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Table S-1
Emissions Data for Diesel Buses Not Equipped with Diesel Particulate Filters

Citation	Number of Vehicles	Engine Make	Engine Model	Model Year	Type of Diesel Fuel	2-Stroke or 4-Stroke Catalyst?	Ox.	Emissions (g/mile)			Included in Analysis?
								PM	NOx	SO ₂	
Ahlvik and Brandberg (2)	1	Scania	Euro II	?	< 10 ppm S	?	None	0.34	17.9		
	1	Scania	Euro II	?	< 10 ppm S	?	Yes	0.28	17.7		
McCormick <i>et al.</i> (3)	2	DDC	50	1993	No 2	4	None	0.77	45		
Motta <i>et al.</i> (68)	6	Cummins	L10	1990	No 2	4	None	1.99	22		
	5	Cummins	L10	1991	No 2	4	None	1.74	24.6		
	3	DDC	6V-92TA	1992	No. 1	2	None	0.72	25		
	5	DDC	6V-92TA	1992	No. 1	2	None	1.05	25.3		
	5	DDC	6V-92TA	1992	No. 1	2	None	0.81	25.8		
	4	DDC	6V-92TA	1990	No. 1 or 2	2	None	2.53	26.7		
Lanni <i>et al.</i> (1)	2	DDC	50	1999	350 ppm S	4	Yes	0.21	24.5	0.29	Yes
	2	DDC	50	1999	30 ppm S	4	Yes	0.17	25.4	0.026	
Northeast Advanced Vehicle Consortium (72)	1	DDC	50	1998	300 ppm S	4	Yes	0.24	30.1		Yes
	1	DDC	50	2000	No 1	4	Yes	0.51	23		Yes
West Virginia University (16)	1	DDC	50	1998	No 1	4	Yes	0.17	28.7		Yes
	2	DDC	50	1995	No 1	4	Yes	0.49	37.3		Yes

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Table S-2
Emissions Data for Diesel Buses Equipped with Diesel Particulate Filters

Citation	Number of Vehicles	Engine Make	Engine Model	Model Year	Type of Diesel Fuel	2-Stroke or 4-Stroke	Ox. Catalyst?	Emissions (g/mile)			Included in Analysis?
								PM	NOx	SO ₂	
Ahvik and Brandberg (2)	1	Scania	Euro II		< 10 ppm S	?	Yes	0.03	17.2		
Motta <i>et al.</i> (68)	3	DDC	6V-92TA	1992	No. 1	2	None	0.44	25.6		
	5	DDC	6V-92TA	1992	No. 1	2	None	0.34	27		
Lanni <i>et al.</i> (1)	2	DDC	50	1999	30 ppm S	4	Yes	0.03	25.1	0.0072	Yes

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Table S-3
Emissions Data for CNG Buses

Citation	Number of Vehicles	Engine Make	Engine Model	Model Year	Open Loop?	Ox. Catalyst?	Emissions (g/mile)			Included in Analysis?
							PM	NOx	SO ₂	
McCormick <i>et al.</i> (3)	1	Cummins	L10G	1995			0.09	16.5		Yes
	1	John Deere	8.1L	1996			0.09	14.8		Yes
	2	DDC	50G	1994	Yes		0.19	44.7		
Motta <i>et al.</i> (68)	5	Cummins	240G	1991	Yes		0.01	29		
	5	Cummins	240G	1992	Yes		0.01	30.4		
	5	Cummins	240G	1993	Yes		0.03	12		
	5	Cummins	240G	1994	Yes		0.02	11.2		
Northeast Advanced Vehicle Consortium (72)	1	Cummins	280G	1998		Yes	0.02	25		Yes
	1	DDC	50G	1999		No ^a	0.02	14.9		Yes
	1	DDC	50G	1998		No ^a	0.02	9.7		Yes
West Virginia University (16)	2	DDC	50G	1999		No ^a	0.05	16.5		Yes

Notes

a. Although these studies reported that the Detroit Diesel Corporation Vehicles tested were configured with a catalytic converter, the buses tested were not so equipped (73).

