APPENDIX A: Examples of Successful Projects

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MSRC Purchase of 19 CNG Transit Buses

Omnitrans is the transit provider for San Bernardino County. Omnitrans is purchasing 19 40-foot CNG transit buses to replace existing diesel buses. The vehicles will be equipped with the Cummins L-10G dedicated CNG engine.

Cost-Effe	ctiveness:			ę	\$3 pe	r Ib						
MV Fund	ing Effectiv	/en	ess:	9	\$5 pe	r Ib						
	Cost of Emi	issi	on Reduc	tic	ons:	:	\$76	60,000				
	Motor Vehic	cle	Funds Us	sec	d:	\$1	.31	5,524				
	Lifetime Err					-	•	7,983 lbs				
		1122			10115.		251	7,905 105				
Project Analy	vsis Period (years	<u>s):</u>			12							
						Descri	-	_				
Capital Costs	<u>. :</u>			\$								new CNG buses and fferential was \$40,000.
(Portion of cap emissions rec	bital costs related tuctions.)	to									o ui	
Annual Operation	ating Costs:					•	•					n for diesel. To be
(Portion of op	erating costs requi	ired to	2					e, operating cos be equal.	SIS IO	or both CNG and	i aie	esel transit buses are
· ·	ality benefits of pro											
Total Cost of	Emission			\$							ng c	osts where inflation rate
										ount rate is 10%.		
Data Sources	s and Assumptio	ns fo	or Cost Estim	ate	<u>s:</u>	Bus ma	anufa	cturers: Neopl	an a	and New Fyer.		
			ROO):		0	lbs	OR	0	tons		
NET EMISSIC	ONS BENEFITS (1	12 ye	ars) NOx	:	25	6,677	lbs	OR	128	tons		
			PM1	0:		1,307	lbs	OR	1	tons		
Direct Benefits	<u>s:</u> emission factor		annual		emissior	n factor		annual		annual emission		annual emission
	VMT (gm/mi)		VMT reduced		TRIPS (RIPS reduced		reduction (gm)		reduction (lbs)
ROG	3.70	х	988,000	+	0.0	- · ·	́x́	0	=	3,655,600	=	8.059
NOx	17.20	Х	988,000	+	0.0	0	Х	0	=	16,993,600	=	37,465
PM10	0.64	Х	988,000	+	0.0	00	Х	0	=	632,320	=	1,394
DisBenefits (if	any):											
	emission factor		annual		emissior	n factor	•	annual	i	annual emission		annual emission
	VMT (gm/mi)		VMT gained		TRIPS (gm/trip)) -	TRIPS gained		increase (gm)		increase (lbs)
ROG	3.70	Х	988,000	+	· 0.0	00	Х	0	=	3,655,600	=	8,059
NOx	7.38	Х	988,000	+	· 0.0	0	Х	0	=	7,291,440	=	16,075
PM10	0.59	Х	988,000	+	· 0.0	00	Х	0	=	582,920	=	1,285
Assumptions t	o estimate travel r	educt	tions: Est	ima	ted annu	al bus r	nilea	ge is provided b	by C	mnitrans. 19 bu	ises	@ 52,000 miles per year
			ре	r bu	JS.							

Assumptions to estimate emission factors:

Emission factors for ROG and PM10 are default values. NOx factor for diesel bus is calculated as (4.0 g/bhp-hr)*(4.3 bhp-hr/mi.) = 17.2 g/mi. NOx factor for CNG bus using 260 hp Cummins L-10G engine is (1.8 g/bhp-hr)*(4.1 bhp-hr/mi.) = 7.38 g/mi.

MSRC Purchase of 13 CNG School Buses

Lapis Energy Organization, Inc. formed a joint venture with two school districts within the South Coast air district for the purchase and deployment of 13 compressed natural gas (CNG) school buses.

Cost-Effectiveness:	9	\$6 pe	r Ib						
MV Funding Effectiveness:	ę	\$6 pe	r Ib						
Cost of Emission Redu	uctio	ons:		\$29	97,258				
Motor Vehicle Funds L	Jsed	d:		\$32	26,984				
Lifetime Emission Red					2,162 lbs				
		0110.		0.	2,102 100				
Project Analysis Period (years):		20	Desci	riptio	<u>n</u>				
<u>Capital Costs :</u>	\$	297,258	Diffei \$297.		purchase cost	for	CNG buses; 13 v	vehic	les @ \$22,866 each is
(Portion of capital costs related to emissions reductions.)			ψ 2 07,	200.					
Annual Operating Costs:					costs for both C analysis.	NG	buses and diese	el bus	ses are assumed to be
(Portion of operating costs required to sustain air quality benefits of project.)			- 1						
Total Cost of Emission	\$						value of operatin ount rate is 10%.	g co	sts where inflation rate
Data Sources and Assumptions for Cost Esti	mate						n vendor quotes.		
R	OG:		-	lbs	OR	0	tons		
	Ox:	5	2,162		OR	26	tons		
Direct Benefits:	M10:		0	lbs	OR	0	tons		
emission factor annual		emissio			annual	i	annual emission	;	annual emission
VMT (gm/mi) VMT reduce		TRIPS (-		RIPS reduced		reduction (gm)		reduction (lbs)
ROG 0.00 X 182,000	+	0.0		Х	0	=	0	=	0
NOx13.00X182,000PM100.00X182,000	+	0.0		X X	0 0	=	2,366,000 0	=	5,216
PM10 0.00 X 182,000	+	0.0	0	~	0	=	0	=	0
DisBenefits (if any):									
emission factor annual		emissio			annual	i	annual emission	i	annual emission
VMT (gm/mi) VMT gaine		TRIPS (TRIPS gained		increase (gm)		increase (lbs)
ROG 0.00 X 182,000	+			Х	0	=	0	=	0
NOx 6.50 X 182,000	+	-		Х	0	=	1,183,000	=	2,608
PM10 0.00 X 182,000	+	0.0	00	Х	0	=	0	=	0
					assumptions ba traveled 14,000		l upon informatio les per year.	n pro	ovided by school

Assumptions to estimate emission factors:

CNG-engine NOx factor corresponds to Cummins C8.3-250 engine @ 2.0 g/bhp-hr. Conversion factor applied is 3.25 bhp-hr/mi. Compared to typical new bus engine certified to 4.0 g/bhp-hr.

