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REPUBLIC OF SOUTH AFRICA

TOWARDS THE DEVELOPMENT OF A NATIONAL VEHICLE EMISSIONS STRATEGY

Session 2

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Orion Safari Lodge.



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Outline

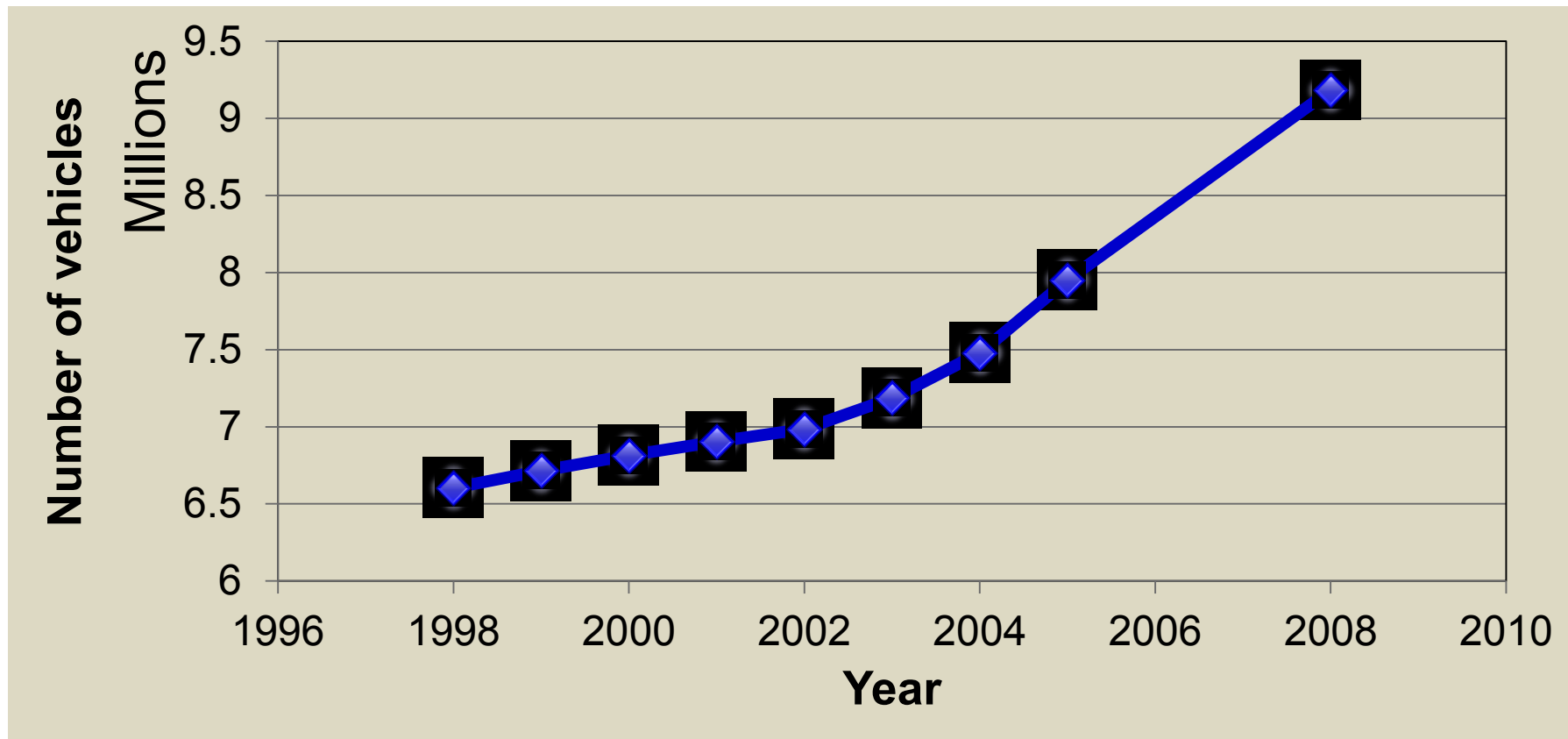
- Why the strategy
- Project progress
- International and national reviews
- Emission inventories
 - Methodologies
 - Results
- Impact in ambient air quality



