



The University of
Nottingham

Co-product Allocation in Road Pavement Life Cycle Assessment

International Symposium on
Life Cycle Assessment and Construction
End of life, waste and allocation

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NTEC

Nottingham Transportation
Engineering Centre

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Background

- Road pavement LCA
 - 20 years
 - Still developing
 - Huang et al. 2007
 - Santero et al. 2011
 - Etc.
- Eurobitume 2011
- AsPECT

Co-product Allocation

- ISO 14040/44
- PAS 2050: 2008
 - 2011 update
- Eurobitume
- asPECT
- Inventory of Carbon & Energy (ICE)

Case Study – Co-Products

- BFS

- Functional Unit: 1t
- Scope: Cradle to Gate
- Data: EcoInvent/SPONs
- Allocation: Zero, Economic, Mass



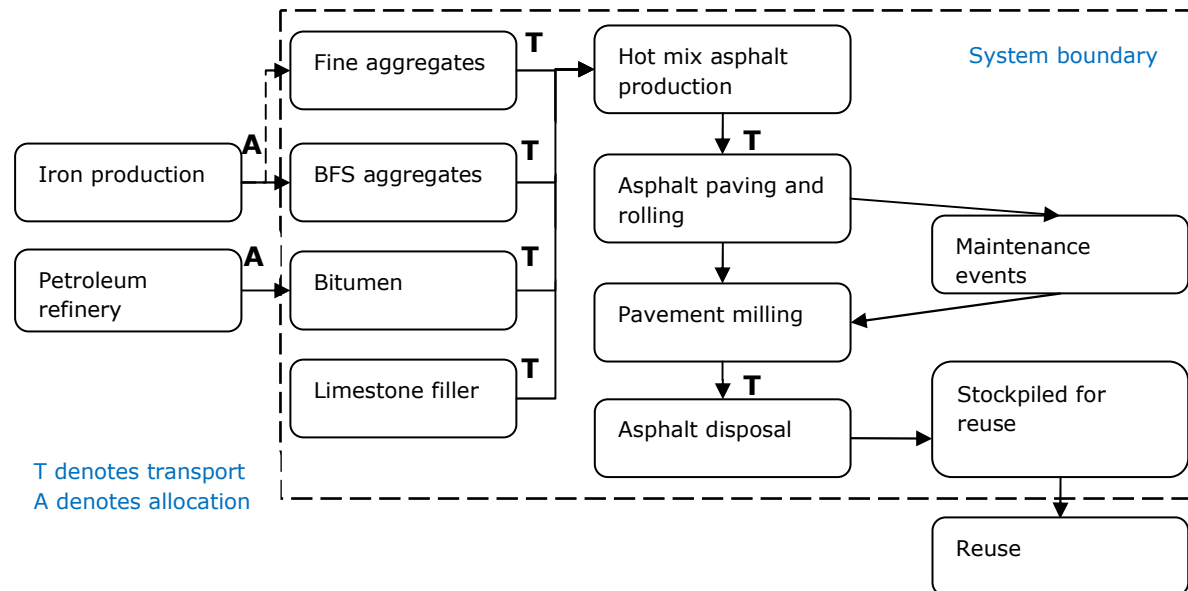
- Bitumen

- Functional Unit: 1t
- Scope: Cradle to Gate
- Data: Eurobitume 2011
- Allocation: Mix, Economic, Mass