MSRC Refuse Haulers CNG Repowering

Waste Management will repower 14 heavy-duty, diesel-powered, waste collection trucks with Cummins L-10G-260 natural gas engines and fuel systems. Vehicles will be employed in Orange County, the Coachella Valley, and the San Gabriel Valley. Initially, the contractor will repower one vehicle which will serve as a model to develop and document the engineering process. The contractor, with co-funding assistance from the Southern California Gas Company, will install compressed natural gas refueling infrastructure to support the vehicles. The contractor will also implement training and a public awareness campaign.

	ectiveness: ling Effectiv	ven		\$	68 per lb 65 per lb		40,000					
	Cost of Emi						46,000					
	Motor Vehic				_	•	52,200					
	Lifetime Em	niss	ion Redu	uctio	ons:	17	4,782 lbs					
Project Ana	lysis Period (years	<u>s):</u>			9 Descr	intio	n					
Capital Cos	t <u>s :</u>			\$1,4		-		with	this alternative fu	iel c	conversion project include:	
(Portion of ca emissions re	apital costs related t ductions.)	to			\$60,00)0; p		n lab			ning labor costs: ublic outreach: \$82,300;	
(Portion of o	rating Costs: perating costs requi uality benefits of pro				not ye made	t ava that t	ilable. For the p	ourp	ose of this analys of the CNG refu	is, t	of CNG refuse trucks are the assumption will be rucks are comparable to	
<u>Total Cost c</u>	f Emission			\$1,4			• •		•	g co	osts where inflation rate	
Total Cost of Emission \$1,446,000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Waste Management of Orange County; TerraFuel Systems, Inc.; Southern California Gas Company.												
			RO	G:	0	lbs	OR	0	tons			
NET EMISSI	ONS BENEFITS (9) yea	rs) NO PM		174,782	lbs Ibs		87 0	tons tons			
Direct Benefi	ts:			10.	U	105	UK	0	lons			
	emission factor		annual		emission facto		annual		annual emission		annual emission	
ROG	VMT (gm/mi) 0.00	х	VMT reduce 40,040	a +	TRIPS (gm/trip 0.00)) X	TRIPS reduced 0	=	reduction (gm) 0	=	reduction (lbs) 0	
NOx	440.00	Х	40,040	+	0.00	X		=	17,617,600	=	38,840	
PM10	0.00	Х	40,040	+	0.00	Х	0	=	0	=	0	
DisBenefits (if any):											
	emission factor		annual		emission facto		annual		annual emission		annual emission	
DOC	VMT (gm/mi)	v	VMT gained		TRIPS (gm/trip	,	TRIPS gained		increase (gm)		increase (lbs)	
ROG NOx	0.00 220.00	X X	40,040 40,040	++	0.00 0.00	X X		=	0 8,808,800	=	0 19,420	
PM10	0.00	X	40.040	+	0.00	X		_	0,000,000	_	0	
	to estimate travel re		2,8 ye	860 h ar. N	s operage 11 h ours of operati	on pe OUR	er vehicle per ye RS PER YEAR F	ear.	week, 52 weeks Fourteen vehicle	s m	year. This equates to eans 40,040 hours per T REDUCED AND GAINED	
Assumptions	to estimate emissio	on fa	fui hc en ca as	el in 1 prsepc nissio Iculat (2.0	4 refuse haule ower requirement n factor for a r ed as (4.0 g/bl g/bhp-hr)*(110	ers. ent fo lew d np-hr) hp)	NOx value for C or refuse collection diesel engine is 4° r)*(110 hp) = 440	Cum on d 4 gn 0 g/l DTE	mins L10G-260 e Iriving cycle = 110 h/bhp-hr. NOx fa hr. NOx factor fo THAT THE EMIS	engii 0 hp acto r Cl	G as opposed to diesel ne = 2 g/bhp-hr; average b. The comparable r for diesel engine is NG engine is calculated ON FACTORS EXPRESSED	

Sacramento Repower of Greenwaste Pickup Vehicle

The City of Sacramento repowered two Case tractors (off-road vehicles) that pick up greenwaste in the City. New certified diesel engines replaced old uncertified diesel engines that would have been rebuild to old emission levels. Important components to this project are that the owner would not have ordinarily purchased a new engine at this time, but would have rebuilt the old one; and, also, that the vehicle could not be converted to an alternative fueled cleaner burning engine (i.e., compressed natural gas) cost-effectively.

Cost-Effe	ectiveness:		\$1 pe	r Ib								
MV Fund	ling Effectiv	ven	ess:	<	\$1 pe	r Ib						
	Cost of Emi	ssi	on Redu	uctio	ons:			\$8,000				
	Motor Vehic	cle	Funds L	Jsed	d:			\$2,000				
	Lifetime Em							7,742 lbs				
								.,				
Project Anal	ysis Period (years	<u>s):</u>			7	Descri	ptio	n				
Capital Cost	<u>s :</u>											of the new diesel
(Portion of ca emissions red	pital costs related t ductions.)	to						d the cost to reb tractor.	build	I the old diesel er	ngin	es, is estimated to be
Annual Oper	ating Costs:				\$0							
	erating costs requi	red to	C		* *							
sustain air qu	ality benefits of pro	oject.)									
Total Cost of	f Emission				\$8,000	Capita	l cos	sts plus net pres	sent	value of operatin	ng c	osts where inflation rate
Data Source	s and Assumptio	<u>ns fo</u>	or Cost Esti	mate	<u>s:</u>							
		•		DG:		-	lbs	OR	0	tons		
NET EMISSI	ONS BENEFITS (7	yea	,	Dx: И10:		7,742	ibs Ibs	OR OR	4 0	tons tons		
Direct Benefit	<u>s:</u>			110.		U	103	ÖK	0	10113		
	emission factor		annual		emissio	n factor		annual		annual emission		annual emission
	VMT (gm/mi)		VMT reduce		TRIPS (• • •		TRIPS reduced		reduction (gm)		reduction (lbs)
ROG	0.00	Х	2,056	+	0.0	-	Х	0	=	0	=	0
NOx	520.00	Х	2,056	+	0.0	-	X	0	=	1,069,120	=	2,357
PM10	0.00	Х	2,056	+	0.0	00	Х	0	=	0	=	0
<u>DisBenefits (i</u>	fany):											
	emission factor		annual		emissio			annual		annual emission		annual emission
	VMT (gm/mi)		VMT gaine	d	TRIPS (TRIPS gained		increase (gm)		increase (lbs)
ROG	0.00	Х	2,056	+			Х	0	=	0	=	0
NOx	276.00	Х	2,056	+			Х	0	=	567,456	=	1,251
PM10	0.00	Х	2,056	+	0.0	00	Х	0	=	0	=	0
Assumptions :	to estimate travel re	educ	V	ehicle	e. (1028)	X 2 = 20)56)		HO			ours per year per EPLACE ANNUAL VMT

Assumptions to estimate emission factors:

Emission benefits are based on NOx only. NOx factor for baseline old diesel engine is calculated as $(80 \text{ hp})^*(13 \text{ g/bhp-hr})^*(0.5) = 520 \text{ g/hr}$. NOx factor for lower emitting new diesel engine is calculated as $(80 \text{ hp})^*(6.9 \text{ g/bhp-hr})^*(0.5) = 276 \text{ g/hr}$. NOTE THAT THE EMISSION FACTORS EXPRESSED AS G/HR REPLACE G/MI IN THE ABOVE EQUATIONS.

Sacramento Purchase of Class 8 Heavy-Duty Trucks

Raley's Corporation purchased eight new Class 8 trucks to deliver products from its Sacramento distribution center. These new trucks were equipped with Cummins L10-300G LNG engines rather than new diesel engines.

