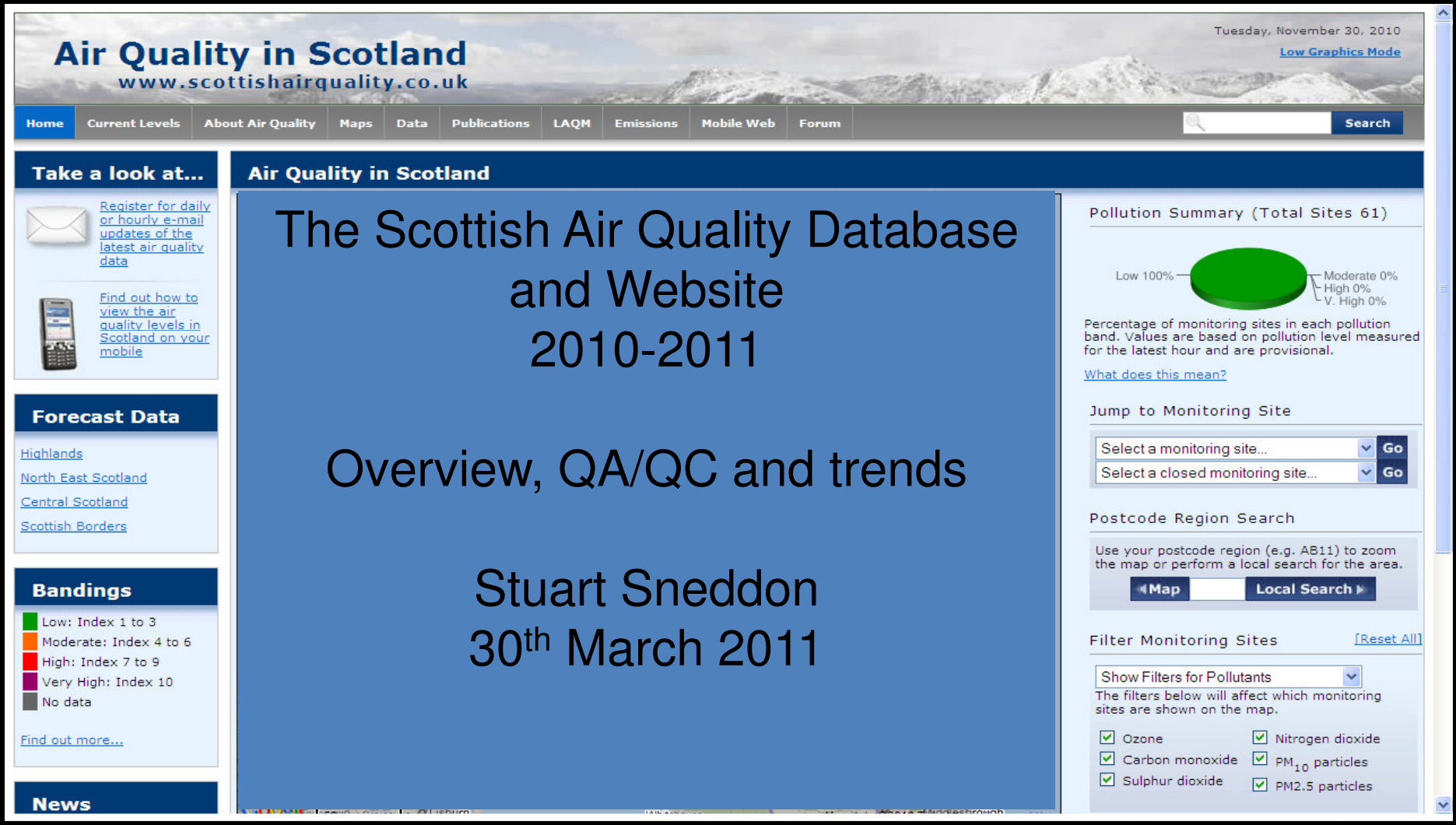
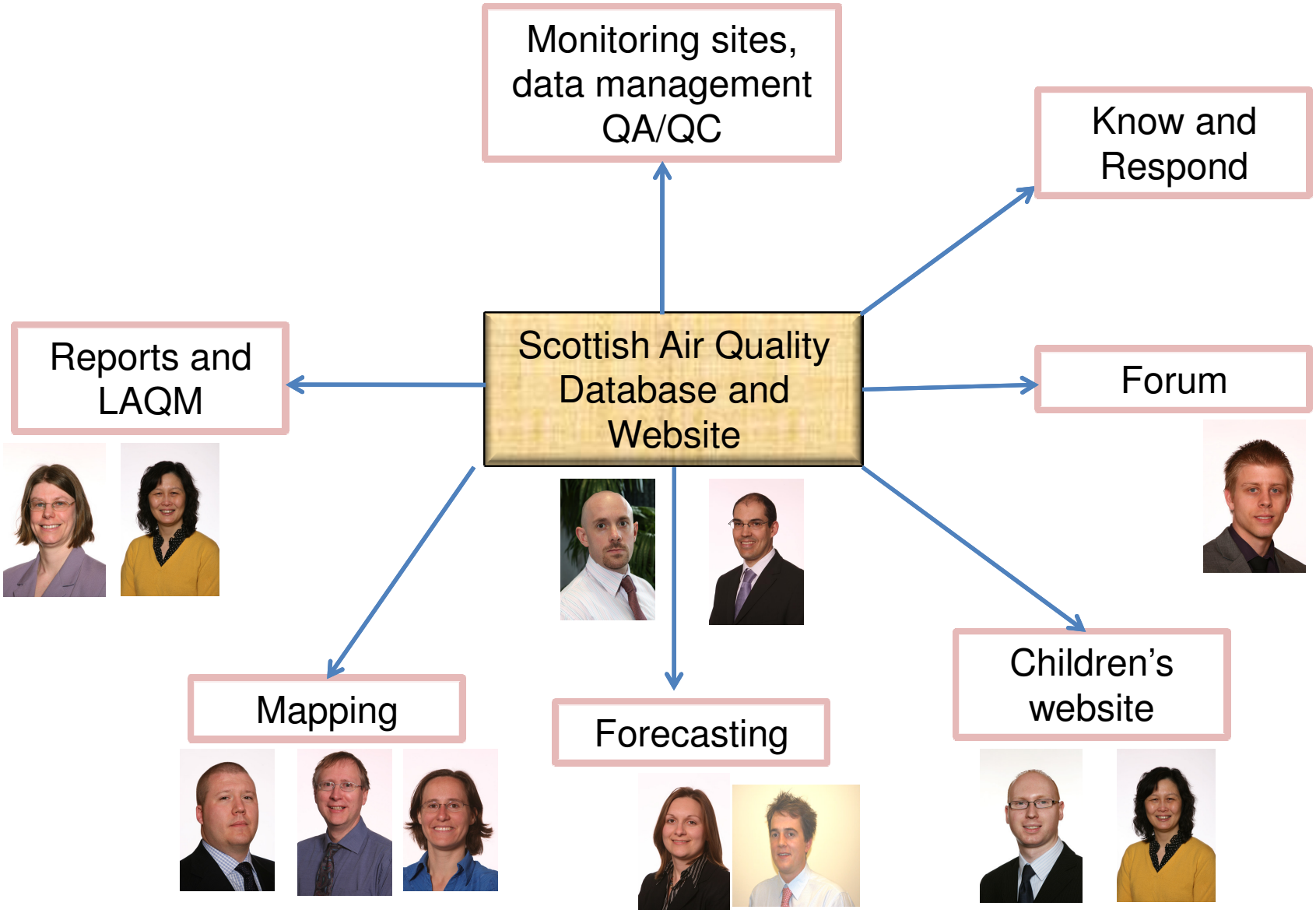

