

**Final Report on Particulate Pollution Reduction Strategy in  
Seven Critically Polluted Cities**

In Response to the Hon'ble Supreme Court Order Dated August 14, 2003  
(In the matter of W.P.(C) No.13029 of 1985; M.C. Mehta v/s UOI & others)

**January 2004**

**Environment Pollution (Prevention & Control) Authority  
for the National Capital Region**

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## 1. EXECUTIVE SUMMARY

### ORDERS OF THE HON'BLE SUPREME COURT

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#### **Direction of the Hon'ble Supreme Court to the Environment Pollution (Prevention and Control) Authority**

On August 14, 2003, the Hon'ble Supreme Court passed the following direction:

*“CPCB’s report shows that the Respirable Suspended Particulate Matter (in short “RSPM”) levels in Ahmedabad, Kanpur, Sholapur, Lucknow, Bangalore, Chennai, Hyderabad, Mumbai and Kolkata are alarming.”*

*“Issue notices to the States of Maharashtra, Andhra Pradesh, Gujarat, Uttar Pradesh, Karnataka and Tamil Nadu. In the meantime, we direct that the Union of India and the respective States shall draw a plan for lowering the rate of RSPM level in the aforesaid cities. After the plan is drawn, the same would be placed before EPCA. This may be done within a period of two months. We are excluding Mumbai and Kolkata where the respective High Courts are stated to be monitoring the RSPM levels in those cities. EPCA after examining the matter shall submit a report to this Court within a period of four weeks thereafter.”*

In response to this order of the Hon'ble Court, the EPCA had submitted an interim report in November 2003. On submission of the interim report, the Hon'ble Court passed the following direction on November 24, 2003:

*“States of Maharashtra, Karnataka, Andhra Pradesh and Gujarat are granted two weeks’ time to supply the requisite material in format which is an Annexure to the Interim Progress Report on “Particulate Pollution Control Strategy in Critically Polluted Cities”, which shall be considered by the Environment Pollution (Prevention & Control) Authority within further period of two weeks. The final report may be submitted by the Authority within eight weeks.”*

The present report is in continuation of the interim report submitted to the Hon'ble Supreme Court in November 2003. In the interim report, the authority based on the analysis of the reports from the state governments had pointed out the following weaknesses in the proposed action plans (Detail comments are in the interim report):

- Inadequate reporting on action plan
- Weak proposals
- All polluted sources were not adequately discussed
- Lax timeline for implementation
- Milestones for implementation not clear
- Inter-agency and center-state coordination weak

### **EPCA ACTIVITIES SINCE THE INTERIM REPORT**

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The Authority undertook the following activities to gather information and guide the state governments in preparing their action plans:

- The Authority assessed the first set of draft reports and prepared a common format in which the states were asked to submit their action plans.

- EPCA members visited Lucknow, Ahmedabad, Chennai and Bangalore to hold consultation with implementing agencies, NGOs and other stakeholders.

All state governments have submitted their final action plans. EPCA has reviewed the final city-wise action plans and is submitting the following to the Hon'ble Court:

- The common minimum programme for all the cities agreed upon between the state government and EPCA with recommendations wherever necessary.
- Some cross cutting policy measures are common to the proposed mitigation strategies. Since these would require proactive intervention from both state and central governments, EPCA has proposed separate set of recommendations on these measures.
- Summary recommendations and directions sought from the Hon'ble Supreme Court.

Key concern of the Authority is to ensure firm and well-defined actions with a tight schedule for implementation and clarity of responsibility and accountability of the implementing agencies.

In this executive summary EPCA would like to make the overall observations and state the summary recommendations and the directions sought from the Hon'ble Supreme Court.

Two members of EPCA (representing the automobile and oil sector) have given dissenting notes that are attached.

#### **EPCA'S OBSERVATIONS AND SUMMARY RECOMMENDATIONS**

While formulating the recommendations EPCA has kept the following concerns and principles in perspective:

- EPCA has made its recommendations in light of spirit of the order of the Hon'ble Supreme Court that the selected seven cities have very high level of particulate pollution and therefore need urgent and advance action beyond the minimum national norms and plans. Rapidly rising pollution sources like vehicles, the growing pollution load and its toxicity threatens to overwhelm the small efforts at pollution control in these cities. Most of the city action plans submitted by the state governments have stated very high contribution of the transport sector to the total air pollution load.
- It is very significant that in the absence of an effective national action plan and air quality planning systems, the Supreme Court rulings in Delhi have become the model of action for other cities as well. Most significant among these is the gaseous fuel strategy. Others include phasing out of old vehicles, and improving vehicle technology and fuel standards. Though air quality planning is nascent in India and pollution source inventory inadequate, the precedence set by the Hon'ble Supreme Court in Delhi demonstrates that action can be started immediately. Priority actions can be drawn up based on science and evidence of harmful effects of air pollution and lessons from global good practices. In the case of particulates it is just not the quantum but toxicity of particulates that determine the immediate target of action.

EPCA is therefore of the view that the seven city action plans need to follow common overarching goals in the following areas of interventions:

- Advancement of vehicle technology and fuel quality standards to achieve significantly cleaner emissions levels.
- Introduction and expansion of gaseous fuels programmes to leapfrog and achieve drastic reduction in particulate emissions.
- Appropriate policies to check rapid dieselisation of small and medium car segments that are growing source of particulate emissions in cities. Otherwise, this may nullify the emissions gains from moving public transport and commercial vehicles to gaseous fuels. Even two-wheelers contribute significantly high particulate as evident from data submitted by Kanpur and would require immediate regulatory intervention.
- Control emissions from on-road vehicles with improved inspection and maintenance programme, more representative test procedures and greater manufacturers accountability (emissions warranty). Upgrade the PUC programme immediately based on effective standards and test procedures and rigorous enforcement to weed out gross polluters. Simultaneously, prepare a phase-in plan for centralized inspection centres with more advanced norms and test facilities and quality audit systems.
- Augmentation of public transportation and transport demand management to restrict growth in number of private vehicles: As recommended earlier in report on IA 179 city transportation plans need to be effectively linked to air pollution abatement programmes.
- Effective strategy to prevent fuel adulteration: EPCA would like to reiterate its recommendations to the Hon'ble Supreme Court on this matter. Make oil companies accountable for the quality of fuel at the retail end, improve testing procedures and fuel quality standards, make penalty effectively stringent, and initiate public broadcast of defaulting retail outlets.
- EPCA notes with concern that 1% percent benzene petrol has been introduced only in a few cities so far. This is of serious concern in cities with very high proportion of two-stroke powered two-wheelers responsible for very high hydrocarbon emissions. Introduce 1 percent benzene petrol in critically polluted cities of India by April 2004.
- Strengthen air quality monitoring and planning in cities: Develop capacities to monitor additional pollutants like PM2.5, ozone, benzene and volatile organic compounds, carbon monoxide and polycyclic aromatic hydrocarbons. It is very important that the concerned state governments and the Union ministry of environment and forests undertake their own source apportionment studies, pollution source inventories, for future planning and monitoring.

**DIRECTIONS SOUGHT FROM THE HON'BLE COURT:**

- i. The state governments of the concerned seven cities be directed to implement the common minimum programme as per the agreement and given deadlines as listed in this report. State governments to be directed to report on progress of implementation every 6 months.

- ii. The concerned state governments be directed to finalise deadlines and implementation schedules for the action points in the agenda, which are still not decided. To report within 1 month with deadlines.
- iii. To direct the central government to take decision on the implementation of Euro IV standards immediately. The time frame of 2010 for Euro IV standards as recommended by the Auto Fuel Policy, will not be conducive to healthy environment.
- iv. To direct the central government to review the in-use emission norms under the PUC scheme, proposed recently by the Ministry of Road Transport and Highways in light of the comments made by EPCA in the relevant section on cross cutting policy measures.
- v. To direct the concerned state governments and Delhi government to submit a comprehensive and time-bound plan for restricting the growth of number of private vehicles and develop and implement public transportation plans.
- vi. In view of the strong cancer potency of benzene emissions and predominance of two-stroke powered two wheelers in vehicular fleet responsible for very high hydrocarbon emissions, EPCA recommends that 1 % benzene petrol be introduced in all critically polluted cities of India by April 2004.
- vii. To address the problem of dieselisation of car fleet and fuel adulteration EPCA recommends that distortions in automotive fuel prices and prices of adulterants (kerosene, naphtha, LDO, solvents etc) are immediately corrected. Additionally, eliminate the price difference between petrol and diesel fuels to remove incentive for dieselisation.

## 2. THE REPORT

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### 3. PROPOSED ACTION PLANS FROM THE STATE GOVERNMENTS AND EPCA'S RECOMMENDATIONS

This is the common minimum programme agreed upon between EPCA and different city authorities and state governments.