**Table S-4
 Greenhouse Gas Emissions for Diesel and CNG Vehicles**

Citation	Propulsion	Number of Vehicles	Engine Make	Engine Model	Model Year	CO ₂ Equivalent Emissions (g/mile) ^a	
						CO ₂	CH ₄
Lanni <i>et al.</i> (1)	CD	2	DDC	50	1999	2,920	
	ECD	2	DDC	50	1999	2,958	
Northeast Advanced Vehicle Consortium (72)	CD	1	DDC	50	1998	2,779	
	CNG	1	Cummins	280G	1998	2,392	307
	CNG	1	DDC	50G	1999	2,343	365
	CNG	1	DDC	50G	1998	2,785	498
West Virginia University (16)	CD	1	DDC	50	2000	2,533	
	CD	1	DDC	50	1998	2,366	
	CD	2	DDC	50	1995	2,213	
	CNG	2	DDC	50G	1999	2,382	
McCormick <i>et al.</i> (3)	CNG	1	Cummins	L10G	1995	2,749	
	CNG	1	John Deere	8.1L	1996	2,093	

Notes:

- a. CO₂ equivalent emissions for CH₄ reflect multiplication of CH₄ emissions by the CH₄ 100 year time horizon GWP value of 21 (p. 9 in (5)).

Table S-5
Optimal Tax on CO₂ and Methane Emissions^a

Study	Tax per Ton of CO₂
Nordhaus (1991) ^{b,f}	\$2.5 (\$0.1-\$22.4) ^d
Ayers and Walter (74) ^f	\$10.2-\$11.9
Nordhaus (75)	\$2.3 (best guess) and \$6.1 (expected value)
Cline (76); Cline (77)	\$2.6-\$52.4
Peck and Teisberg (78)	\$4.1-\$4.8
Fankhauser (79)	\$7.8 (\$2.5-\$18.0) ^d
Maddison (80)	\$2.8-\$2.9 ^e
Tol (64) ^c	\$4.4

Notes:

- a. *Calculated based on Table 4 in (64).*
- b. *Full reference not available in Tol (64).*
- c. *Costs in Tol (64) were expressed in 1990 dollars and have been converted to 1998 dollars here.*
- d. *Values in parentheses represent 90% confidence intervals.*
- e. *The lower value reported by Maddison (80) is the result of a cost benefit calculation, whereas the upper value is the result of a marginal cost calculation.*
- f. *The model did not explicitly consider the time when the emission occurs.*

**Table S-6
 CNG Infrastructure Capital Cost Estimates**

Source and Location	Conversion or New	Facility Type	Reported Capital Cost	Per-Vehicle-Year Capital Cost Amortized over 50 Years: Discount Rate of 3% (2000 dollars) ^{a,b}
p. 26 in (66) (LA County MTA)	New	Fuel	200 buses – \$6,858,000 divided into 10 equal payments made over 10 years ^c	\$823
p. 23 in (6) (LA County, MTA)	Conversion	Fuel	200-buses, outdoor facility – \$1,700,000	\$326
Table 5 in (68) (Location not specified)	Conversion	Fuel	For conversion of a diesel facility to CNG for 160 buses – \$1,500,000 (1994 dollars)	\$417
Table 5 in (68) (Location not specified)	Conversion	Maintenance	For conversion of a diesel facility to CNG for 160 buses – \$1,080,000 (1994 dollars)	\$300
Table 5 in (68) (Location not specified)	Conversion	Storage	For conversion of a diesel facility to CNG for 160 buses – \$1,170,000 (1994 dollars)	\$325
Dana Lowell, NYCT, Personnel Communication NY City	Conversion	Fuel	Bid of \$5 million for a 200 bus facility in the Bronx and \$7 million for a 200 bus facility in Brooklyn	\$957
Dana Lowell, NYCT, Personnel Communication NY City	New	Maintenance and Storage	Capital Planning Department estimated \$5 million cost for a new 200 bus 1-floor CNG facility	\$957
Dana Lowell, NYCT, Personnel Communication NY City	Conversion	Maintenance and Storage	Bid of \$15 million to convert a 200 bus facility with all indoor parking in Brooklyn	\$2,872
Dana Lowell, NYCT, Personnel Communication NY City	Conversion	Maintenance and Storage	Estimated \$50 million cost of converting a 3-level 200 bus facility when little extra outdoor space is available.	\$9,575
Brown (81) (Toronto, Canada)	Conversion	Fuel, Maintenance, and Storage	\$8.2 million Canadian for a 125 Bus facility	\$1,621 (U.S.)

Notes:

- a. *The computations have been based on the assumption that payments are made mid-year.*
- b. *Adjustments for inflation were made using the consumer price index (at <http://minneapolisfed.org/economy/calc/hist1913.html>)*

- c. *This analysis assumed that payments of \$685,800 were made annually for each of 10 years. This expenditure amounts to \$3,429 per bus. However, because the buses have a useful life of 12 years, and the facility has been assumed to have a useful life of 25 years, the analysis assigned (12/50) of this annual cost to the buses considered here.*

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