



Ricardo
Energy & Environment

Health Impact Assessment and Economic Appraisal of Air Quality Improvement Measures

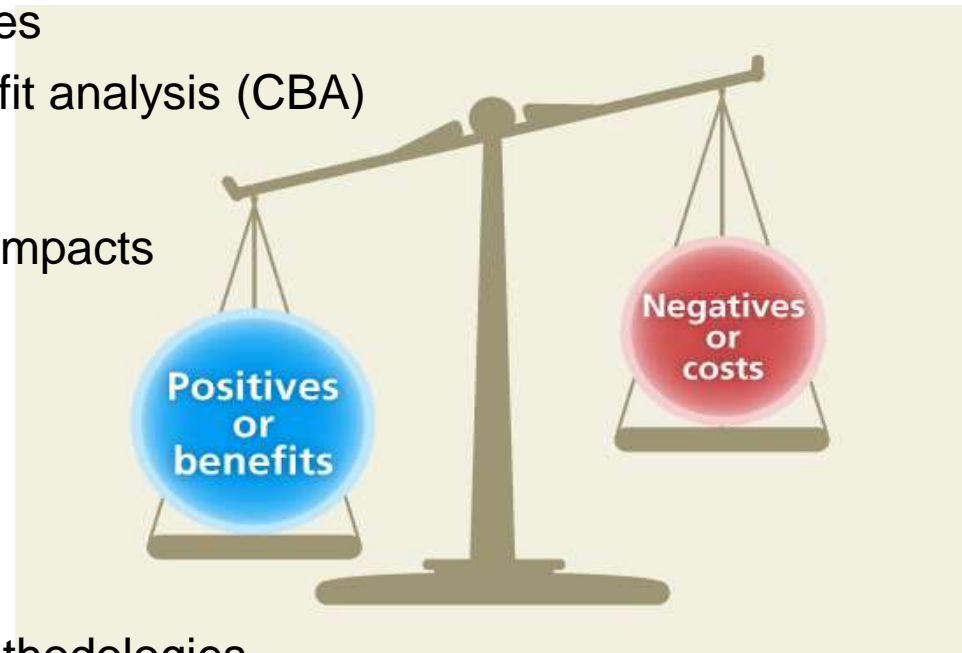
IAPSC Session 1

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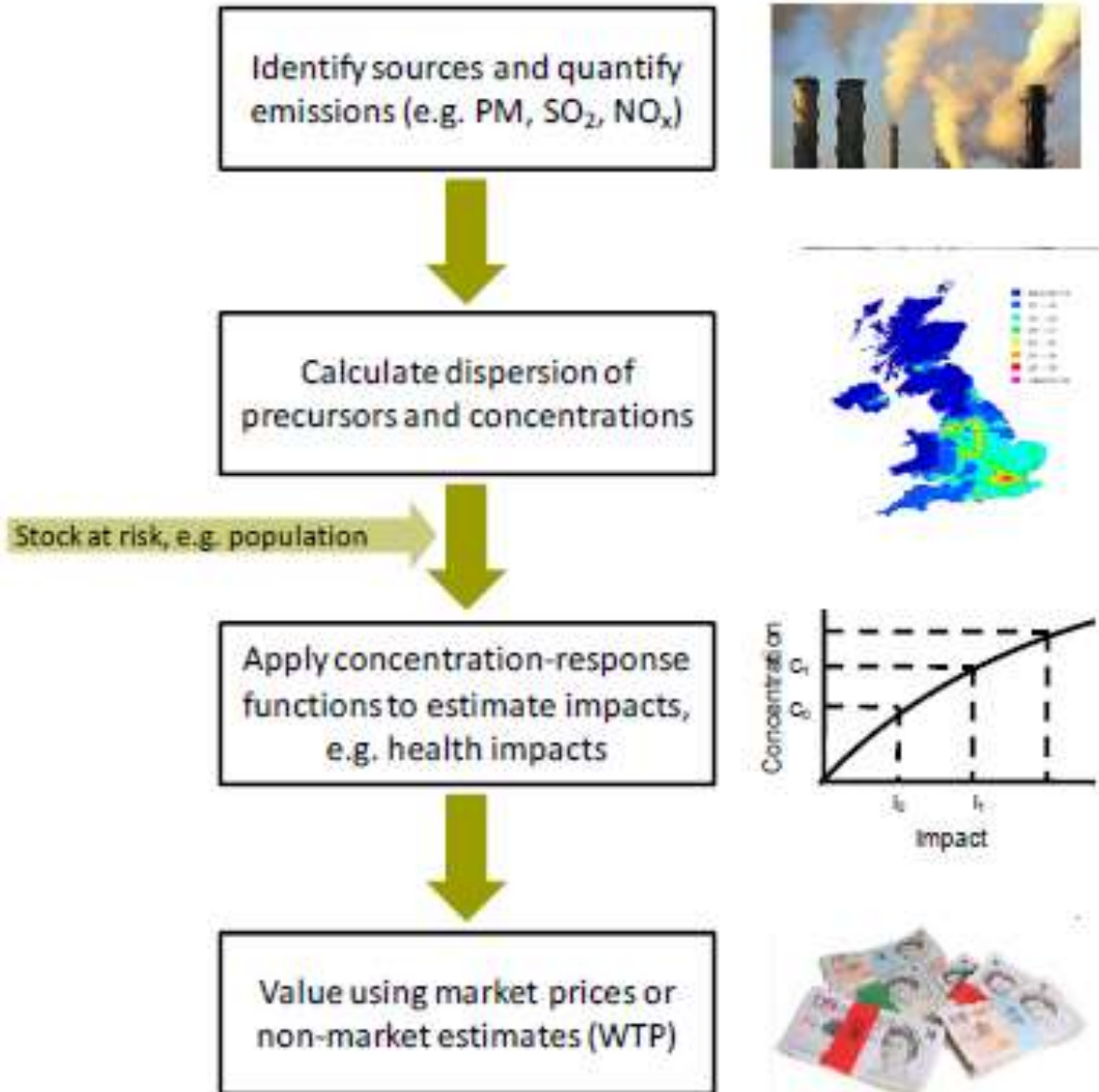
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01/12/15