#### Ahmedabad:

Serial No	Issues	Action proposed	Deadline	EPCA's comments
1.	Emission norms and automotive fuel quality			
		Status of implementation of Bharat II emission norms	As per Union government notification  COT has already decided to register only Bharat II compliant four wheeler vehicles	This should be implemented with immediate effect
		Introduction of Bharat III and Euro IV emission norms	As per Union government notification	
		Reduction of benzene content of petrol to 1%	As per Union government notification	To implement 1% percent benzene petrol immediately
		Installation of pre-mix oil dispensers and measures to ban sale of loose 2T oil	Only 49 out of 148 oil stations have pre-mix 2T oil dispensers	Make this mandatory immediately.
2.	Alternative fuels			
	CNG supply & distribution infrastructure	Laying of Hazira-Mehsana GSPC pipeline is in progress.  GSPC to supply CNG in Ahmedabad region  GSPC to distribute CNG in	Commissioned up to Vadodara  April 2004  December 2004	Submit status report

		Ahmedabad region First station in Maninagar area of the city	June 2004	
	Targeted vehicles on CNG	To convert 400 AMC buses and 400 private buses to CNG	May 2004	To submit periodic status report
		GSPC has also proposed conversion of different types of vehicles to CNG as a fuel, in a phased manner	No schedule	Submit schedule of implementation and submit status report on the following.
		<b>Phase I:</b> 30 CNG outlets targeting 11,500 vehicles	December 2004	
		<b>Phase II:</b> 50 CNG outlets targeting 17,500 vehicles	December 2005	
		<b>Phase III:</b> Increase number of outlets as per demand	December 2006	To make demand projection in advance to plan expansion of the infrastructure. Submit status report on this.
	Policy to promote CNG	To enact the Draft Gujarat Motor Vehicles (Use of Fuel) Bill 2003 to facilitate the compulsory switchover of certain category of vehicles on cleaner fuels		To give deadline for its implementation
4.	Public transport system and plan	126 routes are approved by the government where LPG/CNG/Bharat-II compliant buses will run, 32 routes will be synchronized with introduction of CNG in the city	No timeframe	
		Metro rail system	GIDB agency	To give a

		for the city	is appointed by the state government to prepare a detailed project report	deadline for completion of the project report and submit progress report to EPCA
		A 200 feet wide AUDA ring road is under completion in phases (this will help divert heavy vehicles)	December 2004	To give schedule of implementation
		Decision on banning heavy duty vehicles within AMC area already taken	Notification to be issued soon	To give deadline
		Shifting of bus terminals on the outskirts of the city for restricting movement of large number of buses to central bus station	Under implementation	Submit the implementation schedule
		Formulation of transport policy to induce a mode shift from private to public transport	No policy as of now	Refer to the EPCA's comments on public transport and transport plan in the section on cross cutting policy measure and submit a plan accordingly.
5.	Fiscal measures to control pollution and polluting vehicles	To discourage use of older and polluting vehicles and to control traffic congestion	No fiscal measures exist at present. Government will study the Bangalore pattern of Green Tax	To submit an implementation plan.
		To encourage replacement of old vehicles with new vehicles on gaseous fuels	No fiscal policy exists	Same as above
6.	In-use vehicles	Phasing out of 15 years old	GOG has prohibited	Implement as per deadline

		commercial vehicles and all diesel three-wheeler	diesel driven six seater autos within the municipal area  AMTS has phased out 160 buses of 15 years age. 135 more buses likely to phased out by March 2004.	
7.	Vehicle Inspection programme	Computerized testing system will be worked out. Modalities are being worked out.  Only visual inspection being carried out at present	No schedule	Refer to the EPCA's comments on vehicle inspection programme in the section on cross cutting policy measure.
		System for auditing and inspection of these centers will be introduced with third party help	No schedule	To submit schedule of implementation
8.	Adulteration of Automotive fuels	Setting up facility for independent fuel testing in city	Forensic Science Lab is an independent testing lab. A team is formed for fuel testing monitoring once in a month	
		Status and plan to implement naphtha, kerosene and solvents control order and make it effective	At present there is no plan	Give deadline for implementation
		Plan for public broadcast of defaulting petrol pump	Names of defaulting petrol pumps are published in the newspapers. Existing system will be continued	To submit status report
		Plans to make	No plan at	To submit a

		penalty more stringent to act as a strong deterrent	present	plan
9.	Control of emission from Industrial sources	Installation of adequate pollution control measures in industries and monitoring of industrial emissions	Ongoing process	To report on progress of implementation
		Determining efficacy of APC system & remedial measures including upgradation of existing APC	31.12.2004	
		Alternative cleaner fuels	Will be considered after survey of air polluting industries, availability of clean fuel and economic viability	Give deadline for submission of this plan
10.	Control of emissions from commercial sources	Pollution control from thermal power plants	Ongoing activity and regularly monitored	Submit progress report
11.	Strengthening of air quality monitoring and planning	It is decided to increase number of monitoring stations with help of AMC & GIDC 7 stations by 3 stations by	31.12.2004 31.12.2004	To indicate new pollutants to be taken up for monitoring
		Air pollution inventory	The GPCB will seek the help of CPCB for this purpose	Give deadline
		NIOH has already undertaken the study on health impact of air pollution	GPCB through competent agency will take up the task	Give deadline
12.	Other issues	Hospital incinerators  There are 4 common incinerators & 6 individual incinerators		Status report

	Generator sets	Supply of electricity is regular so gensets are not used in a big way. Emission standards as per CPCB notification		Status report
		Tree plantation: GIDC has agreed to provide green belt around estates and also in open space within estates	Target date for plantation: 31.9.2004	

**Bangalore:**

Serial No	Issues	Action proposed	Deadline	EPCA's comment
1.	Emission norms and automotive fuel quality	Euro III and Euro IV emission standards and commensurate fuel quality	No schedule submitted	To submit schedule of implementation
		Implementation of Euro II norms for 2 and 3 wheelers and Introduction of emission warranty for vehicles	No schedule submitted	To submit schedule of implementation
		Reduction in benzene content to 1 % in petrol	No schedule submitted	This should be introduced with immediate effect.
		Installation of pre-mix oil dispensers for two-stroke two- and three-wheelers	No schedule submitted	Make this mandatory
		Measures to ban sale of loose 2T oil	No schedule submitted	Implement this with immediate effect.
2.	Alternative fuels	Mandatory conversion of in-use three-wheelers registered after April 1, 1991 to bi-fuel mode and registering only new three-	December 1, 2003 onwards	To report on progress of implementation of this measure

		wheelers having bi-fuel mode		
		Five auto LPG dispensing stations	March 2004	To provide a plan to indicate the appropriate number of dispensing stations that need to be set up to meet the projected demand and schedule for implementation
		Institutional plan for implementation of gaseous fuel programmes like safety inspection programme, system of authorisation of conversion kits and workshops etc.		To submit status report and implementation schedule
3.	Public transport system and transportation plan			Please refer to the EPCA's comments on public transport and transport plan in the section on cross cutting policy measure and submit a plan accordingly
		To increase the current fleet of 3,116 buses to 4,330 buses	October 2005	
		Metro for the city	No schedule submitted	To submit an implementation schedule
4.	In-use vehicles	Phasing out of 15 year old commercial vehicles and all diesel three wheelers	Phase out decision is kept under abeyance	*Please see the note below this table
		Plans to lower the age cap further	Plan is under abeyance	
		Restriction on plying of interstate/intercity buses in city	No schedule submitted	To submit the schedule of implementation
		Restriction of	Not allowed to	

		entry of non-destined commercial vehicles	enter city and taken outside or limits	
5.	Vehicle Inspection programme	“No PUC No Fuel” scheme	From October 2004	
		Upgradation of the PUC programme (modifications of PUC norms, test procedures, plan for centralized inspection center etc)		Refer to the cross cutting section on EPCA recommendations and give an action plan accordingly.
6.	Adulteration of automotive fuels	One full fledged fuel testing facility established		
7.	Air quality monitoring network	Proposed to set up one online ambient air quality monitoring system	By June 5, 2004	To give a plan for monitoring of new pollutants
		Emission Inventory study	Proposed	To give deadline for this study
8.	Control of emissions from Industrial sources	No action proposed		To submit a status report and action planned

**\*A special observation:**

i) Phasing out of old commercial vehicles, restriction on plying of interstate/intercity buses in city, restriction of non-destined commercial vehicles in city, and shifting of bus terminals from the city are consistent with the direction given by the Hon’ble Supreme Court in Delhi. In this context the Authority would like to take a strong note of the fact that some cities like Bangalore who had taken the initiative to fix the age of the vehicles were stopped by the central government from doing so on the ground that such steps are not consistent with the provisions of the Central Motor Vehicles Act and Rule. The contention is that if vehicles meet the PUC norms they should be allowed to ply. But the Supreme Court order has already set precedence in Delhi and age of vehicles has been fixed accordingly. The central government must be directed not to obstruct such moves taken in the interest of clean air. Moreover, as EPCA has repeatedly brought to the notice of the Supreme Court that PUC is a very ineffective system to identify gross polluters.

ii) The Authority recognises the fact that phasing out of old cars and scooters would be a difficult proposition. Therefore, the Authority recommends adoption of an approach based on fiscal regulation discouraging ownership of old vehicles and replacement of these with vehicles on alternative fuels.