Why Vehicle Emissions

- Increase in population of on-road vehicles

~ 10M 2012



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The 2003 Joint Strategy

DEA

Develop vehicle emissions standards

- Role: DTI - SABS and NRCS

DoE

Development of fuel specification/regulations

- 2006 Clean fuels 1 (Euro 2)
- 2012 Clean fuels 2 (Euro 4&5)

1. Challenge: old cars with no adequate emission control
2. Establish the nature and extent of the problem



The Strategy

- Strategy objectives

“ensure an environment that is not harmful ...by controlling emissions from road-going motor vehicles”

- Progress to-date

- Establishment of the status quo
- Development of intervention strategies
- Development of emission scenarios under different strategies
- Cost benefit analysis of interventions
- Final strategy



Desktop Review

- International interventions
 - Fuel economy standards
 - Emission standards
 - Fuel quality standards
 - Vehicle inspections (to encourage vehicle maintenance)
 - Declaration of low emission zones
- National interventions
 - Clean Fuels 2
- Local interventions
 - Vehicle emission testing
 - Improved public transport



Emission Inventory

- **Methodology**

- $E_i = \sum_j (\sum_m (FC_{j,m} \times EF_{i,j,m}))$

- Emission factors (g/kg) for each pollutant for a given vehicle type and fuel (IPCC and EEA)
- Number of vehicles (types) per jurisdiction (SAPIA)
- Fuel sales data per jurisdiction/ consumption (DME)
- Correction of fuel sales data



Emission Inventory Data

- Number of vehicle per province (2007)

Vehicle Class	Vehicle population per province (thousands)									RSA
	GA	KZ	WC	EC	FS	MP	NW	LI	NC	
Motorcycles	124	31	63	19	19	18	17	10	7	312
Passenger cars	2 262	773	979	347	253	272	263	196	90	5 437
Light duty vehicles	584	268	263	152	104	135	120	137	57	1 822
Heavy duty vehicles	113	47	34	23	18	22	16	17	8	302
Buses	13	6	5	3	1	3	2	3	1	39



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Emission Inventory Data

- Fuel consumption per province

Fuel Type	Fuel Consumption (m ³ /year)									Total
	EC	FS	GP	KZN	L	MP	NW	NC	WC	
Diesel 50	29 204	15 334	170 583	53 432	19 985	40 725	15 762	1 603	47 281	393 909
Deisel 500	911 677	870 519	2 158 638	1 614 223	418 440	942 863	545 320	304 179	1 214 029	8 979 887
Gasoline	972 300	671 828	4 364 137	1 760 249	543 033	765 794	500 712	177 622	1 454 331	11 210 007
% of total	9.29	7.57	32.52	16.65	4.77	8.50	5.16	2.35	13.19	