Air Quality in Scotland
www.scottishairquality.co.uk
Tuesday, November 30, 2010
Low Graphics Mode
Home
Current Levels
About Air Quality
Maps
Data
Publications
LAQM
Emissions
Mobile Web
Forum
Search
Take a look at...
Register for daily or hourly e-mail updates of the latest air quality data
Find out how to view the air quality levels in Scotland on your mobile
Forecast Data
Highlands
North East Scotland
Central Scotland
Scottish Borders
Bandings
Low: Index 1 to 3
Moderate: Index 4 to 6
High: Index 7 to 9
Very High: Index 10
No data
Find out more...
News
Air Quality in Scotland
The Scottish Air Quality Database and Website 2010-2011
Overview, QA/QC and trends
Stuart Sneddon
30th March 2011
Pollution Summary (Total Sites 61)
Low 100%
Moderate 0%
High 0%
V. High 0%
Percentage of monitoring sites in each pollution band. Values are based on pollution level measured for the latest hour and are provisional.
What does this mean?
Jump to Monitoring Site
Select a monitoring site...
Go
Select a closed monitoring site...
Go
Postcode Region Search
Use your postcode region (e.g. AB11) to zoom the map or perform a local search for the area.
Map
Local Search
Filter Monitoring Sites
[Reset All]
Show Filters for Pollutants
The filters below will affect which monitoring sites are shown on the map.
Ozone
Nitrogen dioxide
Carbon monoxide
PM10 particles
Sulphur dioxide
PM2.5 particles

Overview

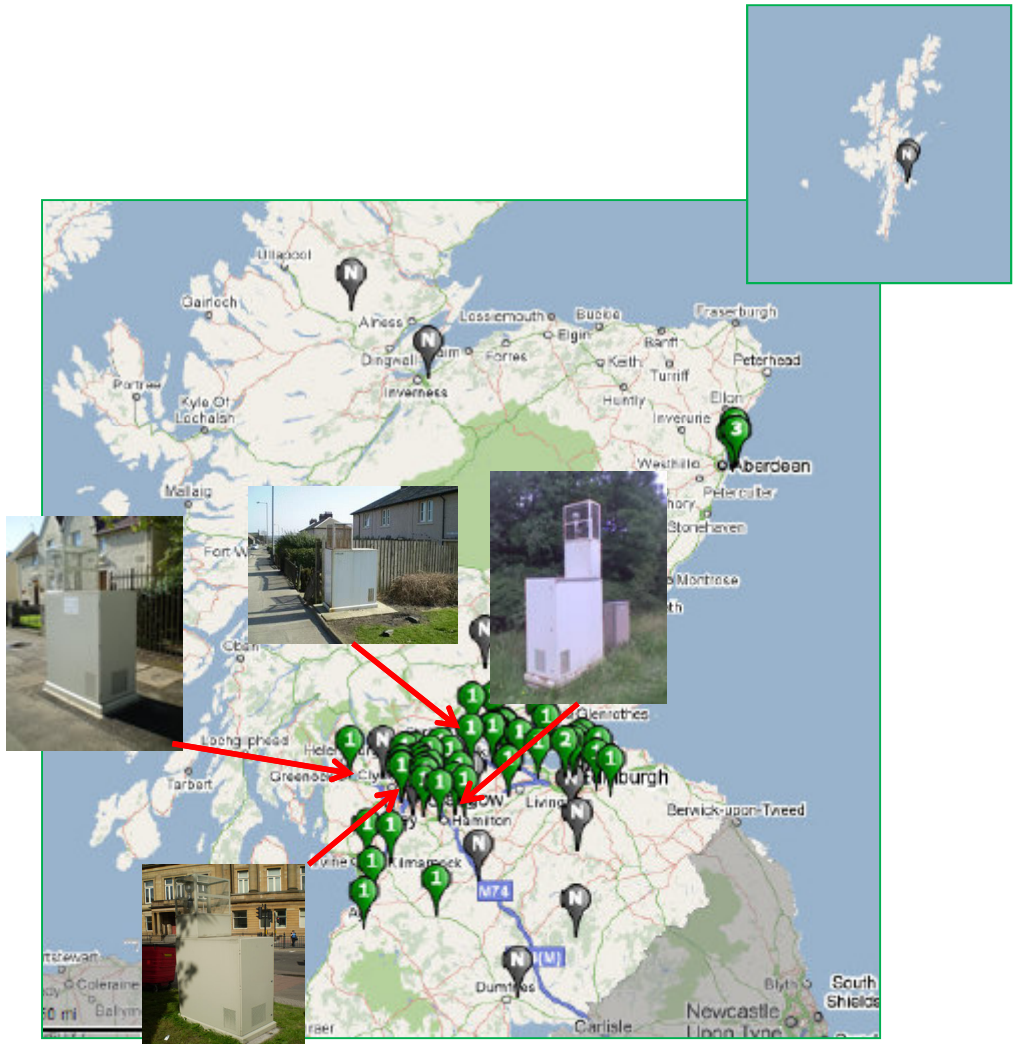
- Introduction to AEA Project Team;
- Update on Scottish Air Quality Database monitoring Sites
- QA/QC;
- Scottish Air Quality Trends;
- Some other developments

Scottish Air Quality Database and Website – AEA Team

AEA



QA/QC of Scottish Air Quality Database sites



Current situation

- 83 Sites on Scottish Website (up from 62 in 2008)
- 15 AURN
- 12 funded by Scottish Grant Scheme
- 56 site operated under this project
- New sites added 2010:
  - Paisley St James
  - Inverclyde – Greenock
  - Milngavie
  - Glespin
  - Raith Interchange
  - Falkirk Haggs

What are QA and QC?

- **QA**: **Q**uality **A**ssurance – relates to the process of monitoring e.g.:
  - Instrument calibration
  - Operator training
  - Site audits and inter-calibrations

- **QC**: **Q**uality **C**ontrol – relates to checking outputs including:
  - Data ratification
  - Information management
  - Quality Circle review and feedback

Fundamental QA/QC objectives

Important that end users of the Scottish Air Quality Database have access to the best possible data at all times:

- Measurements accurate, precise & credible;
- Data representative of ambient conditions;
- Results comparable and traceable;
- Measurements consistent over time;
- High data capture, evenly distributed;

AEA Scottish Air Quality Database - QA/QC Team

- Diane Mooney

- Brian Stacey

- Stephen Stratton

David Hector

Susannah Telfer

- Colin Rae

- Stephen Gray

Scottish Air Quality Database and Website - QA/QC

AEA

- System of both automatic and manual data reviews and updates.

- Hourly mean monitoring results from the UK AURN and non-AURN - **provisional data** several times each day.

  - **Data verification**: manual clean up e.g. Instrument malfunctions, communication errors;

  - **Data ratification**: detailed manual check (longer term view of dataset and incorporating independent audits) – e.g. faulty NO_x converters, drift in cylinder calibration concentrations.

  - Once all the ratification checks and corrections have been made – "Ratified".

  - The QA/QC process ensures the best possible accuracy of air quality data for public information and helps the Scottish Government to meet it's statutory requirements under EU Directives.

