Summary of Greenhouse Gas Inventory
City of Hesperia + Sphere of Influence
Prepared by Michael Brandman Associates
Edited July 20, 2010

Population (City + Sphere)	102,896	176,527	243,465

Business as Usual Emissions (MTCO2e/year)

Activity	2009	2020	2030
Transportation: Cars, light and medium	199,414	249,365	302,008
Transportation: Heavy duty trucks	200,392	250,587	303,488
Transportation: Other	7,454	9,321	11,288
Natural Gas	34,507	87,734	136,118
Electricity	135,824	233,019	321,378
Solid Waste	28,394	48,713	67,184
Fireplaces	9,528	16,073	22,023
Refrigerants	23,906	59,836	92,825
Total	**639,419**	**954,646**	**1,256,311**
Per capita emissions	6.2	5.4	5.2

With CAP Strategies (MTCO2e/year)

				Percent Reductions	
Activity	2009	2020	2030	2020	2030
Transportation: Cars, light and medium	199,414	242,881	294,156	2.6%	2.6%
Transportation: Heavy duty trucks	200,392	250,587	303,488	0%	0%
Transportation: Other	7,454	9,321	11,288	0%	0%
Natural Gas	34,507	87,734	136,118	0%	0%
Electricity	135,824	233,019	321,378	0%	0%
Solid Waste	28,394	30,243	41,711	38%	38%
Fireplaces	9,528	16,073	22,023	0%	0%
Refrigerants	23,906	59,836	92,825	0%	0%
Subtotal	**639,419**	**929,693**	**1,222,986**	2.6%	2.7%
Business as usual	639,419	954,646			
Reductions from Statewide Measures	0	226,251		23.7%	
Reductions from CAP-1 (CEQA)	0	25,218		8%	8%
Reductions from other CAP strategies	0	24,953			
Community Emissions with Reductions	639,419	678,223			
Population	102,896	176,527			
Per capita emissions, with Reductions	6.2	3.8			
Reduction Target		3.8			

Assumptions

City of Hesperia, Business as Usual

Prepared by Michael Brandman Associates

Year	2005	% in 2009	2009	2020	2030
Population (City)			88,184		
Population (Sphere)			14,712		
Population (City + Sphere)			102,896	176,527	243,465
SFR (City)		89%	25,617		
MFR (City)		11%	3,198		
SFR (Sphere)			5,098		
MFR (Sphere)			637		
SFR (City + Sphere)			30,715	51,812	70,991
MFR (City + Sphere)			3,835	6,469	8,864
Total Units			34,550	58,281	79,855
Persons per unit (population/unit)			2.98	3.03	3.05
Commercial, Industrial, Office (sq. ft)	6,629,228		20,330,035	58,007,256	92,259,274
Office (sq. ft)	513,828		1,046,369	2,510,857	3,842,210
Commercial/Retail (sq. ft)	2,474,000		10,068,162	30,952,106	49,937,511
Industrial (sq. ft)	3,641,400		9,215,505	24,544,292	38,479,554

Commercial

Type	Assumed FAR	Acres	Square feet
Commercial	0.25	825.3	8,987,517
Main Street and Freeway SP			
Main St SP: Mixed Use- Residential/Office	0.25	33	359,370
Neighborhood Commercial (C1)	0.25	448.54	4,884,601
General Commercial (Pedestrian-C2)	0.35	117.24	1,787,441
Service Commercial (Auto Sales- C3)	0.35	351.54	5,359,579
Regional Commercial (C4)	0.35	1,589.57	24,234,584
Summit Valley (Commercial)	0.25	2.9	31,581
Rancho Los Flores Commercial (C)	0.25	79.9	870,111
Rancho Los Flores Commercial (TC)	0.25	314.3	3,422,727
Total Commercial		**3762.3**	**49,937,511**