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Emission Inventory Data

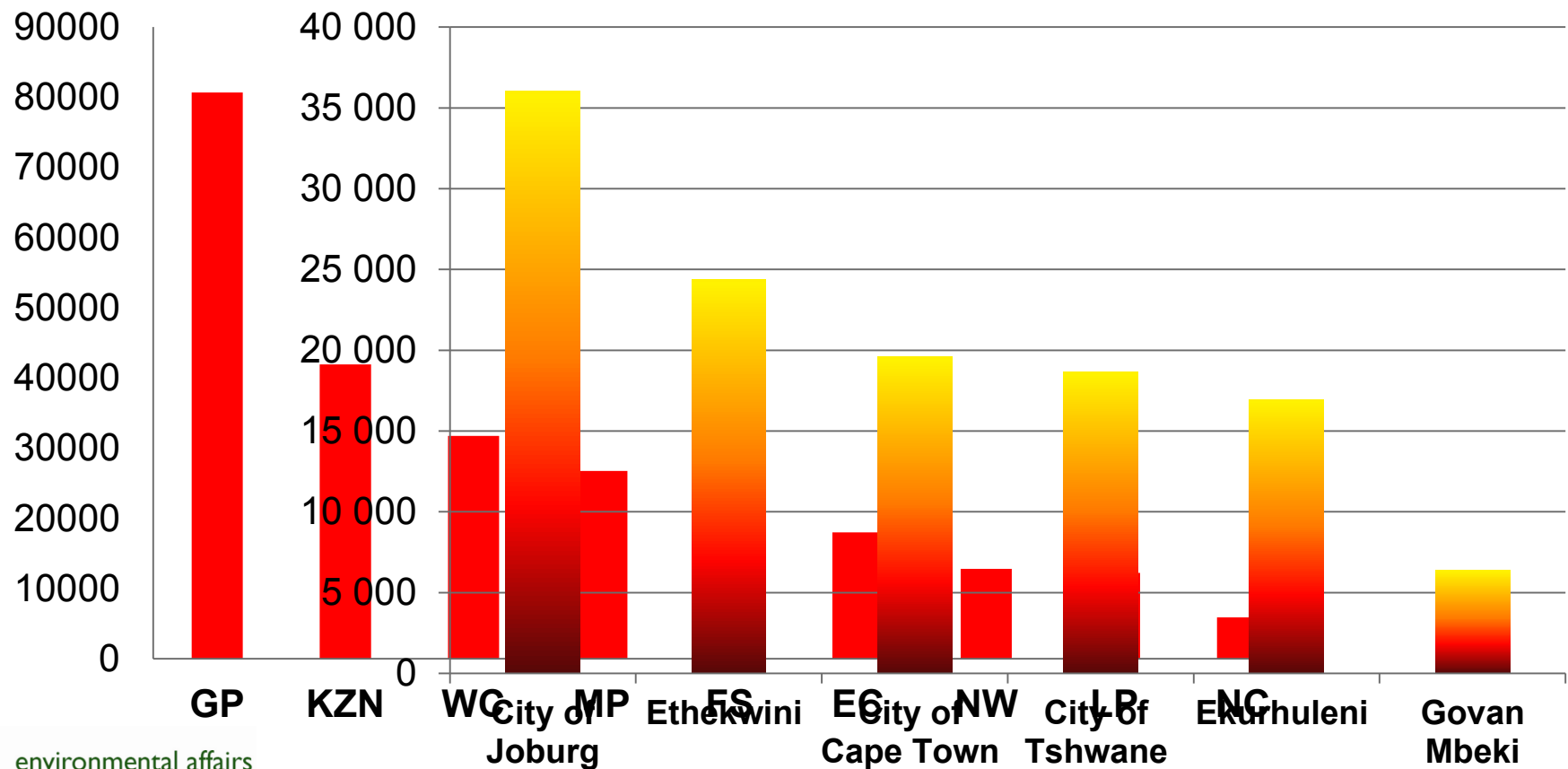
- Emission factors (IPCC and EEA)

Category	Fuel	Emission Factor (g/kg Fuel)						
		NO _x	SO ₂	CO	PM ₁₀	NMVO C	Lead	CO ₂ ¹
Motorcycles	Gasoline	9.50	-	490	2.7	114	0.00007	69 300
Passenger cars	Gasoline	14.5	-	132	0.037	14	0.000017	69 300
	Diesel 50	11	0.1	4.7	1.7	1.1	0.000032	74 100
Light-duty vehicles	Gasoline	24	-	155	0.03	14	0.000017	69 300
	Diesel 500	11	1	4.7	1.7	1.1	0.000032	74 100
Heavy-duty vehicles and buses	Diesel 500	37	1	8	1.2	1.6	0.000032	74 100