**Chennai:**

<b>Serial No</b>	<b>Issues</b>	<b>Action proposed</b>	<b>Deadline</b>	<b>EPCA's comment</b>
1.	Emission norms and automotive fuel quality	Euro III for new vehicles except two- and three-wheelers	April 1, 2005	
		Euro IV for new vehicles except two- and three-wheelers for vehicles	April 1, 2010	
		Two- and three-wheelers Euro II Euro III	April 1, 2005 April 1, 2010	
		Low benzene petrol (1 per cent) to be introduced	April 1, 2004	
		Ban on supply of loose 2T oil at petrol pumps	Draft notification is under process in government	To implement this immediately and make pre-mix oil mandatory
2.	Alternative fuels	28 auto LPG dispensing stations to be set up. 5 stations functioning, work in 18 ALDS is in progress	To be commissioned by March 2004. Sites have to be identified for 5 stations and are to be set up by June 2004	To provide status report on implementation.
		Switchover to LPG of autos and taxis	No schedule given	To give a firm phase in plan for targeted vehicles and estimate projected demand for LPG thereof.
3.	Public transport system and transportation plan	Finalisation of plans by the state government/local authorities for augmentation of city public transport	Not later than April 1, 2004	Refer to the EPCA's comments on public transport and transport plan in the section on cross cutting policy measure and submit a plan accordingly.
		Improvement of public transport system for discouraging use of private vehicles	MTC replaced 117 buses by complying with Euro II norms during 2002-03	This is not adequate. Please submit a feasibility study and a

			and 25 buses are to be replaced during 2003-04	implementation plan for phasing in of LPG buses
4.	In-use vehicles	Phasing out of grossly polluting vehicles	Because of certain policy measures there would not be any bus more than 8 years old in the fleet of MTC. At present, matter is pending before the High Court	
		From April 1, 2008 city buses and taxis registered before introduction of Euro II norms to meet minimum Euro I norms	April 1, 2008	Review for further tightening of deadline
		From April 1, 2004, three-wheelers registered before April 2000: Minimum 1996 emissions norms, and after April 1, 2000, applicable norms on date of registration	April 1, 2004	This action point to be linked to LPG conversion programme and a phase in plan and schedule to be submitted
		From April 1, 2008, three wheelers registered before April 1, 2000: Minimum India 2000 norms, and after applicable norms on the date of registration	April 1, 2008	Same as above
		From April 1, 2004, inter-state buses registered after April 1, 2000: Minimum India 2000 Euro II norms, and before minimum 1996 norms	April 1, 2004	
		From April 1, 2008, inter-state buses registered	April 1, 2008	Review to tighten deadline

		after April 1, 2005, Minimum Euro II norms, and before minimum India 2000 (Euro I) norms		
		Prohibition of movement of heavy goods vehicles except essential services in Chennai city on 19 important roads	Strict implementation would continue	
5.	Vehicle Inspection programme	Setting up of emission testing centers at MTC depots	Another five centers by December 2003	Refer to the EPCA's comments on vehicle inspection programme and PUC scheme in the section on cross cutting policy measure and submit a plan accordingly.
		Upgradation to Computerised centers	Process to be completed within a month	Submit upgradation plan of PUC and vehicle inspection programme according to the comments from EPCA on this issue in the section on cross cutting measures
6.	Adulteration of automotive fuels	Illegal sale of kerosene to vehicles and checking adulteration of fuels	Periodic checking is being done and will continue	
7.	Control of emissions from Industrial sources	To provide scrubbers to reduce emission from GMR power corporation	June 2004	Submit status report
8.	Control of emissions from commercial sources	To shift the entire coal handling from Chennai to Ennore Port	December 2004	Submit status report
		To shift the entire iron ore handling from Chennai to	December 2005	Submit status report

		Ennore Port		
9.	Air quality monitoring network	No action plan proposed		To give a plan for increasing number of monitoring station and plan for monitoring of new pollutants like PM2.5, benzene, PAH

## Hyderabad:

Serial No	Issues	Action proposed	Deadline	EPCA's comment
1.	Emission norms and automotive fuel quality	Euro II norms will be applicable to all new four-wheeled vehicles 3.5 tonnes and below laden weight	October 2004	
		Euro II norms for all new buses/goods vehicles	April 2005	
		Euro II norms will be applicable to all new three-wheelers	With immediate effect	
		Reduction of sulphur content in diesel and petrol to 500 ppm and lower levels	Already implemented	
		Reduction of benzene content in petrol to 1 per cent	April 2004	
		Plan for introduction of Euro III and Euro IV fuels	No schedule submitted	
		Installation of premix oil dispensers and measures to ban sale of loose 2T oil	No schedule submitted	Immediately implement and report to EPCA on the progress made
2.	Alternative fuels	All in-use petrol driven three-wheelers (63,414) to be converted to LPG	By October 2005	To submit status report
		All petrol taxis to be converted to LPG (452 vehicles)	By October 2004	To submit status report
		More than 15 year old government vehicles to be replaced by either Euro II compliant vehicles or converted to LPG (477 vehicles)	By December 2003	To submit status report
		No gaseous fuel plan for buses		To undertake a feasibility study for phasing in of LPG buses and

				submit a phase in plan
		45 LPG dispensing stations required	No schedule submitted	To submit implementation schedule for refueling infrastructure and setting up of safety inspection system
3.	Public transport system and transportation plan	No action plan proposed		Please refer to the EPCA's comments on public transport and transport plan in the section on cross cutting policy measure and submit a plan accordingly.
4.	In-use vehicles	Phasing out of 15 year old commercial vehicle and all diesel three wheelers Above 20 years 19 to 20 years 18 to 19 years 17 to 18 years 16 to 17 years 15 to 16 years	October 2004 October 2005 October 2006 October 2007 October 2008 December 2009	To submit status report
		Restriction on plying of interstate/intercity buses and restriction of entry to non-destined commercial vehicles in city	No schedule submitted	To submit implementation plan
5.	Vehicle Inspection programme	No fuel without PUC	By December 2003	Please refer to the EPCA's comments on vehicle inspection programme and PUC scheme in the section on cross cutting policy measure and submit a plan accordingly.
		Improved centralized inspection and maintenance	No schedule submitted	To submit schedule of implementation

6.	Adulteration of automotive fuel	No action plan proposed		
7.	Control of emissions from Industries	Seven non-compliant industries to meet norms	By March 31, 2004	To submit status report
8.	Air quality monitoring network	Installation of automatic monitoring stations	By January 2004	To give plan for monitoring of additional pollutants – PM2.5, benzene, VOCs, and PAH
		Plans to develop air pollution inventory for the city	Proposal being submitted to MOEF-GOI for possibility of funding	To give deadline

**Kanpur:**

Serial No	Issues	Action proposed	Deadline	EPCA's comment
1.	Emission norms and automotive fuel quality			
		Installation of premixed 2T oil dispensers and plan for more retail outlets with such facility	2010	This deadline in very lax. Implement with immediate effect
		Bharat Stage II norms for two- and three-wheelers	April 2005	
		Emission warranty	No target date given	Report to EPCA on schedule to implement
		Bharat III norms for new vehicles	April 2005	
		Euro IV norms for new vehicles	April 2010	
		Euro III and IV fuels	IOCL is implementing agency. Deadline to be get from corporate office	
2.	Alternative	All types &	June 2004	State

	fuels	categories of vehicles are targeted  Demand estimated at 0.10-0.14 million metric standard cubic meter per day  <b>Phase I:</b> To set up 11 CNG stations with a target of 22,000 vehicle consumers and other users  <b>Phase II:</b> To set up 16 CNG stations with a target of 28,000 consumers	commencement of supply (subject to availability of land and statutory permission for execution of project)  2006  2013	government must meet the deadline and expedite interagency coordination accordingly  Submit status report
3.	Public transport system and transportation plan			Please refer to the EPCA's comments on public transport and transport plan in the section on cross cutting policy measure and submit a plan accordingly.
		No restriction on entry of non-destined commercial vehicles and interstate/intercity buses	No restriction	Give a detail plan to EPCA with a deadline
4.	Fiscal measures to control polluting vehicle and introduction of	There would be more tax on motor vehicles	No timeframe	Set a deadline and submit to EPCA



	clean fuels			
5.	In-use vehicles	Old tempos shall be banned on certain routes	2006	Review and tighten the deadline
		Only scrubber-fitted tempos shall be allowed in the city	2006	Review and tighten the deadline
6.	Vehicle Inspection programme	Upgradation of PUC system	No new plan	Refer to the EPCA's comments on PUC and vehicle inspection programme in the section on cross cutting measures and prepare a phase in plan for centralized inspection center.
7.	Adulteration of automotive fuels	Regular monitoring of adulteration is conducted	No further plans submitted	To give a proper plan with deadline
8.	Control of emissions from Industrial sources			
		Installation of adequate air pollution control device	2004	
		Updating of inventorisatation of industrial status	2005	
		Regulatory measures to shift polluting units	2010	Review and advance deadline
		Polluting industries will be discouraged from non-conforming areas	2010	Need firm plan on preventing polluting industry in non-conforming areas
9.	Other sources of air pollution			
10.	Control of emissions from generator sets	Phase-wise registration of DG sets above 50KVA and	2004 and 2005 respectively	To submit status report