Cost-Eff	ectiveness:			\$	64 per	lb							
MV Fund	ding Effectiv	ven	ess:	9	64 per	lb							
	Cost of Em			ctio	ns:		\$32	0,000					
	Motor Vehi	cle	Funds U	ser	<u>ا</u> ٠		\$32	0,000					
	Lifetime En							7,039 lbs					
		1155			0115.		11	,039 105					
Project Ana	lysis Period (year	<u>s):</u>			12	_							
Capital Cos	4c ·			¢			ption		oto	botwoon the new	I N	IG trucks and new diese	~1
Capital Cos	<u>15.</u>			φ.	•),000 per truck		between the new		IG TUCKS and new diese	*1
(Portion of c emissions re	apital costs related eductions.)	to					·	, I					
Annual Ope	erating Costs:				\$0 O	pera	ting c	osts are assun	nec	I to be equal for th	is a	analysis.	
	perating costs requ uality benefits of pr												
Total Cost o	of Emission			\$:						t value of operating ount rate is 10%.	g c	costs where inflation rate	;
Data Sourc	es and Assumptic	ons fo	or Cost Estim	nates	<u>s:</u> Er	ngine	distri	butor and engi	ne	manufacturer.			
			RO	G:		0	lbs	OR	0	tons			
NET EMISS	IONS BENEFITS (12 ye	•		77,0	039		OR	39				
Direct Denef	ito.		PM	10:		0	lbs	OR	0	tons			
Direct Benef	emission factor		annual		emission fa	acto		annual		annual emission		annual emission	
	VMT (gm/mi)		VMT reduced		TRIPS (gr			RIPS reduced		reduction (gm)		reduction (lbs)	
ROG	0.00	Х	560,000	+	0.00		x	0	=	0	=		
NOx	10.40	Х	560,000	+	0.00		Х	0	=	5,824,000	=	12,840	
PM10	0.00	Х	560,000	+	0.00		Х	0	=	0	=	,	
DisBenefits (if any):												
	emission factor		annual		emission fa	acto	r	annual		annual emission		annual emission	
	VMT (gm/mi)		VMT gained		TRIPS (gm	n/trip) Т	RIPS gained		increase (gm)		increase (lbs)	
ROG	0.00	Х	560,000	+	0.00		´ x	0	=	0	=	()	
NOx	5.20	Х	560,000	+	0.00		Х	0	=	2,912,000	=	6,420	
PM10	0.00	Х	560,000	+	0.00		Х	0	=	0	=	0	
Assumptions	to estimate travel r	reduc			ed vehicle 000 miles/y		je pro	vided by Raley	's -	70,000 miles per	ye	ar per truck. (8 X 70,00	0
<u>Assumptions</u>	to estimate emissi	on fa	g/	bhp-l		p-hr						new diesel) engine is 4.0 is 2.0 g/bhp-hr X 2.6)

San Joaquin Valley Agricultural Sprayer Engine Re-power

Phippen Brothers proposes to re-power 2 agricultural sprayers with new diesel engines. The new diesel engines will emit 6.9 g/bhp-hr of NOx compared to the old engines rebuilt to emit 12.9 g/bhp-hr.

