Annex D

Proposed Emission Control Measures and Emission Reduction Potential

(i) Baseline Emissions (Tonnes) in 2006

Sector	**SO_2**	**NOx**	**RSP / PM_{10}**	**VOC**
Power	66,000	41,800	1,860	416
Transport	5,170	43,520	2,330	8,645
Vehicles	*956*	*21,800*	*1,810*	*8,080*
Marine (figure in brackets for local vessels)	*3,920 (682)*	*16,700 (3,994)*	*499 (179)*	*304 (91)*
Aviation	*294*	*5,020*	*21*	*261*
Industry and Others	2,660	9,530	1,675	32,198
Total	**73,830**	**94,850**	**5,865**	**41,259**

(ii) Proposed Phase I Emission Control Measures

		Emission Reduction Potential (Tonnes)			
		SO2	**NOx**	**RSP / PM_{10}**	**VOC**
Emission Capping and Control					
1.	Increase ratio of natural gas in local electricity generation to 50% together with additional emission abatement measures[1]	13,402	25,225	523	0
2.	Early retirement of aged / heavily polluting vehicles (pre-Euro, Euro I and Euro II commercial diesel vehicles and franchised buses)	0	3,102	300	184
3.	Earlier replacement of Euro III commercial diesel vehicles with models meeting latest Euro standards	0	743	75	24
4.	Wider use of hybrid / electric vehicles or other environment-friendly vehicles with similar performance (20% private cars and 10% franchised buses)	15	216	7	173
5.	Ultra low sulphur diesel for local vessels	675	0	18	0
6.	Selective catalytic reduction for local vessels	0	304	0	0
7.	Electrification of aviation ground support equipment	85	759	21	67
8.	Emission control for off-road vehicles / equipment	4	950	239	326
9.	Strengthening volatile organic compounds control	0	0	0	700
Transport Management					
10.	Low emission zones	Note [2]	Note [2]	Note [2]	Note [2]
11.	Car-free zone / pedestrianisation scheme	Note [2]	Note [2]	Note [2]	Note [2]
12.	Bus route rationalization	4	156	7	9
Infrastructure Development and Planning					
13.	Expand rail network	17	501	46	207
14.	Cycling network to major public transport hubs	0.1	2.3	0.1	0.1
Energy Efficiency Measures [3]					
15.	Mandatory implementation of Building Energy Codes	151	256	8	3
16.	Energy efficiency standards for domestic electrical appliances	84	142	4	1
17.	Light-emitting diode or equivalent alternatives for traffic signal / street lighting	3	5	0.1	0
18.	Tree planting / roof-top greening [4]	Note [4]	Note [4]	Note [4]	Note [4]
19.	District cooling system for Kai Tak Development	6	16	0.5	0.2

Baseline Emissions (Tonnes) Upon Completion of Phase I Measures

Sector	**SO2**	**NOx**	**RSP / PM_{10}**	**VOC**
Power	11,718	17,375	737	420
Transport	4,910	38,048	1,933	6,040
Vehicles	*263*	*9,354*	*1,262*	*5,257*
Marine	*4,263*	*21,380*	*658*	*436*
Aviation	*384*	*7,314*	*13*	*348*
Industry and Others	12	3,658	385	23,104
Total	**16,640**	**59,080**	**3,055**	**29,564**

(iii) Proposed Phase II Emission Control Measures

		Emission Reduction Potential (Tonnes)			
		SO2	**NOx**	**RSP / PM_{10}**	**VOCs**
Emission Capping and Control					
20.	Increase the ratio of natural gas in local electricity generation to 75% with additional abatement measures (Additional to Phase I measure)	5,163	5,761	178	0
21.	Increase ratio of renewable energy (2% wind energy)	502	852	25	8
22.	Wider use of hybrid / electric vehicles or other environment-friendly vehicles with similar performance [30% private cars, 15% buses (including franchised buses), 15% light goods vehicles (LGVs) plus 15% heavy goods vehicles (HGVs)] (Additional to Phase I measure)	40	849	79	174
23.	Ultra low sulphur diesel for ocean-going vessels and local vessels (Additional to Phase I measure)	2,392	1,145	15	0
24.	Selective catalytic reduction for ocean-going vessels and local vessels (Additional to Phase I measure)	0	7,153	0	0
25.	Electrification of on-shore power supply	377	2,361	297	404
26.	Tightening aviation emission standards	0	3,587	0	0
27.	Further strengthening volatile organic compounds control	0	0	0	4,870
Transport Management					
28.	Electronic road pricing (ERP) / congestion charging scheme for Hong Kong Island North	Note [5]	Note [5]	Note [5]	Note [5]
29.	Reduce parking provision (25%) to restrain car usage for Central	Note [6]	Note [6]	Note [6]	Note [6]
Energy Efficiency Measures [3]					
30.	District cooling system (35% in existing areas and 90% in other new development areas)	120	197	5.5	1.9