QA/QC of Scottish Air Quality Database sites

AEA

Daily collection and checking of data from each site;

Scaling of data from last calibration results;

Update to website;

On-going data update as new information becomes available;

Site audits – ensures traceability;

Collection and storage of all calibrations and service records etc;

- 6-monthly data ratification;
- Quality Circle data review;
- Update of ratified data to the website;
- Assistance to local authorities where-ever possible;

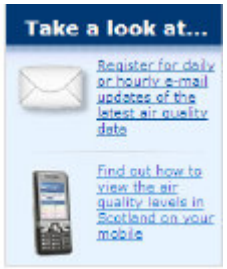
Daily Checking of data

Data from all site in the database are checked each day by data checkers

Daily internal email on diagnostics;

Scottish Field Team have daily phone call/ email discussion with the site operators on fault issues;

Faults will lead to some false alarms on the text alert system.



Email sent to Scottish Government when elevated concentrations are reported.

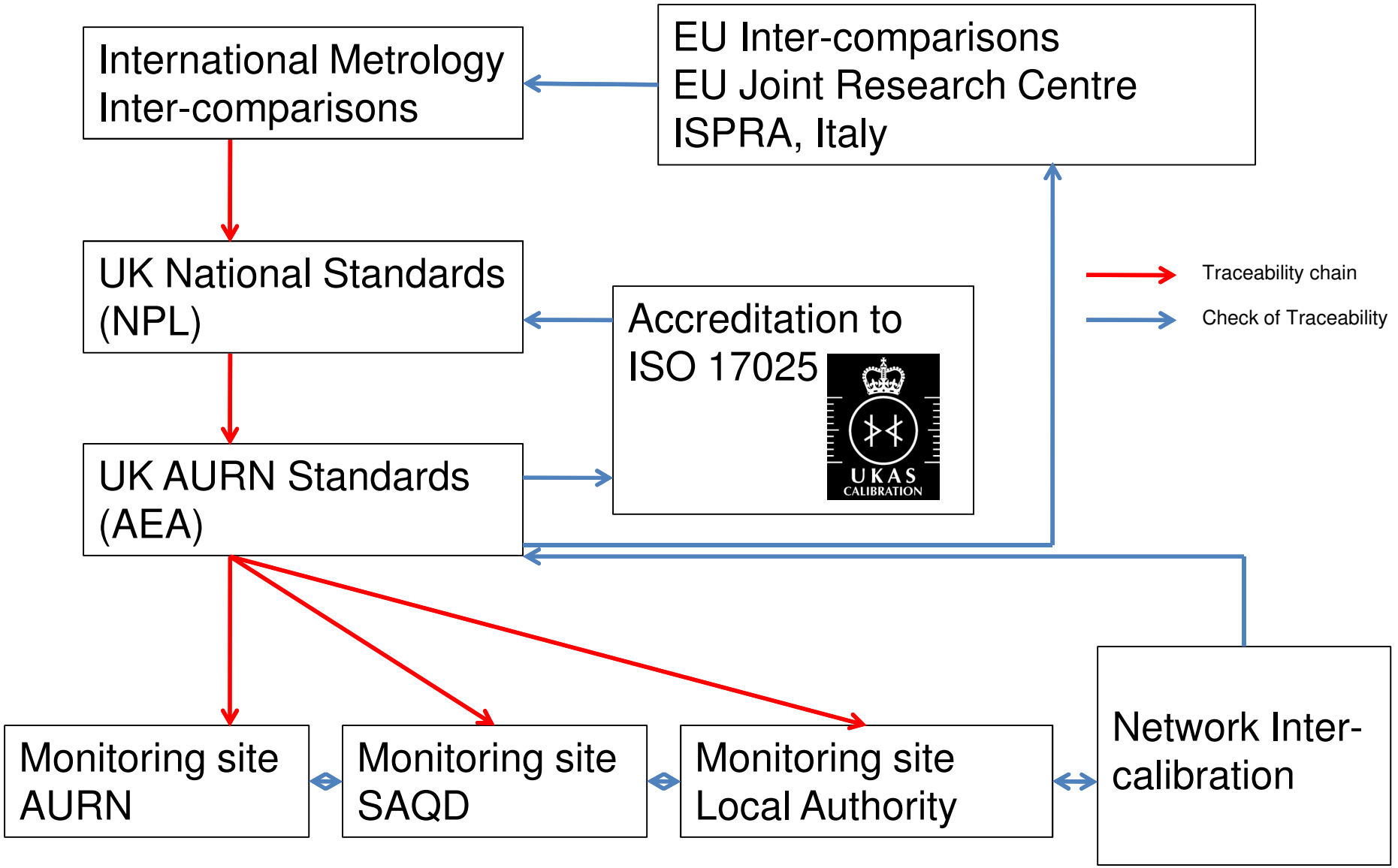
Site audits: 6-monthly site inter-calibration and audit

- AEA visits each site every 6-months to undertake the inter-calibration and site audit
  - Check analysers
  - Check calibration gases
  - Site infrastructure
  - Local Site Operator

UKAS CALIBRATION

Lab. 0401

Traceability Chain



UKAS Certificate of Calibration

AEA

CERTIFICATE OF CALIBRATION

Glengarnock technology Centre, Caledonian Road, Lochshore Business Park, Glengarnock, Ayrshire, KA14 3DD. Telephone 0870 1905269 Fax 0870 1905151

UKAS CALIBRATION 0401

Approved Signatories: K. Stevenson S. Stratton

Signed: Date: 18th November 2010

Date of issue: 19th November 2010
Cert No: 2328 Page 1 of 5

Customer Name and Address: Scottish Government
Water, Air, Soils and Flooding Division
Environmental Quality Directorate
Scottish Government
Victoria Quay
Edinburgh
EH6 6QQ

Description: Calibration factors for Glasgow City Council's Anderston, Byres Road, Battlefield Road, Waulkmillglen Reservoir, Nithsdale Rd, Broomhill, and Abercromby St air monitoring stations.

AEA Identification Number: 46761/GLASG/A7B7C7D7E6F6G6

Site / Date Test Carried Out	Species	Analyser Serial No.	Zero Response[1]	Uncertainty (ppb)	Calibration Factor[2]	Uncertainty %	Converter eff. (%)[3]
Anderston 26th July 2010	NOx	529B-229	102.3	5.0	1.0197	5.0	98.1
	NO	529B-229	101.3	5.0	1.0070	5.0	N/A
	SO_2	835B-324	100.3	4.0	1.0150	13.7	N/A
	CO	626B-178	100.5	0.3(ppm)	0.0495	3.0	N/A
Byres Road 27th July 2010	NOx	M1362-M575	4.7	5.0	1.0872	5.0	98.2
	NO	M1362-M575	0.7	5.0	1.0163	5.0	N/A
	CO	M1382-M403	0.0	0.3(ppm)	0.9786	3.0	N/A
Battlefield Road 28th July 2010	NOx	404003	-2.8	5.0	1.0237	5.0	100.0
	NO	404003	-1.5	5.0	1.1129	5.0	N/A

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95% The uncertainty evaluation has been carried out in accordance with UKAS requirements.
This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory

Site / Date Test Carried Out	Species	Analyser Serial No.	Parameter	Specified Value	Measured Value	Deviation %
Anderston 26th July 2010	TEOM PM_{10}	22127	Main Flow[4]	3.00	2.99	-0.3
			AuxFlow[4]	13.65		
			Total Flow[4]	16.67	16.25	-2.5
			k_0[5]	12699	12764	0.5
Byres Road 27th July 2010	TEOM PM_{10}	23422	Main Flow[4]	3.00	3.27	8.9
			Aux Flow[4]	13.66		
			Total Flow[4]	16.67	17.16	3.0
			k_0[5]	12837	12995	1.2
Battlefield Road 28th July 2010	TEOM PM_{10}	25458	Main Flow[4]	3.00	2.99	-0.3
			Aux Flow[4]	13.69		
			Total Flow[4]	16.67	16.57	-0.6
			k_0[5]	12980	12873	-0.8
Waulkmillglen Reservoir 29th July 2010	TEOM PM_{10}	23919	Main Flow[4]	3.00	3.01	0.3
			Aux Flow[4]	13.68		
			Total Flow[4]	16.67	16.42	-1.5
			k_0[5]	13426	13435	0.1