MV Funding Effectiveness: \$1 per lb Cost of Emission Reductions: \$8,000 Motor Vehicle Funds Used: \$6,000 Lifetime Emission Reductions: 4,894 lbs Project Analysis Period (years): 10 Capital Costs : \$8,000 (Portion of capital costs related to emissions reductions.) \$8,000 Annual Operating costs: \$0 (Portion of operating costs required to sustain air quality benefits of project.) \$0 Total Cost of Emission \$8,000 Capital Costs required to sustain air quality benefits of project.) \$0 Total Cost of Emission \$8,000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Project proponent. NET EMISSIONS BENEFITS (10 years) NOX: 4.894 lbs OR 2 tons PM10: 0 lbs OR 0 tons 10 Nox 740 + 0.00 x annual emission factor annual emission factor annual emission factor annual emission annual emission factor annual emission annual emission factor a	Cost-Eff	ectiveness:		9	\$2 pe	r Ib								
Motor Vehicle Funds Used: Lifetime Emission Reductions:\$6,000 4,894 lbsProject Analysis Period (years):10 DescriptionCapital Costs: (Portion of capital costs related to emission factotion of operating costs required to sustain air quality benefits of project.)10 DescriptionAnnual Operating Costs: (Portion of operating costs required to sustain air quality benefits of project.)S0 Assumed to be the same for rebuild and for new engines.Chall Cost of Emission Sustain air quality benefits of project.)S0.000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%.Total Cost of Emission Sustain air quality benefits of project.)80.000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%.Total Cost of Emission Sustain air quality benefits of project.)ROG: NOX: PMIO:0 lbsOR O top openent.Tert EMISSIONS BENEFITS (10 years) NOX	MV Func	ling Effectiv	/en	ess:		\$1 pe	r Ib							
Lifetime Emission Reductions:4,894 lbsProject Analysis Period (years):10Capital Costs :0(Portion of capital costs related to emissions reductions.):50Annual Operating Costs:50Annual Operating costs required to sustain air quality benefits of project.):50Assumed to be the same for rebuild and for new engines.Cost of Emission60Cost of Emission740Cost of Emission740Cost of Emission740Cost of Emission740Cost of Cost Estimate740Cost of Emission740Cost of Emission740Cost of Emission740Cost of Cost Estimate740Cost o		Cost of Em	issi	on Red	ductio	ons:		\$8,	000					
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Project Analysis Period (years): 10 Capital Costs : Storm of capital costs related to emissions reductions.): Storm of capital costs related to emissions reductions.): Storm of capital costs related to emissions reductions.): Storm of capital costs required to sustain air quality benefits of project.): Storm of capital costs required to sustain air quality benefits of project.): Storm of capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Project proponent. Net EMISSIONS BENEFITS (10 years): NOS: PM10: 0 lbs OR 0 tons Direct Benefits: MOG 0 lbs OR 0 tons Net EMISSIONS BENEFITS (10 years): NOS: PM10: 0 lbs OR 0 tons Direct Benefits: emission factor annual emission factor annual annual annual emission NOS 645.00 X 740 + 0.00 X 0 emission annual emission PM10 0.00 X 740 + 0.00 X 0 annual emission annual emission NOS 645.00 X 740 </td <td></td>														
Capital Costs : Description Capital Costs : (Portion of capital costs related to emissions reductions.) \$8,000 The cost of the new diesel engines is \$10,000 each. The cost to rebuild the old engines is \$6,000 each. The cost of rebuild and for new engines is \$8,000. Annual Operating Costs: \$0 Assumed to be the same for rebuild and for new engines. (Portion of operating costs required to sustain air quality benefits of project.) \$0 Assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Project proponent. NET EMISSIONS BENEFITS (10 years) ROG: 0 lbs OR 0 tons Direct Benefits: emission factor annual VMT (gm/mi) VMT reduced reduction (gm) reduction (lbs) ROG 0.00 X 740 + 0.00 X 0 = 0 = 0 Diseene finction (gm) increase (gm)			moc		aaou	0110.		.,.						
Capital Costs : \$8,000 The cost of the new diesel engines is \$10,000 each. The cost to rebuild the old engines is \$6,000 each. The cost difference for two engines is \$8,000. Central Operating Costs: \$0 Assumed to be the same for rebuild and for new engines. Control of operating costs required to sustain air quality benefits of project.) \$0 Assumed to be the same for rebuild and for new engines. Total Cost of Emission \$8,000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Project proponent. NET EMISSIONS BENEFITS (10 years) ROG: 0 lbs OR 0 tons Direct Benefits: emission factor annual annual annual annual annual emission NOX 645.00 X 740 + 0.00 X 0 = 0 = 0 Disenfits (ff any): emission factor annual annual annual annual emission annual annual emission annual emission annual emission annual emission PM10 0.00 X 740 + 0.00 X 0 </td <td>Project Anal</td> <td>ysis Period (year</td> <td><u>s):</u></td> <td></td> <td></td> <td>-</td> <td>Docorin</td> <td>lion</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Project Anal	ysis Period (year	<u>s):</u>			-	Docorin	lion						
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(Portion of operating costs required to sustain air quality benefits of project.) Fortial Cost of Emission \$8,000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Project proponent. NET EMISSIONS BENEFITS (10 years) ROG: NOX: 4,894 lbs OR 2 tons PM10: 0 lbs OR 0 tons Direct Benefits: emission factor annual VMT (gm/mi) VMT (gm/mi) VMT reduced TRIPS (gm/trip) TRIPS reduced TRIPS reduced reduction (gm) reduction (lbs) NOX 645.00 X 740 + 0.00 X 0 = 0 = 0 DisBenefits (if any): emission factor annual function factor annual for Cost X annual emission annual emission annual emission annual emission reduction (lbs) = 0	`	•	to				ola engir	ies is \$	6,000 each	. I	ne cost ainerence	e toi	r two engines is \$8,000.	
sustain air quality benefits of project.) Total Cost of Emission \$8,000 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%. Data Sources and Assumptions for Cost Estimates: Project proponent. NET EMISSIONS BENEFITS (10 years) ROG: 0 lbs OR 0 tons NET EMISSIONS BENEFITS (10 years) ROG: 0 lbs OR 0 tons O lbs OR 0 tons Direct Benefits: emission factor annual emission factor annual annual annual emission NOX 645.00 X 740 + 0.00 X 0 = 0 DisBenefits (if any): emission factor annual emission factor annual annual emission annual emission NOX 645.00 X 740 + 0.00 0 = 0 0 DisBenefits (if any): emission factor annual annual annual emission annual emission annual emission ROG 0.00 X 740 + 0	Annual Ope	rating Costs:				\$0	Assume	d to be	e the same f	or r	ebuild and for nev	w e	ngines.	
is assumed to be 3% and discount rate is 10%.Data Sources and Assumptions for Cost Estimates:Project proponent.NET EMISSIONS BENEFITS (10 years)ROG:0 lbsOR0total Sources and Assumptions for Cost Estimates:Project proponent.NET EMISSIONS BENEFITS (10 years)ROG:0 lbsOR0Direct Benefits:Direct Benefits:emission factorannualemission factorannualO lbsOR0VMT (gm/mi)VMT reducedTRIPS (gm/trip)TRIPS reducedannualemission factorannualannual emissionAGG0.00XO2oDisBenefits (if any):emission factorannualemission factorannualColspan="2">annualemission factorannualoDisBenefits (if any):emission factorannualemission factorannualemission factorannualemission factorannualemission factor <th colspa<="" td=""><td>· ·</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>· ·</td> <td></td>	· ·												
