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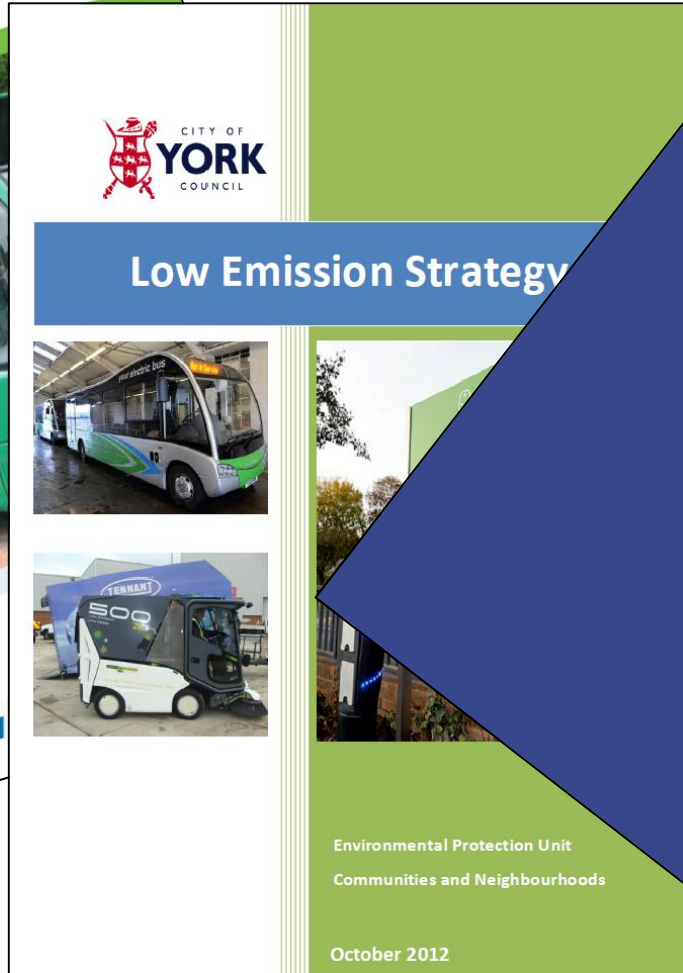
## Developing a Low Emission Strategy

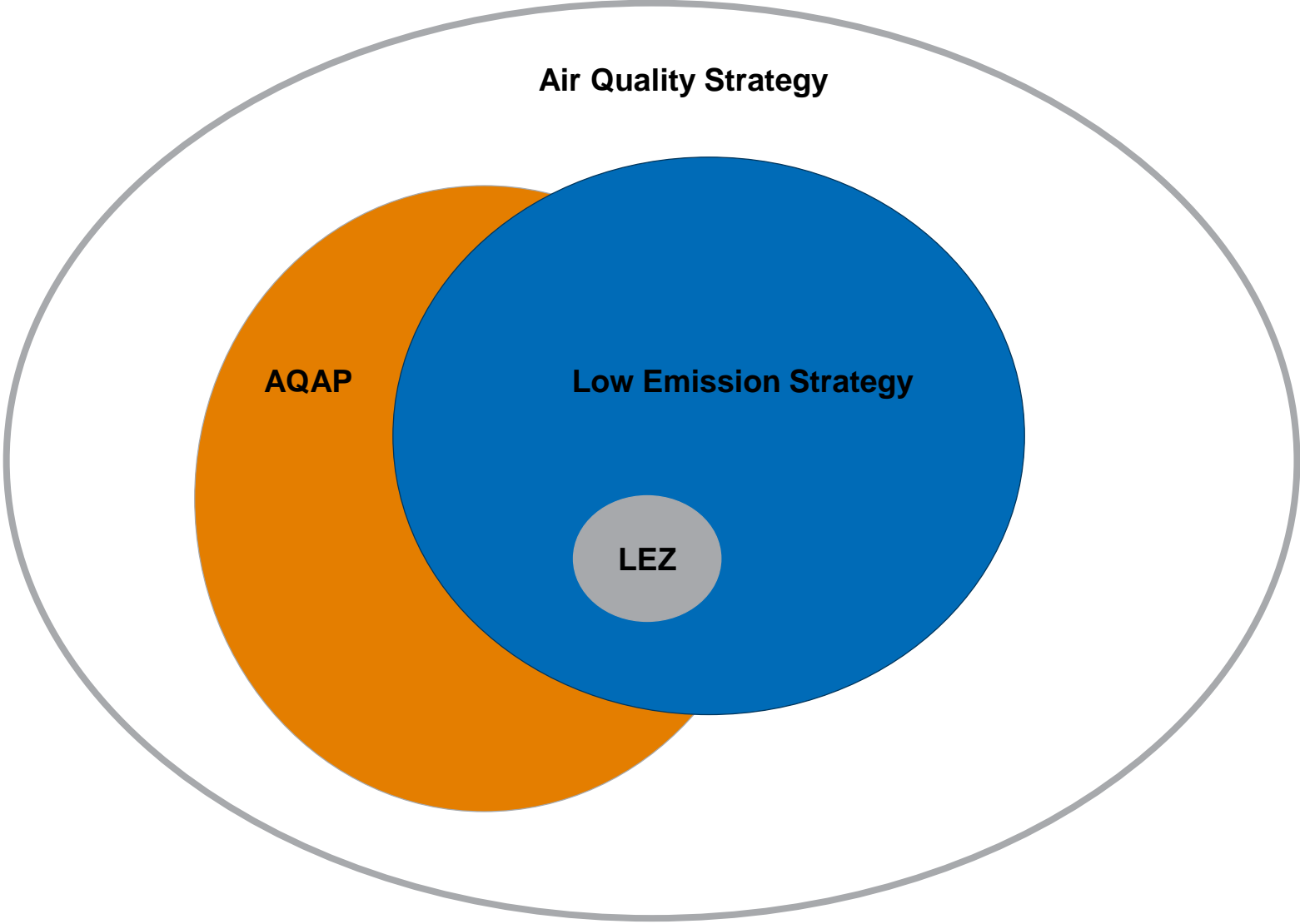
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Knowledge Leader

