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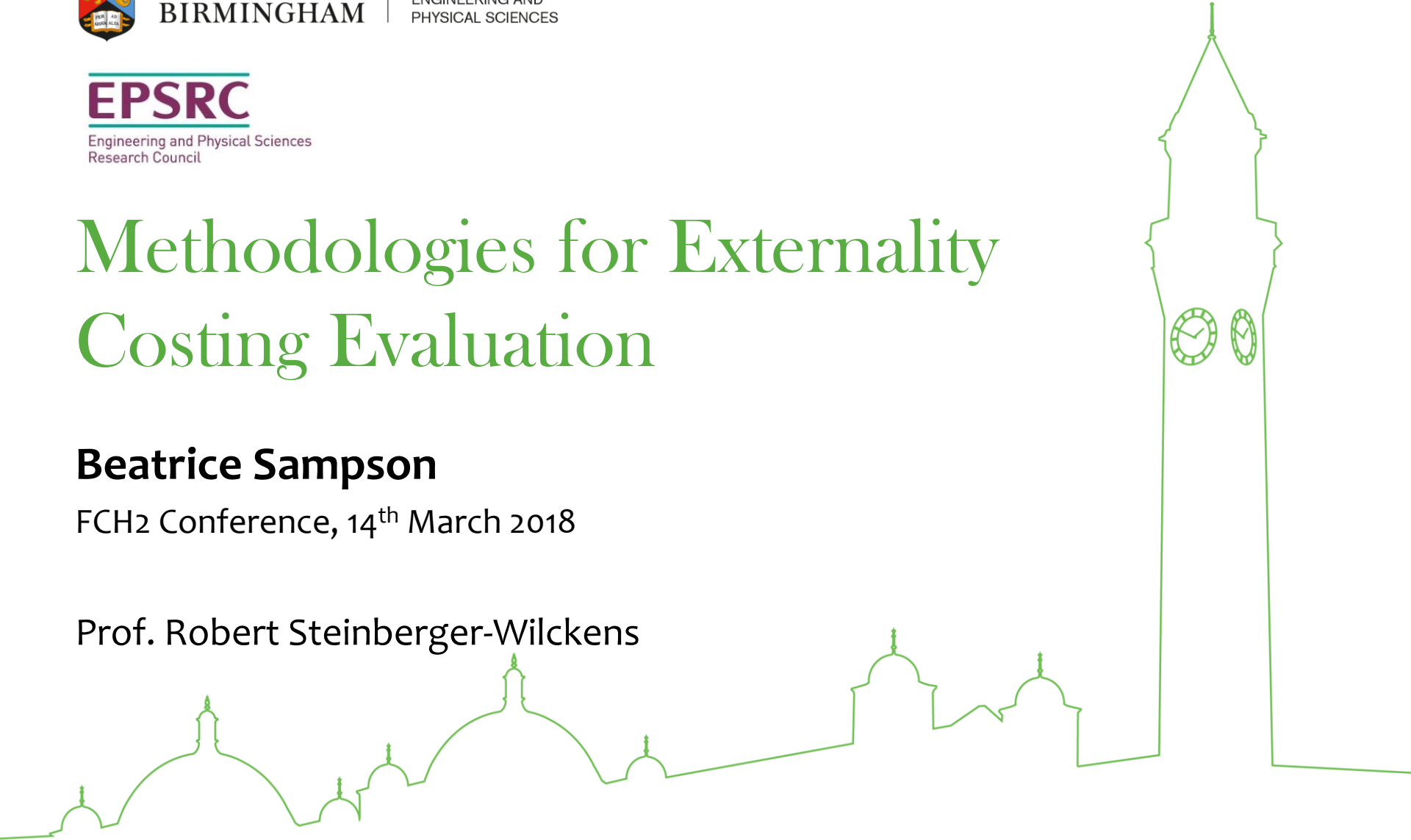
Engineering and Physical Sciences
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Methodologies for Externality Costing Evaluation