Baseline Emissions (Tonnes) Upon Completion of Phase II Measures

Sector	**SO2**	**NOx**	**RSP / PM_{10}**	**VOC**
Power	6,053	10,762	534	412
Transport	2,861	28,317	1,760	5,442
Vehicles	*270*	*9,722*	*1,284*	*4,900*
Marine	*2,124*	*13,450*	*457*	*122*
Aviation	*466*	*5,145*	*19*	*421*
Industry and Others	11	3,682	386	18,865
Total	**8,925**	**42,761**	**2,679**	**24,719**

(iv) Proposed Phase III Emission Control Measures

		Emission Reduction Potential (Tonnes)			
		SO2	**NOx**	**RSP / PM_{10}**	**VOC**
Emission Capping and Control					
31.	Increase ratio of natural gas in local electricity generation to 100% (Additional to Phase II measure) [7]	6,553	7,430	270	0
32.	50% nuclear power and 50% natural gas (Alternative Case compared to Base Case of 75% natural gas) [7]	6,554	8,422	381	210
33.	Wider use of hybrid / electric vehicles or other environment-friendly vehicles with similar performance (50% private cars, 50% buses (including franchised buses), 50% HGVs plus 50% LGVs) (Additional to Phase II measure)	63	789	42	232
34.	Vehicle permit quota system (to reduce around 50% private cars and 50% motorcycles)	28	93	3	119
35.	Use of hydrogen fuel eell vehicles or equivalent alternatives (not less than 40% penetration)	140	2,778	94	1,453
Infrastructural Development and Planning					
36.	Rail for transport of cross-boundary goods	1	11	1	9

Baseline Emissions (Tonnes) Upon Completion of Phase III Measures

Sector	**SO2**	**NOx**	**RSP / PM_{10}**	**VOC**
Power	0	2,340	153	202
Transport	3,952	29,515	1,894	4,000
Vehicles	*101*	*5,466*	*1,195*	*3,276*
Marine	*3,385*	*18,904*	*680*	*303*
Aviation	*466*	*5,145*	*19*	*421*
Industry and Others	10	3,770	391	20,083
Total	**3,962**	**35,626**	**2,437**	**24,285**

Notes:

[1] Possible additional emission abatement measures include enhancing the selective catalytic reduction (SCR) systems of the existing coal-fired units. However, the technical feasibility and financial viability of retrofitting the existing coal-fired units with enhanced SCR systems are not yet established and subject to more detailed examination with the concerned power company.

[2] Emission reduction potential would not be substantial as it involves mainly transferring emission from one place to another.

[3] Benefits include material damage, energy saving, acute and chronic health benefits. For strategies 15, 16, 17 and 19, the majority of benefits are due to energy savings, not health benefits. Emission reduction of energy efficiency measures is generated from less electricity demand. To be conservative, they have not been included in the net total emission reduction.

[4] The proposed measures help reduce urban heat island effect and improve the air pollution dispersion. No local emission and cost data are available. Estimates are based on overseas data for roof top greening of 10% of the urban area.

[5] The ERP strategy will have additional ride-on effect on improvement of air quality. The overall emission reduction potential would not be substantial. The ERP measure will have incidental improvements to air quality. Only these benefits have been calculated here. The estimated cost for the proposed ERP scheme is about HK$1 billion (including the cost of in-vehicle units for existing vehicles) with an annual recurrent cost of about HK$200 million.

[6] Emission reduction potential would not be substantial as it involves mainly transferring emission from one place to another.

[7] The "increase ratio of natural gas in local electricity generation to 100%" scenario and "50% nuclear & 50% natural gas" scenario are either-or case. Adoption of only one of these measures would be expected.