What is 'economic analysis'?

- 'Economic analysis' is commonly used to support policy cycle
- Refers to a range of analytical tools / techniques
 - In AQ context, most often means cost-benefit analysis (CBA)
- CBA seeks to attach a monetary value to key impacts
 - So they can be compared / combined
- But CBA is not a perfect science
- View results in light of quality of inputs and methodologies
 - And alongside other evidence



Placing a monetary value on AQ impacts – the IPA



- Defra has published guidance to steer valuation of AQ impacts
- 3 methodologies
 - Impact pathway approach (IPA)
 - Damage costs
 - Abatement costs
- IPA is step-by-step process to assessing impacts
- Apply IPA where impacts are greater than £50m

Using the damage costs

- Apply damage costs when impacts <£50m
- Represent average impact across UK
 - Impacts expressed as £ / tonne of emission
- Damage costs exist for PM, NOx, SOx, and NH3
- Include a range of impacts:
 - Long-term impact on mortality
 - Short-term impact on mortality and hospital admissions (respiratory and CV)
 - Crop-yield
 - Buildings and materials

Air Quality Appraisal – Damage Cost Methodology

Interdepartmental Group on Costs and Benefits,
Air Quality Subject Group

Table 1: Damage costs by pollutant, location and source (2015 prices)

	Central Estimate (1)	Sensitivities	
		Low Central Range (2)	High Central Range (2)
NOx Damage Costs by Location and Source			
Agriculture	£5,050	£2,020	£8,080
Waste	£10,858	£4,343	£17,373
Energy Supply Industry (ESI)	£1,263	£505	£2,020
Industry	£13,131	£5,253	£21,010
Domestic	£14,646	£5,859	£23,434
Transport average	£25,252	£10,101	£40,404
Transport central London	£115,405	£46,162	£184,648
Transport inner London	£118,688	£47,475	£189,901
Transport outer London	£77,526	£31,010	£124,041
Transport inner conurbation	£61,365	£24,546	£98,184

How do abatement costs fit in?