8th October 2015

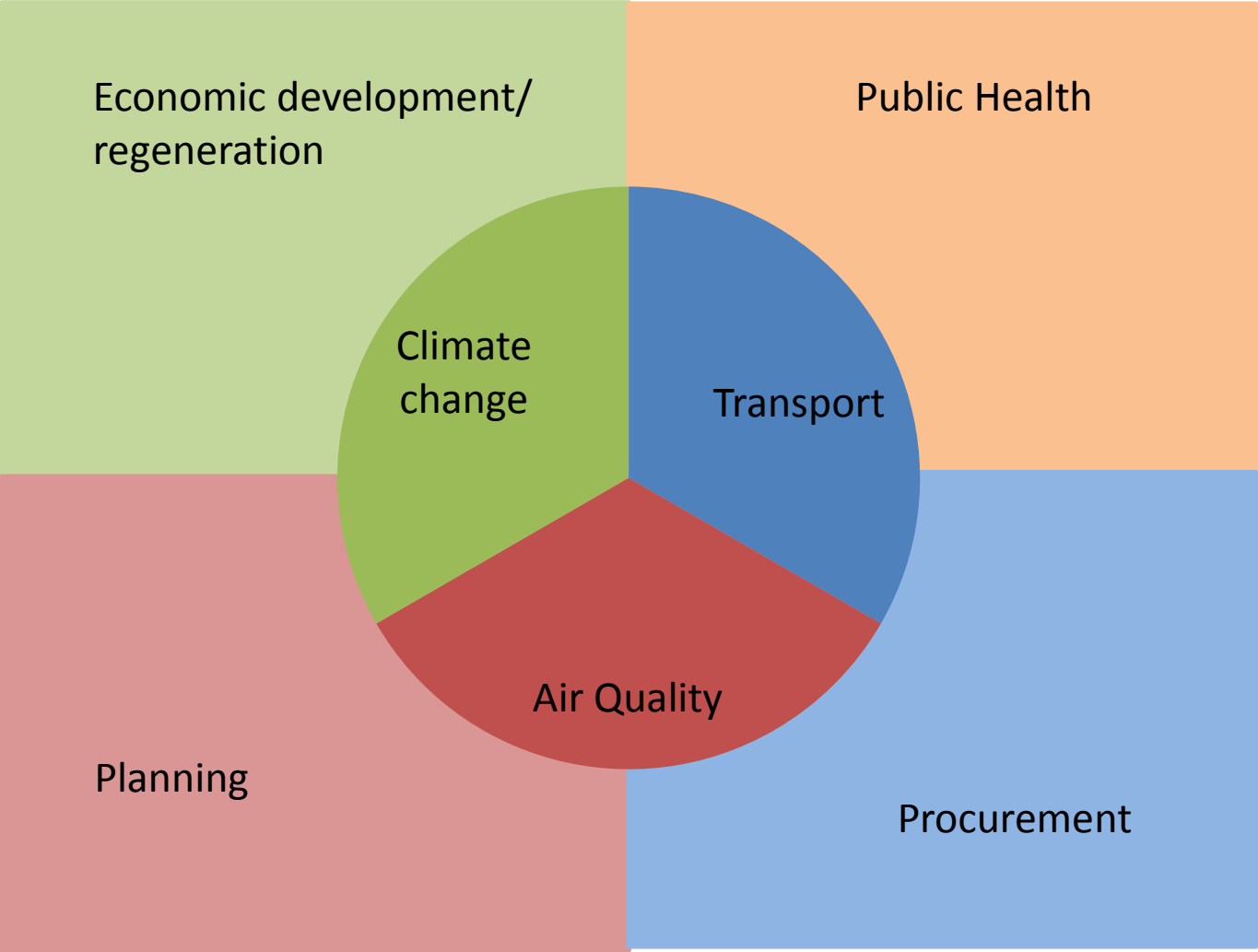
- Original definition from the Low Emission Strategies Partnership:  
“a package of planning measures to reduce transport emissions, air quality and carbon, from new developments”
- **Wider definition:**  
“a package of measures to reduce transport emissions, air quality and carbon, from new developments”  
*Transport emissions (not concentrations)*  
*Air quality and carbon emissions*  
*Integrated package of measures covering both air quality and carbon emissions*
- Widest definition:  
“a package of measures to reduce transport emissions, both air quality and carbon, from all sectors”

