

Is Local Air Quality Management a successful strategy in achieving selected EU Limit Values?

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Supervisory team



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Outline

- EU & UK air quality legislation
- Local Air Quality Management (LAQM)
- Review & Assessment (R&A) and Action Planning Process
- Progress with LAQM & Compliance Flexibility
- Research aims/hypothesis/objectives
- Proposed method
- Conclusions and outcomes

Timeline of adoption of EU Directives and UK Acts

Framework Directive on Air Quality Assessment and Management (96/62/EC), 1996

Council Directive concerning integrated pollution prevention and control (96/61/EC), 1996

Environment Act, 1995

1st Daughter Directive relating to limit values for SO₂, NO₂ & oxides of nitrogen, particulate matter and lead

2nd Daughter Directive relating to carbon monoxide and benzene (2000/69/EC), 2000

3rd Daughter Directive relating to ozone in ambient air (2002/3/EC), 2002

Public Participation Directive (2003/53/EC), 2003

4th Daughter Directive relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (2004/107/EC), 2004

Directive of the European Parliament and the Council on ambient air quality and cleaner air for Europe – to be published in official journal in May 2008 (includes PM_{2.5} exposure reduction approach)

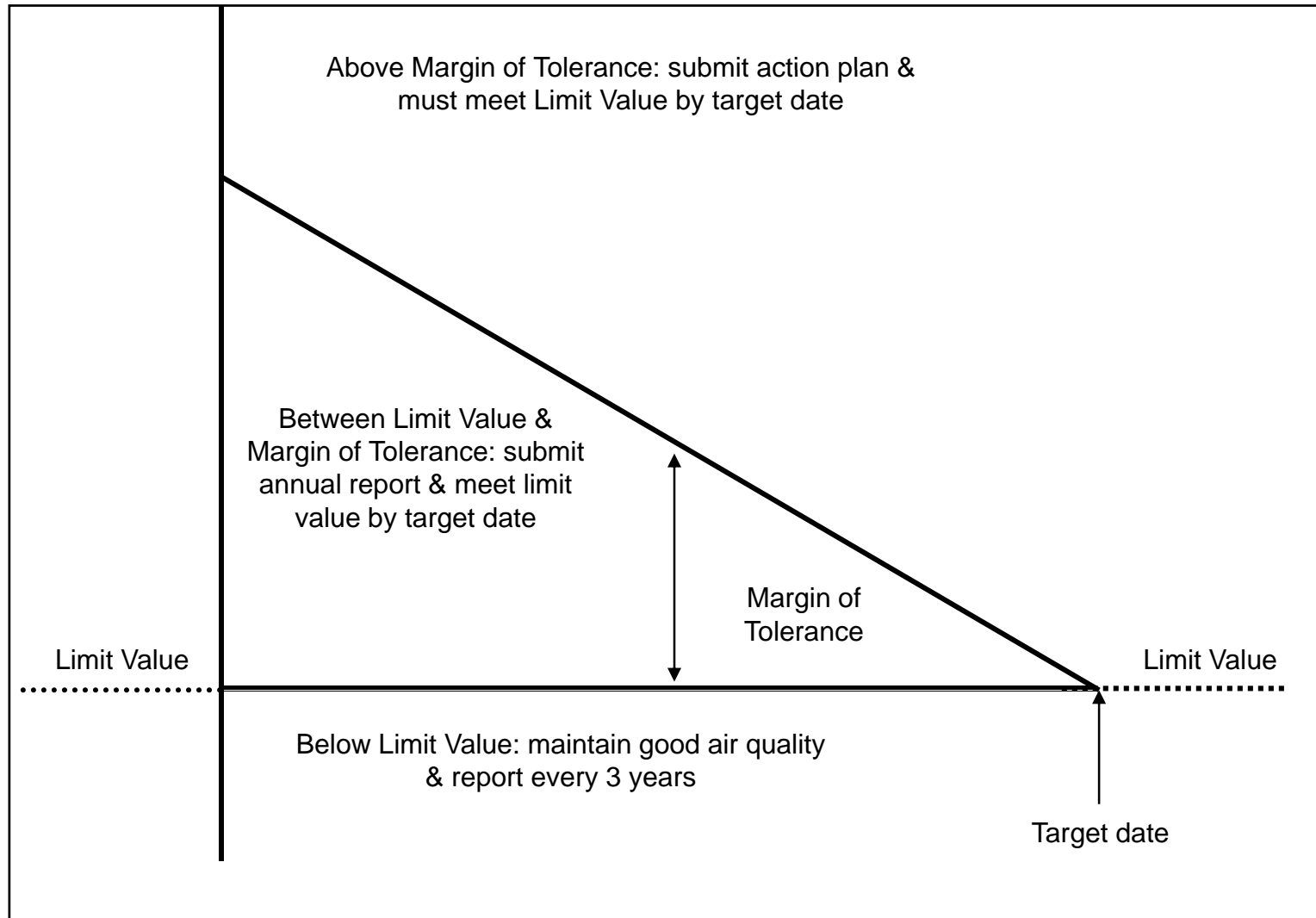
EU Air Quality Framework Directive (1)

- World Health Organisation recommended air quality guidelines as a basis for setting EU standards.
- Council Directive 96/62/EC of 27th September 1996 on ambient air quality assessment and management (Official Journal L 296, 21/11/1996, pp. 0055-0063).
- To be implemented by Member States by May 1998.
- Focus on human health.