Uncertainties:

TEOM PM_{10}	Main Flow	±2.2%
	Total Flow	±2.2%
	Aux Flow	±2.2%
	k_0	±1.0%

Selection of problems identified during site audits

AEA

Cylinders:
22% (NO) at Kilmarnock John Finnie Street
11% (NO) at Grangemouth Municipal Chambers
12% (SO_2) at Shetlands Staney Hill
19% (NO) East Kilbride
20% (NO) Stirling
16%(NO) Musselburgh
9% (NO) Clydebank

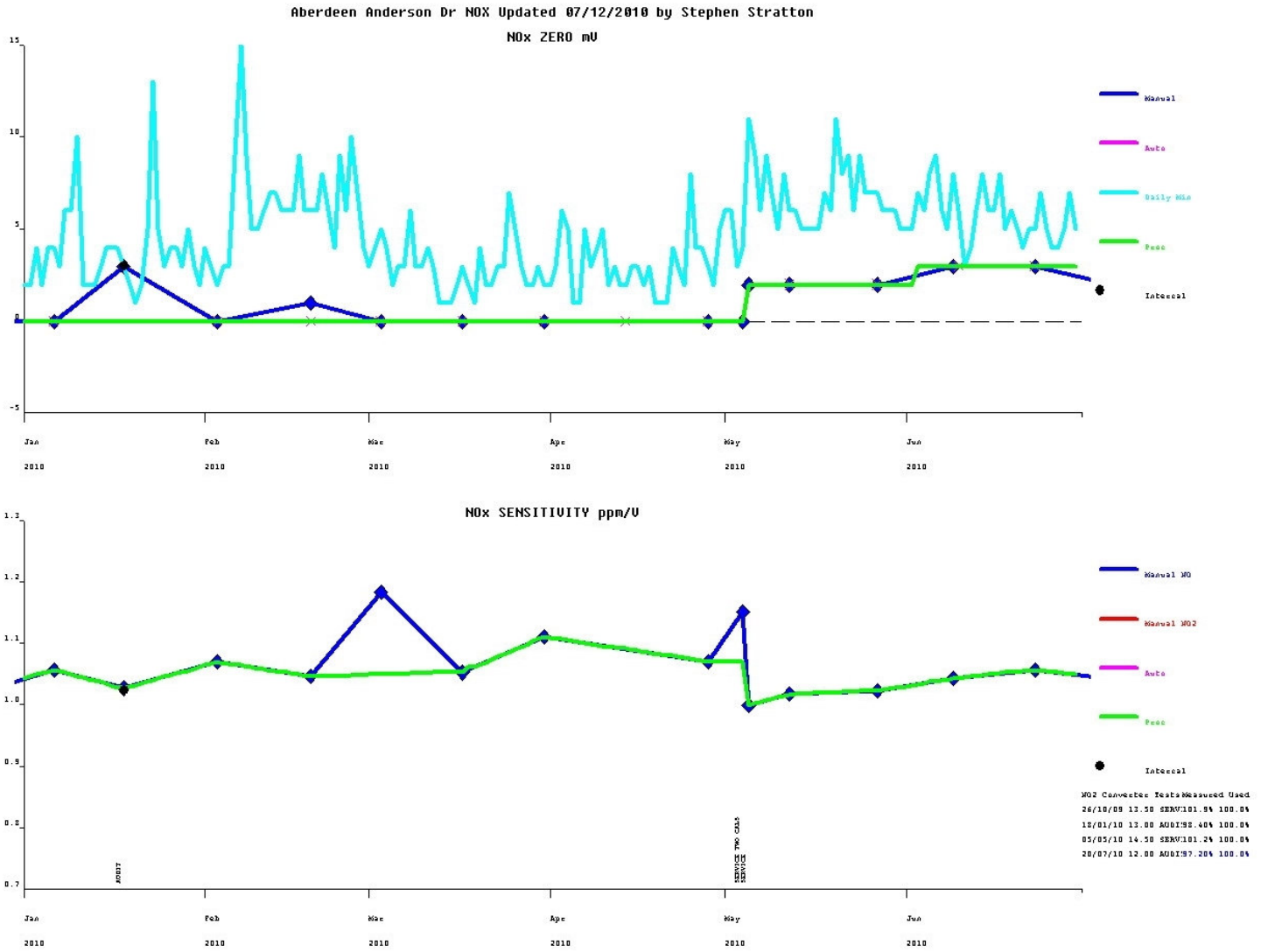
NO_x Converter Efficiency found between 95% - 98%: Aberdeen Anderson Drive, North Lanarkshire Shawhead, West Lothian Whitburn, East Dunbartonshire Kirkintilloch, Falkirk Grangemouth Moray.

PM_{10} Faults:
7 Flow Faults: - Kilmarnock (15%), Musselburgh (21%), East Renfrewshire Sheddens (96.5%), Grangemouth MC (15%), Pathhead (19%), Irvine (18%), Ayr (15%).

Leak Faults: Glasgow Nithdale Road, Dalkieth, Chapehall, Motherwell, East Kilbride.

K_0 faults: Pathhead (2.7%) and Paisley Gordon Street (2.5%)