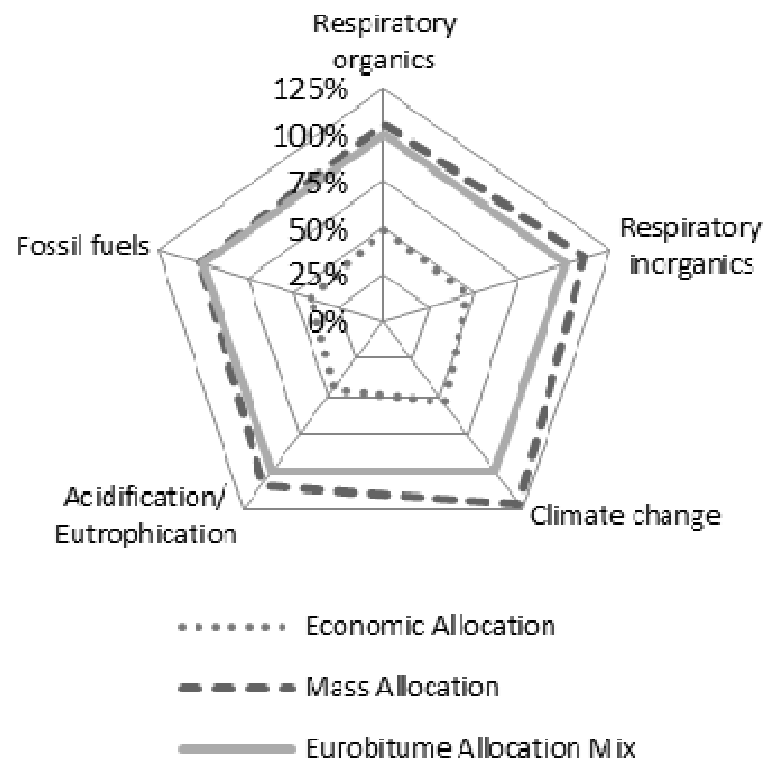


Case Study - Road

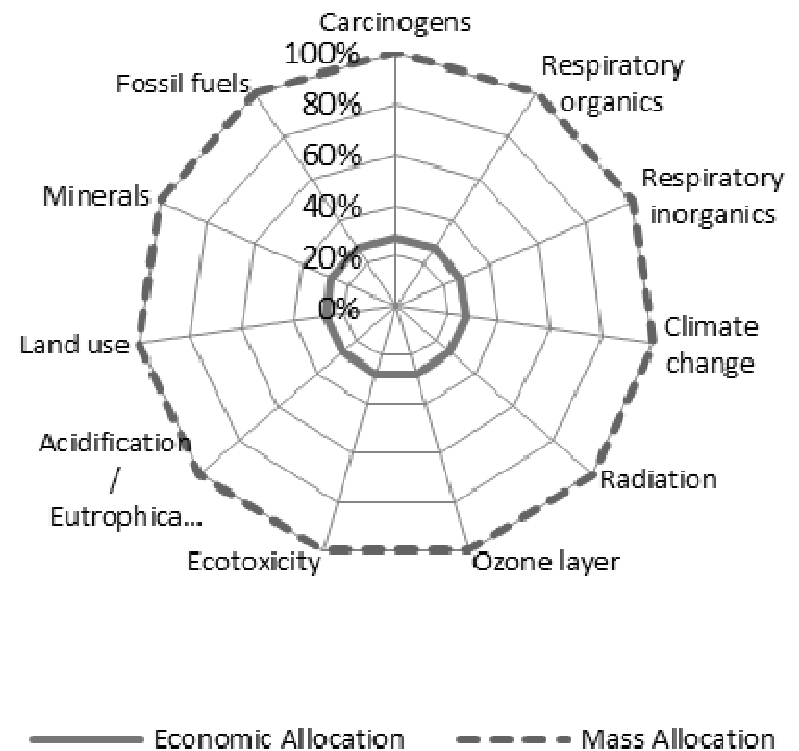
- Functional Unit: 1km / 11m width / 60 year life
- Scope: Cradle to Grave
- Data: Primary / ICE / Eurobitume / SPONs / EcoInvent



