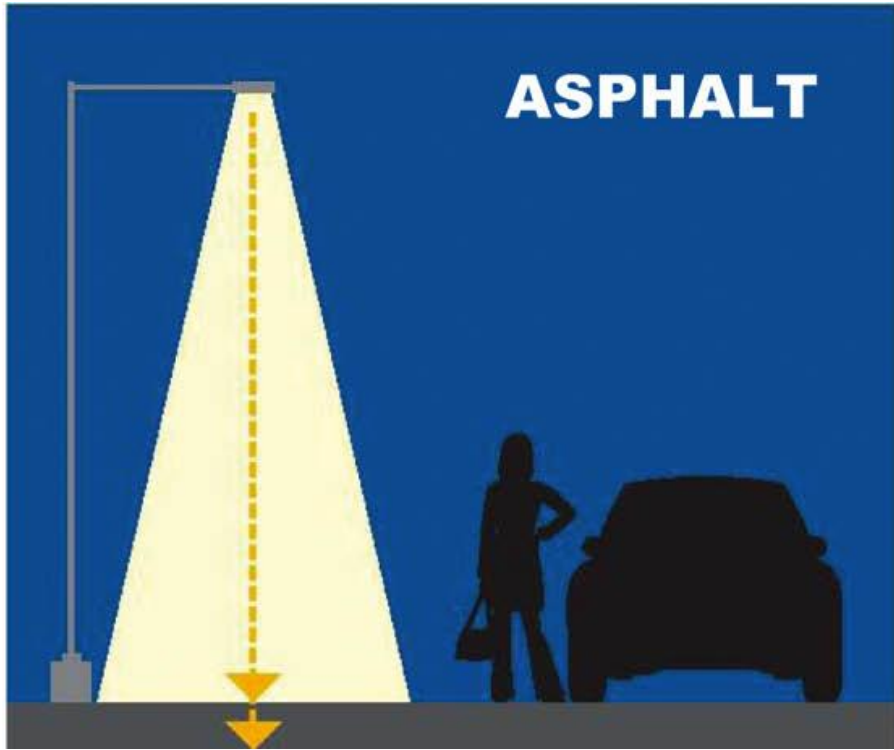
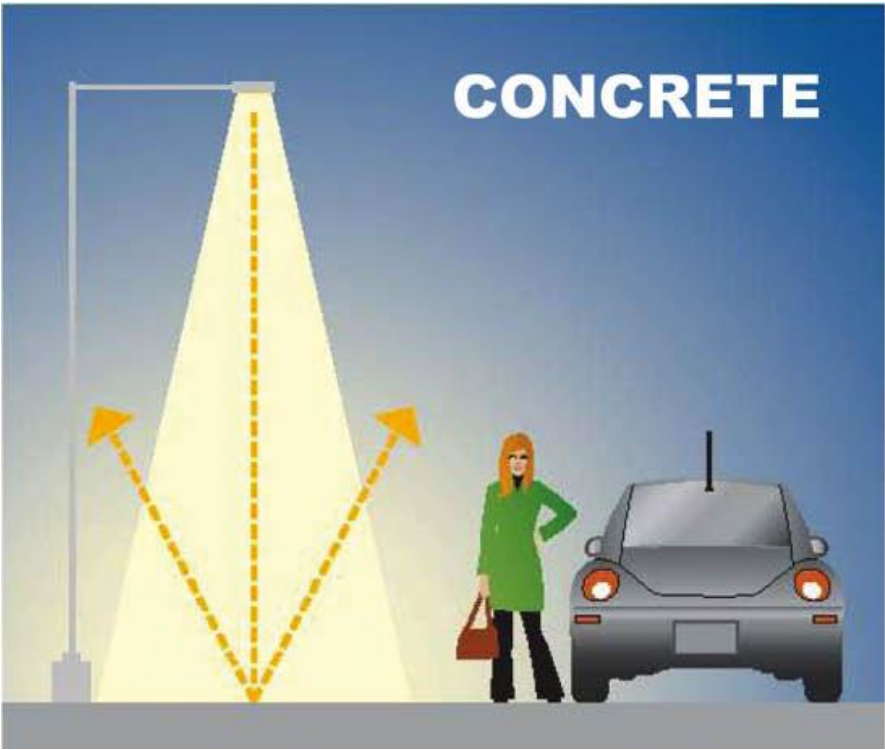
R6 643 000

R7 856 000

	Asphalt	Concrete
1984 Predicted	R6 643 000	R7 856 000
1984 Actual	R8 160 000	R8 264 915