# Examples of Low Emission Strategies

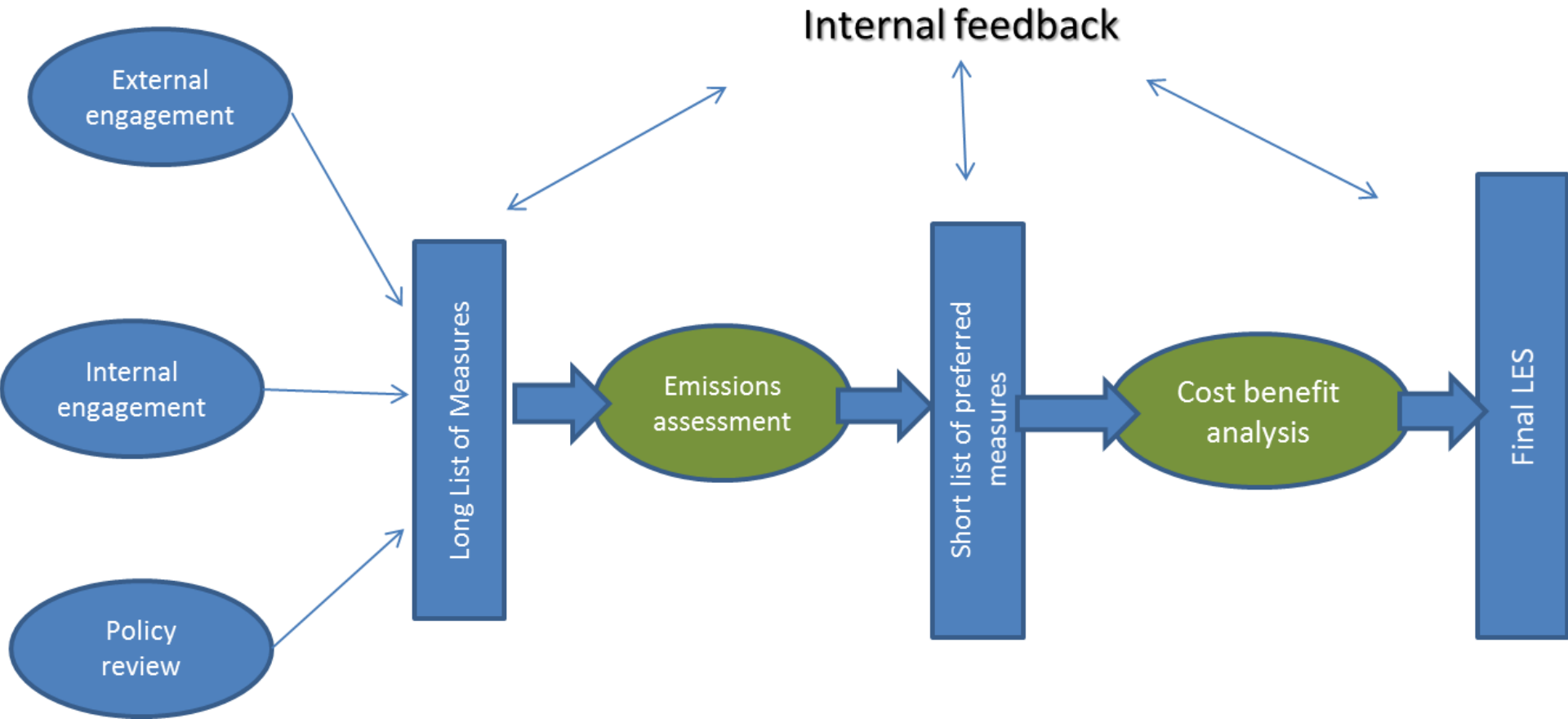




# LES and policy integration



# Developing a LES



# Engagement – key stakeholders

## Internal

- Transport
- Air Quality
- Climate change
- Planning and development control
- Procurement
- Taxi Licensing
- Public Health
- Fleet Management
- Human Resources

## External

- Freight & Logistics
- Bus Operators
- Taxi Drivers/Businesses
- Retail interests
- Commercial interests – key business
- Health Sector
- Universities
- Community and NGOs

# Assessing the emissions impact of measures

Any measure can impact on emissions in three ways by influencing:

1. The fleet composition
2. Traffic levels
3. Vehicle speeds

**That's easy then?!**



# Developing measure impacts for a LES package

ID	Measure	Description	Fleet composition	Traffic levels	Vehicle speeds
<b>Regulatory LEZ</b>					
<b>Corridor based LEZ</b>		LEZ defined for key corridors (AQMA) into Leicester. Applies to bus and HGV and is regulated by ANPR. Traffic management measures applied to stop rat running off key routes.			
LEZ1	Base LEZ	Euro 3 standard for all Bus and HGV in 2016	Bus and HGV Euro 3	-	-
LEZ2	Mid LEZ	Euro 4 standard for all Bus and HGV in 2016	Bus and HGV Euro 4	-	-
ULEZ	Ultra low Emission Zone	Euro 6 standard for all bus and HGV by 2016. Sensitivity scenario to see what highest Euro standard could be achieved.	Bus and HGV Euro 6	-	-
