UK Air Quality Monitoring Networks

AEA

Steve Telling – 28 August 2012

Introduction

History of air quality monitoring

Legislative drivers
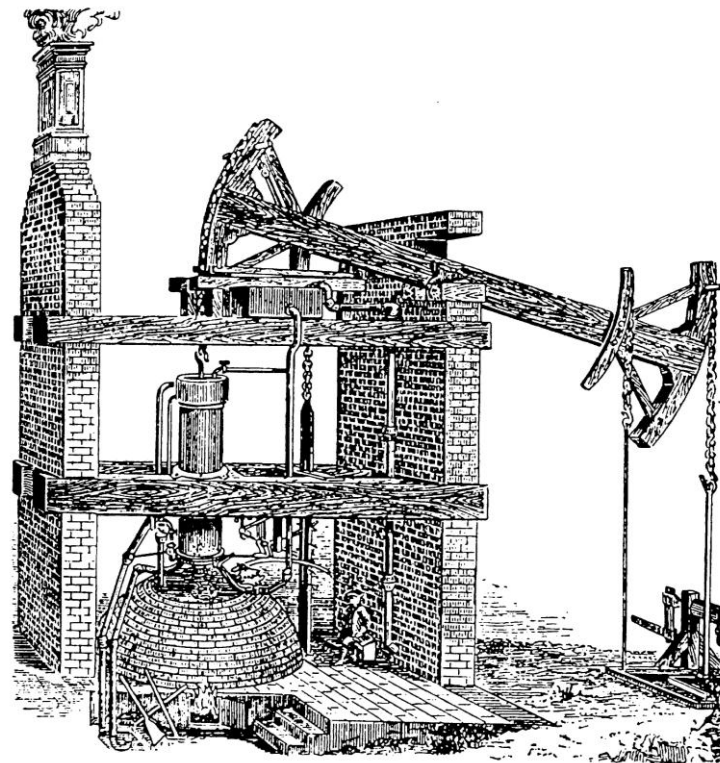
The monitoring networks

Data quality considerations

Access to data

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In 1285, King Edward I set up a commission to deal with the foul air in London

The Steam Engine Act of 1821 forced users not to 'prejudice public health'..

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- widespread use of coal
- cleaner fuels available but not used
- unfavourable winter meteorology (fogs)
- lack of effective source control/regulation
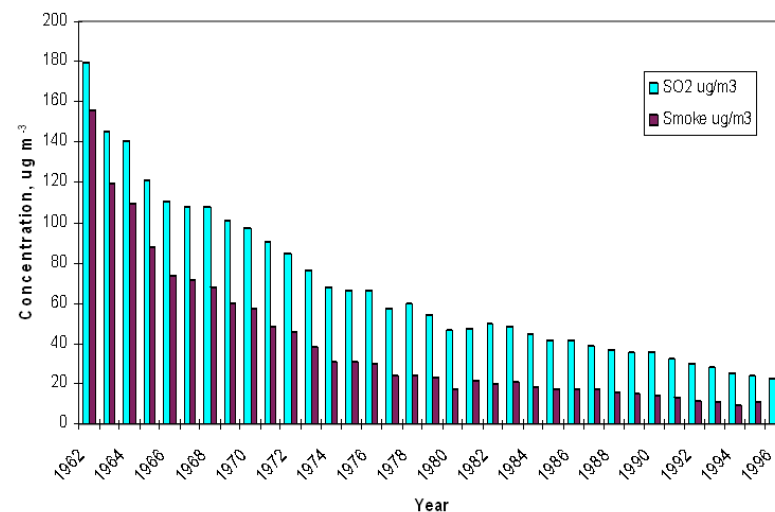- air pollution not seen as priority by public or government

- 4 days of stable, foggy weather
- peak smoke levels up to 1.5 mg/m^3
- peak SO_2 up to 0.75 mg/m^3
- death rate tripled, up to 4000 excess deaths
- widespread public concern and pressure for action...