ROG:0 lbsOR0tonsDirect Benefits:emission factorannualannualVMT (gm/mi)VMT reducedTRIPS (gm/trip)TRIPS reducedreduction (gm)reduction (lbs)ROG0.00X0annualannual emissionannualannual emissionMIT (gm/mi)VMT reducedTRIPS (gm/trip)TRIPS reducedROG0.00X0=0=NOX645.00X740VMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS (gm/trip)TRIPS gainedincrease (gm)increase (gm)increase (gm)NOX345.00X740+0.00X740VMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS (gm/trip)TRIPS gainedincrease (gm)increase (gm)NOX00NOX </td <td>Total Cost o</td> <td>f Emission</td> <td></td> <td></td> <td></td> <td></td> <td>•</td> <td>•</td> <td>•</td> <td></td> <td></td> <td>g co</td> <td>osts where inflation rate</td>	Total Cost o	f Emission					•	•	•			g co	osts where inflation rate	
NET EMISSIONS BENEFITS (10 years)NOx: PM10:4,894 lbs 0 lbsOR OR 0 lbs2 tonsDirect Benefits: emission factorannual 	Data Source	es and Assumptio	ons fo	or Cost Es	stimate	<u>s:</u>	Project p	ropone	ent.					
NET EMISSIONS BENEFITS (10 years)NOx: PM10:4,894 lbs 0 lbsOR OR 0 lbs2 tonsDirect Benefits: emission factorannual annualemission factor reduction (gm)annual emission reduction (gm)annual emission reduction (gm)ROG NOx 645.000.00X 740740+ 0.000.00X X0= 00NOx box PM10645.00X 740740+ 0.000.0021,052PM10 DisBenefits (if any): VMT (gm/mi)annual VMT gainedemission factor TRIPS (gm/trip)annual annual annual emission factorannual emission factor annual annual emission factorannual emission factor annual annual emission factorannual emission factor annual emission factor trips gainedannual emission increase (gm)DisBenefits (if any): emission factor VMT (gm/mi)annual VMT gainedemission factor trips (gm/trip) trips (gm/trip)annual emission factor trips gainedannual emission increase (gm)ROG NOx NOx NOx 345.00X 740740+ 0.000= 00ROG NOx NOX NOX 0.00X 740740+ 0.000= 00= 0Assumptions to estimate travel reductions: Diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE														
NET EMISSIONS BENEFITS (10 years)NOx: PM10:4,894 lbs 0 lbsOR OR 0 lbs2 tonsDirect Benefits: emission factorannual annualemission factor reduction (gm)annual emission reduction (gm)annual emission reduction (gm)ROG NOx 645.000.00X 740740+ 0.000.00X X0= 00NOx box PM10645.00X 740740+ 0.000.0021,052PM10 DisBenefits (if any): VMT (gm/mi)annual VMT gainedemission factor TRIPS (gm/trip)annual annual annual emission factorannual emission factor annual annual emission factorannual emission factor annual annual emission factorannual emission factor annual emission factor trips gainedannual emission increase (gm)DisBenefits (if any): emission factor VMT (gm/mi)annual VMT gainedemission factor trips (gm/trip) trips (gm/trip)annual emission factor trips gainedannual emission increase (gm)ROG NOx NOx NOx 345.00X 740740+ 0.000= 00ROG NOx NOX NOX 0.00X 740740+ 0.000= 00= 0Assumptions to estimate travel reductions: Diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE					ROG:		0 11	os	OR	0	tons			
Direct Benefits:emission factorannualemission factorannualannualannualannualannual emissionannual emissionROG0.00X740+0.00X0=0=0NOx645.00X740+1.00X0=477,300=1,052PM100.00X740+0.00X0=0=0DisBenefits (if any):emission factorannualemission factorannualannual emissionannual emissionVMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS gainedincrease (gm)increase (lbs)ROG0.00X740+0.00X0=0=0NOx345.00X740+1.00X0=255,300=563PM100.00X740+0.00X0=0=0Assumptions to estimate travel reductions:Two diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE	NET EMISSI	ONS BENEFITS (10 ye		-				-		tons			
emission factorannualemission factorannualannualannualemissionVMT (gm/mi)VMT reducedTRIPS (gm/trip)TRIPS reducedreduction (gm)reduction (lbs)ROG0.00X740+0.00X0=0=0NOx645.00X740+1.00X0=477,300=1,052PM100.00X740+0.00X0=0=0DisBenefits (if any):emission factorannualemission factorannualannual emissionannual emissionVMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS gainedincrease (gm)increase (lbs)ROG0.00X740+0.00X0=0=0NOx345.00X740+1.00X0=0=563PM100.00X740+0.00X0=0=0NOx345.00X740+0.00X0=0=0Assumptions to estimate travel reductions:Two diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE	Direct Depeti	ho.			PM10:		0 lk)S	OR	0	tons			
VMT (gm/mi) VMT reduced TRIPS (gm/trip) TRIPS reduced reduction (gm) reduction (lbs) ROG 0.00 X 740 + 0.00 X 0 = 0 = 0 NOx 645.00 X 740 + 1.00 X 0 = 477,300 = 1,052 PM10 0.00 X 740 + 0.00 X 0 = 0 = 0 DisBenefits (if any): emission factor annual emission factor annual annual emission annual emission increase (lbs) ROG 0.00 X 740 + 0.00 X 0 = 0 = 0 ROG 0.00 X 740 + 0.00 X 0 = 0 = 0 NOx 345.00 X 740 + 0.00 X 0 = 0 = 0	Direct Benein			annua	I	emissio	n factor		annual		annual emission		annual emission	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$														
PM100.00X740+0.00X0=0=0DisBenefits (if any):emission factorannualemission factorannualannualemissionannualemissionVMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS gainedincrease (gm)increase (lbs)ROG0.00X740+0.00X0=0=NOx345.00X740+1.00X0=255,300=563PM100.00X740+0.00X0=0=0Assumptions to estimate travel reductions:Two diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE	ROG	(0)	Х				• • • •			=	(O)	=	· · /	
PM100.00X740+0.00X0=0=0DisBenefits (if any):emission factorannualemission factorannualannualemissionannualemissionVMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS gainedincrease (gm)increase (lbs)ROG0.00X740+0.00X0=0=NOx345.00X740+1.00X0=255,300=563PM100.00X740+0.00X0=0=0Assumptions to estimate travel reductions:Two diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE	NOx	645.00	Х	740	+	1.0	00	Х	0	=	477,300	=	1,052	
emission factorannualemission factorannualannualannualannualemissionVMT (gm/mi)VMT gainedTRIPS (gm/trip)TRIPS gainedincrease (gm)increase (lbs)ROG0.00X740+0.00X0=0=0NOx345.00X740+1.00X0=255,300=563PM100.00X740+0.00X0=0=0Assumptions to estimate travel reductions:Two diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE	PM10	0.00	Х	740	+	0.0	00	х	0	=		=		
VMT (gm/mi) VMT gained TRIPS (gm/trip) TRIPS gained increase (gm) increase (lbs) ROG 0.00 X 740 + 0.00 X 0 = 0 = 0 NOx 345.00 X 740 + 1.00 X 0 = 255,300 = 563 PM10 0.00 X 740 + 0.00 X 0 = 0 = 0 Assumptions to estimate travel reductions: Two diesel engines operating 370 hrs/yr each. NOTE THAT HOURS PER YEAR REPLACE	<u>DisBenefits (i</u>	<u>f any):</u>												
ROG 0.00 X 740 + 0.00 X 0 = 0 = 0 NOx 345.00 X 740 + 1.00 X 0 = 255,300 = 563 PM10 0.00 X 740 + 0.00 X 0 = 0 = 0 Assumptions to estimate travel reductions: Two diesel engines operating 370 hrs/yr each. NOTE THAT HOURS PER YEAR REPLACE		emission factor		annua	I						annual emission		annual emission	
NOx 345.00 X 740 + 1.00 X 0 = $255,300$ = 563 PM10 0.00 X 740 + 0.00 X 0 = 0 = 0 Assumptions to estimate travel reductions:		VMT (gm/mi)		VMT gair	ned	TRIPS (gm/trip)	TRI	PS gained		increase (gm)		increase (lbs)	
PM100.00X740+0.00X0=0=0Assumptions to estimate travel reductions:Two diesel engines operating 370 hrs/yr each.NOTE THAT HOURS PER YEAR REPLACE	ROG	0.00	Х	740	+	0.0	00	Х	0	=	0	=	0	
Assumptions to estimate travel reductions: Two diesel engines operating 370 hrs/yr each. NOTE THAT HOURS PER YEAR REPLACE	NOx	345.00	Х	740	+	1.0	00	Х	0	=	255,300	=	563	
	PM10	0.00	Х	740	+	0.0	00	Х	0	=	0	=	0	
	Assumptions	to estimate travel r	educ	tions:										
	Assumptions	to estimate emissi	on fa	ctors:	The ag	ricultural	sprayer	has an	100 hp eng	gine	. Assume load fa	acto	r is 0.5. The rebuilt old	
Assumptions to estimate emission factors: The agricultural sprayer has an 100 hp engine. Assume load factor is 0.5. The rebuilt old	ASSUMPTIONS	to estimate emission	un ta	CIOFS:									r IS U.5. The repulit old	