		20KVA to 50KVA		
		Enforcement of emission standards for generator sets	2005 to 2010	To submit status report
11.	Strengthening of air quality monitoring network	3 ambient air quality monitoring station data display system	Not schedule	Submit schedule of implementation
		Monitoring of additional pollutants Lead Hydrocarbon & benzene	2004 2005	Review to advance the deadline. Also monitor PM2.5
		3 Automatic monitoring stations	First 2007 & second 2010	Review and tighten deadline
		Air pollution inventory	2005	To submit status report
		Study of health impact of air pollution	2005	To submit status report

**Lucknow:**

Serial No	Issues	Action proposed	Deadline	EPCA's comment
1.	Emission norms and automotive fuel quality	Euro II emission norms for new vehicles	To be implemented on 1.3.2004	To ensure that this is done as per deadline
		Reduction of sulphur content in diesel and petrol to 0.05%	Being introduced from January 1, 2004	To ensure that this is done as per deadline
		Reduction of benzene content of petrol to less than 1 per cent.	To be done as per the directives of MOP&NG	To direct MOP&NG to advance to 1.3.2004
		Installation of pre-mix oil dispensers for 2 stroke 2 and 3 wheelers	2T pre-mix dispensers being installed at the remaining outlets	To make this mandatory immediately
2.	Alternative fuels	1,500 tempo taxi, 300 buses/minibuses and 250 auto rickshaw to be on CNG	December 31, 2005	To submit status report
		900 tempo taxi, 200 buses/minibuses and 400 auto rickshaw to be on CNG	December 31, 2006	Review the deadline for advancement
		426 auto rickshaws and 200 Bus/Minibus	December 31, 2007 (Subject to approval of state govt.)	Interagency coordination and clearances to be expedited to meet the deadline
		To set up infrastructure for CNG dispensing	The CNG project being executed by GAIL is scheduled for commissioning of first station by June 1, 2004, subject to availability of land and statutory permission. GAIL has also planned one mother station at Amausi of capacity 1200	State government must be directed to give firm deadline after coordination with gas authorities.

			SCMH and one daughter station of capacity 150 SCMH	
			Safety inspection programme for CNG and LPG vehicles is under active consideration.	Inadequate deadlines. Direct state government to give firm deadlines.
3.	Public transport system and transportation plan		Augmentation of fleet shall be based on demand	Prepare a plan on public transport and transport demand management with fixed milestones and deadline and submit to Court within 6 months
			No proposal for fiscal measures to discourage use of older polluting vehicles	To submit a plan with deadline
4.	In-use vehicles	Phasing out of 15 year old commercial vehicles and all diesel three wheelers	All commercial vehicles plying within the municipal limit of Lucknow are phased out, except buses of educational institutions and from other organizations. Decision regarding age limit for school buses and commercial vehicles shall be taken by June 30, 2004	To take decision and inform Court accordingly
		Plans to lower the age cap further	State government has decided to lower down the age limit of city buses from 9 to 5 years	Give deadline
5.	Vehicle Inspection programme			Refer to EPCA's recommendations in the section on cross cutting policy measures

				and submit a plan accordingly
		Institutional systems put in place or planned for rigorous auditing and inspection of centres	Monthly auditing is proposed for every pollution checking center from January 1, 2004	To report on progress
		On-road inspection of vehicles planned and periodicity and coverage	Quarterly on road inspection camps are to be organized by Transport Dept with the help of UPPCB with effect from January 1, 2004	To report on progress
6.	Centralised inspection & maintenance system		It involves high cost and modern technology, it may be considered at Govt. of India level	To give deadline and plan.
7.	Adulteration of automotive fuel	Public broadcast of defaulting petrol pump	Under consideration	Give deadline
8.	Control of emissions from Industrial sources	All the moderate air polluting small scale units numbering 40 shall be provided with adequate air pollution control system	December 2004	To report on progress
		Monitoring programme of industries	Every six months with effect from January 1, 2004	To report on progress
9.	Control of emissions from commercial sources	No plan submitted		
10.	Air quality monitoring network	Plans to increase number of monitoring stations, improving frequency of monitoring	Two more stations, one in commercial area and one in residential area by end of this fiscal year 2003-04	To report on progress
		Monitoring of additional pollutants	Monitoring of CO, Lead, Benzene, soluble	To report on progress

			fraction of RSPM by the year 2004-05	
		Air pollution inventory and plan to sponsor studies on health impact of air pollution	MoEF considering entrusting this job to ITRC, Lucknow in association with UPPCB as the agencies to carry out the health study	Give deadline
11.	Other sources of pollution	Hospital incinerators	It shall be ensured that installation of water scrubber on each of six incinerators is completed by December 31, 2004	To report on progress

**Solapur:**

<b>Serial No</b>	<b>Issues</b>	<b>Action proposed</b>	<b>Deadline</b>	<b>EPCA's comment</b>
1.	Emission norms and automotive fuel quality			
		Bharat II sulphur fuel	Proposed to introduce Bharat II by 01.04.2004	To enforce immediately
		1% benzene containing fuel	2004	To implement by 1.3.2004 as notified.
		Euro III equivalent norms & 350 ppm sulphur fuel	2005	
		Euro IV equivalent norms and 50 ppm sulphur diesel	2010	
		Ban on supply of loose 2T oils at petrol pumps	Continuous efforts	Implement this fully immediately. Make pre-mix oil mandatory
2.	Alternative fuels	Introduction of alternate fuels like CNG/LPG depending upon supply	No LPG outlet at present IOC proposed to plan one retail outlet to supply auto LPG	To prepare a detail phase in plan for LPG vehicles and refueling infrastructure with schedule and submit to EPCA
		Fiscal incentives for alternative fuels and vehicles	24 months, to be decided by the Government of Maharashtra	To submit status report
3.	Public transport system and transportation plan	Augmentation of city public transport system	To be completed by April 1, 2005	Refer to the EPCA's comments on public transport and transport plan in the section on cross cutting policy measure and submit a plan

				accordingly.
4.	In-use vehicles			
		Higher road tax for older motor vehicles	Within 12 months, to be decided by government of Maharashtra	To submit status report
		All types of vehicles of 15 year old required to be phased out within 2 years		To submit status report
		All types of vehicles which are not conforming emission norms to be phased out. (Phasing out of vehicles other than SMT buses)	2 years	To submit status report
		“All city buses should conform to 1996 or India 2000 or Bharat Stage II norms from April 1, 2004 and India 2000 or Bharat Stage II or Euro III equivalent norms from April 1, 2008.”	In consultation with MoRTH and MoEF	Review to keep only Euro I (Indian 2000 norms) and Bharat II and post Bharat II compliant fleet and. Phase out others.  Interagency coordination to be expedited to meet the deadline
		“All Inter State buses should conform to India 2000 or Bharat Stage II norms from April 1, 2004 and from April 1, 2008 they should conform to minimum India 2000 or Bharat Stage II or Euro III equivalent norms.”		To submit status report



		“All taxis should confirm India 2000 or Bharat Stage II norms from 1.04.2004 and India 2000 or Bharat Stage II or Euro III equivalent norms from 1.04.2008”		Also develop gaseous fuel programme targeting these vehicle segments and submit a plan.
		“All three-wheeler should conform to India 2000 or Bharat Stage I or proposed Bharat Stage II emission norms from 1.04.2004 and from 1.04.2008 they should conform to India 2000 or proposed Bharat Stage II or proposed Bharat Stage III emission norms.”		Also develop gaseous fuel programme targeting these vehicle segments and submit a plan.
5.	Vehicle inspection programme	New PUC checking system  I & M for all categories of vehicles  Performance checking for cat converters and conversion	April 1, 2004  April 1, 2006  April 1, 2005	Refer to the EPCA comments on PUC and vehicle inspection programme in the section on cross cutting policy measures and prepare a phase in plan for centralized inspection programme
6.	Adulteration of automotive fuels	Checking of fuel adulteration	Continuous efforts	
7.	Control of emissions from Industrial sources	Organization of inventory of the polluting industries	Completed and continuously updated	Submit plan and tight schedule for completion of

				the inventory
		Identification and closure of clandestine/ unauthorized industrial operation or shifting	Commenced, to be completed within 12 months	Submit status report
		Identification of areas where industries from non-conforming zones shall be shifted	Commenced, completion within 12 months	Submit status report
8.	Control of emissions from commercial sources	Compliance to standards in DG sets	Routine continuous efforts. Board is issuing NOC stipulating conditions as per guidance of MoEF/CPCB	Give schedule for implementation of emissions standards for DG sets.