EU Air Quality Framework Directive (2)

- Each Member State to assign agglomerations and other zones.
- After a preliminary assessment, decided which pollutants have the potential to exceed the limit values.
- Limit values are concentration component and averaging time.
- Margin of tolerance is defined as the percentage of limit value by which it can be exceeded.
- If limit values (or limit values + margin of tolerance) are exceeded, air quality improvement plan must be submitted to the Commission.
- A list of poor quality areas across the EU will be published annually with a report every 3 years.

EU Air Quality Framework Directive (3)

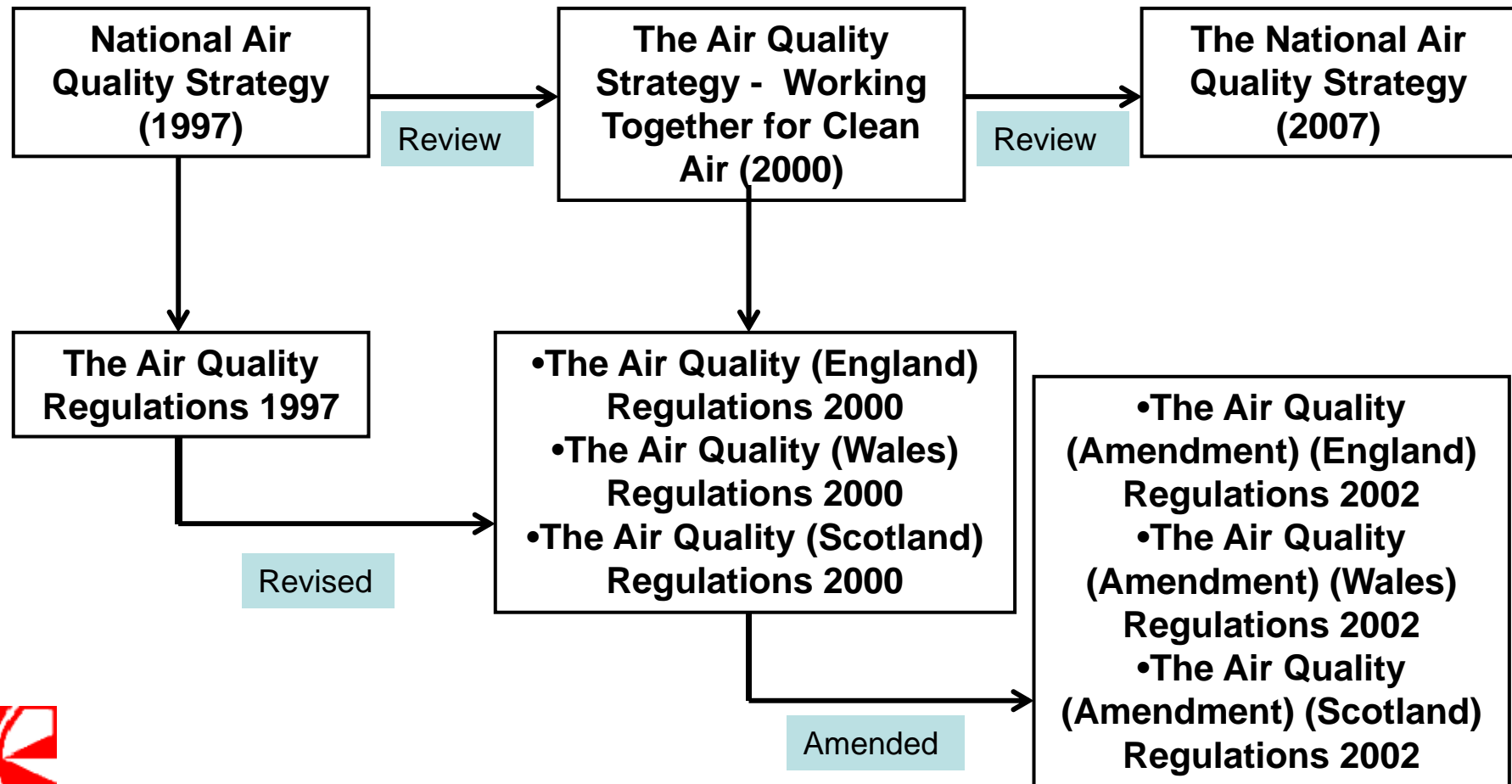


CAFÉ Directive

- The new Council Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe entered into force on 11 June 2008 and the earlier Directives will be repealed from 11 June 2010:
 - Framework Directive on Air Quality Assessment and Management (96/62/EC), 1996
 - 1st Daughter Directive relating to limit values for SO₂, NO₂ & oxides of nitrogen, particulate matter and lead
 - 2nd Daughter Directive relating to carbon monoxide and benzene (2000/69/EC), 2000
 - 3rd Daughter Directive relating to ozone in ambient air (2002/3/EC), 2002
 - 4th Daughter Directive relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (2004/107/EC), 2004