diesel engine emits 12.9 g/bhp-hr and the new diesel engine will emit 6.9 g/bhp-hr. NOTE THAT THE EMISSION FACTORS EXPRESSED AS G/HR REPLACE G/MI IN THE ABOVE EQUATIONS.

San Joaquin Valley Street Sweeper Purchase

The City of Clovis proposes to purchase a new CNG street sweeper. The NOx emissions for the new CNG vehicle will be 1 g/bhp-hr compared to a new diesel street sweeper that emits 5 g/bhp-hr of NOx.

Cost-Eff	ectiveness:		\$6 per	· Ib								
MV Func	ling Effectiv	/ene	ess:		\$6 per	' Ib						
	Cost of Em	issic	on Redu	ctio	ons:		\$3	2,209				
	Motor Vehic	cle F	unds U	se	d:		\$3	2,209				
	Lifetime Err							5,819 lbs				
			01111000					,				
Project Anal	ysis Period (year	<u>s):</u>			15 [Descri	ption	I				
Capital Cost	<u>is :</u>								•			pared to a new diesel
(Portion of ca emissions re	apital costs related ductions.)	to			S	weep	er at S	\$124,329. The	COS	st difference is \$3	2,2	09.
Annual Ope	rating Costs:				\$0	Opera	ting c	osts are assun	ned	to be the same.		
	perating costs requi ality benefits of pro											
Total Cost o	f Emission									value of operatin ount rate is 10%.	g co	osts where inflation rate
Data Source	es and Assumptio	ons for	Cost Estin	nate	<u>s:</u> F	Project	prop	onent.				
	-											
			RO	<u>c</u> .		0	lbs	OR	0	tons		
NET EMISSI	ONS BENEFITS (15 yea			5	5,819		OR	3	tons		
		•	, PW	1 0 :		0	lbs	OR	0	tons		
Direct Benefit	_											
	emission factor		annual		emission			annual	1	annual emission		annual emission
ROG	VMT (gm/mi) 0.00	X	MT reduce/ 332		TRIPS (g 0.00	•) I X	RIPS reduced		reduction (gm) 0		reduction (lbs) 0
NOx	663.00	X	332 332	+	1.00		X	0	=	220,116	=	485
PM10	0.00	X	332 332	++	0.00		X	0	=	220,116	=	485 0
DisBenefits (i		,,	001		010	•		Ũ		Ū		Ŭ
	emission factor		annual		emission	factor	-	annual		annual emission		annual emission
	VMT (gm/mi)		VMT gained	I	TRIPS (g			RIPS gained		increase (gm)		increase (lbs)
ROG	0.00	Х	332	' +			́x ˈ	0	=	0	=	0
NOx	133.00	X	332	+			X	0	_	44,156	=	97
PM10	0.00	X	332	+	-		X	0	=	0	=	0
Assumptions	to estimate travel r	eductio								OTE THAT HOU THE ABOVE EQ		PER YEAR REPLACE TIONS.
Assumptions	to estimate emission	on fact	<u>ors:</u> Ar	alys						000 CNG by Joh		on Sweeper Co. The

Analysis is based on a road sweeper model #4000 CNG by Jonnston Sweeper Co. The new CNG engine is a Cummins 5.9 and that emits 1 g/bhp-hr of NOx compared to a new diesel engine emitting 5 g/bhp-hr of NOx. Engines operate at 195 hp and assume 0.68 load. NOTE THAT THE EMISSION FACTORS EXPRESSED AS G/HR REPLACE G/MI IN THE ABOVE EQUATIONS.

San Diego Old Vehicle Buy Back Program

Pre-1982 vehicles were purchased and scrapped.

	ectiveness: ing Effectiv	ven	ess:			\$2 per lb \$2 per lb						
	Cost of Emi	ssi	ion R	educ	tic	<u>ons:</u> \$1	,98	30,000				
	Motor Vehic	cle	Fund	s Us	e	d: \$1	.98	30,000				
	Lifetime Err					-		9,741 lbs				
						<u>ono:</u> 1,	000	5,7 11 160				
Project Anal	ysis Period (years	<u>s):</u>				3 <u>Descri</u> j	otior	<u>1</u>				
Capital Cost	<u>s :</u>			5	51,			nicle purchase. 5 model year ve			19	75-81 vehicles and \$600
(Portion of ca emissions red	pital costs related t ductions.)	to				lor pre-	1970	o model year ve	IIICIE	5.		
Annual Oper	ating Costs:					\$0						
· ·	erating costs requi ality benefits of pro											
Total Cost of	Emission			\$	51,	<i>,</i> ,				value of operatin ount rate is 10%.	g c	osts where inflation rate
Data Source	s and Assumptio	ns f	or Cost	Estima	te	s: District	assı	Imptions based	lon	South Coast AQ	MD	's experience.
				ROG		702,428	lbs	OR	351	tons		
NET EMISSIO	ONS BENEFITS (3	3 yea	ars)	NOx:	-	307,312		OR	154			
				PM10):	0	lbs	OR	0	tons		
Direct Benefit	<u>s:</u> emission factor		ann	ual		emission factor		annual		annual emission		annual emission
	VMT (gm/mi)		VMT re			TRIPS (gm/trip)		RIPS reduced		reduction (gm)		reduction (lbs)
ROG	6.20	Х	22,126		+	0.00	x	0	=	137,181,200	=	
NOx	3.30	Х	22,126		+	0.00	Х	0	=	73,015,800	=	160,973
PM10	0.00	Х	-		+	0.00	Х	0	=	0	=	0
DisBenefits (if	any):											
	emission factor		ann	ual		emission factor		annual	á	annual emission		annual emission
	VMT (gm/mi)		VMT g	ained		TRIPS (gm/trip)		TRIPS gained		increase (gm)		increase (lbs)
ROG	1.40	Х	22,126	6,000	+	0.00	Х	0	=	30,976,400	=	68,292
NOx	1.20	Х	22,126	5,000	+	0.00	Х	0	=	26,551,200	=	58,536
PM10	0.00	Х	22,126	6,000	+	0.00	Х	0	=	0	=	0
Assumptions t	to estimate travel re	educ	<u>tions:</u>	"Mol	bile	e Source Emissio	on R	eduction Credit	s Gu	uidelines, Februa	ıry ´	1996."

Assumptions to estimate emission factors:

"Mobile Source Emission Reduction Credits Guidelines, February 1996."

Santa Barbara Commuter Express CNG Bus Service A subscription commute bus service was operated using 5, full-sized 40-passenger compressed natural gas (CNG) buses.

	ectiveness: ling Effectiv		ess:		\$3 р \$1 р								
	Cost of Em	issi	on Redu	uctio	ons:	\$	88	91,268					
	Motor Vehic	cle	Funds l	Jse	d:	\$	519	0,000					
	Lifetime Err							9,616 lbs					
								-,					
Project Anal	ysis Period (year	<u>s):</u>			15	<u>Descrip</u>	tior	<u>1</u>					
Capital Cost	<u>s :</u>				\$							for this commute service a apital costs are included.	at
(Portion of ca emissions re	pital costs related ductions.)	to					of b	ouses were fact				e cost effectiveness	
Annual Ope	rating Costs:				\$96,60			driver salaries, on, minus bus r		s maintenance ar fares.	nd ii	nsurance, and	
· ·	perating costs requi ality benefits of pro												
Total Cost o	f Emission			\$	891,26					value of operatin ount rate is 10%.	g c	osts where inflation rate	
Data Source	es and Assumptio	ons fo	or Cost Esti	mate	<u>s:</u>	(mainter	nanc		, ins			g costs per bus and administration).	
			R	OG:		70,169 l	bs	OR	35	tons			
NET EMISSI	ONS BENEFITS (15 ye	•	Ox:	1	08,157 II		OR	54	tons			
Direct Benefit	S.		PI	M10:		91,290 II	bs	OR	46	tons			
	emission factor		annual		emissi	on factor		annual	i	annual emission		annual emission	
ROG	VMT (gm/mi)	v	VMT reduc		-	(gm/trip)		RIPS reduced		reduction (gm)		reduction (lbs)	
NOx	0.36 0.71	X X				3.26 .56	X X	16,735 16,735	=	2,343,631 4,540,670	=	5,167 10,011	
PM10	0.45	X	6,358,540			0.00	X	16,735	=	2,861,343	=	6,308	
<u>DisBenefits (i</u>	<u>f any):</u>												
	emission factor		annual			on factor		annual	i	annual emission		annual emission	
	VMT (gm/mi)		VMT gaine			(gm/trip)		FRIPS gained		increase (gm)		increase (lbs)	
ROG	1.10	X		+		0.00	Х	0	=	221,760	=		
NOx PM10	6.30 0.50	X X	201,600 201,600	+		0.00 0.00	X X	0 0	=	1,270,080 100,800	=	2,800 222	
	to estimate travel r											ssengers per bus. 5	
	to estimate emissio		בלסרק: בלסרק: בלסרק: דר בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בלסרק: בל בל בל בל בל בל בל בל בל בל בל בל בל	euses. he ex- NPCD bus trij onger ise. Emissi Projec 'ear 1 //bhp-	. 83% c -solo dri). Assu p. 252 than the ion facto ts, April 998, an	of participa vers drive mption: 5 days of op e average ors for aut 1997." d average . CNG bu	nts to ti erat 12- o tri Bus	drove alone to he bus. 252 da e one-way aver- tion. 5 buses. year life of an u ps are from "M- emission facto sed 45 mph. N	wor ays o rage Ave irbai etho rs a Ox o	k prior to taking the of operation. (So access trip. Dis rage life of buses in transit bus becan transit bus becan ds to Find Cost- re based on MVE emission rate fror	he o urco ber s is auso Effe El 7 m m	ectiveness of Air Quality 'G, urban buses, Model nodel is based on 4.0 alf the NOx emissions of	