Table 1: Menu of NO_x abatement options

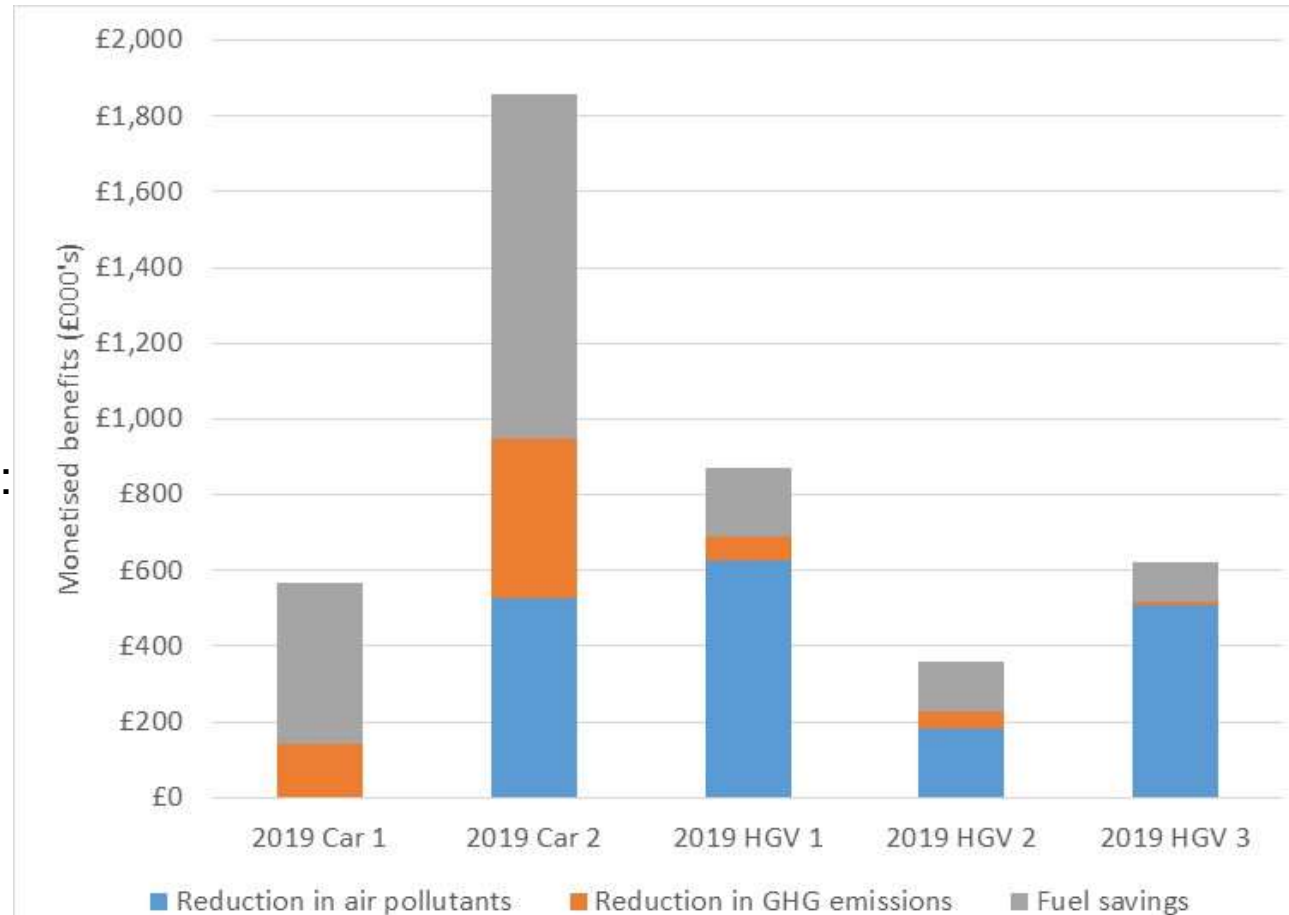
Sector	Measure	MAC 2015 (£ 2011/t)	Emission savings 2015 (tNO _x)
Road transport	Euro V buses replaced by Euro VI	£24,852	1,433
Road transport	Euro V rigid HGVs replaces by Euro VI	£28,374	3,394
Road transport	Euro IV buses replaced by electric*	£29,150	13
Road transport	Euro V buses replaced by hydrogen	£72,932	282
Road transport	Class 1 Euro V diesel LGVs replaced by Class 1 Euro VI	£79,323	559
Commercial buildings	Dry lining of solid walls	£313,555	46
Commercial buildings	External insulation of solid walls	£313,555	8
Domestic homes	Retrofit cavity walls	£537,411	3,111
Domestic homes	Improved boiler efficiency	£686,688	113