Beatrice Sampson

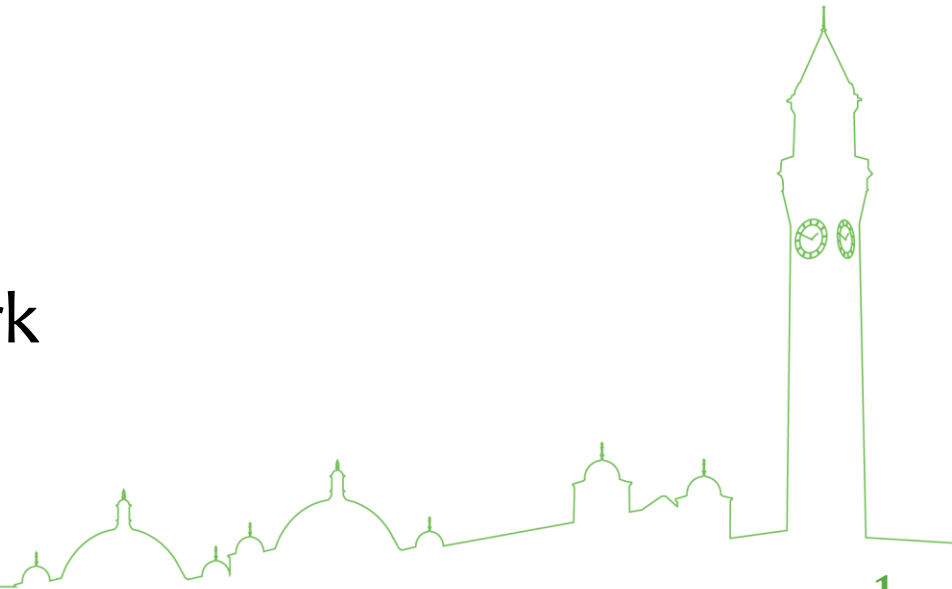
FCH2 Conference, 14th March 2018

Prof. Robert Steinberger-Wilckens



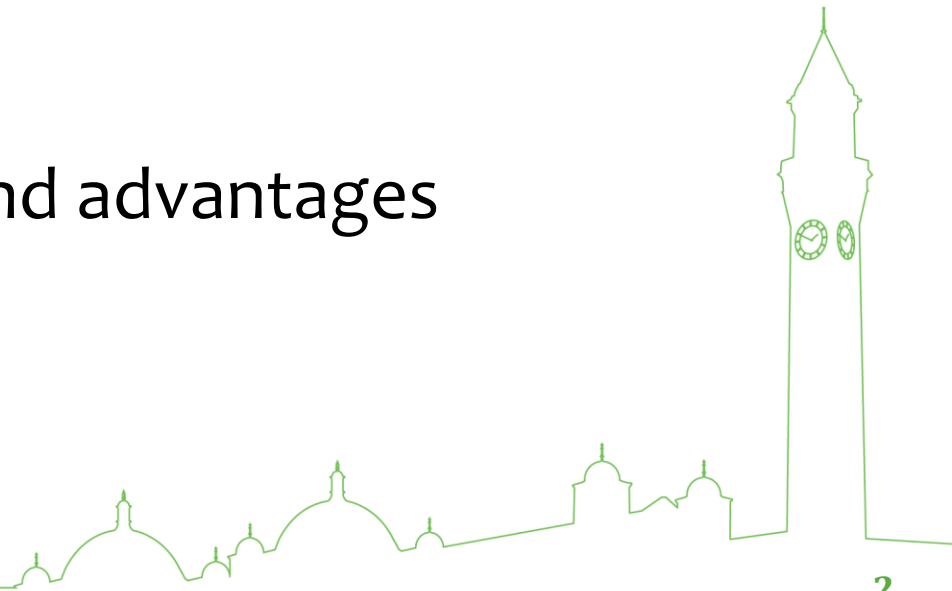
Presentation Overview

- ❖ Project introduction
 - Fuel cell added value
- ❖ External costing review
 - Summary of methods
 - ExternE Project
- ❖ Conclusions & future work



Fuel Cell Added Value

- ❖ Additional value to justify higher cost
- ❖ Necessary part of fair costing for FC & other clean technologies
- ❖ Two routes:
 - Additional functions and advantages
 - ‘Cost’ savings