San Diego Long-Distance Commuter Vanpools

Funds to subsidize the cost of long-distance commute vanpools. The San Diego Association of Governments (SANDAG) entered into agreements with two vanpool providers for vehicle leasing, insurance and maintenance, and with four transportation management associations for marketing and vanpool formation.

Cost-Effe	ectiveness:				\$5 per	r Ib						
MV Fund	ing Effectiv	/en	ess:		\$2 per	r Ib						
	Cost of Em	issi	on Reduc	tic	ons:		\$37	3,796				
	Motor Vehic	cle	Funds Us	se	d:		\$17	0,352				
	Lifetime Err	niss	ion Redu	cti	ions:		70),947 lbs				
Project Anal	ysis Period (years	<u>s):</u>			1	Descri						
Capital Cost	s ·				_		-	-	in th	ne annual lease ui	nde	r operating costs.
	pital costs related	to			ΨŪ	00010	, van				140	
Annual Oper	ating Costs:			\$	399,200	Financ	cial su	ubsidy of \$300	per	vanpool per mon	th.	97 participating
	erating costs requi ality benefits of pro									v remaining cost o 00 administrative (ase (which includes ts.
Total Cost of	Emission			\$						value of operating ount rate is 10%.	g co	osts where inflation rate
Data Source	s and Assumptio	ons fo	or Cost Estim	ate	<u>s:</u> 3	Source	: SA	NDAG				
			ROG		20	0.061	lha	OR	10	topo		
NET EMISSI	ONS BENEFITS (1 yea				0,961 5,082		OR	18	tons tons		
			PM1	0:	14	4,905	lbs	OR	7	tons		
Direct Benefit	s: emission factor		annual		omionion	factor		annual				annual amigaian
	VMT (gm/mi)		VMT reduced		emission TRIPS (g			RIPS reduced		annual emission reduction (gm)		annual emission reduction (lbs)
ROG	0.55	х	17,351,421	+	4.9		́x́	98,031	=	10,031,476	=	22,116
NOx	1.02	Х	17,351,421	+	2.0		Х	98,031	=	17,899,413	=	39,462
PM10	0.45	Х	17,351,421	+	0.0	0	Х	98,031	=	7,808,139	=	17,214
DisBenefits (if	any):											
	emission factor		annual		emission	factor		annual		annual emission		annual emission
	VMT (gm/mi)		VMT gained		TRIPS (g	gm/trip)) 7	RIPS gained		increase (gm)		increase (lbs)
ROG	0.18	Х	2,328,000	+	2.10	6	Х	48,500	=	523,800	=	1,155
NOx	0.82	Х	2,328,000	+	1.6	0	Х	48,500	=	1,986,560	=	4,380
PM10	0.45	Х	2,328,000	+	0.0	0	Х	48,500	=	1,047,600	=	2,310
	to estimate travel r		wer vel con one sur	re fo niclo nmi e-wa vey	ormer sold e to the va ute trip is 4 ay trips pe 's)	o driver anpool; 48 mile er day, 1	s or o aver s. 250 c	carpool drivers age one-way ac 50 commute da lays per year.	(no cce: iys (So	t passengers). 7 ss trip is 5 miles. per year. Disben urce: SANDAG ar	5% Ave lefits nd v	77% of participants of participants drive a grage one-way s: 97 vans, two 48-mile vanpool participant Air Quality Projects, April
								for model year			2.7	

Santa Rosa Employee Transit Subsidy Project

Transit passes were subsidized for County of Sonoma employees at the main Santa Rosa facility.

	fectiveness: ding Effectiv		055.	-	10 per lb \$5 per lb						
	Cost of Em				•		47,286				
	Motor Vehi	cle	<u>Funds L</u>	Jse	<u>ed:</u>	\$	24,000				
	<u>Lifetime En</u>	niss	sion Red	uct	tions:		4,848 lbs				
Project Ana	alysis Period (year	<u>s):</u>			1						
					Desc	riptio	<u>n</u>				
Capital Cos (Portion of c emissions r	capital costs related	to			\$0						
(Portion of c	erating Costs: operating costs requ quality benefits of pr				\$50,500 Tran	sit pa	ss subsidies. \$	6,5	00 for administrat	ion	and marketing.
Total Cost	of Emission								t value of operatir ount rate is 10%.	ng c	costs where inflation rate
NET EMISS	SIONS BENEFITS (1 ye	ars) No	DG: Dx: //10:	1,784 2,319 745		OR OR OR	1 1 0	tons		
Direct Derici	emission factor		annual		emission facto	or	annual		annual emission		annual emission
	VMT (gm/mi)		VMT reduce	ed	TRIPS (gm/tri	p) ⁻	TRIPS reduced		reduction (gm)		reduction (lbs)
ROG	0.71	Х	750,750	+	- 6.13	Х	45,045	=	809,158	=	1,784
NOx	1.26	Х	750,750	+		Х	45,045	=	1,051,801	=	1
PM10	0.45	Х	750,750	+	- 0.00	Х	45,045	=	337,838	=	745
DisBenefits	(if any):										
	emission factor		annual		emission facto	or	annual		annual emission		annual emission
	VMT (gm/mi)		VMT gaine	d	TRIPS (gm/tri	p)	TRIPS gained		increase (gm)		increase (lbs)
ROG	0.00	Х	0		+ 0.00	Х	0	=	0	=	-
NOx	0.00	Х	0	-	+ 0.00	Х	0	=	0	=	-
PM10	0.00	Х	0	-	+ 0.00	Х	0	=	0	=	0
Assumptions	s to estimate travel i	reduc	p s	rior t ourc	o receiving trans e: County of So	sit pa noma	sses. Average o ; participant sur	one vey	-way trip distance	• wa 25	articipants drove alone as 14 miles. (Data 50 commute days. 25% p.
• •				·		haar					an af Air Oscality Drain ata

Assumptions to estimate emission factors:

Emission factors are based on "Methods to Find Cost-Effectiveness of Air Quality Projects, April 1997." Factors are for calender year 1996.