#### **4. EPCA'S RECOMMENDATIONS ON CROSS CUTTING POLICY MEASURES:**

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The following are certain important cross cutting policy measures that are common to all states and would require special attention. These include roadmap for new technology, inspection and maintenance programme for in-use vehicles, the problem of rapidly growing number of personal vehicles and inadequate public transport, and issues of common concern in gaseous fuel programmes.

##### **1. Roadmap for mass emissions standards**

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The state governments are following the roadmap on mass emissions standards for new vehicles as proposed by Auto Fuel Policy and approved by the government.

However, EPCA is of the view that there is need for early introduction of tighter mass emissions standards to control particulate pollution in critically polluted cities of India. EPCA outlines the reasons for this contention and recommends that in view of the following concerns the official roadmap should be reviewed immediately to assess how can it be tightened further.

##### **Issues of concern:**

i) Particulate pollution in almost all cities has shown very high levels (see table) requiring the Hon'ble Supreme Court to intervene. These cities will therefore require more aggressive measures than currently approved. The issue of concern is that some cities have reported phenomenally high contribution of vehicles to the total air pollution load. In Hyderabad vehicles contribute 67 percent of the pollution load as opposed to 2 percent from industry. In Kanpur vehicles contribute 80 percent as opposed to 14 percent from domestic and 6 percent from industrial sources. In Lucknow the share is 75-80 percent. Kanpur plan specifically shows that diesel vehicles are responsible for 23 percent of the total particulate emissions from the transportation sector. Even more disturbing is the contribution of two-wheelers -- as much as 70 percent of the particulate emissions from the transport sector in Kanpur. This clearly brings out the need for aggressive action to reduce vehicular emissions.

**Table: Current status of particulate pollution in all seven cities**

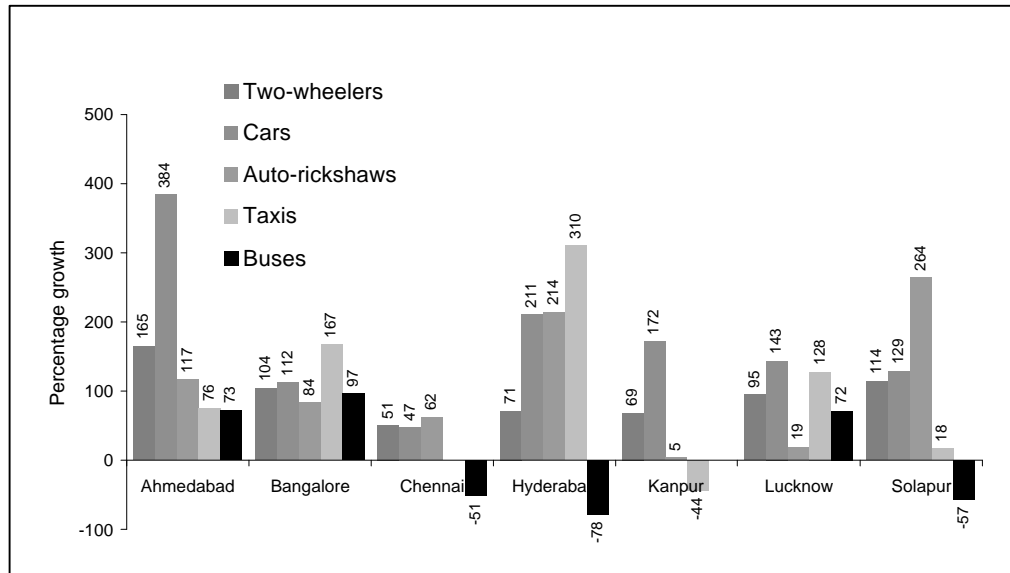
<b>City</b>	<b>Year</b>	<b>RSPM</b>	<b>SPM</b>
1. Ahmedabad	2002	High exceedance level (ranging from 1.3 to 4 times the standards in two locations)	Higher than standard during all the monitoring days
2. Kanpur	2002	All locations are exceeding the standard by 3 to 3.5 times the standards	Very high levels
3. Lucknow	2002	All locations show very high levels (3 to 3.5 times the standards)	Very high levels in all locations
4. Solapur	2002	High levels	Equally high

			levels
5. Chennai	2002-2003	Few locations are exceeding the standard by 1.5 times	Few locations show high levels of exceedance
6. Bangalore	2002-03	Reduced since 2000	Exceeding the standard in one location
7. Hyderabad	2003	Levels have reduced over the years, but still exceeding the standard	Exceeding the standard

Source: Based on various submissions of state government and state agencies to EPCA.

ii) Even more alarming is the rapidly rising numbers of vehicles in these cities especially that of personal cars and two-wheelers that are increasing more rapidly than the other vehicle segments. Public transport buses are showing negative growth rate in almost all cities.

**Graph: Pattern of change in motorisation in seven cities**

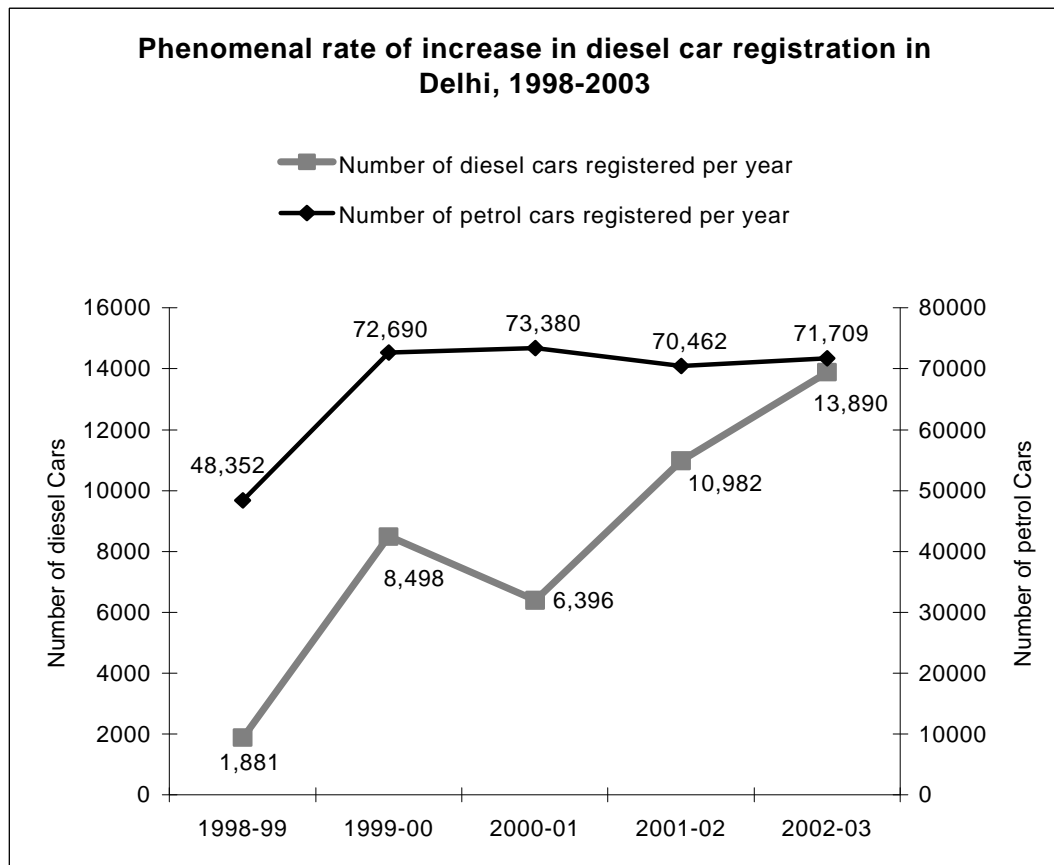


Source: Based on various submissions of state government and state agencies to EPCA.

iii) It is important to understand that the Euro II norms that are in force in the seven cities were enforced in Europe in 1996 and are very lax compared to the global best standards. Euro II emissions standards for particulate matter for heavy duty vehicles and for cars are 86.67 percent and 68.7 percent higher respectively than the corresponding Euro IV standards to be enforced in Europe in 2005. Moreover, even the Euro IV standards of 2005 are lagging behind the global best standards to be phased in the US from 2004 onwards. For example, according to a study by the US based International Council of Clean Transportation (ICCT) the US Tier II standards for commercial vehicles are approximately 90 percent tighter for NOx and 60 percent tighter for PM than even the proposed Euro V limits. US Tier II limit values for NOx and PM are approximately 80 percent lower than Euro IV limits for cars.<sup>1</sup> The deteriorating air quality in Indian cities as well as the

phenomenal growth of private vehicles, combined with an existing fleet of old and polluting heavy-duty vehicles requires us to find ways to leapfrog to adopt the best standards.

iv). *While considering mitigation strategies it is not enough to consider only the quantum of pollution but also toxicity of emissions.* Literature review shows that diesel vehicles contribute not only considerable amount of particulate from the transport sector but are also most toxic. The World Bank study of 2000 that studied six cities in the developing world found diesel vehicles responsible for 79% of the total transport health costs. Diesel particles have already been designated as toxic air contaminant and potential human carcinogen, therefore should be minimized as drastically as possible. While the consumption of diesel is already very high in most cities due to significant size of diesel commercial fleet, registration of passenger cars and multi utility segments as in Delhi show dramatically high penetration of diesel models. Given the price advantage of diesel fuel this trend is anticipated even in other cities of India. Data provided by Bangalore shows very high level of diesel consumption in the city. While the city action plans have targeted, and rightly so, the public transport fleet on diesel for conversion to gaseous fuels, private vehicles have no clear strategy.