UK Air Quality Management Legislation

Environment Act 1995, part IV



Environment Act 1995 (part IV)

<i>Section</i>	<i>Contents</i>
80	Secretary of State to formulate a National Strategy.
82	Requires local authorities, unitary or district, to review air quality and to assess whether the air quality standards and objectives are being achieved.
83	Requires a local authority, for any area where air quality standards are not being met, to issue an order designating it an air quality management area (AQMA).
84	Imposes duties on a local authority with respect to AQMAs. The local authority must carry out further assessments and draw up an action plan specifying the measures to be carried out and the time scale to bring air quality in the area back within limits.

UK objectives and EU obligations

Pollutant	UK Objective	Measured as	European Obligations	To be achieved by
Benzene: all authorities	16.25 $\mu\text{g m}^{-3}$	Running annual mean	5 $\mu\text{g m}^{-3}$	31 December 2003
Benzene: authorities in England and Wales only	5 $\mu\text{g m}^{-3}$	Annual mean	5 $\mu\text{g m}^{-3}$	31 December 2010
Benzene: authorities in Scotland and Northern Ireland only	3.25 $\mu\text{g m}^{-3}$	Running annual mean	5 $\mu\text{g m}^{-3}$	31 December 2010
1,3-Butadiene	2.25 $\mu\text{g m}^{-3}$	Running annual mean	–	31 December 2003
Carbon monoxide	10.0 $\mu\text{g m}^{-3}$	Running 8-h mean ^a	10.0 mg m^{-3}	31 December 2003
Lead	0.5 $\mu\text{g m}^{-3}$	Annual mean	0.5 $\mu\text{g m}^{-3}$	31 December 2004
	0.25 $\mu\text{g m}^{-3}$	Annual mean	0.5 $\mu\text{g m}^{-3}$	31 December 2008
Nitrogen dioxide	200 $\mu\text{g m}^{-3}$ Not to be exceeded more than 18 times/yr	1-h mean	200 $\mu\text{g m}^{-3}$ Not to be exceeded more than 18 times/yr	31 December 2005
	40 $\mu\text{g m}^{-3}$	Annual mean	40 $\mu\text{g m}^{-3}$	31 December 2005
Particles (PM ₁₀) (gravimetric) ^b All authorities	50 $\mu\text{g m}^{-3}$ Not to be exceeded more than 35 times/yr	24-h mean	50 $\mu\text{g m}^{-3}$ Not to be exceeded more than 35 times/yr	31 December 2004
	40 $\mu\text{g m}^{-3}$	Annual mean	40 $\mu\text{g m}^{-3}$	31 December 2004
Particles (PM ₁₀) Authorities in Scotland only ^c	50 $\mu\text{g m}^{-3}$ Not to be exceeded more than 7 times/yr	24-h mean	50 $\mu\text{g m}^{-3}$ Not to be exceeded more than 35 times/yr	31 December 2010
	18 $\mu\text{g m}^{-3}$	Annual mean	40 $\mu\text{g m}^{-3}$	31 December 2010
Sulphur dioxide	266 $\mu\text{g m}^{-3}$ Not to be exceeded more than 35 times/yr	15-min mean	–	31 December 2005
	350 $\mu\text{g m}^{-3}$ Not to be exceeded more than 24 times/yr	1-h mean	350 $\mu\text{g m}^{-3}$ Not to be exceeded more than 24 times/yr	31 December 2004
	125 $\mu\text{g m}^{-3}$ Not to be exceeded more than 3 times/yr	24-h mean	125 $\mu\text{g m}^{-3}$ Not to be exceeded more than 3 times/yr	31 December 2004

Local Air Quality Management (1)

- A national approach with local actions.
- The Environment Act 1995 (Part IV) requires a National Air Quality Strategy and introduces the concept of Local Air Quality Management.
- Air Quality Regulations set objectives for seven pollutants.
- Regulations set to protect human health – effects based.
- An exceedence of Air Quality Objective specified in the Regulations may apply ONLY when public exposure occurs.
- The purpose of LAQM is to identify and manage the highest concentrations of specified air pollutants in areas of public exposure. Local Authorities (LA) conduct review and assessments, declare Air Quality Management Areas (AQMAs) and develop Action Plans.