<b>EcoPass system</b>		Normal LEZ is applied to all bus lanes on key corridors. Emissions charging scheme is applied to HGV lanes. HGV emission limit is free, two charges for low and high emission HGVs.			
EP1	Base EcoPass	Bus at Euro 4 HGV Euro4 – free HGV Euro2-3 – Low charge, shift to Euro 4 standards up HGV <Euro2 – High charge	Bus at Euro 4, adjust HGV Euro standards up	HGV Traffic <20%	-
EP2	Ultra Low Ecopass	Bus at Euro 6 HGV Euro6 – free HGV Euro3-6 – Low charge HGV <Euro3 – High charge	Set bus to Min Euro 4, adjust HGV Euro standards up	HGV Traffic <20%	-
<b>Other measures</b>					
Bus 1	Voluntary emission standard	Agree a voluntary emission standard for buses operating in the city. Set standard to Euro 4 or re-evaluate (CAF scheme). Assume 80% compliance.	Euro 4 plus SCRT retrofit 20% non-compliant	-	-
Bus 2	Gas bus scheme	Gas buses operating from main Arriva depot. Apply to Melton road and Devonshire road – check for cross city routes from here and so impact on other corridors. Also apply to Uppingham road to compare with TRL work.	Gas buses on 3 agreed corridors.	-	-
Bus 3	Quality corridor measures	Use data from Aylstone corridor to estimate roll out to all corridors.	-	Reduce car traffic by 3%	Check speed currently and increase – journey time reduced by 7-8 mins.