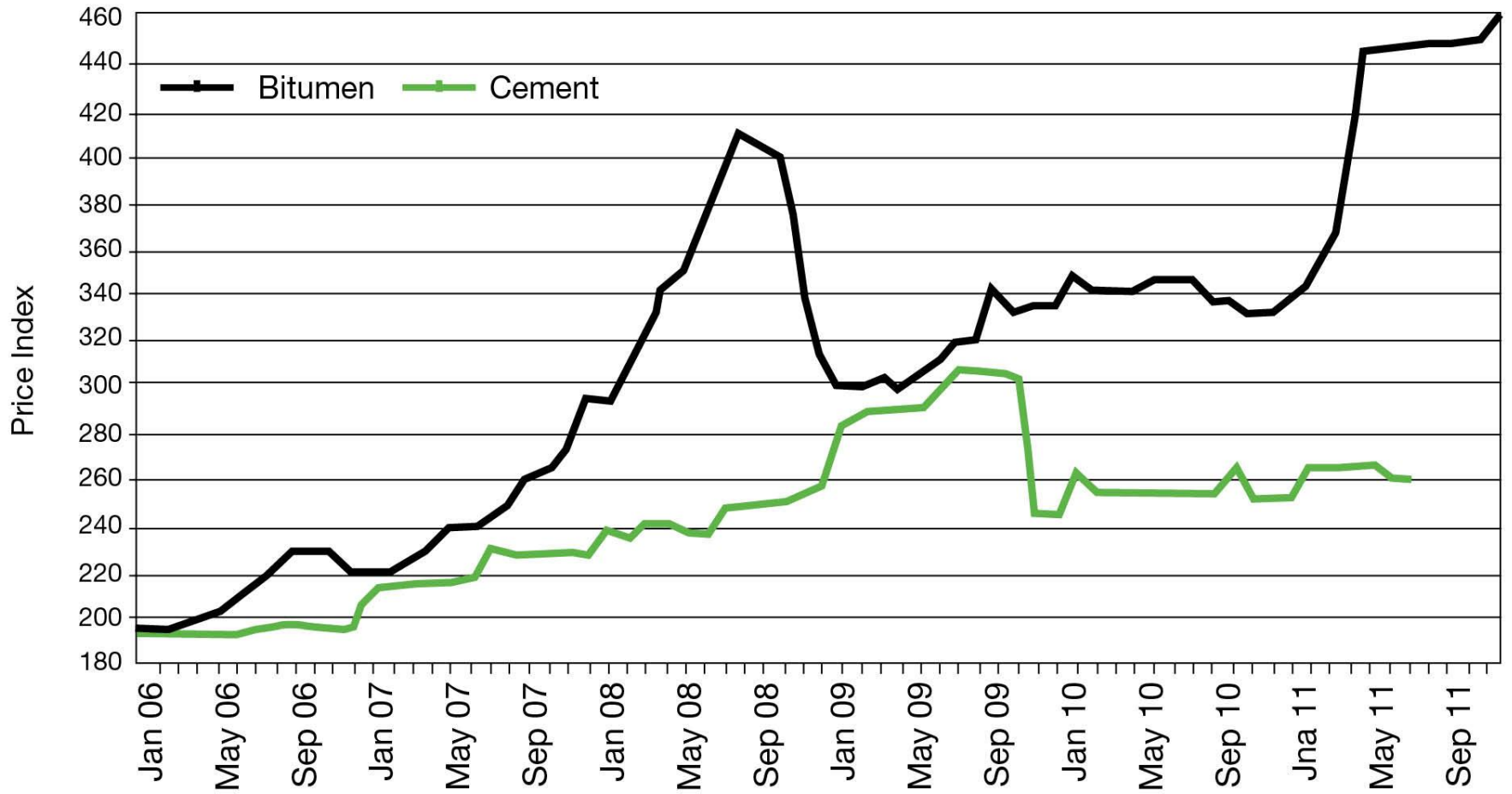
Economical Aspects

- Life-cycle cost analysis
- Cost of lighting



Economical Aspects

- Life-cycle cost analysis
- Cost of lighting
- Price stability



Economical Aspects

- Life-cycle cost analysis
- Cost of lighting
- Price stability
- Pavement type competition

SOCIETY

Social Aspects

- Labour intensivity
- Less congestion
- Ride comfort
- Safety
- Noise

CONCLUSIONS

CHOOSING A CONCRETE PAVEMENT IS CHOOSING A SUSTAINABLE SOLUTION



Sustainable Solutions to Global Transportation Needs

July 8 -12, 2012

Québec City, Québec Canada

www.concretepavements.org

INTERNATIONAL CONFERENCE ON LONG-LIFE CONCRETE PAVEMENTS—2012

September 18–21, 2012 — Seattle,
Washington

ACPT *ADVANCED CONCRETE
PAVEMENT TECHNOLOGY*

<http://www.fhwa.dot.gov/pavement/concrete/2012conf.cfm>.



Thank you

... for listening!

Knowledge, ..
.. Expertise,



Sustainable Perfection



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