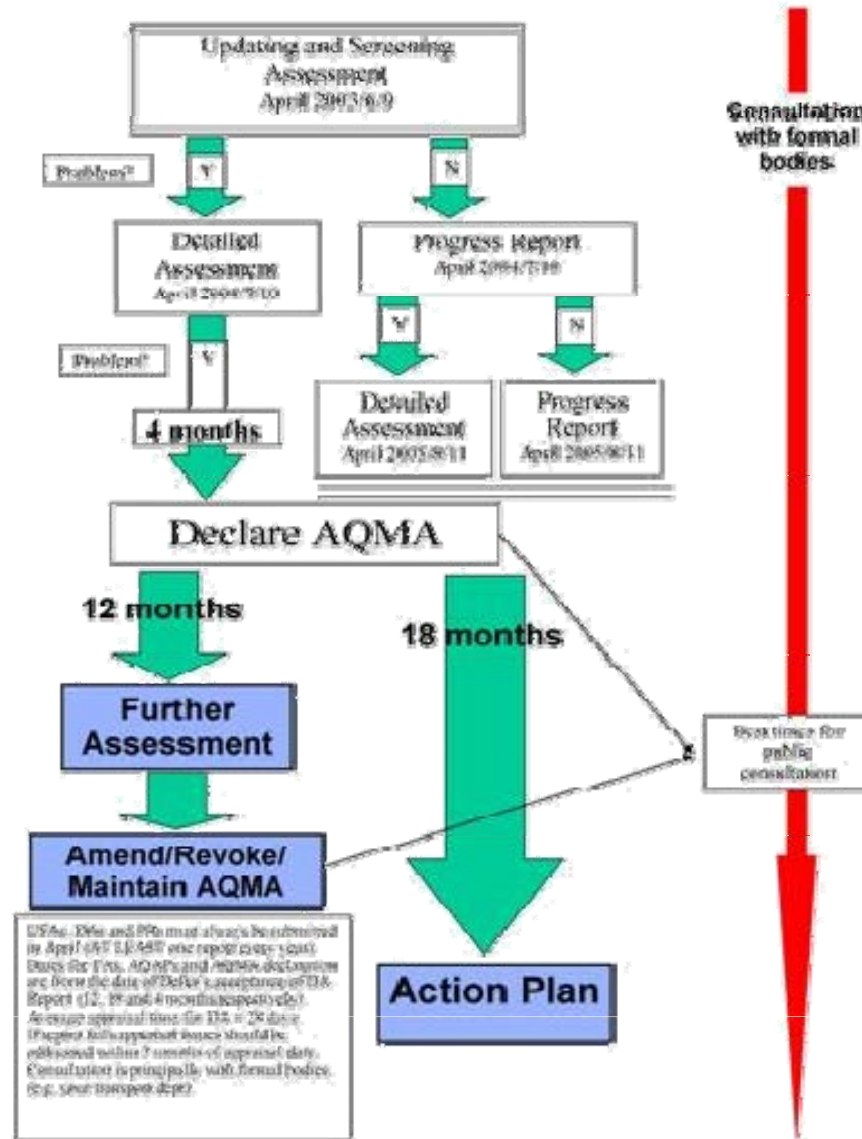
Local Air Quality Management (2)

- LAQM is a local authority duty. LAs have a duty to work towards securing the air quality objectives set in regulation.
- LAQM is designed to identify those local areas (hotspots) through a process of review & assessment where national actions on their own will not secure the Objectives.
- The responsibility for the achievement of policy rests with Defra and the Devolved Administrations.