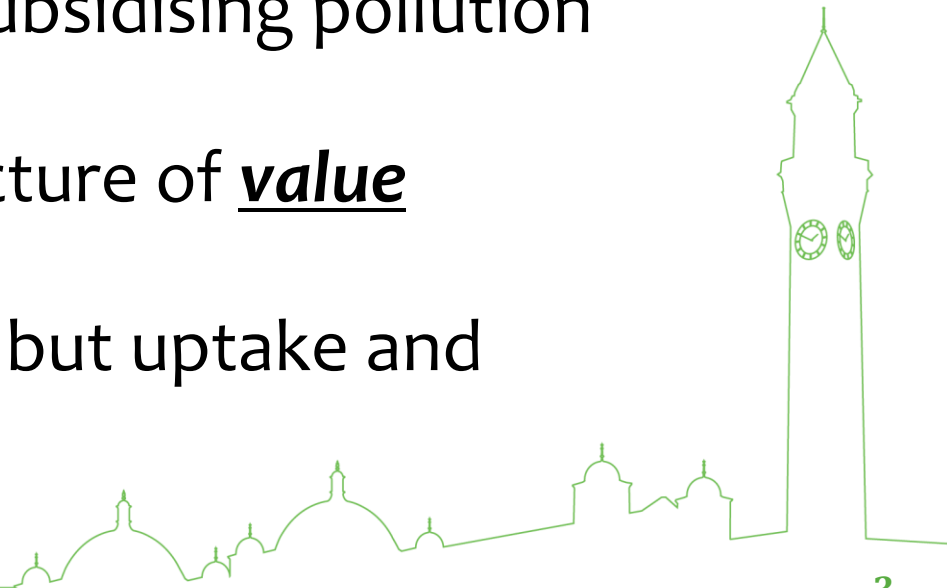


External Costs



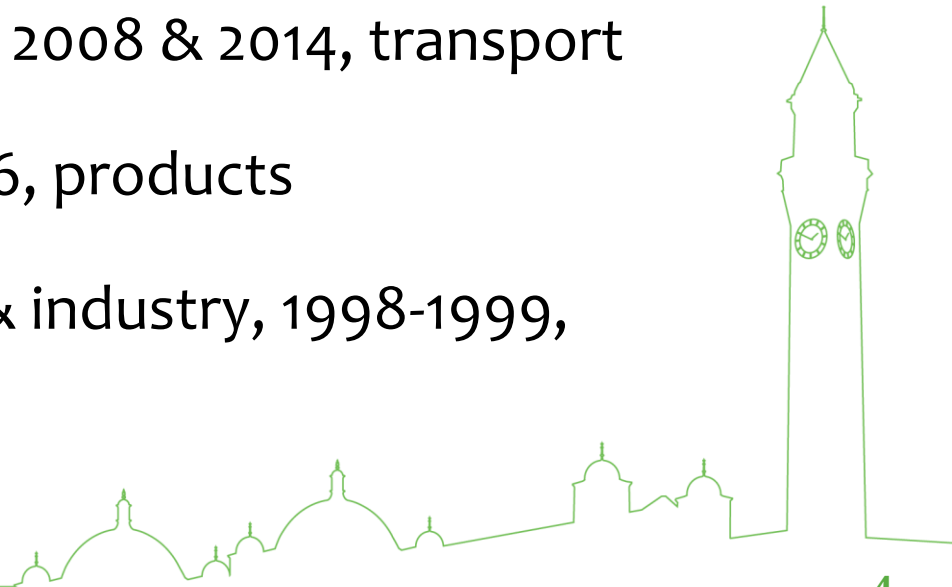
Wires, 2013

- ❖ Impact or cost borne by a party not involved in the activity causing the impact
- ❖ Form of market failure, subsidising pollution
- ❖ Gives a more accurate picture of value
- ❖ Not a new phenomenon, but uptake and understanding is low



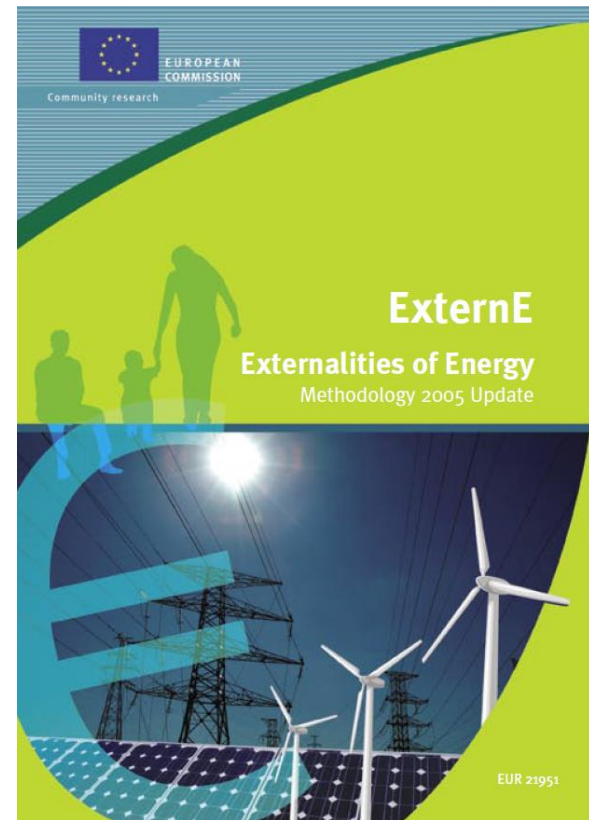
Evaluation Methodologies

- ❖ ExternE: EU-US EPA, 1991-2005, energy sector
- ❖ AQBAT: Canadian Government, 2011, air quality and health
- ❖ TCBA: Canada (VTPI), ongoing (last update 2016), transport
- ❖ HECT: European Commission, 2008 & 2014, transport
- ❖ Stepwise 2006: EU, 2005-2006, products
- ❖ EPS 2000: Swedish research & industry, 1998-1999, products