- 1956 and 1968 Clean Air Acts
- effective control of domestic emissions
- introduction of Smokeless Control Zones
- use of cleaner fuels required by law
- accelerated existing trend to clean fuels
- public and fuel users willing to co-operate
- national monitoring programme established

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Domestic/industrial coal burning

(Smoke and SO_2)

Traffic in our cities

(CO, PM_X, NO_2, O_3, VOCs)

Key air quality monitoring objectives

- Assessment of population/ecosystem exposure
- Providing a basis for local planning & action
- UK Government Policy Development
- Monitoring compliance with UK, EU standards
- Public information/awareness

- Initiated under part IV, 1995 Environment Act
- Prescribed health-based standards for major air pollutants
- With objectives to be achieved by end 2005 and
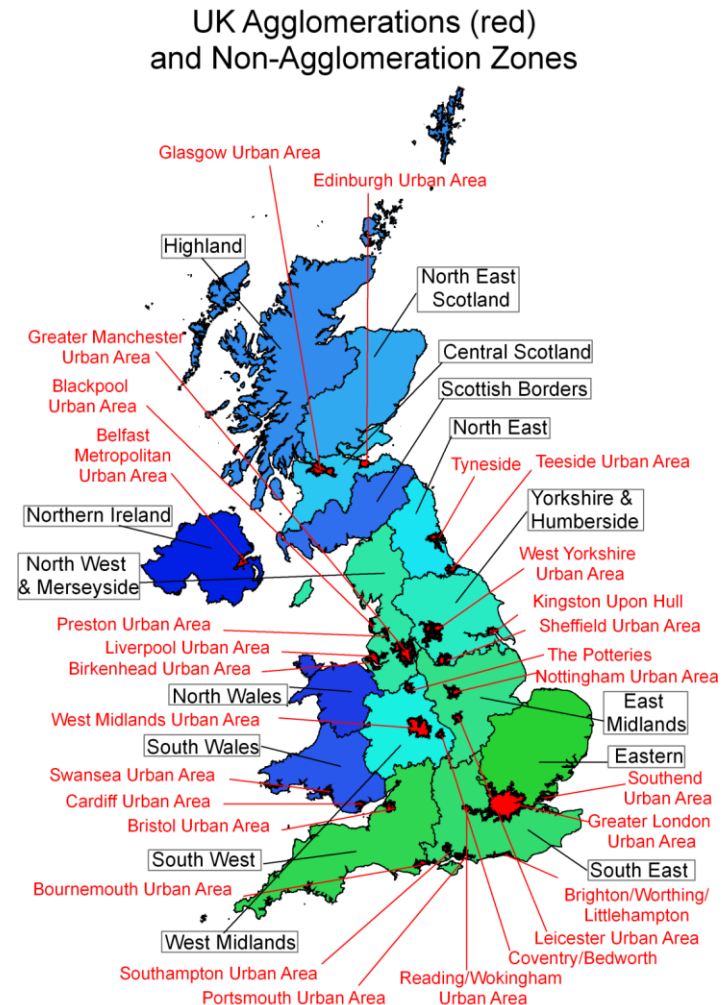- LA duty to "Review and Assess" local air quality…

Objectives and targets for a range of substances

- Carbon monoxide
- Nitrogen dioxide
- Ozone
- Sulphur dioxide
- Particulate matter (PM_{10} & $PM_{2.5}$)
- Benzene
- Metals (As, Cd, Hg, Ni, Pb)
- PAHs

Other substances (reporting only)

- Ozone precursor VOCs
- Speciated $PM_{2.5}$

- Agglomerations
  - Continuous urban areas of >250,000 population
  - 28 in UK (2 in Scotland)

- Zones
  - Remaining territory divided following government regions
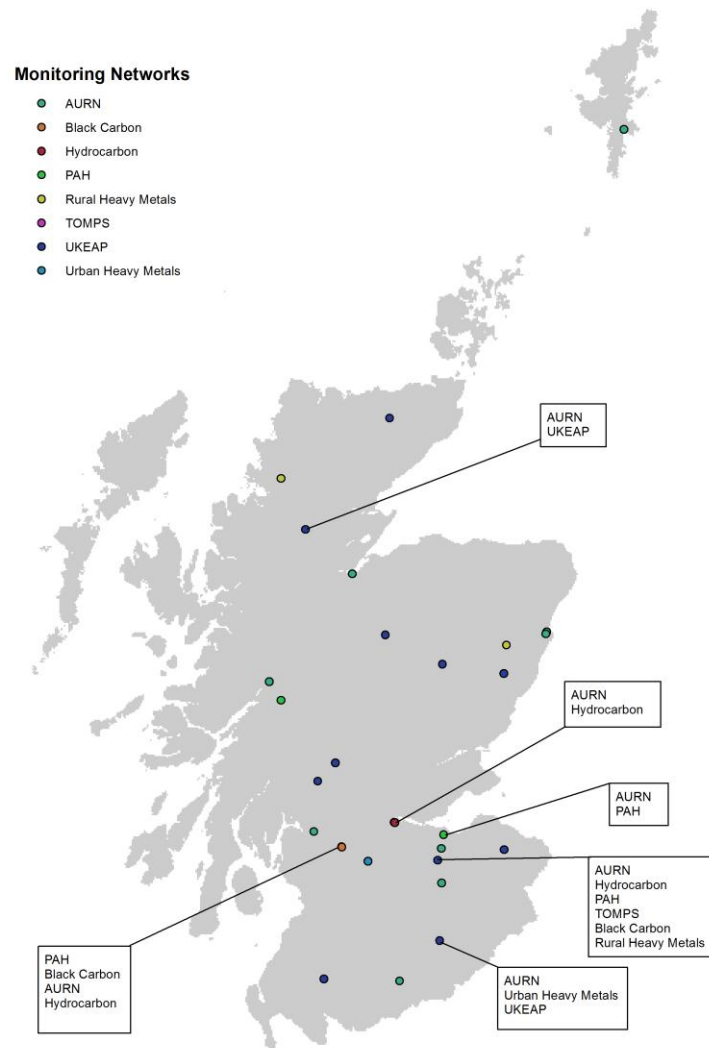 - 15 for UK (4 in Scotland)