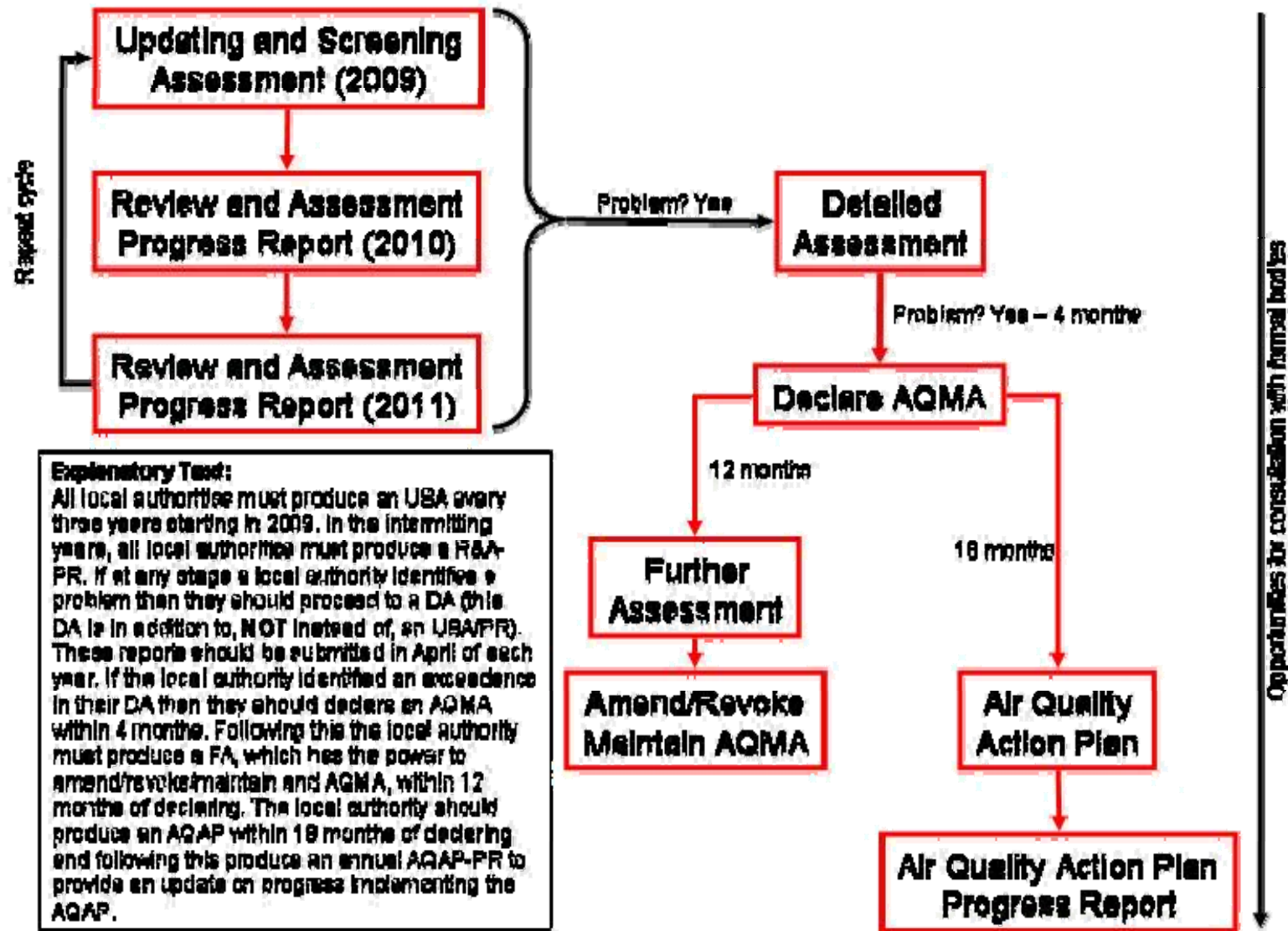
Review & Assessment

- Local authorities in Great Britain began the process of Review and Assessment in 1998.
- The first round of the process concluded in 2001 and resulted in 129 local