Data Ratification



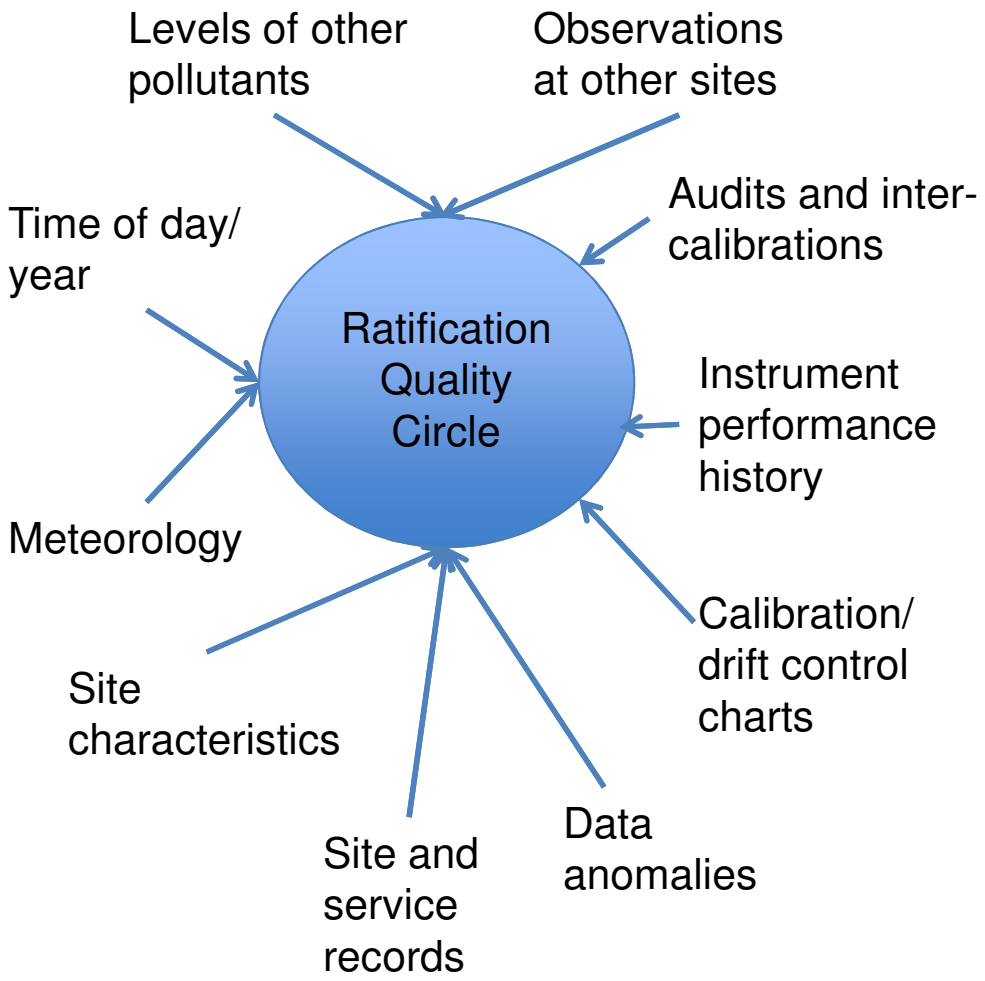
Data Investigation

- Calibration history;
- Comparison of all pollutants at the site;
- Comparison with other sites;
- Identify episode periods;
- Diurnal average;
- NO/ NO_x ratio;
- FDMS – use of diagnostic information;

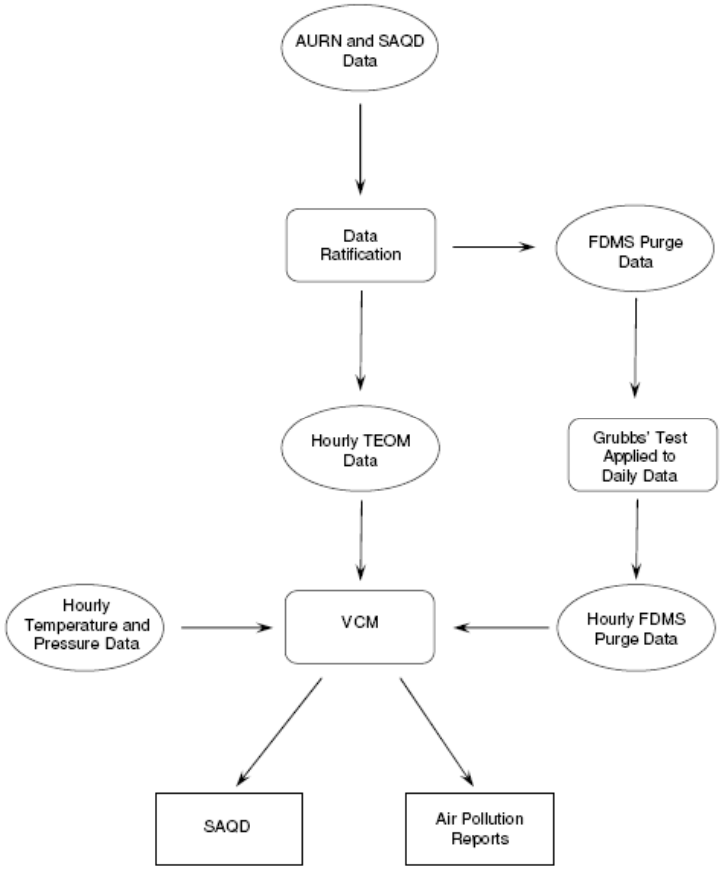
Quality Circle

- Quality Circle
  - Project Manager
  - Data Manager
  - Field Manager
  - Other Senior Staff

- Aims of the Quality Circle
  - Final decisions on data
  - Identification of quality issues
  - Feedback via outcomes and recommendations



PM Volatile Correction Model



- Correct TEOM data for loss of volatile particles;
- FDMS analyser measures volatile particles;
- Volatile particle concentrations are similar over regional scale;
- Use volatile measurement from nearby FDMS (<130 km) to correct TEOM data;

- Hourly average temps – Edinburgh Airport;
- Hourly average pressures – Edinburgh Gogarbank;
- Hourly average purge – all SAQD and AURN FDMS;

FDMS Monitoring Sites used in VCM Correcting TEOM Data from Aberdeen and Central Scotland Monitoring Sites

AEA

TEOM Locations	FDMS Sites used in VCM	Monitoring Network
Aberdeen	Aberdeen PM_{10}	AURN
	Aberdeen $PM_{2.5}$	AURN
	Angus Forfar	SAQD
	Fife Cupar	SAQD
Central Scotland	Angus Forfar	SAQD
	Auchencorth Moss PM10	AURN
	Auchencorth Moss PM25	AURN
	East Dunbartonshire Kirkintilloch	SAQD
	East Renfrewshire Sheddens	SAQD
	Edinburgh St Leonards PM_{10}	AURN
	Edinburgh St Leonards $PM_{2.5}$	AURN
	Fife Cupar	SAQD
	Fife Rosyth	SAQD
	Glasgow Abercromby Street	SAQD
	Glasgow Broomhill	SAQD
	Glasgow Centre PM_{10}	AURN
	Glasgow Centre $PM_{2.5}$	AURN
	Glasgow Kerbside PM_{10}	AURN
	Glasgow Kerbside $PM_{2.5}$	AURN
	Glasgow Nithsdale Road	SAQD
	Grangemouth PM_{10}	AURN
	Grangemouth $PM_{2.5}$	AURN
	Paisley Gordon Street	SAQD
	Paisley St James St	SAQD
	South Lanarkshire East Kilbride	SAQD
	South Lanarkshire Raith Interchange	SAQD
	West Dunbartonshire Clydebank	SAQD
	West Lothian Broxburn	SAQD
	West Lothian Linlithgow High Street	SAQD
	West Lothian Whitburn	SAQD

Example of an Air Pollution Summary Sheet

Air Pollution Report

Produced by AEA on behalf of the Scottish Government

GLASGOW BYRES ROAD
1st January to 30th June 2010

These data have been fully ratified by AEA

POLLUTANT	CO	PM_{10}*+	NO_2	NO_X
Number Very High	0	0	0	-
Number High	0	0	0	-
Number Moderate	0	18	0	-
Number Low	4317	4297	4314	-
Maximum 15-minute mean	3.8 mg m^{-3}	342 µg m^{-3}	197 µg m^{-3}	980 µg m^{-3}
Maximum hourly mean	2.4 mg m^{-3}	157 µg m^{-3}	189 µg m^{-3}	947 µg m^{-3}
Maximum running 8-hour mean	1.8 mg m^{-3}	98 µg m^{-3}	154 µg m^{-3}	684 µg m^{-3}
Maximum running 24-hour mean	1.1 mg m^{-3}	68 µg m^{-3}	130 µg m^{-3}	524 µg m^{-3}
Maximum daily mean	0.9 mg m^{-3}	68 µg m^{-3}	128 µg m^{-3}	518 µg m^{-3}
Average	0.3 mg m^{-3}	28 µg m^{-3}	46 µg m^{-3}	119 µg m^{-3}
Data capture	99.4 %	99.1 %	99.3 %	99.3 %