Assumptions

Residential

Residential (Non Specific Plan)	Acres	Average Density (du/acre)	Residential Units
General Agricultural	2139.28	(0.0 - 0.2 du/ac)	
Limited Agricultural- 2½	792.34	(0.21 - 0.4 du/ac)	
Limited Agricultural- 1	4162.38	(0.41 - 1.0 du/ac)	
Rural Residential- 2 1/2	13173.21	(0.0 - 0.4 du/ac)	
Rural Residential-Special Development	9131.41	(0.0 - 0.4 du/ac)	
Rural Residential-1	2737.13	(0.41 - 1.0 du/ac)	
Rural Residential-20,000	3210.77	(1.1 - 2.0 du/ac)	
Single-Family Residence- 18,000	4640.89	(2.1 - 2.4 du/ac)	
Single-Family Residence	744.73	(2.5 - 4.5 du/ac)	
Single-Family Residence- 4,500	438.77	(4.6 - 8.0 du/ac)	
Multiple Family Residential	140.55	(8.1 - 15.0 du/ac)	
Rancho Las Flores Specific Plan			
Equestrian Residential	869.8	0.8	737
Very Low Density	468.8	0.5	220
Low Density	1,074.4	3.6	3,843
Low Medium Density	905.9	5.4	4,915
Medium Density Residential	402.5	8.3	3,331
Medium High Density	121.9	12.7	1,553
High Density	85.0	24.9	2,116
Summit Valley Ranch Specific Plan			
7,000 sq. ft. lots	81.1	3-4.1	277
6,000 sq. ft. lots	76.3	3.7-4.5	315
5,000 sq. ft. lots	49.3	4.6-5.3	248
Duplex	39.6	6.5-7.5	277
Townhouse/Condominium	21.4	13.8	295
Apartments	13.4	19.1	256
Main Street and Freeway Corridor Specific Plan			
Low Density Residential (R1)	1,450.8	average = 4	6,239
Very Low Density Residential (R1-18000)	98.8	0.5-2	85
Rural Residential (RR-1)	813.7	0-0.5	350
Medium Density Residential (MFR R3)	1,066.4	8 to 15	11,005
High Density Residential (MFR R4)	183.9	15-20	2,848
Mixed Use	33.4	average = 8	315
Regional Commercial (High Density)		15-25	5547
Total	**49,167.9**		

Summary (w/ SP)	Acres
Less than 1 du/ac	34,288.1
1 - 2.4 du/ac	7,950.5
2.5 - 4.5 du/ac	3,427.3
4.6+ du/ac	3,502.0
Total	49,167.86

Summary (no SP)	Acres
Less than 1 du/ac	32,135.75
1 - 2.4 du/ac	7,851.66
2.5 - 4.5 du/ac	744.73
4.6+ du/ac	579.32
Total	41,311.46

		Assumptions	
Other			
Public (General Plan)		2201.0	
Other (General Plan)		4488.9	
Freeway Corridor SP: Parks		267.0	
Freeway Corridor SP: Government, Schools		208.0	
Rancho Los Flores SP: Public Use, Open Space, etc.		5662.9	
Summit Valley SP: Recreational, public facilities		429.8	
Total		**13257.6**	
Industrial			
Limited Manufacturing (I1)	0.40	235.0	4,095,337
General Manufacturing (I2)	0.25	487.6	5,310,400
Main St. SP: Limited Manufacturing (I1)	0.40	1,150.92	20,053,630
Main St. SP: General Manufacturing (I2)	0.25	828.3	9,020,187
Total		**2,702**	**38,479,554**
Office			
Main St SP: Office (OF)	0.25	345.92	3,767,069
Summit Valley (Office Professional)	0.25	6.9	75,141
Total		**353**	**3,842,210**

Abbreviations:
SFR = single family residential, MFR = multi family residential, SOI = sphere of influence
EIR = Environmental Impact Report for the City of Hesperia General Plan Update (2010)

Notes:
- Population for the City for 2009, % in 2009, and units in 2009 are from the City of Hesperia 2008-2014 Housing Element, dated December 2009 (Table 15)
- Population for SOI is from EIR
- Population for 2030 is from the General Plan; population in 2020 is interpolated from 2009 and 2030 population
- Units for SOI in 2009 is from the EIR
- 2030 residential units is from the EIR
- 2005 data from the Economic Conditions and Trends, City of Hesperia General Plan Update, prepared by Stanley R. Hoffman Associates, 2006.