authorities declaring one or more AQMAs.
- A second round of Review and Assessment began in 2003, a third round in 2006 and the fourth round has started in April 2009.

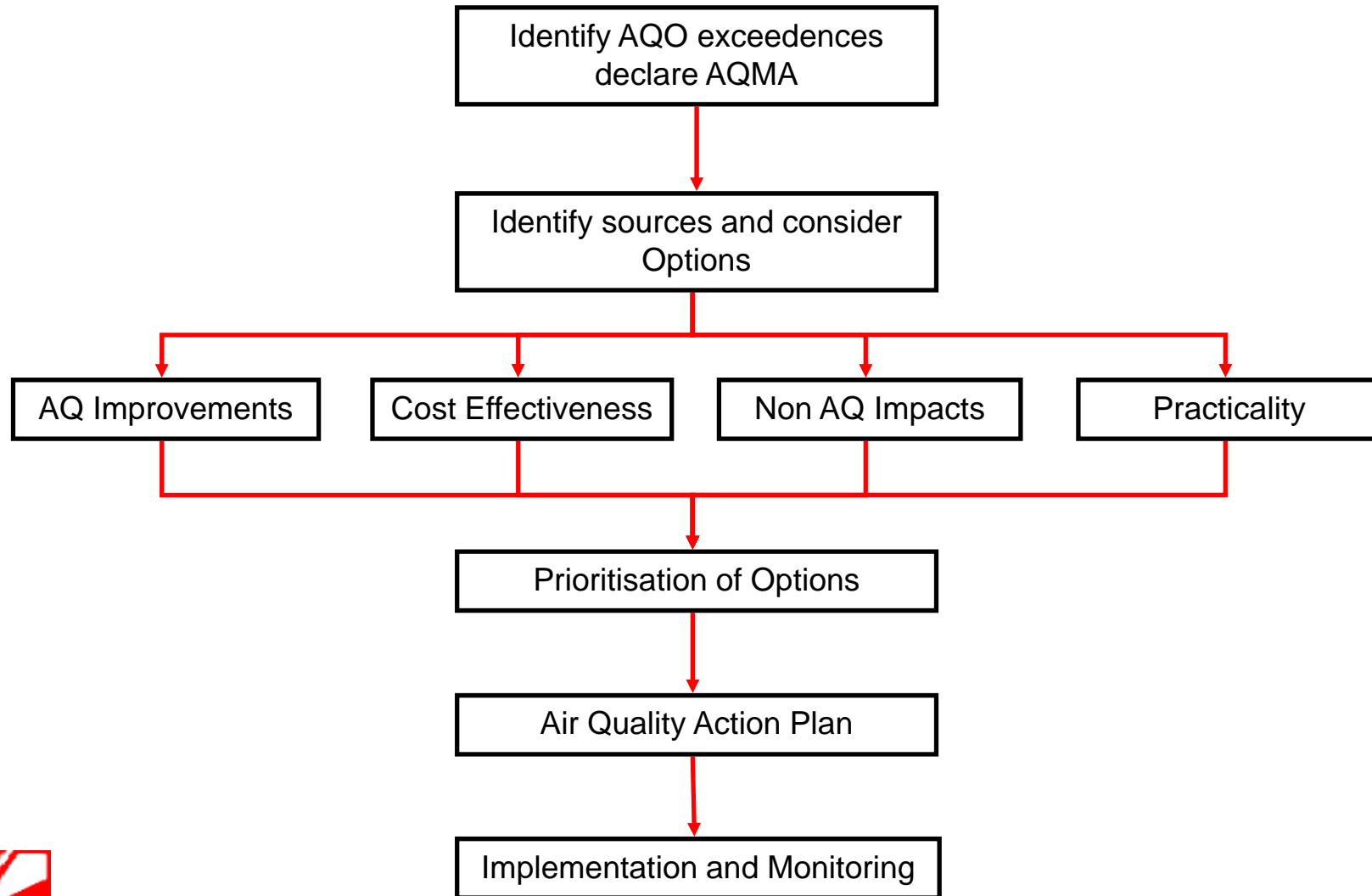
LAQM Process (Round 3)