County of San Bernardino Employee Trip Reduction Program

The County of San Bernardino conducts a comprehensive employee trip reduction program, which includes vanpool and carpool programs, telecommuting, compressed work schedules and guaranteed emergency transportation.

· •										
Cost of Emission Reductions: \$172,342										
nds Used:	\$140,505									
n Reductions:	26,886 lbs									
1										
	iption									
\$U										
Annual Operating Costs: \$184,055 General operating costs and ridesharing incentives.										
Total Cost of Emission \$172,342 Capital costs plus net present value of operating costs where inflation rate is assumed to be 3% and discount rate is 10%										
Data Sources and Assumptions for Cost Estimates:										
POC- 8 022		1 tons								
/ -										
,		3 tons								
		annual emission	annual emission							
	,	(0)	reduction (lbs)							
	,		= 8,922 = 12,793							
	,	, ,	= 12,793 = 5,171							
		, ,_ ,_ ,_ ,_ ,	-,							
annual emission facto	r annual	annual emission	annual emission							
			increase (lbs)							
	-		= 0							
0 + 0.00	X 0	= 0	= 0							
0 + 0.00	X 0	= 0	= 0							
Assumptions to estimate travel reductions: 250 commute days. 359,000 yearly vehicle trips reduced (County employee commute										
	S: \$5 per lb Reductions: inds Used: n Reductions: 1 Descrisor \$1 0 \$184,055 Gener \$172,342 Capita is assu cost Estimates: ROG: 8,922 NOX: 12,793 PM10: 5,171 annual emission facto IT reduced TRIPS (gm/trip, 212,680 + 2.05) ,212,680 + 2.05 .000 annual emission facto MT gained TRIPS (gm/trip, 0.00) 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00 0 + 0.00	s: \$5 per lb $Reductions: $172,342$ $1 $140,505$ $reductions: 26,886 lbs$ $1 $26,886 lbs$	s: \$5 per lb Reductions: \$172,342 inds Used: \$140,505 n Reductions: 26,886 lbs 1 Description \$0 \$184,055 General operating costs and ridesharing incent \$172,342 Capital costs plus net present value of operatin is assumed to be 3% and discount rate is 10%. Sost Estimates: ROG: 8,922 lbs OR 4 tons NOX: 12,793 lbs OR 6 tons PM10: 5,171 lbs OR 3 tons annual emission factor annual annual emission IT reduced TRIPS (gm/trip) TRIPS reduced reduction (gm) 2,12,680 + 4.98 X 236,940 = 4,046,935 2,212,680 + 2.05 X 236,940 = 5,802,661 2,212,680 + 0.00 X 236,940 = 2,345,706 annual emission factor annual annual emission AT gained TRIPS (gm/trip) TRIPS gained increase (gm) 0 + 0.00 X 0 = 0 0 + 0.00 X 0 = 0							

Assumptions to estimate emission factors:

Emission factors are from "Methods to Find Cost-Effectiveness of Air Quality Projects, April 1997."

distance, 17 miles (San Bernardino Association of Governments).

Bernal-Sherwood Bikeway Facility

The Bernal-Shervood Bike Lanes are a critical link in the City of Salinas comprehensive Bikeways Plan. This link provides circulation between north and south Salinas that will allow 80,000 residents bicycle access to downtown, north and south Salinas education, employment, shopping, and recreational sites. The access is currently blocked by US highway 101 and railroad tracks. The project includes installation of new pavement, signage, and Class II bike lane striping along 500' of Bernal Drive plus signage and striping for Class II bike lanes on 1.03 miles of Sherwood Drive.

	fectiveness:				\$3 p								
MV Fun	ding Effectiv				\$2 p	er Ib							
	Cost of Em	iss	ion Rec	lucti	ions:		\$1	55,852					
	Motor Vehi	cle	Funds	Use	ed:		\$10	00,000					
	Lifetime En	nis	sion Re	duc	tions:		4	9,975 lbs					
Project Ana		15	Descr	intio	n								
Capital Costs :					\$135,00		lation		ent (500'), signage, a	and	Class II bike lanes (1.03
(Portion of c emissions re	apital costs related eductions.)	to					-						
Annual Ope	erating Costs:				\$2,26					per mile per yea es of bike lanes.		ncluding sweeping, s	triping,
	perating costs requination provide the provided the provi					·		·					
Total Cost	of Emission				\$155,85					value of operatir ount rate is 10%.		costs where inflation	rate
Data Sourc	es and Assumptic	ons i	for Cost Es	<u>timat</u>	<u>es:</u>	II bike	e facil					ar for mainenance for -Effectiveness of Air	
			F	ROG:		25,847	lbs	OR	13	tons			
NET EMISS	IONS BENEFITS (15 y	,	NOx: PM10:		18,770 5,357		OR OR	9 3	tons			
Direct Benef	its:		ſ			5,557	105	UK	3	tons			
	emission factor		annual			on facto		annual FRIPS reduced		annual emission reduction (gm)		annual emission	
ROG	VMT (gm/mi) 0.36	х	VMT redu 360,000			6 (gm/trip 8.26	, Х	200,000	=	781,600	=	reduction (lbs) = 1,723	
NOx	0.71	Х	360,000			.56	Х	200,000	=	567,600	=		
PM10	0.45	Х	360,000) -	+ C	0.00	Х	200,000	=	162,000	=	= 357	
DisBenefits (• • •												
	emission factor		annual			on facto		annual		annual emission		annual emission	
ROG	VMT (gm/mi) 0.00	Х	VMT gair 0			6 (gm/trip).00) X	TRIPS gained 0	=	increase (gm) 0	=	increase (lbs) = 0	
NOx	0.00	X).00	X	0	_	0	_	•	
PM10	0.00	X				0.00	X	0	=	0	=	-	
<u>Assumptions</u>	<u>s to estimate travel r</u>	edu		of info miles (2) Th Hartn mode greate Salina weath trips a	b: (1) Up of bikew he 1990 of ell Colleg split for er than .3 has is 600 her). Ass and vmt	oon com ays vs. census o ge in 199 universi 35. The 0,000. A sume av reduced	pletio 80 mi data s 90. (3 ty tow local ssum erage is ba	n of the Bikewa iles of arterial s shows that 30% 3) CMAQ Meth yns where ratio transportation e bike trips are bike trip is 1.8	ays F treet of c odol of b mod mad mad mad	Plan in year 2000 s for a bike/arter city population ag ogies state that 6 ike lane miles to el indicates that de 329 days/year es (NPTS). The Reduction Calcula), the je 1 5.8% arte tota r (10 met	based on several pi ne city will have 71.7 mileage ratio of .89. 18-30 were enrolled i % can be used as bik erial/freeway miles is al daily person trips fo 0% of days will be bit thodology for estimations for Congestion	n ke s or ad
				Emission factors and project life are from "Methods to Find Cost-Effectiveness of Air Quality Projects, April 1997."									