UK Agglomerations (red) and Non-Agglomeration Zones

Monitoring networks

Monitoring network	Statutory	Research
AURN	✓	
Hydrocarbons	✓	
PAH	✓	
TOMPS		✓
Black carbon		✓
UKEAP		✓
Urban heavy metals	✓	
Rural heavy metals		✓

"National" AQ monitoring in Scotland

Monitoring network	Number of monitoring points
AURN	16
Hydrocarbons	3
PAH	4
TOMPS	1
Black carbon	2
UKEAP	12
Urban heavy metals	2
Rural heavy metals	3

Monitoring Networks
- AURN
- Black Carbon
- Hydrocarbon
- PAH
- Rural Heavy Metals
- TOMPS
- UKEAP
- Urban Heavy Metals

AURN
UKEAP

AURN
Hydrocarbon

AURN
PAH

AURN
Hydrocarbon
PAH
TOMPS
Black Carbon
Rural Heavy Metals

AURN
Urban Heavy Metals
UKEAP

PAH
Black Carbon
AURN
Hydrocarbon

European Monitoring & Evaluation Programme (EMEP)

"acidification, eutrophication, ground level ozone, heavy metals, persistent organic compounds and atmospheric particles"
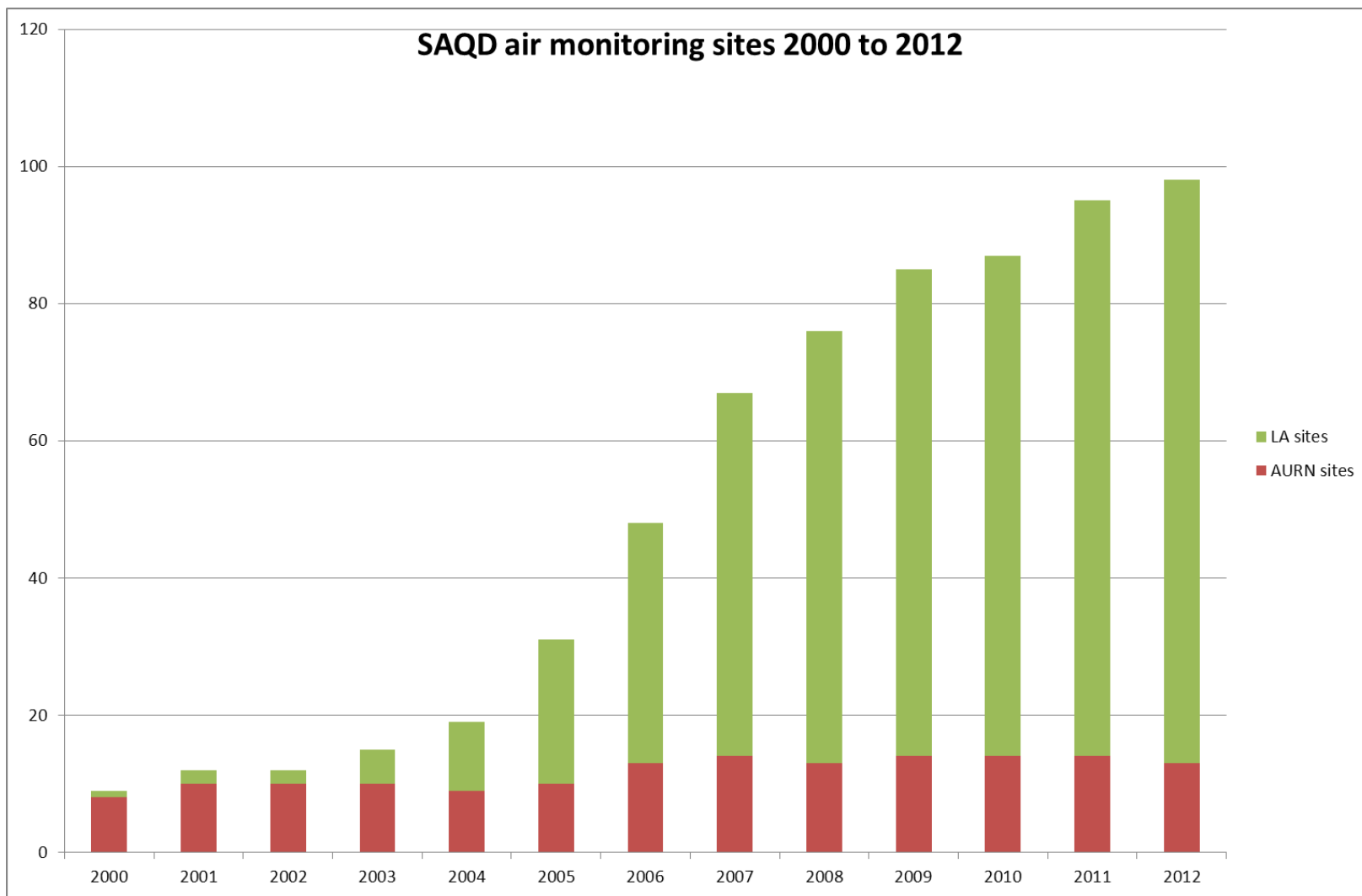
UK Supersite – Auchencorth Moss