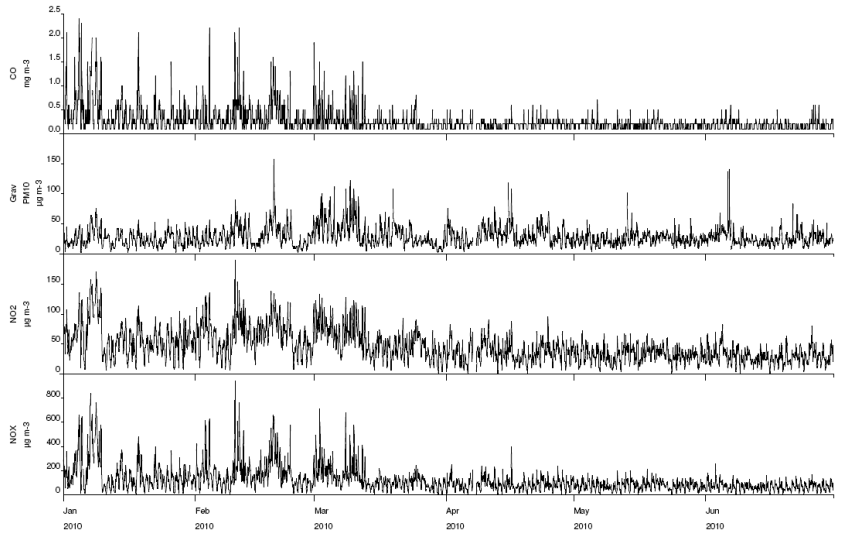
* PM_{10} Indicative Gravimetric Equivalent µg m^{-3}
+ PM_{10} as measured by a TEOM using a gravimetric factor of 1.3 for Indicative Gravimetric Equivalent
All mass units are at 20°C and 1013 mb
NO_X mass units are NO_X as NO_2 µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
Carbon Monoxide	Running 8-hour mean > 10.0 mg m^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	7	7
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Air Pollution Report

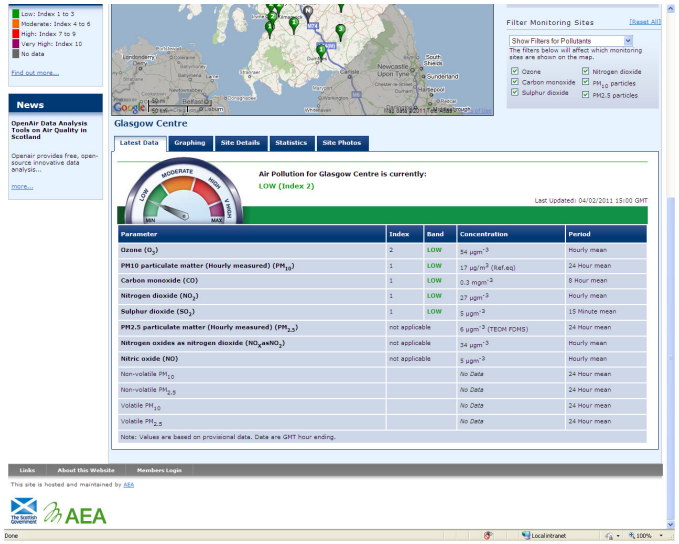
Produced by AEA on behalf of the Scottish Government

Glasgow Byres Road Air Monitoring
Hourly Mean Data for 1st January to 30th June 2010

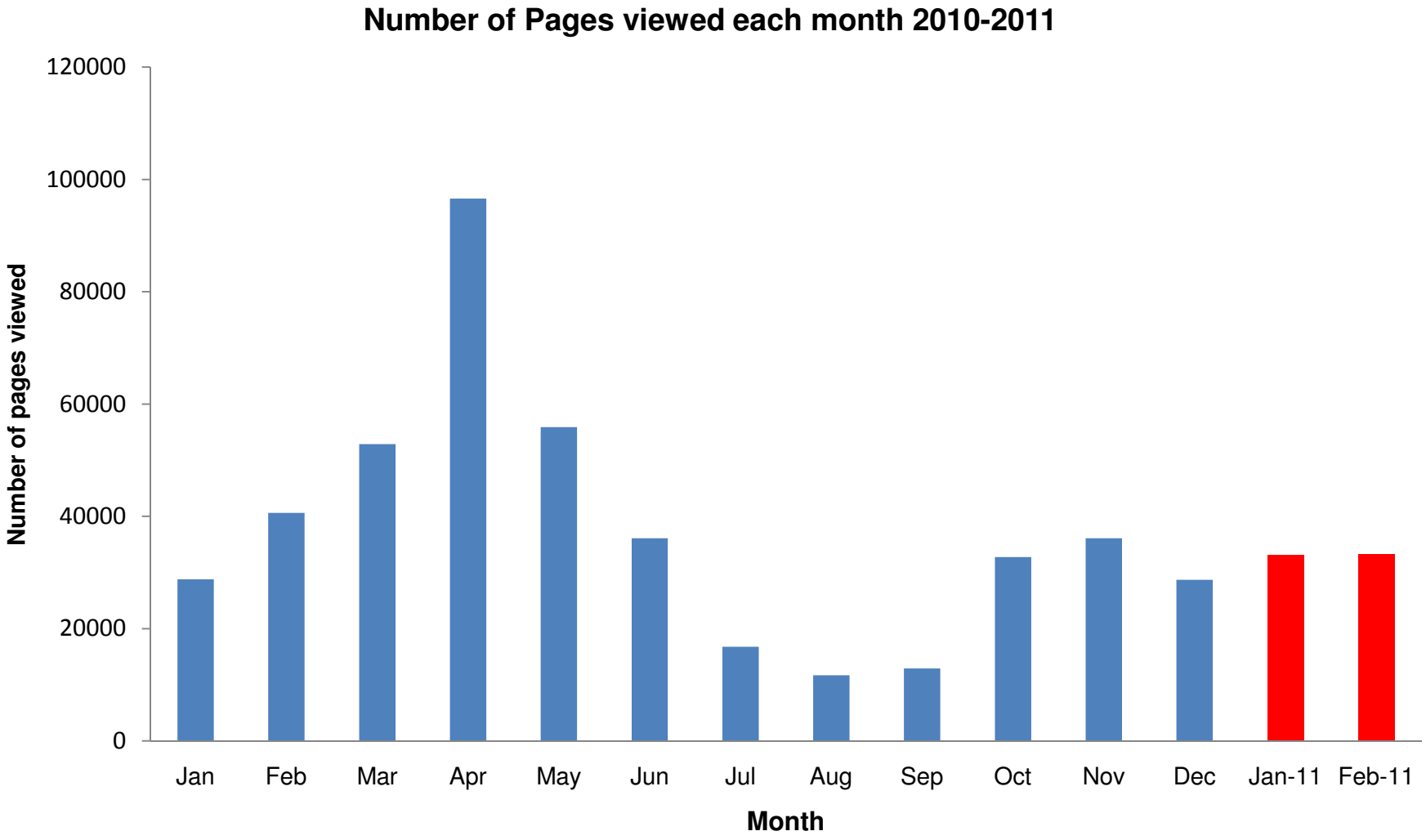


Usage of data

- Full public access via website, database and email air quality bulletins;
- Distribution of annual brochure and project report;
- Students asking for assistance;
- Cited as a data source in Key Scottish Environment Statistics;
- Air Quality Indicator
- Know and Respond Service