LAQM Process (Round 4)



The Air Quality Action Plan process



Consultation with Statutory & Non-Statutory Stakeholders

LAQM – what has it achieved? (1)

- Significant process has been made with the LAQM Review & Assessment process.
- Significant increase in monitoring capability.
- Significant advances in the use of sophisticated modelling software.
- More emissions inventories carried out.
- High quality national air quality archive of monitoring data.

LAQM – what has it achieved? (2)

- Enhanced joint working between professionals and between Local Authorities, but is it enough?
- LAQM represents a substantial challenge in implementing solutions through transport and land-use planning processes.
- More is known about the spatial extent and temporal variability of air quality in the UK.
- Almost all urban authorities have had to proceed to Detailed Assessments, with the majority having to proceed for NO₂ and PM₁₀.

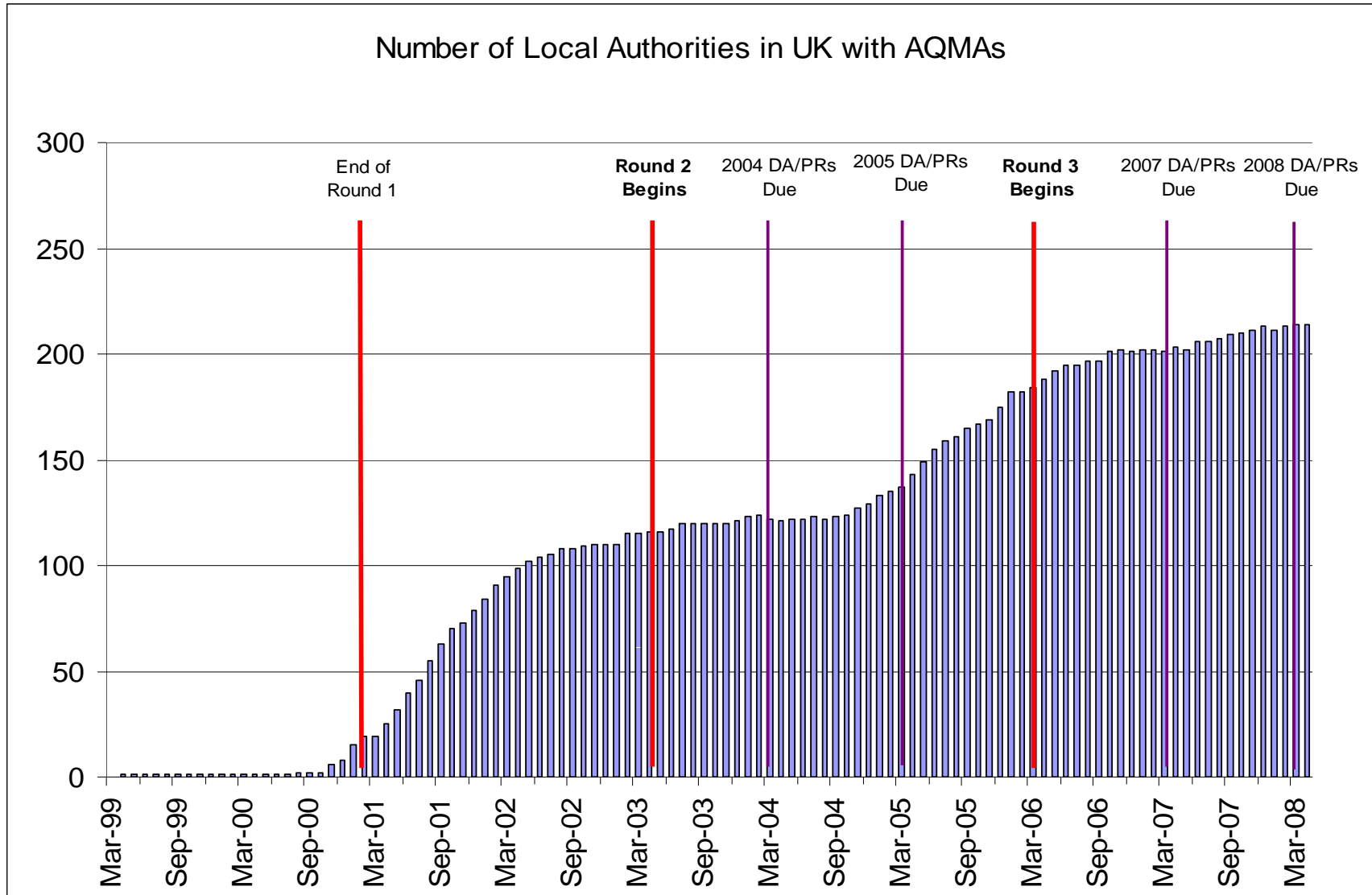
Progress with LAQM

- What progress has been made?
 - **Objective dates passed.**
 - **More AQMAs than anticipated.**
 - **Fewer AQAPs than expected.**
 - **Most emissions falling, but concentrations not responding as expected.**
 - **Traffic volumes increasing.**
 - Industrial emissions declining.
 - Large populations exposed to adverse concentrations.
 - Social equity and environmental justice considerations given insufficient attention.
 - Need for better consultation with the public and community engagement in LAQM decision making.
- Efficient, but not effective?

Compliance Flexibility

- The Air Quality Framework Directive (1996/62/EC) and the Daughter Directives (1999/30/EC, 2000/69/EC, 2002/3/EC) set limit values and target values for various pollutants in ambient air, including for PM₁₀. For PM₁₀ the limit values should have been met since 2005.
- The new Council Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe entered into force on 11 June 2008 and the earlier Directives will be repealed from 11 June 2010. This new Directive includes the following key elements:
 - The possibility for time extensions until 2011 for PM₁₀ and until 2015 for nitrogen dioxide (NO₂), for complying with limit values, based on meeting strict conditions and assessment by the European Commission.

AQMAs Rounds 1 - 3



Round 1 Evaluation

- “The pollutants causing greatest challenges were initially anticipated to be nitrogen dioxide and PM₁₀, although the level to which the annual mean nitrogen dioxide objective is now predicted to be exceeded was never anticipated.
- “Road transport has long been recognised as a major contributor to air quality problems and it is thus no surprise that the vast majority of AQMAs are related to locations affected by road traffic.”

AQMAs by pollutant (Feb 09)

Country	Number of LAs with AQMAs resulting from Round 1	Number of LAs with AQMAs resulting from Round 2	Number of LAs with AQMAs (current)	Pollutants for which AQMA declared						
				CO	Ben	1,3-but	Pb	NO ₂	PM ₁₀	SO ₂
England (exc. London)	82	126	167	-	1	-	-	156	35	9
London	30	5	33	-	-	-	-	33	28	-
Scotland	3	9	12	-	-	-	-	7	4	1
Wales	4	4	8	-	-	-	-	7	1	-
N Ireland	n/a	n/a	12	-	-	-	-	6	5	1
TOTAL	119	144	232	-	1	-	-	209	73	11

Research Aims

- This research aims to draw on the extensive body of evidence provided by the Review and Assessment process between the completion of Rounds 1 and 3 to establish whether AQAPs have been effective in achieving their aims and in improving air quality at a local level. By evaluating the degree of success achieved through individual AQAPs and then building an aggregate picture of progress to achievement of their goals it will be possible to assess the effectiveness and efficiency of the LAQM regime as a national strategy to meet EU air quality legislative requirements.

Research Hypothesis

- *Air Quality Action Plans are successful in terms of reducing local concentrations of nitrogen dioxide and PM_{10} and therefore Local Air Quality Management will enable the UK Government to meet the relevant EU Limit Values in the future.*



Posing the problem

- “It will be difficult to differentiate improvements in air quality which relate specifically to the review and assessment process undertaken at a local scale, and those improvements that arise as a consequence of national policy measures or international initiatives.
- “Only in the latter stages of the management process, through measures implemented in local authority air quality action plans, will the real solutions for improving local air quality be realised. Only then will it be possible to assess whether ambient air quality in areas which are currently exceeding the objectives, or predicted to exceed the objectives, will be improved to levels acceptable for human health.”