ExternE

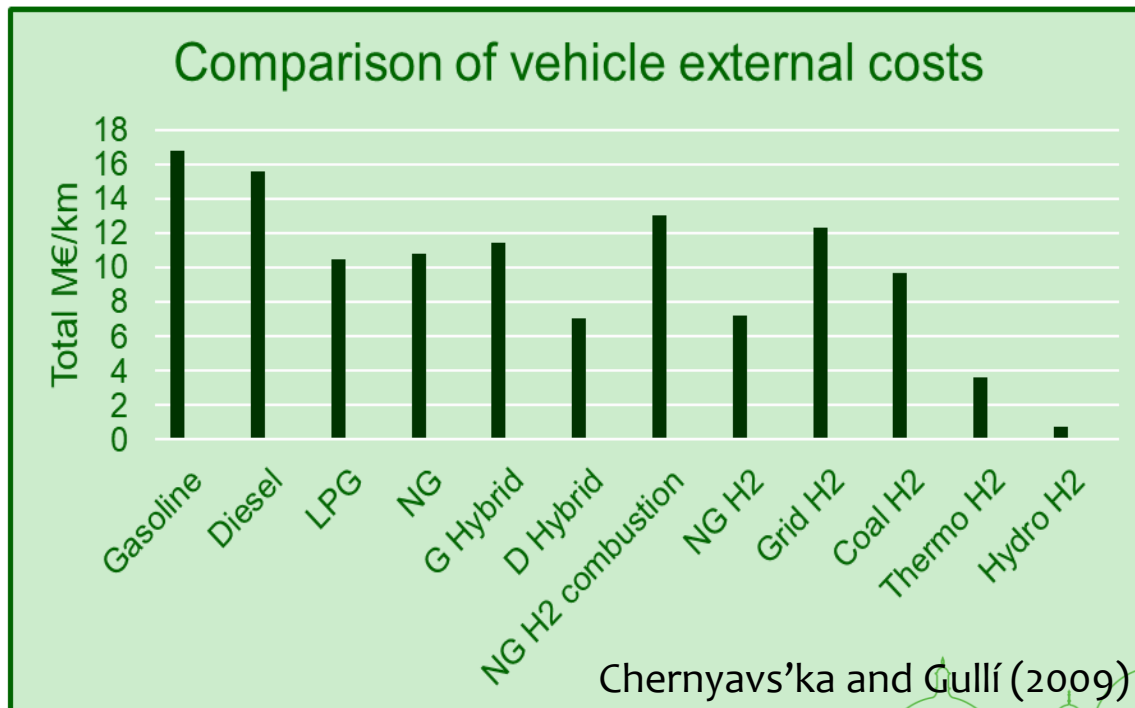
- ❖ Impact Pathway Approach
- ❖ Three impact categories:
 - Environmental impacts
 - Global warming
 - Accidents
- ❖ Monetisation through willingness to pay, avoidance costs, damage costs
- ❖ Example: CO₂ cost of 5 to 95 €/t



www.externe.info

External Cost Review

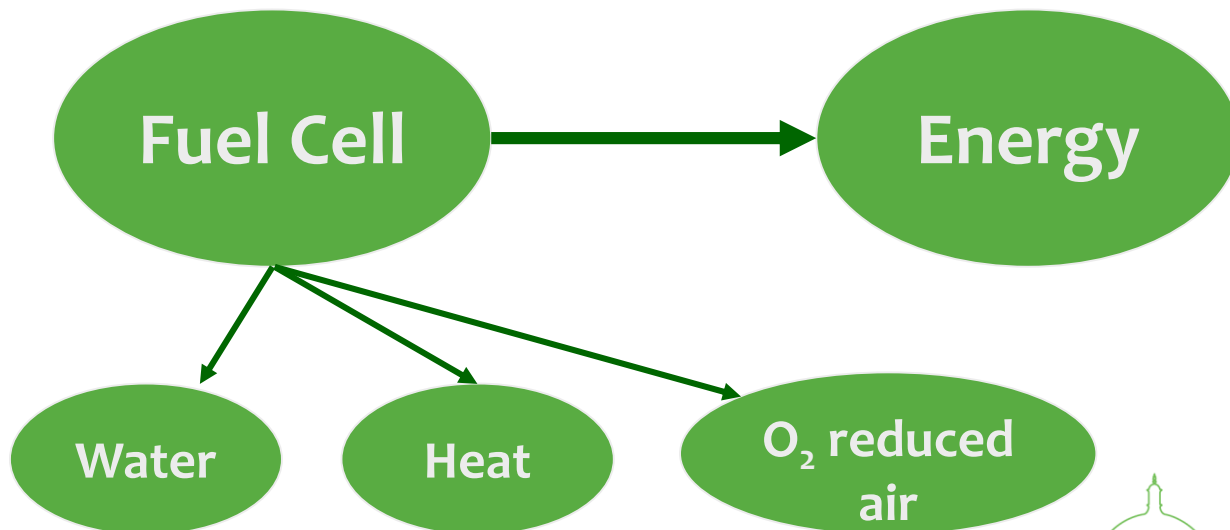
- ❖ Extensive external costing analysis
- ❖ Context of fuel cell costs