- Residential (non specific plan) is from the Land Use Element
- Residential Specific Plan units are from the City of Hesperia 2008-2014 Housing Element, December 2009 (Table 35 and Table 36)
- Year 2030 residential units is from the EIR
- Year 2020 residential units is interpolated from 2030 and 2009 residential units.

- Non specific plan Commercial and Industrial acres are from General Plan Land Use Element (Table 7).
- Assumed floor area ratio (FAR) is assumed based on the range of allowed FAR, which ranges between 0 and 1 or 0 and 0.5 FAR.
- Specific Plan information is from the Housing Element, dated December 2009
- "Other" is from the Land Use Element
- Industrial land uses are from the Lane Use Element
- Commercial and industrial total for years 2009 and 2020 interpolated from years 2005 and 2030

Electricity - Indirect Emissions

Project: City of Hesperia
Prepared by: Michael Brandman Associates
Prepared on: 4/27/2010

2007 and 2009 Electricity: City of Hesperia (not including sphere of influence)

Rate Group	2007 Electricity Use (kWh/year)	2009 Electricity Use (kWh/year)	2009 Percentage
Time of use agricultural pumping	28,203,637	25,431,749	7%
Domestic	211,472,892	205,309,988	58%
General service non demand (GS-1)	24,971,913	23,633,195	7%
General service demand (GS-2)	60,725,631	58,163,740	16%
Street lighting	6,048,440	6,510,808	2%
Time of use general service (TOU-GS)	29,226,347	33,810,940	10%
Total (kWh/year)	**360,648,860**	**352,860,420**	
Total (MWh/year)	**360,649**	**352,860**	

Greenhouse Gas	Emission Factor (pounds per MWh)	2009 Emissions (pounds/year)	2009 Emissions (tons/year)	2009 Emissions (MTCO2e/year)
Carbon dioxide	724.12	255,513,287	127,757	115901
Methane	0.0302	10656	5.33	102
Nitrous oxide	0.0081	2858	1.43	402
Total: City only		*255,526,802*	*127,763*	*116,404*
Population: City only				*88,184*
Per capita emissions in 2009 (MTCO2e/person/year)				*1.32*

Interpolation Based on Per Capita City Emissions in 2009

Area	Year	Estimated Population	MTCO2e/year
City + Sphere	2009	102,896	135,824
City + Sphere	2020	176,527	233,019
City + Sphere	2030	243,465	321,378

Notes:

Emission factor source: California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 3.1, January 2009. Table C.2
www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf

Electricity use source for 2007: Southern California Edison. Electricity Use Report for Hesperia, Year 2007. Version 5.0. April 26, 2010.

Electricity source for 2009: Southern California Edison. Electricity Use Report for Hesperia, Year 2009. Version 5.0. April 26, 2010. Summary of Results, Table C, January 1, 2009 - December 31, 2009

Municipal Electricity

Project: City of Hesperia
Prepared by: Michael Brandman Associates
Prepared on: 4/27/2010

Greenhouse Gas	Emission Factor (pounds per MWh)	Global Warming Potential
Carbon dioxide	724.12	1
Methane	0.0302	21
Nitrous oxide	0.0081	310

2007

Source	Electricity Use (kWh/year)	Carbon Dioxide (MTCO2e per year)	Methane (MTCO2e per year)	Nitrous Oxide (MTCO2e per year)	Total (MTCO2e per year)
Library and related buildings	1,410,074	463	0.41	1.61	465
Street lighting	212,018	70	0.06	0.24	70
Animal control	144,720	48	0.04	0.16	48
Offices	229,307	75	0.07	0.26	76
Other	27,908	9	0.01	0.03	9
Total	**2,024,027**	**665**	**0.58**	**2.31**	**668**