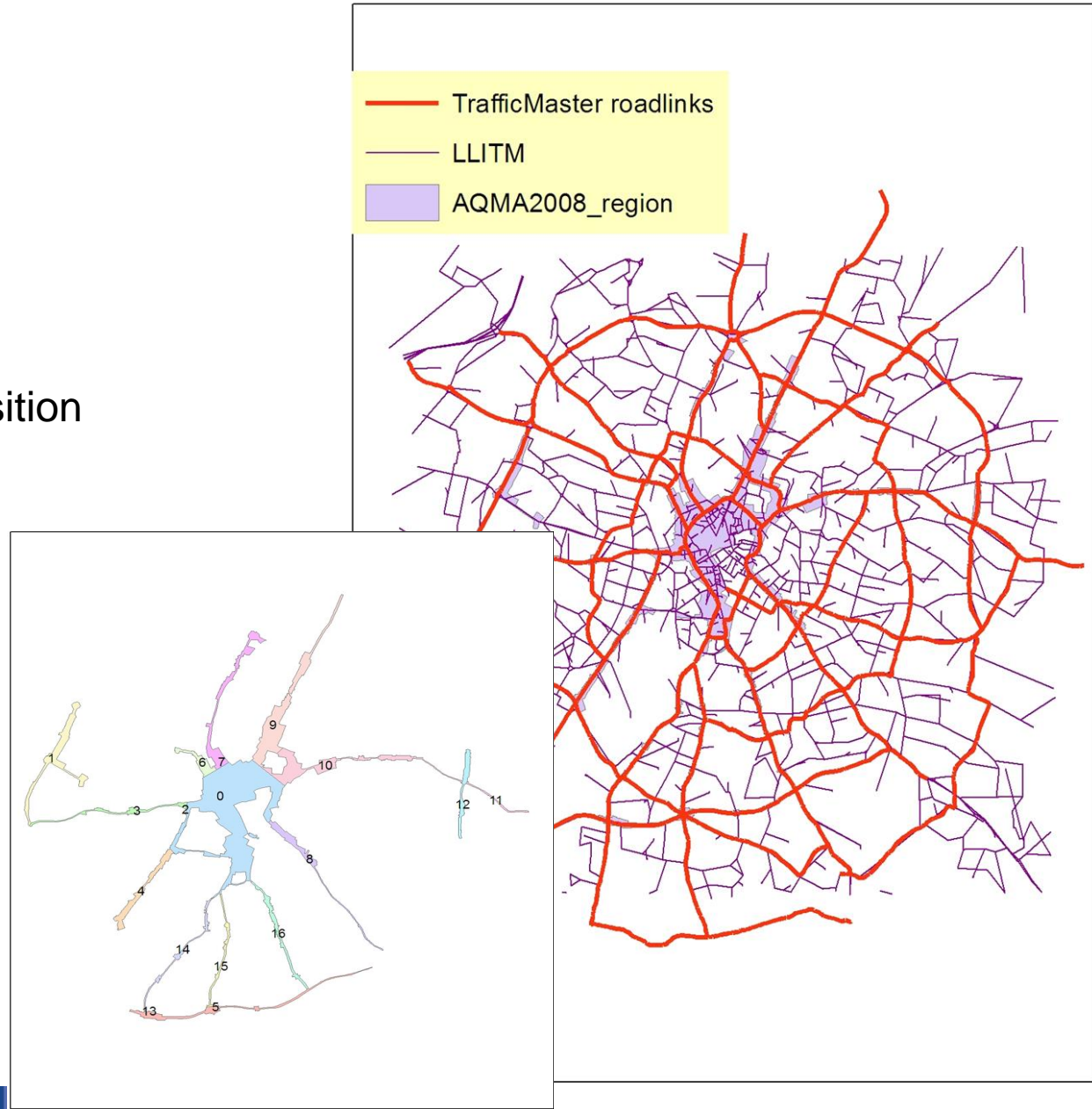
Literature review of measures  
Local knowledge/models  
Expert views

- Fleet composition
  - All less than Euro IV become Euro IV?
  - All less than Euro IV are renewed so...
  - All less than Euro IV spread in same way? Existing 2016 fleet greater than Euro IV?
  - Would bus response and HGV response be the same?
  - Engagement with fleet operators?
- Traffic levels
  - These are not affected
  - Some vehicles... LEZ so traffic levels go down?
  - Traffic model...
- Vehicle speeds
  - No change?
  - Less vehicles, so speeds may increase?