- ExternE
- Fuel production to use
- Climate and local effects
- With 100% urban use, H₂ external costs reduce

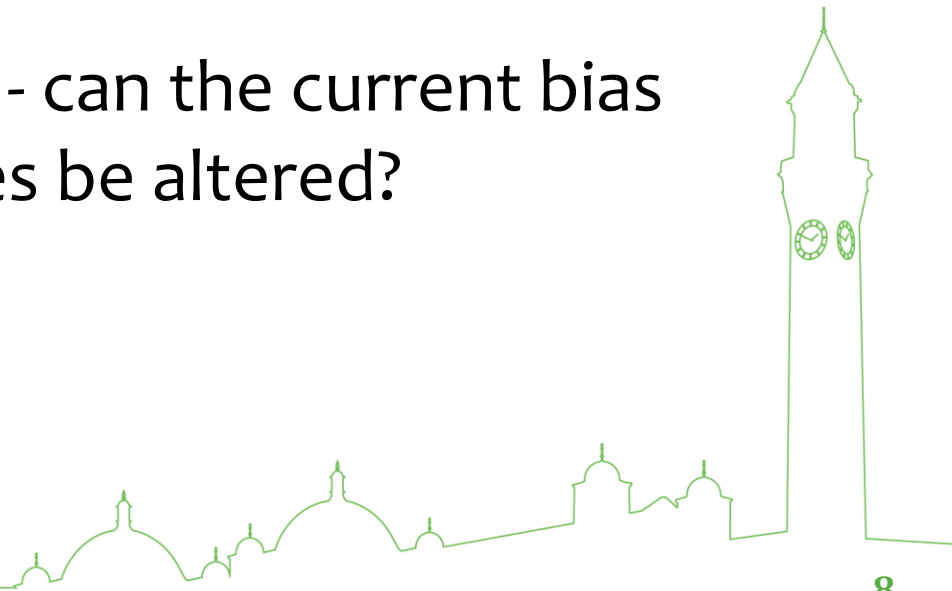
Added Value Evaluation

- ❖ External costing is 1st step towards fair pricing
- ❖ Idea of additional functions, or other areas of added value



Conclusions

- ❖ Brief overview of added value and external costing evaluation
- ❖ Significance of value over market pricing
- ❖ Applying this to fuel cells - can the current bias against clean technologies be altered?



Some Interesting References

- ❖ Barn, P. et al. (2011) Air quality assessment tools: A guide for public health practitioners National Collaborating Centre for Environmental Health, Public Health Agency of Canada
- ❖ Bickel, P., Friedrich, R. (2005) ExternE Externalities of Energy - Methodology 2005 Update European Commission, Luxembourg
- ❖ Chernyavs'ka, L., Gullí, F. (2009) Measuring the environmental benefits of hydrogen transportation fuel cycles under uncertainty about external costs *Energy Policy* 38(2010) p. 5335 - 5345
- ❖ Hohmeyer, O. (1988) *Social Costs of Energy Consumption - External Effects of Electricity Generation in the Federal Republic of Germany*. Berlin, Germany: Springer-Verlag
- ❖ Korzhenevych, A. et al. (2014) Update of the Handbook on External Costs of Transport European Commission - DG Mobility and Transport
- ❖ Litman, T.A., Doherty, E. (2011) *Transportation Cost and Benefit Analysis - Techniques, estimates and implications* (2nd Ed.) Victoria Transport Policy Institute
- ❖ Pigou, A.C. (1929) *The Economics of Welfare* 3rd Ed. St. Martin's Street, London, UK: Macmillan and Co., Limited



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Thank you for your attention

Acknowledgments:

Prof. Robert Steinberger-Wilckens

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BJS284@student.bham.ac.uk