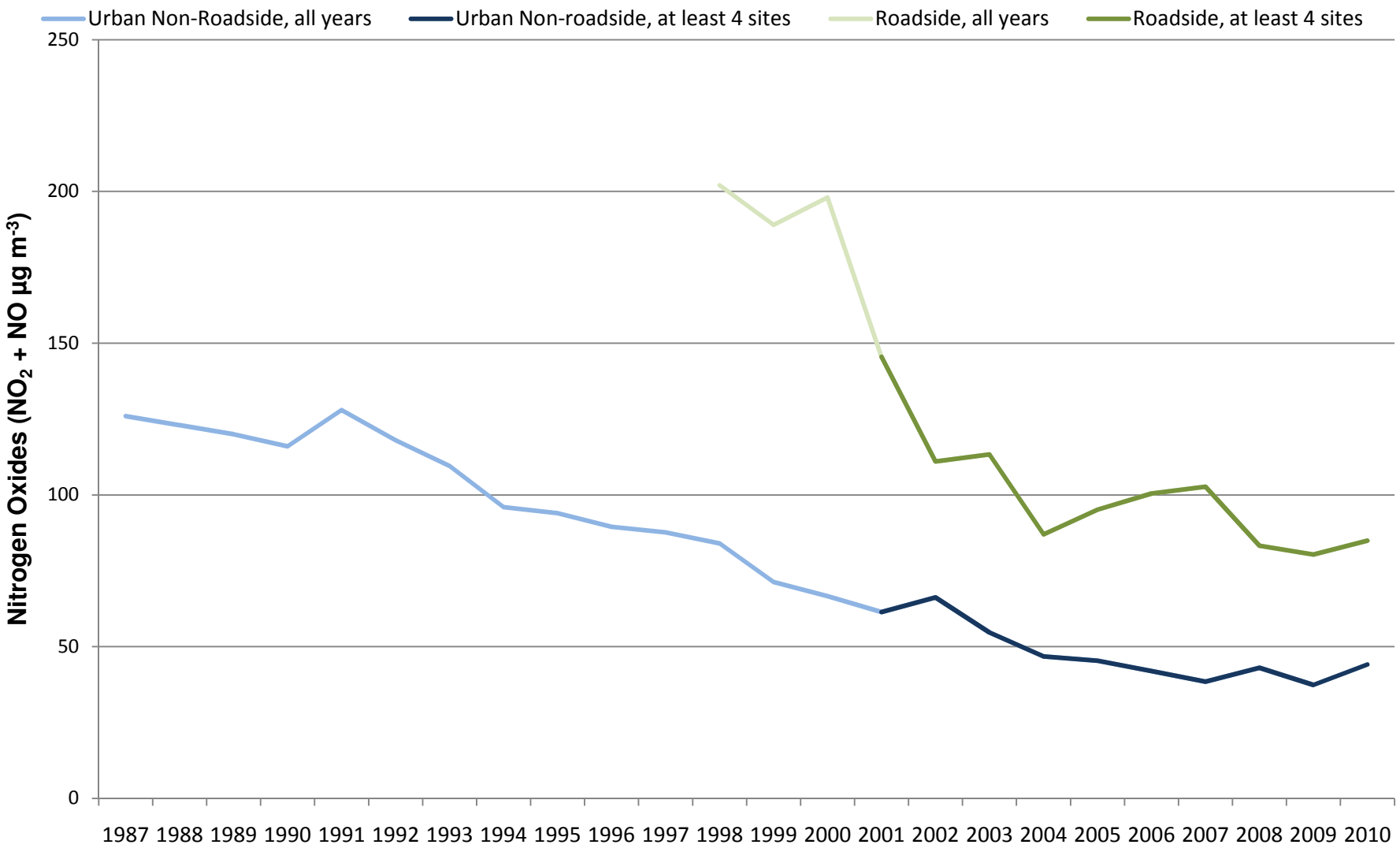


Website Hits



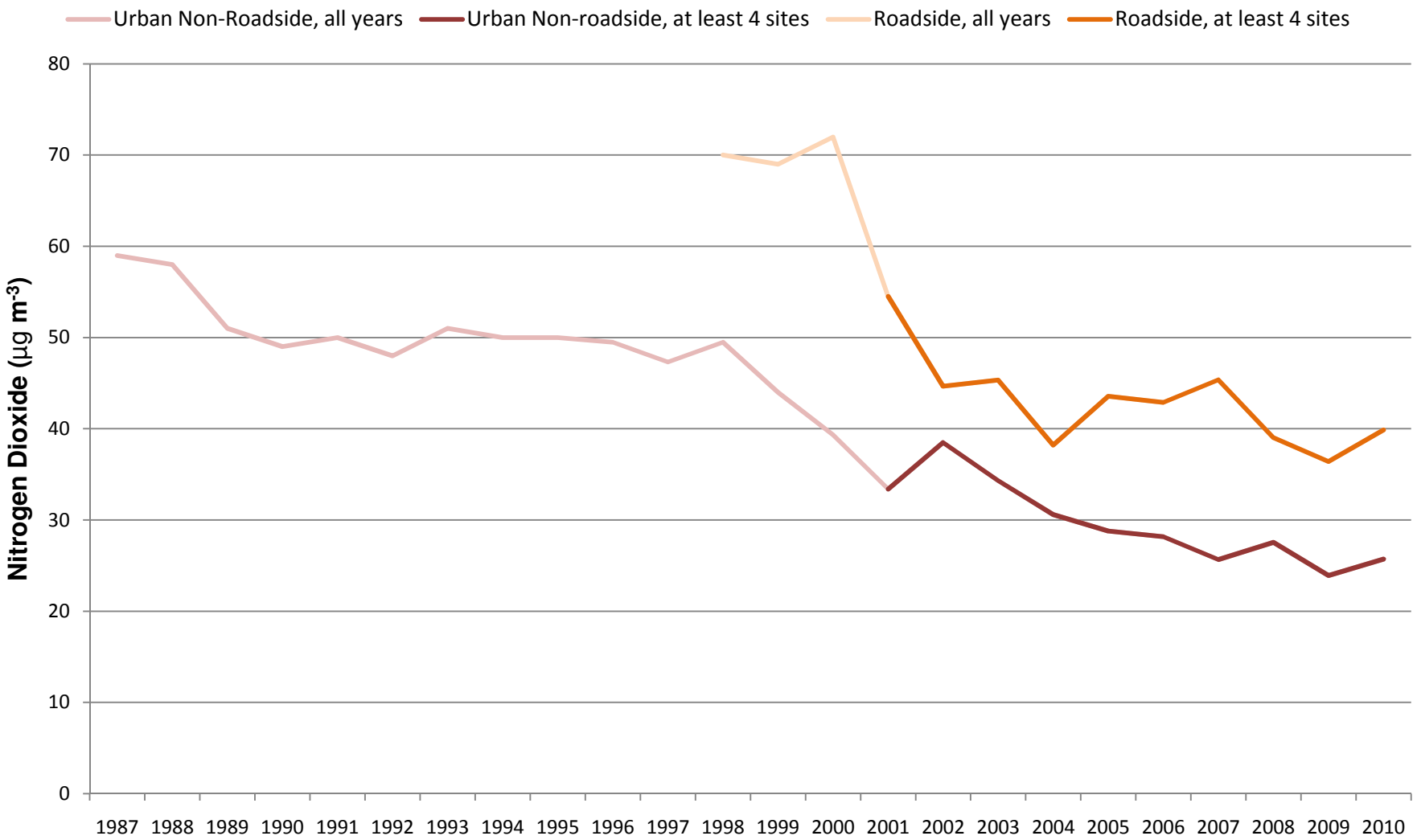
Air Quality Trends for Scotland

Trends in annual mean NO_x concentration at urban background and roadside sites in Scotland: 1987 - 2010



