



Comparing NAEI emissions with the LAEI

Tony Bush

NAEI stakeholder meeting - Monday 16th July

Overview

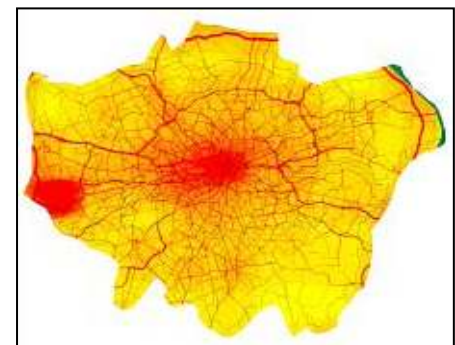
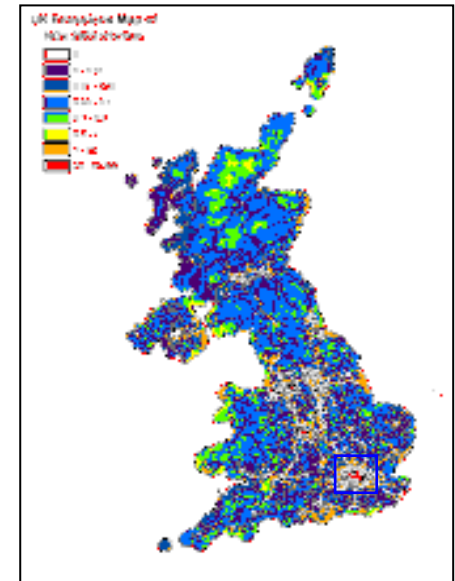
- Objectives of this study
- Background to the inventories
- Key issues on inventory preparation
- How do estimates compare
- Reasons for variability & the way forward

Objective of this study

- To review emissions estimates for the London area provided by the 2003 NAEI and LAEI
- To identify and attempt to explain differences
- Broaden the dialogue with inventory compilers
- Driver forward improvements in both NAEI and LAEI

Background to the inventories

- The NAEI is a National inventory focussing on
 - Providing data for UK wide AQ assessments
 - Supporting national policy/strategy (AQS)
 - Servicing UK reporting commitments (UNFCCC/CLRTAP)
- The LAEI is focussed on London
 - Providing data for AQ assessments inside M25
 - Supporting UK & Mayoral policy/strategy (AQS/MAQS)
 - Providing a unique London centric view point key issues



Key issues on inventory preparation

- **NAEI is largely top-down**

- ⇒ Key issue is spatial disaggregation at local level

- **National scale necessitates a simplified approach**

- ⇒ Major and minor road flows, vkm & speeds

- ⇒ Nationally averaged vehicle fleets

- ⇒ Nationally averaged trip assumption for cold starts

- **Estimates based on recognised sectoral standards (UNECE SNAPs)**

- ⇒ Sectoral compatibility

- **LAEI is bottom-up**

- ⇒ Key issue is generating a complete picture of level of activity

- **Local scale enables greater detail**

- ⇒ Major and minor roads flows, vkm & speeds

- ⇒ London specific vehicle fleets

- ⇒ London specific trip assumptions for cold starts

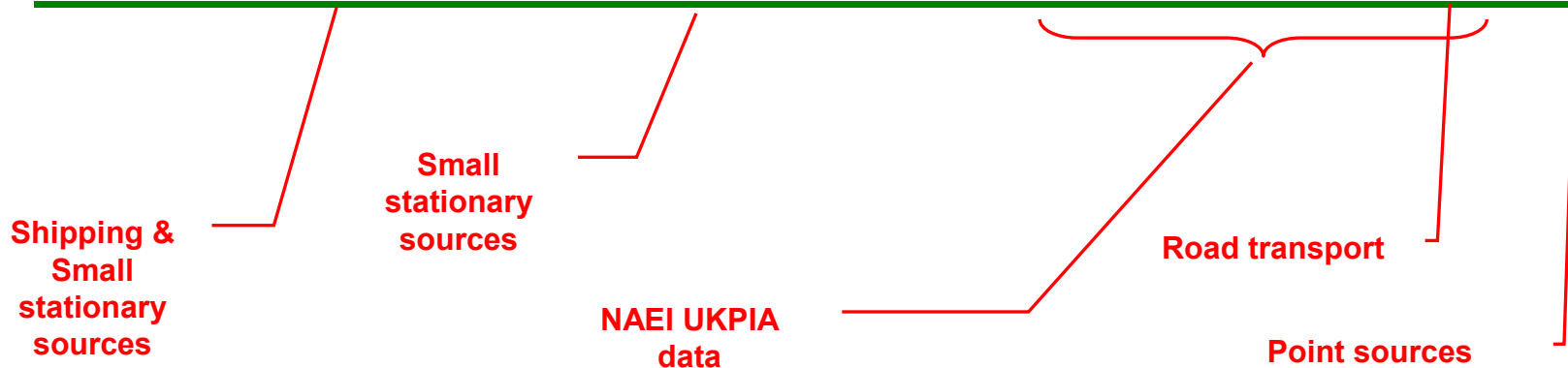
- **Estimates not based on UNECE SNAP codes**