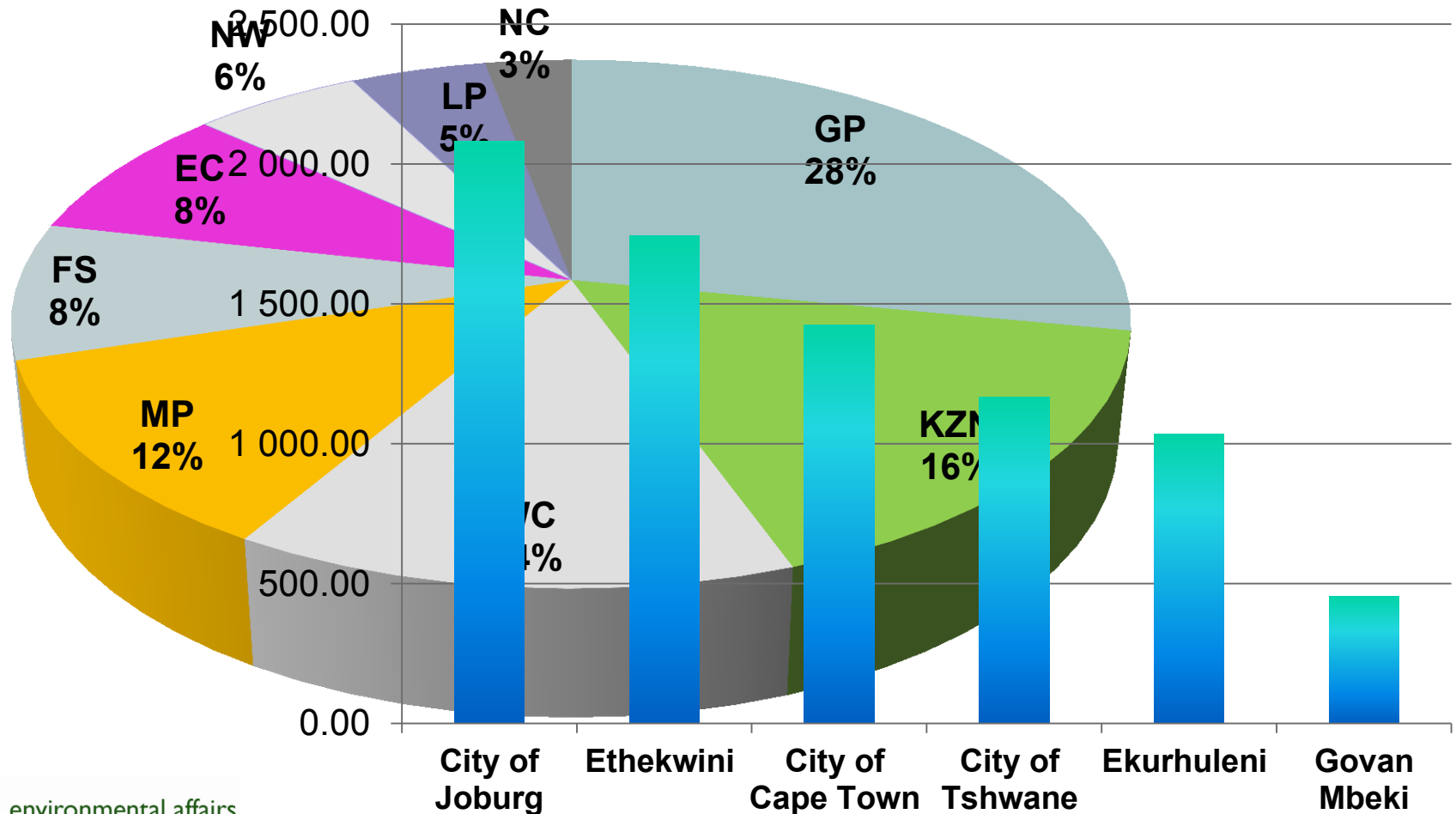
Emission Inventory Results

- *Provincial assessment in the report*
- **NO_x Emissions = 249 354 t/y** countrywide