2009

Source	Electricity Use (kWh/year)	Carbon Dioxide (MTCO2e per year)	Methane (MTCO2e per year)	Nitrous Oxide (MTCO2e per year)	Total (MTCO2e per year)
Library and related buildings	1,506,227	495	0.43	1.72	497
Street lighting	203,582	67	0.06	0.23	67
Animal control	140,130	46	0.04	0.16	46
Offices	137,779	45	0.04	0.16	45
Other	54,709	18	0.02	0.06	18
Total	**2,042,427**	**671**	**0.59**	**2.33**	**674**

Notes:

Emission factor source: California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 3.1, January 2009. Table C.2 www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf

Electricity use source: Southern California Edison. Provided on April 27, 2010

Natural Gas Combustion

Industrial
City of Hesperia Greenhouse Gas Inventory
Prepared by Michael Brandman Associates

Year	Gas	Type of Land Use	Square Feet	Annual Natural Gas Usage Factor* (kBTU/sf)	Natural Gas Usage for Project (MMBTU/year)	Emission Factor (kg/MMBTU)**	Emissions (kg/year)	Emissions (tons/year)	Emissions (MTCO2e/year)
2009	Methane	All warehouses	9215505	3.44	31701	0.005	159	0.174	3
	Nitrous Oxide	All warehouses	9215505	3.44	31701	0.0001	3	0.0035	1
	Carbon Dioxide	All warehouses	9215505	3.44	31701	71.42	2264109	2491	2259
	Total								***2264***
2020	Methane	All warehouses	24544292	3.44	84432	0.005	422	0.464	9
	Nitrous Oxide	All warehouses	24544292	3.44	84432	0.0001	8	0.0093	3
	Carbon Dioxide	All warehouses	24544292	3.44	84432	71.42	6030160	6633	6018
	Total								***6029***
2030	Methane	All warehouses	38479554	3.44	132370	0.005	662	0.728	14
	Nitrous Oxide	All warehouses	38479554	3.44	132370	0.0001	13	0.0146	4
	Carbon Dioxide	All warehouses	38479554	3.44	132370	71.42	9453841	10399	9434
	Total								***9452***

Greenhouse Gas	Global Warming Potentials
Methane	21
Nitrous Oxide	310
Carbon Dioxide	1

* Natural gas usage: Table E-1 from California Energy Commission. California Commercial End-Use Survey. Consultant Report. March 2006. CEC-400-2006-005

** Emission factors: Table C.8 from California Climate Action Registry, General Reporting Protocol. Version 3.1, January 2009. www.climateregistry.org/tools/protocols/general-reporting-protocol.html

Table E-1: Overview of Energy Usage in the Statewide Service Area

Building Type	Floor Stock (kft^2)	Annual Energy Intensities			Total Annual Usage	
		Electricity (kWh/ft^2)	Natural Gas (therms/ft^2)	Natural Gas (kBtu/ft^2)	Electricity (GWh)	Natural Gas (Mtherms)
All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<30k ft^2)	361,584	13.10	0.11	10.54	4736	38.10
Large Office (>=30k ft^2)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.96	5986	312.60
Retail	702,053	14.06	0.05	4.62	9871	32.50
Food Store	144,209	40.99	0.26	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10817	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,706	6.74	0.03	3.44	4380	22.40

Natural Gas Combustion

Commercial and Office
City of Hesperia Greenhouse Gas Inventory
Prepared by Michael Brandman Associates