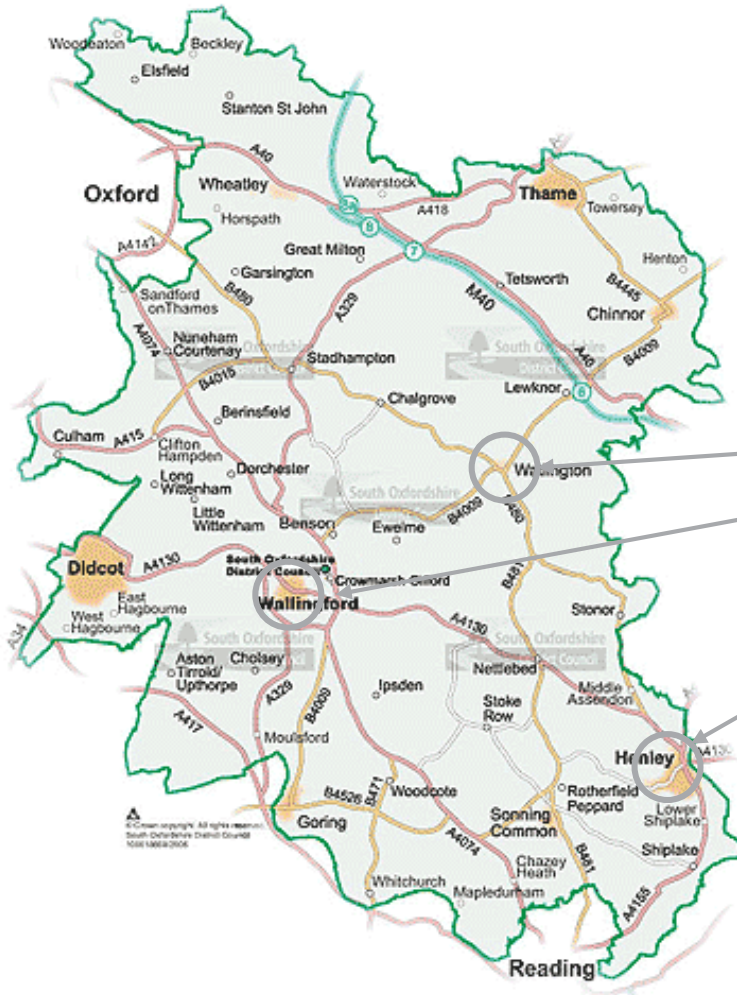
**Your assumptions can have a big impact on the results**  
**Sensitivity testing of assumptions**

# Example emissions model 1 - Leicester

- Based in EfT
- Leicester traffic model as basis
- DfT count data for fleet composition
- Traffic master data for speeds
- Zonal aggregation
- NO<sub>x</sub>, PM and CO<sub>2</sub>



# Example emissions model 2 – South Oxfordshire



- District wide emissions model
  - EfT basis
  - DfT traffic data
- Three AQMA sub models
  - EfT/ADMS
  - Local count data
  - Local bus fleet data
  - Traffic master speeds
  - DfT complementary data
  - Emissions/concentrations

# Cost Benefit Analysis

- Damage/Abatement costs savings
  
- Measure costs
  - Capital expenditure (CapEx)
  - Operating expenditure (OpEx)
  - Public sector costs
  - User/operator costs
  - Treasury costs (change in tax take)?
  
- Cost benefit assessment
  - Assessment period?
  - Net present value of costs and benefits over period  $> 0$
  - Benefit Cost Ratio (BCR)  $> 1$

# Damage and Abatement costs

- Damage cost
  - Simplified estimate of cost of damage of emission to health, crops, etc
  - Emissions X damage cost
  
- Abatement cost
  - Used when in areas of non-compliance
  - Represents costs in terms of national average cost to abate emissions
  - Applies only to portion of emission that effect compliance
  - Choice of abatement costs to reflect local conditions
  - Default value - £29,150
  - Much higher than damage costs

Sub sector	Baseline Technology	Abatement Measure	Marginal Abatement Cost (£/Tonne of NOx) 2015
HGV	Euro II	SCR	5099
HGV	Euro III	SCR	5380
Buses	Euro II	SCR	6251
Buses	Euro I	Hybrid	6500
Buses	Euro I	SCR	6625
Buses	Euro III	SCR	7257
Buses	Euro II	Hybrid	7462
HGV	Euro IV	SCR	8053
Buses	Euro III	Hybrid	9423
Buses	Euro IV	SCR	11889
Buses	Euro I	Electric	14669
Buses	Euro II	Electric	14872
Buses	Euro III	Electric	17352
Articulated HGV	New Euro V	Euro VI	17743
Buses	Euro IV	Hybrid	18391
Buses	New Euro V	Euro VI	24852
Rigid HGV	New Euro V	Euro VI	28374
<b>Buses*</b>	<b>Euro IV</b>	<b>Electric</b>	<b>29150</b>
Buses	Euro V	Hydrogen	72932
Diesel LGV - class 1	New Euro 5 class I	Euro 6	79323
Diesel LGV	Euro 1	Electric	100665