The Scottish Air Quality Database

Holds data from air
quality monitoring
stations in Scotland

Co-ordinated network
- Consistent procedures
- Data quality
- Accessible

SAQD air monitoring sites 2000 to 2012

- Representative of ambient conditions
- Results comparable and traceable
- Measurements consistent over time
- High data capture, evenly distributed
- Measurements of known uncertainty

Quality Assurance

(Pre-measurement)

- Definition of monitoring objectives
- Network design, management, training systems
- Site selection and establishment
- Equipment evaluation and selection
- Operator training and manuals

Quality Control

(Post-measurement)

- Routine site operations
- Establishment of calibration/traceability chain
- System maintenance and support
- Data review and management
- System review and development

Data quality processes

Measurements

- Data collection

- Front end screening

- Data scaling

- Provisional data

Quality Control

- On-site calibrations

- Equipment maintenance
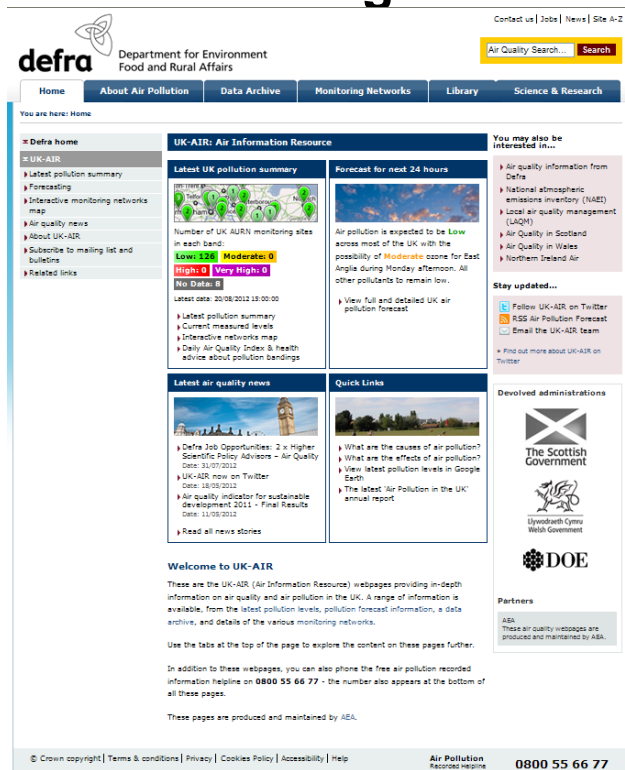
- Independent audits