Beattie *et al.* 2001

Objectives

- O1: Determine whether there has been any change in the concentration of pollutants, in AQMAs declared in Round 1 of Review and Assessment;
- O2: Evaluate whether the measures included in the Air Quality Action Plans produced following Round 1 are being achieved; and
- O3: Critically assess whether implementation of the Action Plans has resulted in the change in pollutant concentrations identified in Objective 1.

Sampling strategy

- 119 Air Quality Action Plans were accepted by Defra and the DAs following the first Round of Review and Assessment.
- Include AQMAs from England, London, Scotland and Wales, to reflect the differences in policy and practice between them, as well as the effects of any geographical effects on air quality.
- Focus on AQAPs based on air quality objective exceedences of nitrogen dioxide and particulate matter (PM₁₀) from traffic sources (~95% AQMA declarations traffic-related).

Objective 1

- Determine whether there has been any change in the concentration of pollutants, in AQMAs declared in Round 1 of Review and Assessment:
 - Compare monitoring data from the first Round Stage 3 (Detailed Assessment) reports and the latest Round 3 Progress Report.
 - Pollutant concentrations between rounds will be statistically analysed for significance.

Objective 2

- Evaluate whether the measures included in the Air Quality Action Plans produced following Round 1 are being achieved:
 - (a) Review measures within the Round 1 AQAPs and the most recent AQAP-PRs/ revised AQAPs resulting from Round 3;
 - (b) Interviews/questionnaires with local authorities/report authors.

Air Quality Action Plans

- The lifetime of Air Quality Action Plans has been found to vary quite considerably.
- Many action plans (especially early ones) have shorter term implementation targets of up to 5 years (41%), largely due to being focused on Air Quality Objectives target dates (2004/2005).
- Remaining local authorities include longer term implementation targets of 5 -10 years (37%) and >10 years (22%).

Traffic Management							
Paragraph In Appendix	Proposed Measure	Impact on air quality Score:	Cost Score:	Feasibility Score:	Responsible authorities	Timescale	Ranking Score
		1-Low 5-High	1-High 5-Low	1-Low 5-High			
4.14	Encourage more traffic on the peripheral road (improved signage)	2	4	5	OCC	Short	13
4.5	A34 Lodge Hill Junction	4	1	3	Highways Agency	Long	12
4.4	A further river bridge crossing for Abingdon and Southern Relief Road	5	1	1	OCC	Long	12
4.9	Remove Rye Farm HGV park	2	4	4	VWH	Medium	12
4.6	Restrict delivery vehicles during the day	2	4	3	OCC/MWH	Short	11
4.7	Weight limits for HGV traffic	2	4	1	OCC	Medium	9
4.13	Close St. Helens Wharf	1	4	2	OCC	Medium	8
4.12	A34 slip roads at Drayton	2	1	2	Highways Agency	Medium	7
4.10	Widen Drayton Road Bridge to Allow two Lanes and Provide a Separate Footbridge	1	2	1	OCC	Medium	5

Objective 2 (b)

- The interviews will seek to identify:
 - The status of implemented AQAP measures,
 - Why any remaining measures have not been implemented/completed,
 - Whether any prioritisation of measures identified in the original AQAP has been adhered to in practice,
 - Whether the agreed deadlines are being met,
 - Any confounding issues, and
 - Any unexpected 'wins', i.e. changes with the potential to improve air quality that were not included in the original Round 1 AQAP.

Objective 3

- Critically assess whether implementation of the Action Plans has resulted in the change in pollutant concentrations identified in Objective 1.
- Assess whether there is any statistical association between ‘successful’ AQAPs (Objective 2) and improvements in air quality (Objective 1).

Conclusions

Air Quality	✓	✗	✗	✓
Action Plan Measures	✓	✗	✓	✗
LAQM	✓	✗	✗	✗
Conclusion	AQAPs achieving objectives to reduce pollutants	Action Planning process is inefficient and ineffective	Action Planning element of LAQM is ineffective	Action Planning is unnecessary

Outcomes

- Assist Defra and the DAs in assessing the suitability of the LAQM mechanism within the Air Quality Strategy in contributing towards the fulfilment of UK and EU air quality legislation for nitrogen dioxide and PM₁₀.
- Examination of both successful and unsuccessful measures and identification of problems experienced in implementing Air Quality Action Plans will help to inform local authorities in the preparation and execution of their own Action Plans and will be developed as a 'good practice' strategy paper.
- Valuable implications both for air quality policy research and enhancement of practice.

...and finally

Thankyou for listening...



...any questions?

<http://www.uwe.ac.uk/aqm/Josresearch.html>