*This value is the default value to be used when there is no alternative to measure of the abatement

- Apply abatement costs where proposal affects compliance with legal limits
- Compares cost of proposal to cost of alternative
 - Benefit is cost difference
- Applies only to portion of emission that effect compliance
- Default value for NO_x: £29,150
- Choose abatement costs to reflect local conditions

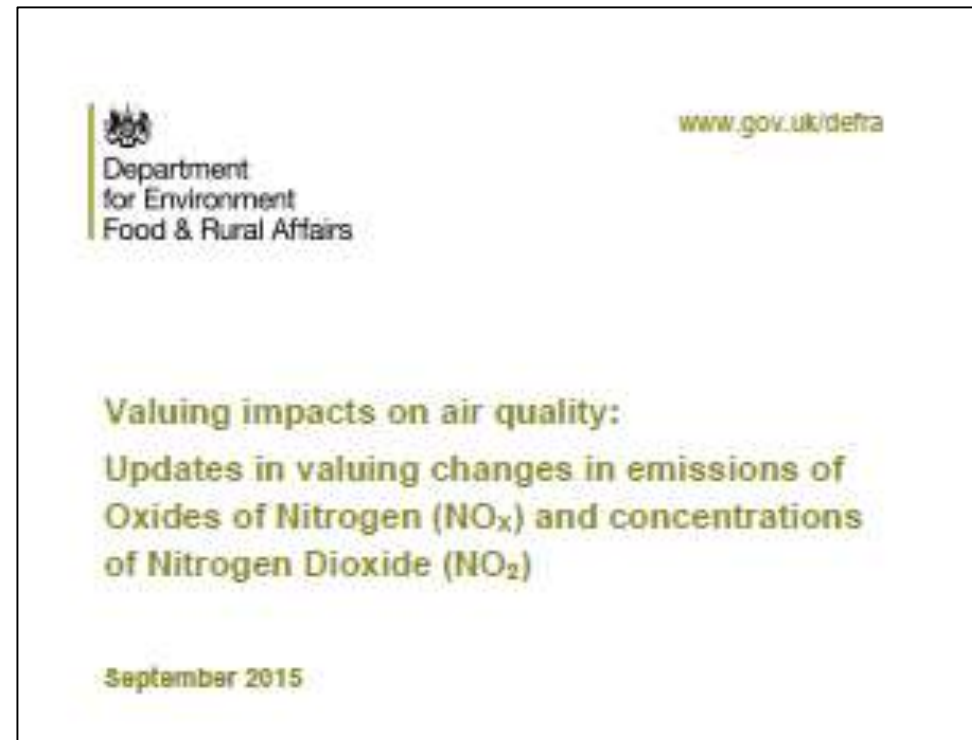
Drawing things together – have we captured everything?

- Secondary impacts can often be significant
 - And methodologies exist with which these can be estimated
- Carbon and fuel consumption impacts (DECC); Congestion (DfT); Noise (Defra); ...
- Might not be possible / proportionate to value all impacts
- Damage costs do not include all effects associated with AQ:
 - Productivity
 - Eco-system
 - Other health impacts . . .



Drawing things together – anything else to consider?

- Assessment of impacts has uncertainty attached
 - In particular when assessing environmental impacts
- Damage and abatement costs are based on UK-level analysis
 - How appropriate are these to location-specific proposals?
- Methods to value AQ impacts are constantly evolving
 - Defra recently published updated damage costs for NO_x



Department for Environment Food & Rural Affairs

www.gov.uk/defra

Valuing impacts on air quality:
Updates in valuing changes in emissions of Oxides of Nitrogen (NO_x) and concentrations of Nitrogen Dioxide (NO₂)

September 2015

Quick re-cap and conclusions

- 'Economic analysis', in particular CBA, can be a powerful tool to support policy development
- Tools and methodologies exist to capture the value of AQ emissions in CBA
 - Impact pathway approach / damage costs / abatement costs
- Need to ensure fair comparison between costs and benefits
- CBA not a perfect science
- But is a useful framework for exploring / comparing impacts
 - Can be an important part of evidence base supporting policy

Thank you



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Appendix