- Data ratification

Data Usage

- Near realtime dissemination

- Formal reporting

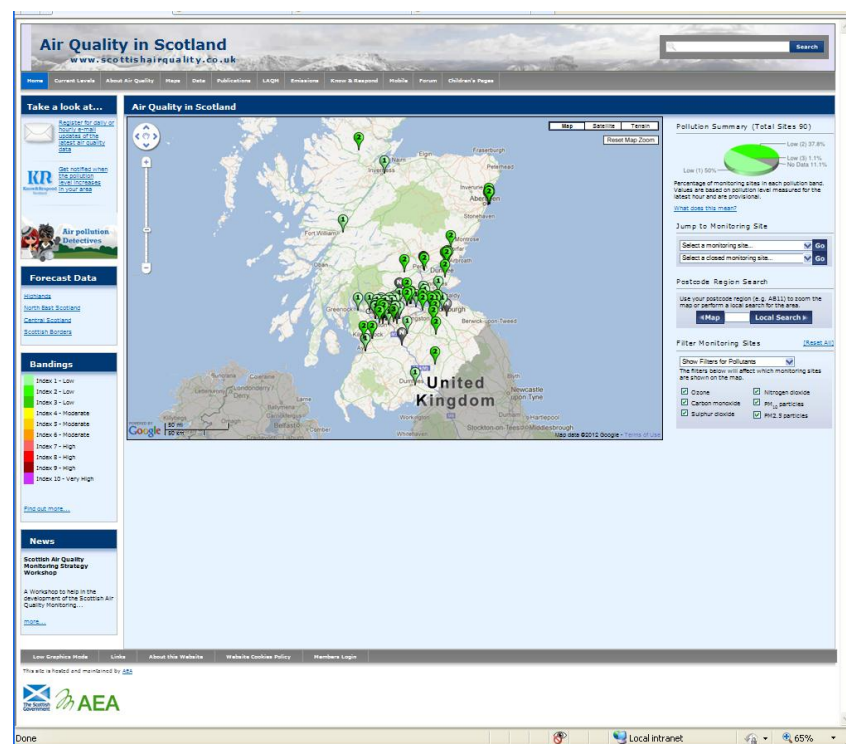- Research and policy development

Access to air quality data

Nationally (Defra)
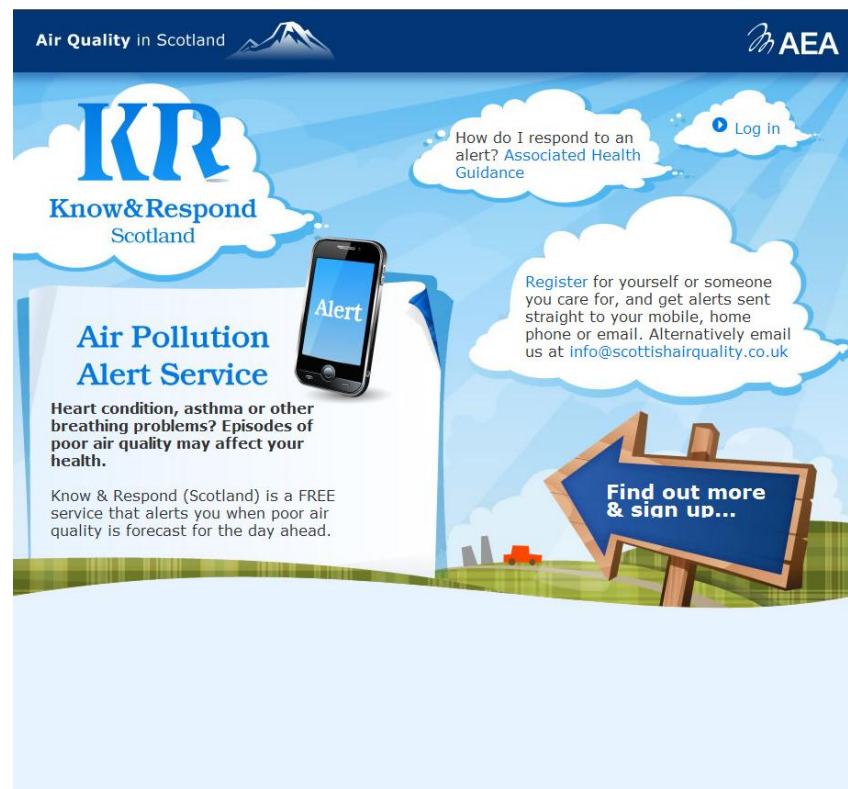
www.uk-air.defra.gov.uk

In Scotland (SAQD)

www.scottishairquality.co.uk

Know & Respond Scotland

Scottish Government initiative supported by Health Protection Scotland and NHS National Service Scotland

Free text message alert service when poor air quality is forecast for the day ahead

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