Source: Vehicle registration data from Department of Transport, Government of NCT Delhi, 2003

- In Delhi, since 1998-99 the share of diesel cars in total car registration has increased from 4% in 1998-99 to 16% in 2002-03. Petrol car registration stagnates during the same period.

- Annual incremental growth rate for the diesel cars is 106.3% as opposed to 12.27% for petrol cars.

v). Moreover, Euro II norms currently in force do not address the problem of particulate emissions adequately. By following the European norms we are inheriting many of their inconsistencies. Successive stages of European emissions standards, though tighter, are still lenient on diesel. Diesel vehicles are legally allowed to emit more nitrogen oxides and particulates compared to petrol vehicles – most serious of our worries. Particulate emissions from petrol cars are so negligible that these are not regulated. Euro II norms that are currently in force in some cities allow diesel cars to emit 40 percent more nitrogen oxides and hydrocarbons combined than the corresponding petrol cars. Even Euro IV standards to be enforced in Europe from 2005, allow diesel cars to emit 3 time more NO<sub>x</sub> than petrol counterparts. While it may be true that petrol cars are allowed to emit more carbon monoxide than diesel vehicles, health concerns over diesel particulates are more serious.

vi). India is focusing only on the intermediate approaches to delay the process to get to clean diesel standards. The focus is on ineffectual steps – a combination of reduced sulphur levels (500 ppm to 350 ppm next year only in some cities) and oxidation catalyst at best. Ignoring that even these are likely to enhance the health risks from diesel emissions. These gizmos would oxidize almost all fuel sulphur and lead to deadlier and more toxic sulphate particles. Sulphate emissions from young and expanding fleet would be a large part of the total particulate emissions closely linked to fuel sulphur levels. A study of US Department of Energy and its National Renewable Energy Laboratory conducted under the programme -- Diesel Emission Control - Sulfur Effects Project (DECSE), shows that at high temperature and high speed operations use of 350 ppm sulphur fuel almost triples the PM emissions from the tailpipe over the engine out emissions.<sup>ii</sup> Most of the increase is due to sulphate particles which means diesel oxidation catalyst when used with high sulphur fuel can dramatically increase harmful particles. According to the WHO sulphate particles are more harmful than PM<sub>10</sub>.

vii). In industrialized countries only near zero sulphur fuels, and advanced emissions control technologies have been benchmarked as clean diesel technology. The future norms in Europe will now be led by concerns over PM and NO<sub>x</sub> and are expected to be more stringent. So far global warming concerns have made some European countries to encourage diesel vehicles to reduce carbon dioxide emissions. But this is changing. For example, in Germany while diesel technology has resulted in some carbon dioxide reduction benefits, it is estimated to result in 60 percent higher particulate emissions than previously projected for the year 2020.<sup>iii</sup> The emerging science now implicates particulates even for global warming (Recent NASA study). The future norms of Euro V and Euro VI in Europe will be designed to address particulate and NO<sub>x</sub> emissions and are expected to reduce the present discrepancy between diesel and petrol norms. The US on the other hand has already moved towards enforcing fuel neutral emissions standards subjecting both diesel and petrol vehicles to same stringent standards.

EPCA therefore recommends that in view of the above and taking into account the critical levels of particulate pollution in Indian cities the government should consider bringing forward the Euro IV standards in critically polluted cities.

Moreover, considering the disturbing fact of very high contribution of two-wheelers to the particulate pollution load as is evident from the Kanpur plan, EPCA would like to draw the attention to its recommendations with regard to the need for particulate standards for two-wheelers in response to the IA 179 submitted to the Hon'ble Court in May 2003.

## 2. Inspection and maintenance programme for in-use vehicles

Vehicle inspection programme is very important strategy for in-use vehicles only if it is designed properly. EPCA has already reviewed the pollution under control (PUC) scheme currently in force and is of the view that this is very ineffective in its current form. While norms are very lax, it is almost impossible to ensure tests are done correctly due to inadequate test procedures and lax enforcement. For instance, without additional measurements, like speed of the engine and temperature of the engine oil at the time of testing, which are currently not done, it is very easy to circumvent the free acceleration smoke test for diesel vehicles. Standards and test procedures need immediate revision. The current norms were first framed way back in seventies and were notified under Motor Vehicles Act and Rules in 1992. The Ministry of Road Transport and Highways is now revising these for the first time. EPCA notes with great concern that in most states the governments are only focusing on introducing computers in the PUC centers without addressing the fundamental weaknesses of the system.

Review of the new norms from Ministry of Road Transport and Highways show that these are not adequate to address the current concerns. Since all state governments would act on the basis of this notification it is important to recommend changes that are immediately needed to make these more effective.

EPCA comments on the draft notification on revised norms for the pollution under control certificate (PUC) scheme released by the Ministry of Road Transport and Highways on July, 30, 2003: Direction may be given to the Union ministry of road transport and highways to immediately revise the PUC notification along the lines recommended below:

### i) Diesel vehicles

<b>Current method of tests and norms</b> For all vehicles (except agricultural tractors)	<b>Proposed in the draft notification</b>	<b>EPCA Comments</b>
Free acceleration for turbocharged and naturally aspirated vehicles  65 Hartidge unit (HSU), 2.45 light absorption coefficient (m <sup>-1</sup> )	No change	Norms for diesel have not been changed at all. The values for post 2000 vehicles should be 50 HSU. (Already Asian countries like Thailand, Singapore, Indonesia, Malaysia etc have implemented this)  Notification does not indicate if test procedures have been modified to ensure correctness of the free acceleration smoke test like oil temperature measurement and engine RPM measurement etc. This should be reviewed immediately. Independent technical evaluation of the PUC system show that India follows the SAE J1667 Free Acceleration test procedures but without the checks and balances that the SAE procedures include. (Rogers 2002).

- The current smoke tests for diesel vehicles do not measure particulate emissions adequately. Studies point to the poor correlation between smoke and particulate

emissions. Develop loaded tests to enable particulate and NOx measurements for centralized vehicle inspection system.

**ii) Petrol/CNG/LPG vehicles**

**Carbon monoxide**

<b>Current method of tests and norms</b>	<b>Proposed in the draft notification</b>	<b>EPCA's Comments</b>
<b>Cars</b>		
Idling CO test 3% (by volume)	Pre 2000 cars: No change (3% by volume)  Post 2000 cars with closed loop 3-way catalytic converters: <b>0.5%</b> by volume  Option of measuring lambda in cars fitted with closed loop 3-way catalytic converters. Not mandatory.	Lambda measurement must be made compulsory for all vehicles fitted with three way converters to ensure that cat converters are working effectively and there is no tampering.

<b>Two/three wheelers</b>		
Idling CO test 4.5% by volume	Pre-2000 vehicles: No change (4.5%)  Post 2000 four-stroke 2/3 wheelers <b>with</b> catalytic converters: <b>3.5 %</b> by volume  Post-2000 two-stroke 2/3 wheelers: <b>No change (4.5%)</b>	Make all post 2000 two-stroke two/three wheelers follow same in-use norms. New two-stroke must not be allowed more lenient norms. 3.5% CO should be uniform for all post 2000 vehicles (two-stroke and four-stroke).