## Public sector costs

- How will scheme be implemented – PR, manual, ?
- Capital costs of scheme – e
- Operational costs of sch – staff, back office, etc
- Revenue from fines

*Literature review of measures*  
*Local knowledge/models*  
*Expert views*

## Operators costs

- Vehicle replacement
  - How many vehicles will be affected? We
  - What will they do?
    - Buy new?
    - Move fleet around
    - Residual values?
- What about operating costs?
  - New or different vehicles may cost more to run?

*Your assumptions can have a big impact on the results*  
*Sensitivity testing of assumptions*

## Benefits over time

- What time frame do we use?
  - Relate to life time of measures – usually 10 or 20 years
- We have assessed the emissions benefit for 1 target year
- However our assessment is over a 10 or 20 years?
  - Is the emission saving the same every year?
  - Should we model every year?
  - Should we estimate trend?
  - In theory benefit will reduce over time as fleet improves
- A simple trend may be best



# Example CBA results 1 - Leicester



Scenario	Total PV benefits 2016-2025 (£millions)	Total PV cost 2016-2025 (£millions)	NPV (£millions)	Rank (NPV)	Benefit Cost Ratio	Rank (BCR)
Bus_LEZ	£3.49	£1.62	£1.87	3	2.15	6
Bus_Retrofit	£3.32	£1.19	£2.13	2	2.79	4
Bus_Gas	£8.04	£1.83	£6.21	1	4.40	1
HGV_DSP	£0.86	£0.29	£0.57	5	2.93	3
HGV_Eco	£0.85	£0.31	£0.54	6	2.74	5
HGV_Gas	£0.64	£1.40	-£0.76	8	0.46	8
EV	£1.85	£0.49	£1.36	4	3.76	2
Smart	£1.70	£1.69	£0.02	7	1.01	7
Total*	£15.68	£7.63	£8.05		2.05	

# Example CBA results 2 - South Oxfordshire

Scenario	Total PV benefits 2016-2025 (£millions)	Total PV cost 2016-2025 (£millions)	NPV (£millions)	Rank (NPV)	Benefit Cost Ratio	Rank (BCR)
<b>Area measures</b>						
EV 2% (a)	1.41	0.38	1.02	2	3.68	3
EV 2% (b)*	6.11	21.62	-15.50	13	0.28	9
Bus 1	0.29	0.50	-0.20	5	0.59	7
Bus 2*	0.84	0.04	0.81	3	22.24	2
HGV*	13.86	0.50	13.36	1	27.76	1
Smart	2.37	5.72	-3.35	9	0.41	8
<b>AQMA measures</b>						
Wallingford BusX	0.09	0.79	-0.70	6	0.12	10
Henley LEZ (a)	0.10	1.31	-1.21	8	0.07	12
Henley LEZ (b)	0.10	7.98	-7.88	11	0.01	13
Watlington HGV1	0.20	0.14	0.06	4	1.44	4
Watlington HGV2	0.07	0.87	-0.80	7	0.08	11
<b>Combined</b>						
Area LES	23.48	28.37	-4.89	10	0.83	5
Area LES Plus AQMA	23.94	38.15	-14.21	12	0.63	6
Package - public costs	19.23	10.24	8.99		1.88	
<b>* Opex savings added to benefits</b>						

## Some conclusions

- A Low Emission Strategy (LES) is an area strategy designed to reduce emissions of both air pollutants and GHG pollutants
- Developing a LES requires
  - An evidence base – quantification
  - Engagement with stakeholders
    - Internal – a council wide approach
    - External – to get a partnership approach
- Focus today has been on the evidence base
  - Often quite a few data/evidence gaps
  - Key gap is impact of measures on actual activity – e.g. uptake of technologies
- Significant effort is also required to engagement
  - In developing appropriate measures
  - Long term implementation

**Thank-you for your attention**

**Any questions?**