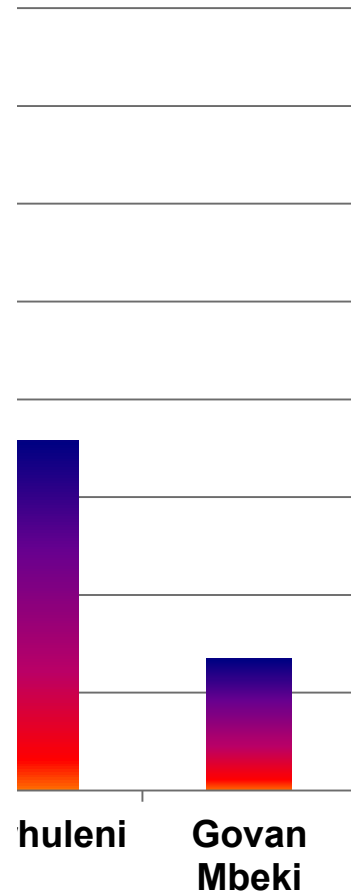
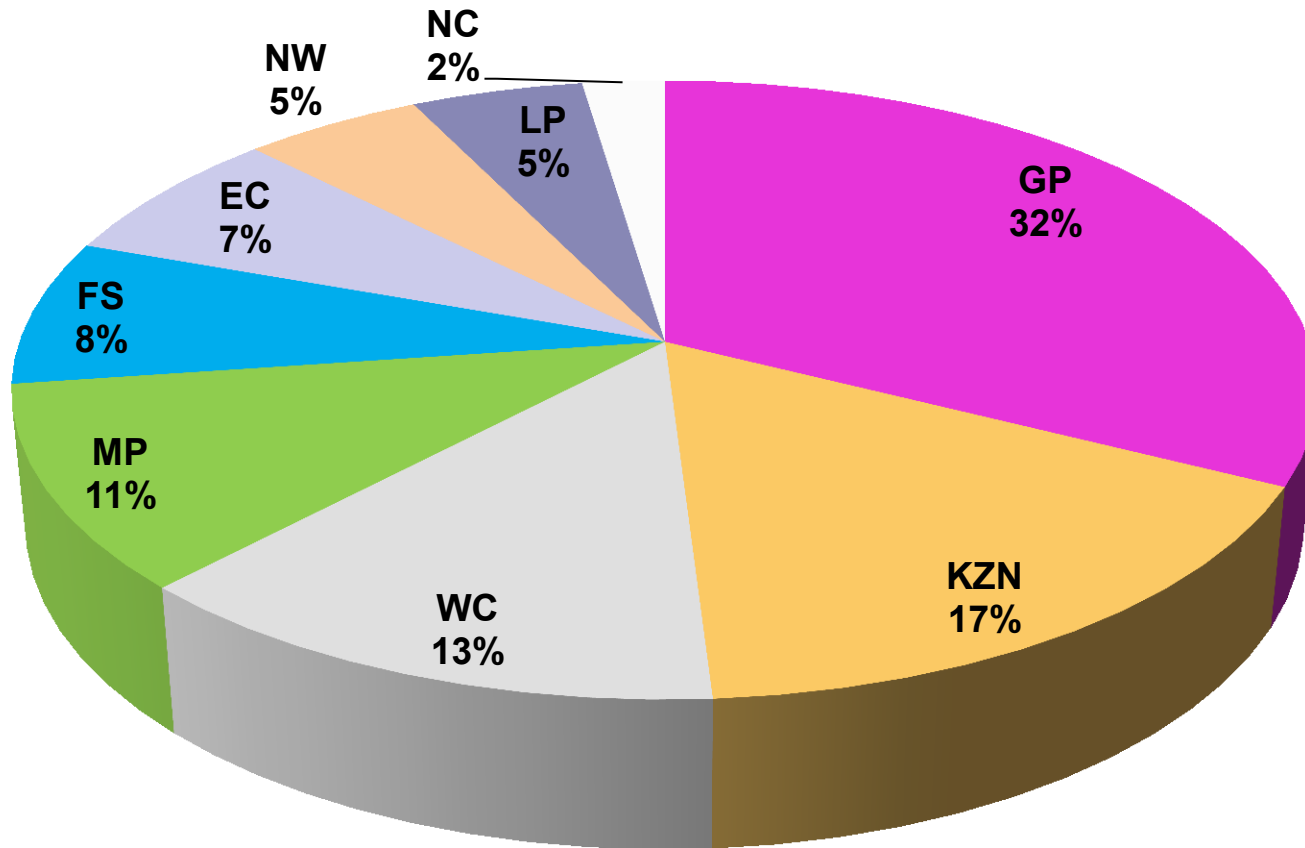
Emissions Inventory Results

- PM₁₀ Emissions = 17 373 t/y countrywide



Emission Inventory Results

- CO₂ Emissions = 25 Million t/y countrywide



Monitoring Data

- City of Joburg
 - Buccleuch
 - Newton
- eThekweni Municipality
 - Ganges
 - City Hall
 - Warwick Avenue
- City of Cape Town
 - Foreshore
- Vaal Triangle
 - Kliprivier



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Monitoring Data

- **PM₁₀ – Monitored**
 - 24hr std = **120 µg/m³**; 4 exceedences
 - 1 yr average = **50 µg/m³**

Monitoring Station	Municipality	Year	24-Hour average Maximum (µg/m ³)	1-Year Average (µg/m ³)	No. of 24-Hour Average Exceedences
Buccleuch	City of Joburg	2010	112	53	0 (26)
		2011	128	46	2 (23)
Newtown	City of Joburg	2010	206	46	8 (29)
		2011	158	46	7 (24)
Ganges	eThekweni	2009	203	41	6 (26)
City Hall		2009	126	32	1 (7)
Kliprivier	Sedibeng	2010	217	63	12 (99)
		2011	304	53	9 (39)
Foreshore	City of Cape Town	2011	90	23	0 (2)