Results – Co-products

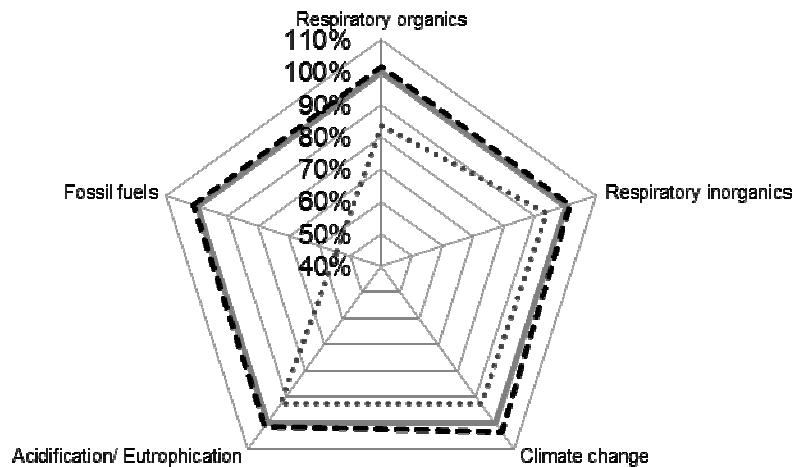


1t C-G Bitumen



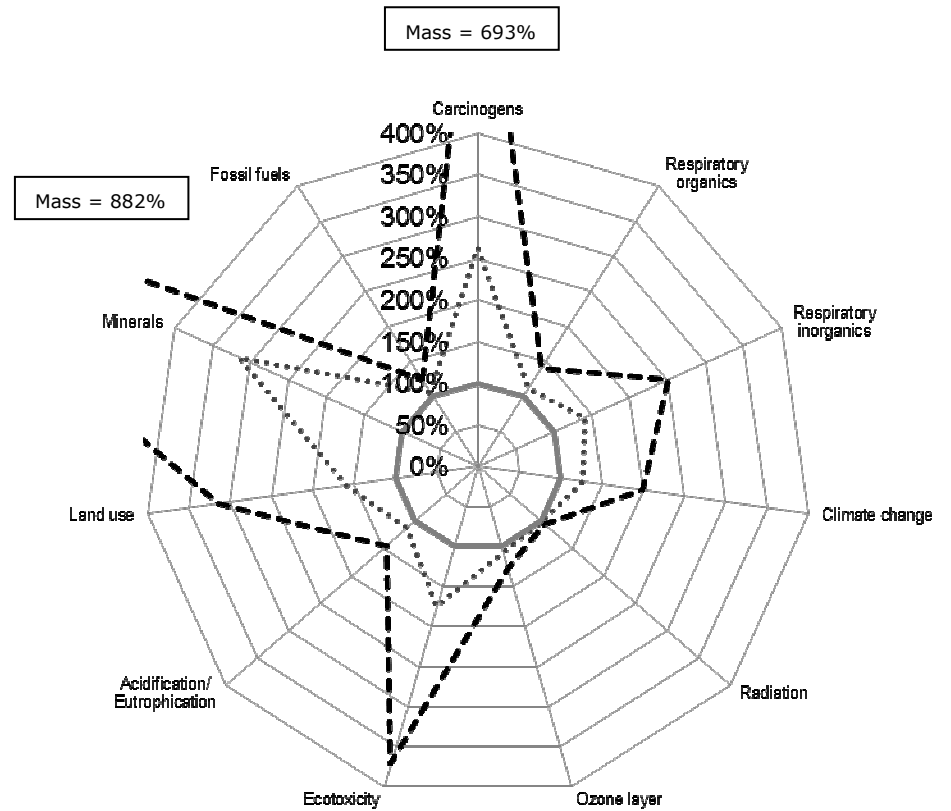
1t C-G BFS **NTEC**

Results – Road Case Study



— Eurobitume Allocation Mix Economic Allocation - - - Mass Allocation

Road Case – Bitumen Allocation
– BFS Zero

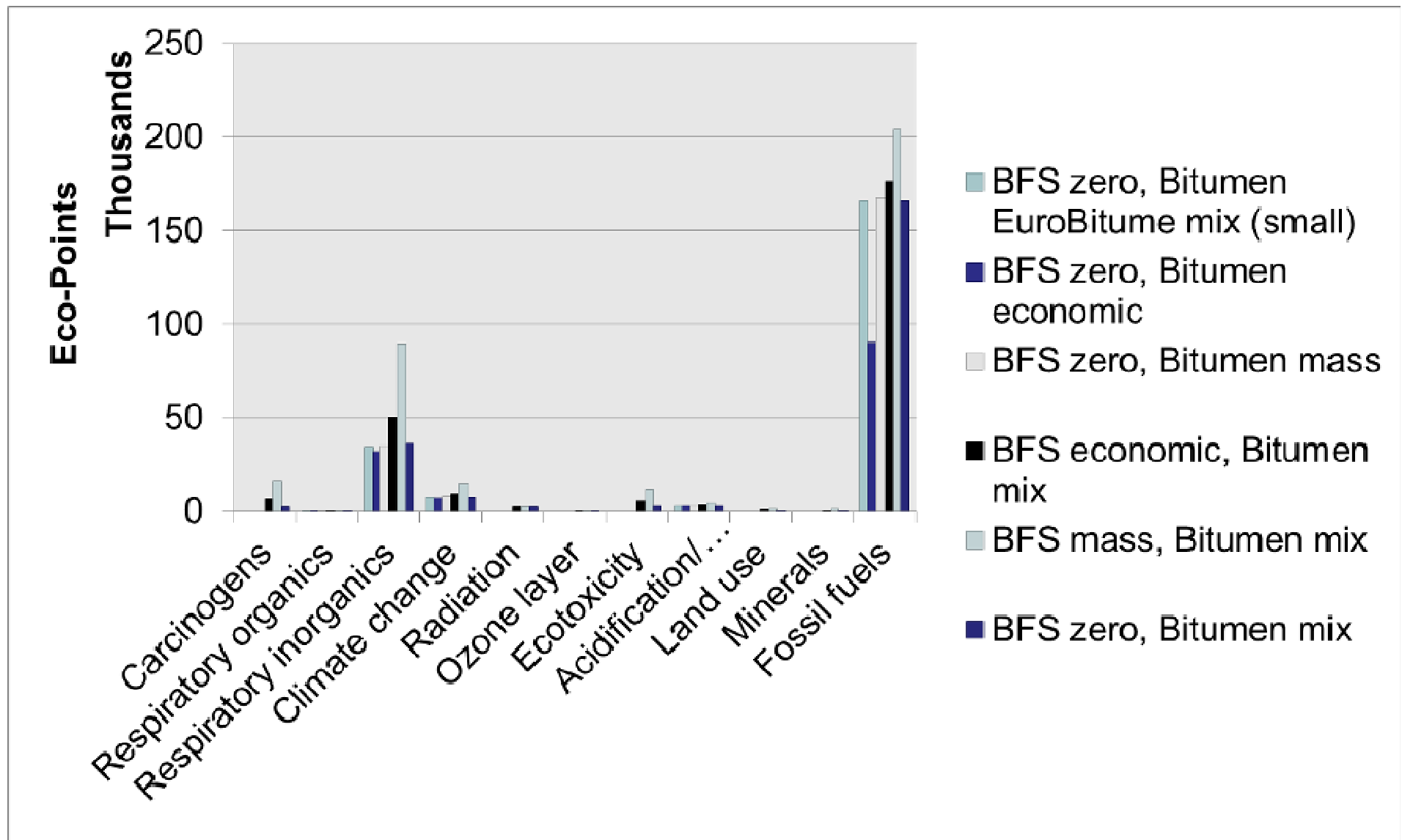


..... Economic Allocation - - - Mass Allocation — Zero

Road Case – BFS Allocation
– Bitumen Mix

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Results – Case Study



Conclusions and Discussion

- Results show significant sensitivity to allocation method
- Current guidance generic
 - ISO/PAS
- Supplementary Requirements needed in road pavement sector
- Initial Discussion
 - Mass allocation penalises construction co-products
 - Economic allocation may be better solution but is it environmentally representative?
 - More sensitivity test needed of other products/case studies
 - reliability/appropriateness of using results for decision making/comparisons

Summary

- Road pavement LCA still developing
- Allocation is a significant consideration
- Consistency and transparency needed
- Sector Supplementary Requirements are next major challenge



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Thank you for listening

Any questions?

Related work:

- HUANG, Y., SPRAY, A. & PARRY, T. Sensitivity analysis of methodological choices in road pavement LCA. International Journal of Life Cycle Assessment, 2012. DOI: 10.1007/s11367-012-0450-7

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