**Hydrocarbon norms**

<b>Current regulations</b>	<b>Proposed in the draft notification</b>	<b>EPCA's Comments</b>
<b>Cars</b>		
Not regulated	Introduced idling HC emissions test  Pre 2000: Cars <b>without</b> catalytic converters: <b>1500</b>	Independent technical evaluation of the PUC programme shows that the new standards are very lax. Comparison with similar technology vintage of vehicles in Europe shows that our proposed values are unacceptably high. For Euro II vehicles with catalytic converters



	<p><b>ppm</b></p> <p>Post 2000 Euro II compliant cars <b>with</b> three-way catalytic converters: <b>750 ppm</b></p> <p>Option of measuring lambda in cars with closed loop 3-way catalytic converters</p>	<p>the norm must not exceed 100 to 200 ppm.</p> <p>Lambda measurement should be compulsory.</p> <p>For older vehicles (pre-2000) it should be 750 ppm.</p>
<b>2/3 wheelers</b>		
Not regulated	<p>Introduced idling HC emissions test</p> <p>Pre-2000: two/three-wheelers: <b>9000 ppm</b></p> <p>Post 2000: Two-stroke two/three wheelers: <b>6000 ppm</b></p> <p>Post 2000: Four-stroke two/three wheelers: <b>4500 ppm</b></p>	<p>For all pre-2000 two/three-wheelers the proposed norm of 9000 ppm and 6000 ppm for post 2000 two-stroke two-wheelers appear too lax and should be reviewed immediately.</p> <p><b>(PI note:</b> If the Indian two-wheeler industry meets one of the most stringent mass emissions norms in the world today, the in-use emissions norms for new vehicles should be commensurably tighter. Taiwan for instance is introducing 2000 ppm for HC for new two wheelers from 2003.)</p>

**iii) Other comments from EPCA:**

i. Proposed modifications like compulsory lambda measurements etc would require shift from presently used 2-gas analyzers to 4-Gas Analyzers calibrated and certified to measure CO, HC, carbon dioxide (CO<sub>2</sub>), oxygen (O<sub>2</sub>) for accurate testing. Measurement of CO<sub>2</sub> and O<sub>2</sub> will eliminate the problem of tampering by diluting the exhaust by not putting the probe correctly.

ii. For the three-way catalyst equipped vehicles adopt two speed idle test, at normal idle and high idle speeds (2500-3000 RPM).

iii. EPCA has taken note of the following independent technical evaluations of the PUC systems to make the recommendations: John Rogers, Assessment of the Pollution Under Control Programme in India and recommendations for improvement, World Bank October 2002, and, Lennart Erlandsson and M Walsh, A Plan for progress, Motor Vehicle Inspection in NCR of Delhi, Centre for Science and Environment, March 2003.

**iv) Phase in centralised vehicle inspection system:** While upgrading the PUC system phase-in centralized inspection system. Develop institutional framework for independent

auditing, quality control and strict enforcement of the programme. Only rigorous enforcement of the programme can make a difference.

**v) Special observations with regard to in-use vehicles:**

i) Phasing out of old commercial vehicles has been proposed by almost all state governments and is consistent with the direction given by the Hon'ble Supreme Court in Delhi. In this context the Authority would like to take a strong note of the fact that emerged from the discussions with the various state government that some cities like Bangalore who had taken the initiative to fix the age of the vehicles were stopped by the central government from doing so on the ground that such steps are not consistent with the provisions of the Central Motor Vehicles Act and Rule. The contention is that if vehicles meet the PUC norms they should be allowed to ply. But the Supreme Court order has already set precedence in Delhi and age of vehicles has been fixed accordingly. The central government must be directed not to obstruct such moves taken in the interest of clean air. Moreover, as EPCA has repeatedly brought to the notice of the Supreme Court that PUC is a very ineffective system to identify gross polluters.

ii) The Authority recognises the fact that phasing out of old cars and scooters would be a difficult proposition. Therefore, the Authority recommends adoption of an approach based on fiscal regulation discouraging ownership of old vehicles and replacement of these with vehicles on alternative fuels.

### 3. Public transport and growing number of vehicles

City action plans are very weak on public transport and transport management. Lack of policy measure has resulted in rapid growth of private cars and two-wheelers whereas buses have registered negative growth. Vehicular registration figures show that in all the cities, two-wheelers (overwhelmingly two-stroke) make up the bulk of the vehicle fleet. In some cities passenger cars have started showing a higher growth rate than two-wheelers. Buses are insignificant two per cent in Ahmedabad. For most other cities, the share is less than one per cent. Most of the actions taken by the cities have focused on traffic measures rather than on creating a clean and efficient public transport system, which can bring in a shift in passengers from private mode of transport to public modes. This has obviously meant more emissions and congestion on roads. Without proactive policy to improve public transport and control the numbers of personal vehicles Indian cities would face severe congestion that cripples many western cities today.

**Table: Share of different types of vehicles in the total vehicle fleet**

*More than two-thirds of the vehicle fleet in any city is made up of two-wheelers, the next biggest segment being that of passenger cars.*

	<b>Two-wheelers</b>	<b>Passenger cars</b>	<b>Auto rickshaws</b>	<b>Taxis</b>	<b>Buses</b>	<b>Tucks</b>
Ahmedabad	80	14	3	1	2	0.004
Bangalore	75.99	14.74	4.40	0.45	1.36	3.08
Chennai	75	18	3	--	--	2
Hyderabad	76	15	5	0.67	0.05	3.14
Kanpur	84.57	11.43	0.64	0.08	0.69	2.58
Lucknow	81.82	12.99	1.47	1	0.54	2.19
Solapur	85.22	5.50	5.60	0.10	0.27	N.A.
Faridabad	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Range	75.99-85.22	5.50-15	0.64-5.60	0.67-1.00	0.05-2.00	0.004-3.14

Source: Based on various submissions of state government and state agencies to EPCA.

It is important to note that if immediate measures are not adopted to control the growth rate of cars and two wheelers in cities all emissions gains from technology improvement will be lost. Congestion also results in higher emissions. Moreover, from global experience it is evident how slow speed of vehicular traffic can further increase emissions dramatically. All state action plans have emphasized building of flyovers. But that will only shift around the congestion in the city without any appreciable impact.

**Table: With lower speed during traffic congestion emissions increases dramatically**

<b>Speed (kilometer per hour)</b>	<b>Autos</b>			<b>Buses</b>		
	<b>CO</b>	<b>HC</b>	<b>NOx</b>	<b>CO</b>	<b>HC</b>	<b>NOx</b>
10	33.02	4.47	2.53	22.60	5.70	22.30
25	21.20	2.60	2.17	14.40	2.30	16.40
50	9.80	1.30	2.24	8.20	0.00	11.90
75	6.40	0.93	2.97	-	-	-

Source: E A Vasconcellos, 2002, Urban Transport, Environment and Equity — the Case for Developing Countries, Earthscan Publications Ltd, London

A cursory review of road taxes on different categories of vehicles in some these cities bears out that in most cases tax burden is higher on public transport than on private transport. Fiscal instrument is the only way to discourage car ownership and usage but has not been considered as a policy measure for transport demand management by the state governments.

- Private vehicles pay one-time tax, as opposed to public transport system that have to pay annual tax. The tax burden on public transport is always higher than private transport.
- Only in Solapur three-wheelers and a few categories of private vehicles pay the same amount annually which is Rs 900.
- Only Chennai has reported Green Tax on old vehicles. (See table)

**Table: Road tax imposed on private vehicles and buses**

*Public transport is taxed higher than private vehicles*

TYPE OF VEHICLE	Tax rate		
	Kanpur & Lucknow <sup>1</sup>	Chennai <sup>2</sup>	Solapur <sup>3</sup>
Moped	Rs 800 (annual tax)		
Scooter/motorcycle	Rs 1,500	Rs 1,000-2,500 (annual tax)	
Car/Jeep (petrol)	2.5 % of cost value (+ Rs 5324 for every 1,000 kg if unladen weight exceeds 5,000 kg)	Rs 600-1,250 (annual tax)	Rs 860-3360 (per annum) (on the basis of laden weight)
Car/Jeep (diesel)	Twice 2.5 % of cost value (+ Rs 5324 for every 1,000 kg if unladen weight exceeds 5,000 kg)	6 % of the total cost of the vehicle (life-time tax)	
Auto-rickshaw (not more than 3 people)	Rs 95 (per quarter)	Rs 280 (per annum)	Rs 300 (per seat per year)
Auto-rickshaw (4-6 people)	Rs 185 (per quarter)		Rs 400-600 (per seat per year)
Transport vehicle with seating capacity of more than 35 persons excluding driver	Rs 1,115 for the first 35 seats and Rs 45 with every additional seat (per quarter)		
Motor cab-metred taxi		Rs 800 (per annum)	Rs 400-600 (per seat per year)
Maxi cab		Rs 500 (per seat per quarter)	
Omni bus		Rs 3,000 (per seat per quarter)	Rs 1,000 (per seat per annum)
Stage carriage buses		Rs 80 + Rs 20	Rs 4,000

		(surcharge) (per seat per quarter)	(per seat per annum)
<b>Green tax:</b>	<b>Motor cycle (15 years old)</b>	Rs 500 for five years	
	<b>Other vehicles (15 years old)</b>	Rs 1,000 for five years	
	<b>Transport vehicle (7 years old)</b>	Rs 500 per annum	

Source:

1. Website of Uttar Pradesh Transport Department, <http://www.uptransport.org/> as viewed on January 8, 2004
2. Website of Tamil Nadu State Transport Authority, <http://www.tn.gov.in/sta/tables-t.htm> as viewed on January 8, 2004
3. Website of Motor Vehicles Department, Government of Maharashtra, <http://www.mahatransport.org/taxation/taxation.htm> as viewed on January 8, 2004

### **Some examples of countries that have taken measures for reducing congestion and growing number of vehicles**

**Durham:** First UK city to introduce an explicit congestion charge in 2002. The aim had been to reduce traffic levels.

**Singapore:** Known to have imposed most stringent tax measures to check numbers and usage of vehicles. Traffic volumes fell by 10 to 15 per cent as a result of electronic road pricing scheme.