Monitoring Data

- PM_{2.5} – Monitored
 - 24hr std = **65 µg/m³**; 4 exceedences
 - 1 yr average = **25 µg/m³**

Monitoring Station	Municipality	Year	24-Hour Average Maximum (µg/m ³)	1 –Year Average (µg/m ³)	No. of 24-Hour Average Exceedances
Buccleuch	City of Joburg	2010	112	52	42
		2011	111	41	28
Kliprivier	Sedibeng	2010	150	49	43
		2011	191	33	23



Monitoring Data

- NO_x – Monitored
 - 1hr std= 106 ppb; 88 exceedences
 - 1yr average = 40 ppm

Monitoring Station	Municipality	Year	1-Hour Maximum (ppb)	1-Year Average (ppb)	No. of 1-Hour Exceedences
Buccleuch	City of Joburg	2010	127	33	15
		2011	756 (?)	110 (?)	495 (?)
Newtown	City of Joburg	2010	76	8	0
		2011	9	1	0
Ganges	eThekweni	2009	200	23	24
Warwick		2009	128	17	18
City Hall		2009	143	17	1
Kliprivier	Sedibeng	2010	115	22	2
		2011	208	16	4
Foreshore	City of Cape Town	2011	245	34	38



Monitoring Data

- SO₂ – Monitored
 - 1hr = 134 ppb; 88 exceedences
 - Annual = 19 ppb

Monitoring Station	Municipality	Year	SO ₂ 1-Hour Maximum (ppb)	SO ₂ 1-Year Average (ppb)	No. of 1-Hour Exceedences
Buccleuch	City of Joburg	2010	73	9	0
		2011	36	6	0
Newtown	City of Joburg	2010	-	-	-
		2011	-	-	-
Ganges	eThekweni	2009	74	5	0
Warwick		2009	-	-	-
City Hall		2009	-	-	-
Kliprivier	Sedibeng	2010	74	5	0
Kliprivier		2011	124	5	0
Foreshore	City of Cape Town	2011	-	-	-



Monitoring Data

Air quality compliant with relevant standards at each monitoring station? (Yes or No)

Standard	Monitoring Station						
	Buccleuch	Newtown	Ganges	Warwick	City Hall	Kliprivier	Foreshore
PM ₁₀ : 24-hr (current)	No	No	No	-	No	No	Yes
PM ₁₀ : 1-yr (current)	No	Yes	Yes	-	Yes	No	Yes
PM ₁₀ : 24-hr (2015)	No	No	No	-	No	No	No
PM ₁₀ : 1-yr (2015)	No	No	No	-	Yes	No	Yes
PM _{2.5} : 24-hr	No	-	-	-	-	No	-
PM _{2.5} : 1-yr	No	-	-	-	-	No	-
SO ₂ : 1-hr	Yes	-	Yes	-	-	Yes	-
SO ₂ : 1-yr	Yes	-	Yes	-	-	Yes	-
NO ₂ : 1-hr	No	Yes	No	No	No	No	No
NO ₂ : 1-yr	No	Yes	No	Yes	Yes	No	No
O ₃ : 8-hr running	Yes	Yes	-	-	-	No	-
Benzene: 1-yr	Yes	-	-	-	-	No	-



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Conclusion and Recommendations

- Monitoring: AQ near major traffic routes is not/will not be in compliance with NAAQ Standards by 2015 if nothing is done.
- Inventory: Areas of concern
 - Implications for national planning: GP,KZN, WC, MP (75%)
 - Implications for provincial planning: 80/20 rule
 - Implications for local planning: AQMPs
 - Resource implication: requirement for traffic monitoring stations



Project way forward

- Stakeholder consultations to solicit inputs to the strategy
 - 2012 AQ Workshop
 - Multi-stakeholder meeting (19th Nov)
 - IDTT
 - AQOs
- Scenarios report (cost benefit analysis)
- Strategy report (March 2013)



.....**Thank you**.....



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Status Quo

- **Correction of fuel sales data**

- Diesel 50 is used exclusively by passenger cars;
 - Diesel 500 is not used by passenger cars;
 - Gasoline is not used by HDVs and buses.
-
- the percentage of passenger cars vs light duty vehicles is equivalent to the percentage fuel consumed by passenger cars vs light duty vehicles