- ⇒ Sectoral compatibility

Comparing emission estimates – Totals

Emissions totals 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	Butadiene	PM10
LAEI	2,381	89,837	127,397	39,201,795	74,030	721	164	4,127
NAEI	3,715	101,685	264,557	36,327,863	83,472	928	355	6,017
NAEI / LAEI (%)	156%	113%	208%	93%	113%	129%	217%	146%



Comparing emission estimates – Point sources

Emissions from Part A processes 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	1,3 Butadiene	PM10
LAEI	728	4,730	2,370	5,437,880	77	0	-	0.1
NAEI	885	4,774	2,098	3,672,647	484	4	0.01	134.1
NAEI / LAEI (%)	122%	101%	89%	68%	628%	6%	-	10,4733%

PS & landfills
in LAEI

NAEI UKPIA
data

No PM data in
LAEI Part As

Emissions from small stationary processes 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	1,3 Butadiene	PM10
LAEI	400	14,536	2,125	6,150,422	6,995	150	-	595
NAEI	599	11,756	17,126	6,255,132	24,834	174	14	527
NAEI / LAEI (%)	150%	81%	806%	102%	355%	117%	-	88%

Off road
machinery

Industrial &
Commercial
gas

Off road
machinery

Petrol
distribution

NAEI ind
gas low

National
Atmospheric
Emissions
Inventory



Comparing emission estimates – domestic fuel use

Emissions from domestic fuel use 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	Butadiene ^{1,3}	PM10
LAEI	116	15,616	6,922	11,805,463	500	45	-	119
NAEI	567	15,596	11,466	11,128,954	685	70	-	239
NAEI / LAEI (%)	487%	100%	166%	94%	137%	156%	-	200%



Non-gas domestic fuel

Comparing emission estimates – Road transport

Road transport 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	1,3 Butadiene	PM10
LAEI	372	45,590	96,854	11,667,871	15,934	408	153	2,995
NAEI	317	63,267	19,7717	13,207187	23,032	482	290	4,040
NAEI / LAEI (%)	85%	139%	204%	113%	145%	118%	190%	135%

Anomalous

Vkm and fuel consumption 2003

	Vehicle kilometres (millions)	Fuel consumption (tonnes)	Fuel use per kilometre (tonnes/million km)
LAEI	75,406	3,649,182	48
NAEI	53,004	4,166,257	79
NAEI / LAEI (%)	70%	114%	162%