**Melbourne:** Called “Citylink” opened in January 2000. In 2001-02, more than 600,000 payments were made each weekday on average. Has helped reduce congestion

**Denmark:** Registration tax for passenger cars varies from 105-180 per cent of the value of the car.

Source: Laura Blow, et al, 2003, London's Congestion charge, The Institute for Fiscal Studies, Briefing Note No 31

### **Recommendations on public transport and transport management**

The concerned state governments should come back to the Court with a clear plan to augment public transport and transport management to restrict the rate of growth in numbers and usage of private vehicles in the city. Indicate the responsible agency and deadline:

- Augmentation plan for buses (on clean fuels) and bus routes so as to cover maximum area of the city with adequate frequency of buses.
- Plans for mass rapid transit systems (bus or rail based) with a definite time-bound implementation plan
- Parking policy
- Redesign vehicle taxation structure to restrict the increase in the number of personal vehicles and encourage public transport. Introduce emissions based taxes.
- Establish a unified authority with the mandate to oversee the implementation of the transport plan
- Design taxes that will make diesel car usage more expensive than petrol cars. Or particulate pollution reduction achieved with gaseous fuel strategy will be nullified.

#### **4. Gaseous fuel programme**

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i. Maximum PM emissions reduction benefits from a gaseous fuel programme come when three-wheelers and diesel fleet are replaced. Therefore, significant proportion of these vehicles should be replaced with gaseous fuel fleet on priority basis. Cities that have already planned their CNG bus programme must not trade off CNG option for Euro II option as Euro II is already obsolete and will not give any significant PM emissions benefits over CNG option.

ii. Prepare a fiscal policy to encourage a shift to the cleaner gaseous fuels. It is also important to note in reference to the EPCA report to the Hon'ble Court on pricing of CNG that all state governments formulate their respective fuel tax policies to always maintain an effective differential between diesel and other clean fuels. This is critical for the success of the programme.

iii. Define the institutional framework to ensure compliance with emission and safety norms and regular checks: EPCA recommends a combined safety and emissions tests along the lines developed in Delhi like the third party inspection system. This issue has been discussed in detail in the report on IA 179 and the earlier EPCA reports on safety standards for CNG vehicles submitted to the Hon'ble court.

v. Cities opting for LPG programme: Some cities have considered moving three-wheelers, taxis and cars to LPG. These cities must also undertake technological feasibility of LPG buses immediately and submit an action plan with schedule of implementation.

vi. EPCA would also like to recommend on the basis of Delhi's experience, that conversion of old diesel buses with CNG or LPG must not be allowed. Only new dedicated buses should replace the old diesel fleet to maintain the overall quality of the programme.

vii. For conversion of other types of vehicles like three wheelers and cars a strong certification and authorisation regime should be put in place. Automotive Research Association of India (ARAI) should also be directed to report on the status within a month.

viii. City action plans do not propose how would they prevent illegal LPG conversion. EPCA is of the view that annual inspection of commercial vehicles on LPG should be closely integrated with the vigilance system. Illegal users of cooking LPG and unauthorized kits should be penalized and license cancelled.

## **5. EPCA'S OBSERVATIONS AND SUMMARY RECOMMENDATIONS**

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While formulating the recommendations EPCA has kept the following concerns and principles in perspective:

- EPCA has made its recommendations in light of spirit of the order of the Hon'ble Supreme Court that the selected seven cities have very high level of particulate pollution and therefore need urgent and advance action beyond the minimum national norms and plans. Rapidly rising pollution sources like vehicles, the growing pollution load and its toxicity threatens to overwhelm the small efforts at pollution control in these cities. Most of the city action plans submitted by the state governments have stated very high contribution of the transport sector to the total air pollution load.
- It is very significant that in the absence of an effective national action plan and air quality planning systems, the Supreme Court rulings in Delhi have become the model of action for other cities as well. Most significant among these is the gaseous fuel strategy. Others include phasing out of old vehicles, and improving vehicle technology and fuel standards. Though air quality planning is nascent in India and pollution source inventory inadequate, the precedence set by the Hon'ble Supreme Court in Delhi demonstrates that action can be started immediately. Priority actions can be drawn up based on science and evidence of harmful effects of air pollution and lessons from global good practices. In the case of particulates it is just not the quantum but toxicity of particulates that determine the immediate target of action.

EPCA is therefore of the view that the seven city action plans need to follow common overarching goals in the following areas of interventions:

- Advancement of vehicle technology and fuel quality standards to achieve significantly cleaner emissions levels.
- Introduction and expansion of gaseous fuels programmes to leapfrog and achieve drastic reduction in particulate emissions.
- Appropriate policies to check rapid dieselisation of small and medium car segments that are growing source of particulate emissions in cities. Otherwise, this may nullify the emissions gains from moving public transport and commercial vehicles to gaseous fuels. Even two-wheelers contribute significantly high particulate as evident from data submitted by Kanpur and would require immediate regulatory intervention.
- Control emissions from on-road vehicles with improved inspection and maintenance programme, more representative test procedures and greater manufacturers accountability (emissions warranty). Upgrade the PUC programme immediately based on effective standards and test procedures and rigorous enforcement to weed out gross polluters. Simultaneously, prepare a phase-in plan for centralized inspection centres with more advanced norms and test facilities and quality audit systems.
- Augmentation of public transportation and transport demand management to restrict growth in number of private vehicles: As recommended earlier in report on IA 179 city transportation plans need to be effectively linked to air pollution abatement programmes.

- Effective strategy to prevent fuel adulteration: EPCA would like to reiterate its recommendations to the Hon'ble Supreme Court on this matter. Make oil companies accountable for the quality of fuel at the retail end, improve testing procedures and fuel quality standards, make penalty effectively stringent, and initiate public broadcast of defaulting retail outlets.
- EPCA notes with concern that 1% percent benzene petrol has been introduced only in a few cities so far. This is of serious concern in cities with very high proportion of two-stroke powered two-wheelers responsible for very high hydrocarbon emissions. Introduce 1 percent benzene petrol in critically polluted cities of India by April 2004.
- Strengthen air quality monitoring and planning in cities: Develop capacities to monitor additional pollutants like PM2.5, ozone, benzene and volatile organic compounds, carbon monoxide and polycyclic aromatic hydrocarbons. It is very important that the concerned state governments and the Union ministry of environment and forests undertake their own source apportionment studies, pollution source inventories, for future planning and monitoring.

#### **6. DIRECTIONS SOUGHT FROM THE HON'BLE COURT:**

1. The state governments of the concerned seven cities be directed to implement the common minimum programme as per the agreement and given deadlines as listed in this report. State governments to be directed to report on progress of implementation every 6 months.
2. The concerned state governments be directed to finalise deadlines and implementation schedules for the action points in the agenda, which are still not decided. To report within 1 month with deadlines.
3. To direct the central government to take decision on the implementation of Euro IV standards immediately. The time frame of 2010 for Euro IV standards as recommended by the Auto Fuel Policy, will not be conducive to healthy environment.
4. To direct the central government to review the in-use emission norms under the PUC scheme, proposed recently by the Ministry of Road Transport and Highways in light of the comments made by EPCA in the relevant section on cross cutting policy measures.
5. To direct the concerned state governments and Delhi government to submit a comprehensive and time-bound plan for restricting the growth of number of private vehicles and develop and implement public transportation plans.
6. In view of the strong cancer potency of benzene emissions and predominance of two-stroke powered two wheelers in vehicular fleet responsible for very high hydrocarbon emissions, EPCA recommends that 1 % benzene petrol be introduced in all critically polluted cities of India by April 2004.
7. To address the problem of dieselisation of car fleet and fuel adulteration EPCA recommends that distortions in automotive fuel prices and prices of adulterants (kerosene, naphtha, LDO, solvents etc) are immediately corrected. Additionally, eliminate the price difference between petrol and diesel fuels to remove incentive for dieselisation.



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**References:**

- <sup>i</sup> M P Walsh and C Pera 2003, Progress toward clean cars, trucks, and buses, International Council on Clean Transportation (ICCT), May 4, P 59.
- <sup>ii</sup> Final Report, Diesel Oxidation Catalyst and lean NOx catalyst Diesel Emission Control – Sulphur Effects programme, US Department of Energy, 2001
- <sup>iii</sup> M P Walsh and C Pera 2003, Progress toward clean cars, trucks, and buses, International Council on Clean Transportation (ICCT), May 4, P 59.