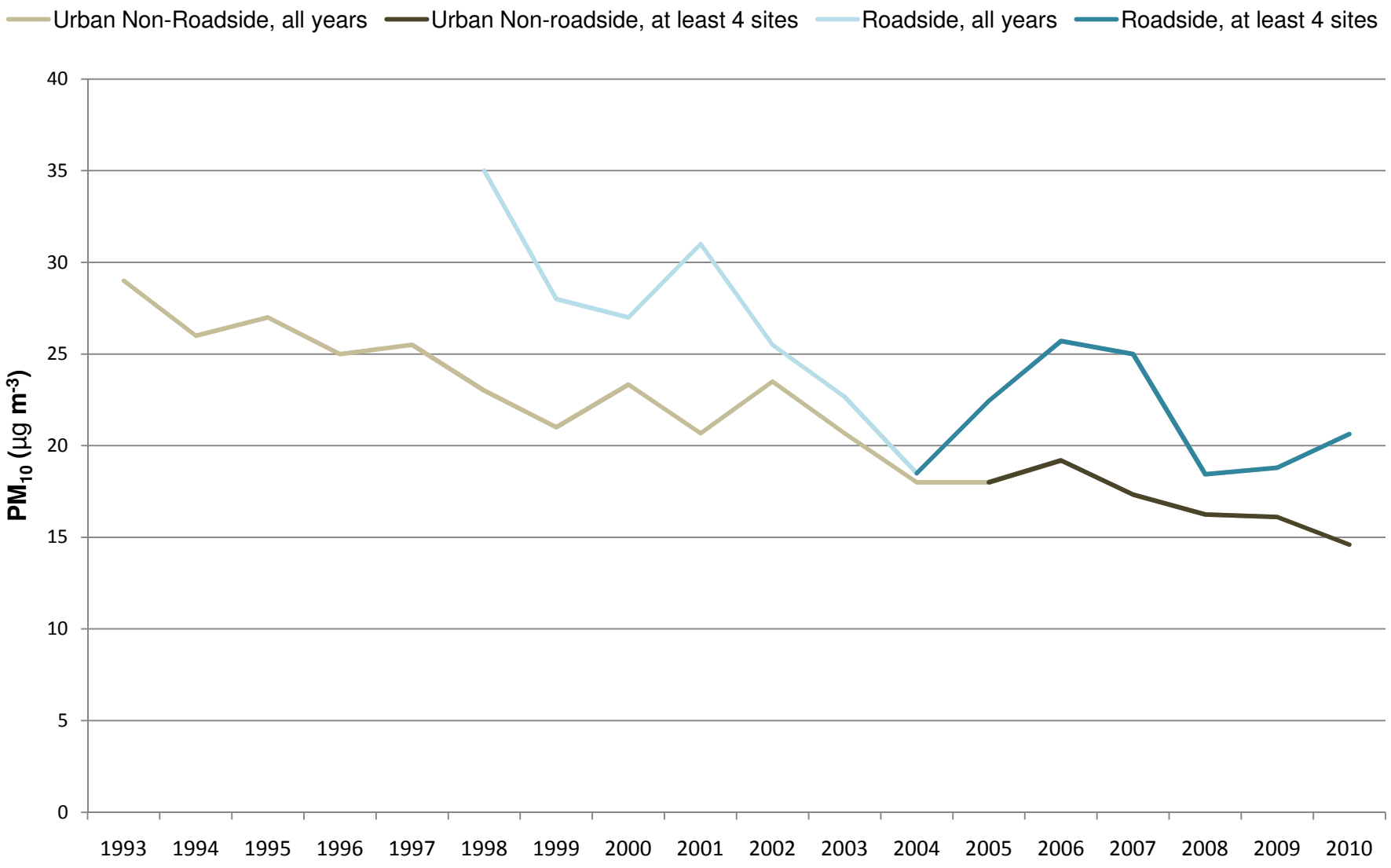
Trends in annual mean NO_2 concentration means at urban background and roadside sites in Scotland: 1987 - 2010

AEA



Trends in annual mean ground-level ozone concentration at sites in Scotland: 1987 - 2010

Trends in annual mean concentration of PM_{10} particulate matter at urban background and roadside sites in Scotland: 1993 - 2010



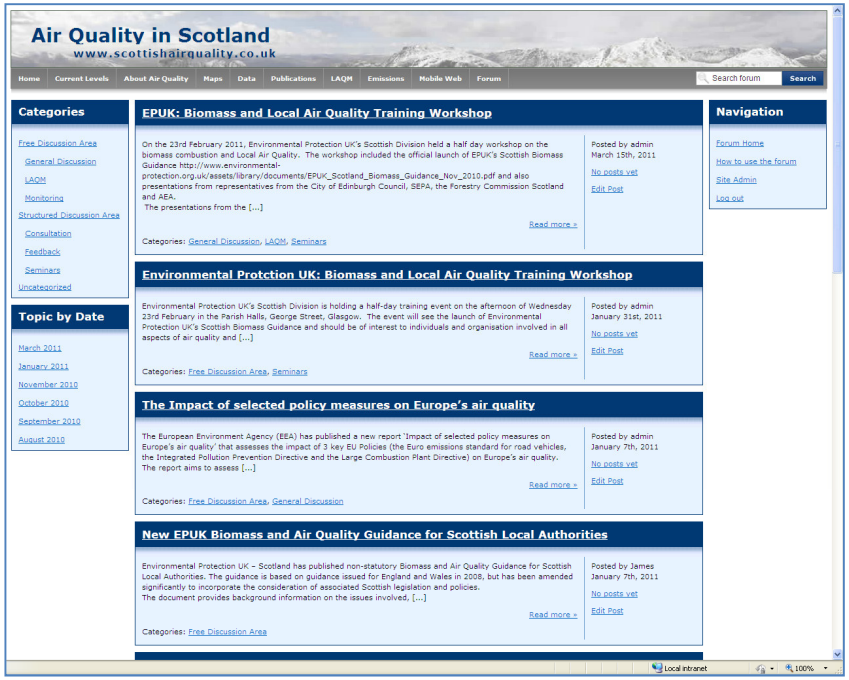
Scottish Air Quality Database and Website

AEA

- Some other Developments 2010-2011

Some other Developments 2010-2011

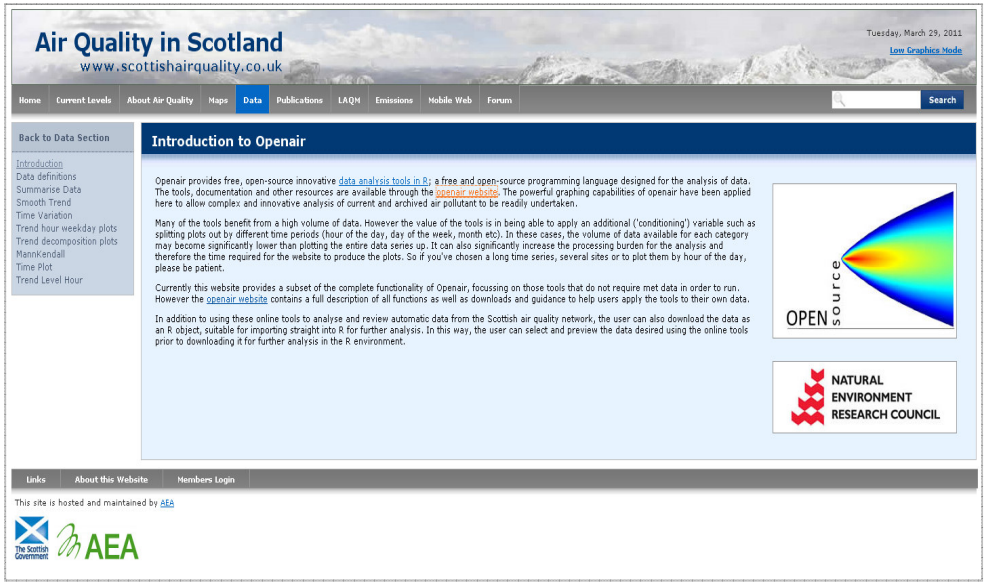
- Air Quality Forum



http://www.scottishairquality.co.uk/forum/

- Know and Respond Alert System

Some other Developments 2010-2011



- Openair

- Children's Website

AEA

Any Questions?