More fuel
efficient
fleet in
LAEI

Significant differences in speed, efficiency & fleet

National
Atmospheric
Emissions
Inventory

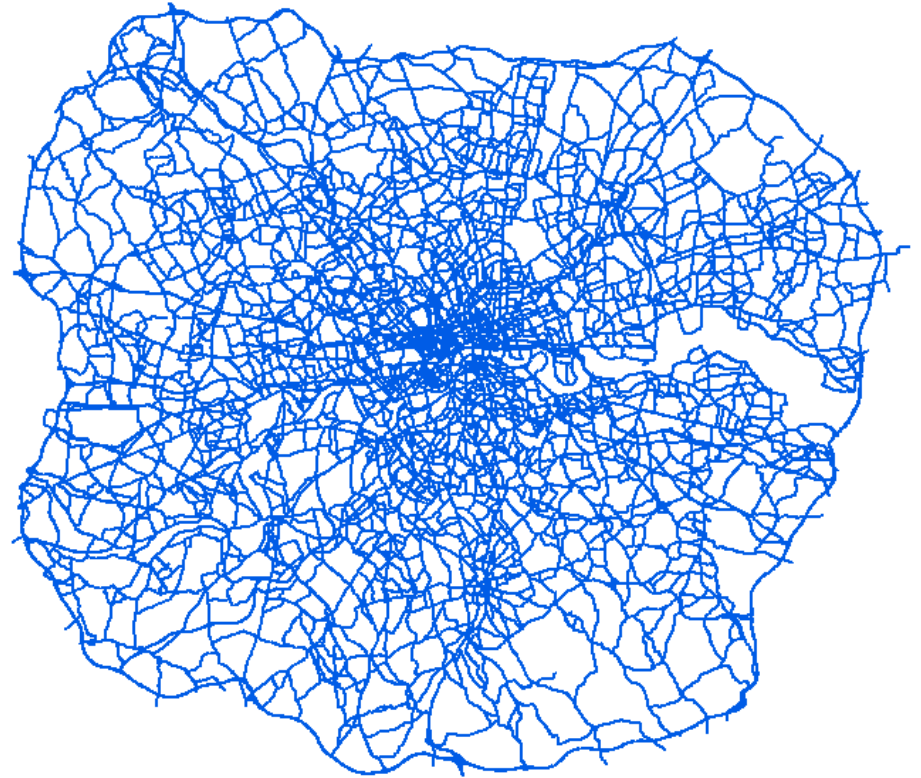


Comparing emission estimates – Road network

NAEI road network 2003



LAEI road network 2003



Comparing emission estimates – Cold starts

Cold start emissions 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	1,3 Butadiene	PM10
LAEI	-	460	10753	-	1,197	-	-	110
NAEI	-	7,214	83,408	-	5,141	179	46	358
NAEI / LAEI (%)	-	1,568%	776%	-	430%	-	-	325%

COPERT assumptions, national vs London specific trip averages

National
Atmospheric
Emissions
Inventory



Comparing emission estimates – Other transport

Emissions from rail transport 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	1,3 Butadiene	PM10
LAEI	277	3,702	1,349	22,1449	692	-	-	138
NAEI	48	512	132	13,527	59	0.039	1.840	11
NAEI / LAEI (%)	17%	14%	10%	6%	9%	-	-	8%

Activity data; DeltaRail vs DfT

Emissions from aviation 2003

	SO ₂	NO _x	CO	CO ₂	NMVOC	Benzene	1,3 Butadiene	PM10
LAEI	299	4,241	4,115	1,154,862	3	12	10	119
NAEI	287	4,185	22,336	273,023	428	15	14	23
NAEI / LAEI (%)	96%	99%	543%	24%	16,105%	124%	134%	19%

Activity data error & compilation error

National
Atmospheric
Emissions
Inventory



Summary

- NAEI totals for the London are higher than the LAEI
- Comparison is complex & variable by pollutant & sector
- Sectoral incompatibility greatly confuses small stationary sources
- Part As show good correlation but effected by data anomalies & omission of UKPIA data
- LAEI RT fleet appears to be more fuel efficient
- Applicability of national average RT assumptions to London needs further investigation
- Rail & aviation affected by differences in activity & data anomalies
- Differences don't greatly effect outputs of AQ models used in the AQSR

Pollutant	Sectors with greatest differential in emission
SO ₂	Domestic fuel use Part B processes & boilers Road transport
NO _x	Road transport Cold starts Non-gas domestic fuel use Shipping
CO	Part A processes Cold starts Non-gas domestic fuel use Shipping Air
CO ₂	Domestic gas use Shipping
NM VOC	Part A & B processes Cold starts Non-gas domestic fuel use Shipping Air
Benzene	Cold starts Non-gas domestic fuel use Gas leakage
1,3-butadiene	Road transport Cold starts Part A & B processes
PM ₁₀	Part A processes Cold starts Non-gas domestic fuel use Shipping

Looking forward

- New and improved links with the LAEI have been established
 - Routine dialogue
 - NAEI presence on the LAEI user group
 - 2003 comparison has fed into the compilation of the 2004 LAEI
- Work towards a uniform sectoral standard
- Update of NAEI cold start methodology (in hand)
- Reconciliation of NAEI's major/minor roads methodologies against London traffic fleet, counts, speeds & road network
- Inclusion of appropriate & accurate emission data in the NAEI from local inventories UK wide where available

Any Questions ?



N ational
A tmospheric
E missions
I nventory