Year	Gas	Type of Land Use	Square Feet	Annual Natural Gas Usage Factor* (kBTU/sf)	Natural Gas Usage for Project (MMBTU/year)	Emission Factor (kg/MMBTU)**	Emissions (kg/year)	Emissions (tons/year)	Emissions (MTCO2e/year)
2009	Methane	All commercial	11114531	25.99	288867	0.005	1444.3	1.589	30
	Nitrous Oxide	All commercial	11114531	25.99	288867	0.0001	28.9	0.0318	9
	Carbon Dioxide	All commercial	11114531	25.99	288867	71.42	20630857	22694	20588
	Total								***20627***
2020	Methane	All commercial	33462964	25.99	869702	0.005	4348.5	4.783	91
	Nitrous Oxide	All commercial	33462964	25.99	869702	0.0001	87.0	0.0957	27
	Carbon Dioxide	All commercial	33462964	25.99	869702	71.42	62114147	68326	61985
	Total								***62103***
2030	Methane	All commercial	53779721	25.99	1397735	0.005	6988.7	7.688	146
	Nitrous Oxide	All commercial	53779721	25.99	1397735	0.0001	139.8	0.1538	43
	Carbon Dioxide	All commercial	53779721	25.99	1397735	71.42	99826229	109809	99619
	Total								***99808***

Greenhouse Gas	Global Warming Potentials
Methane	21
Nitrous Oxide	310
Carbon Dioxide	1

* Natural gas usage: Table E-1 from California Energy Commission. California Commercial End-Use Survey. Consultant Report. March 2006. CEC-400-2006-005

** Emission factors: Table C.8 from California Climate Action Registry, General Reporting Protocol. Version 3.1, January 2009.
www.climateregistry.org/tools/protocols/general-reporting-protocol.html

Table E-1: Overview of Energy Usage in the Statewide Service Area

Building Type	Floor Stock (kft^2)	Annual Energy Intensities			Total Annual Usage	
		Electricity (kWh/ft^2)	Natural Gas (therms/ft^2)	Natural Gas (kBtu/ft^2)	Electricity (GWh)	Natural Gas (Mtherms)
All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<30k ft^2)	361,584	13.10	0.11	10.54	4736	38.10
Large Office (>=30k ft^2)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.96	5986	312.60
Retail	702,053	14.06	0.05	4.62	9871	32.50
Food Store	144,209	40.99	0.26	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10817	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,706	6.74	0.03	3.44	4380	22.40

Natural Gas Combustion

Residential Developments
City of Hesperia Greenhouse Gas Inventory
Prepared by Michael Brandman Associates

Global Warming Potentials	
Methane	21
Nitrous Oxide	310
Carbon Dioxide	1

Year	Gas	Units	Natural Gas Usage Factor* (therms/unit/year)	Natural Gas Usage (MMBTU/year)	Emission Factor (kg/MMBTU)**	Emissions (kg/year)	Emissions (tons per year)	Emissions (MTCO2e per year)
2009	Methane	34,550	471	162731	0.005	814	0.9	17
	Nitrous Oxide	34,550	471	162731	0.0001	16	0.0	5
	Carbon Dioxide	34,550	471	162731	71.42	11622212	12784	11598
	Total							***11620***
2020	Methane	58,281	471	274504	0.005	1373	1.5	29
	Nitrous Oxide	58,281	471	274504	0.0001	27	0.0	8
	Carbon Dioxide	58,281	471	274504	71.42	19605105	21566	19564
	Total							***19602***
2030	Methane	79,855	471	376117	0.005	1881	2.1	39
	Nitrous Oxide	79,855	471	376117	0.0001	38	0.0	12
	Carbon Dioxide	79,855	471	376117	71.42	26862280	29549	26806
	Total							***26857***

* California Energy Commission. Energy Almanac. California Residential Natural Gas Consumption. Average Therms in 2007, state average. http://energyalmanac.ca.gov/naturalgas/residential_natural_gas_consumption.html, Accessed April 29, 2010.

** Emission factors: Table C.8 from California Climate Action Registry, General Reporting Protocol. Version 3.1, January 2009. www.climateregistry.org/tools/protocols/general-reporting-protocol.html

Conversion factor for stationary combustion calculations from Table III.8.1 in California Climate Action Registry, General Reporting Protocol. Version 3.1, January 2009. www.climateregistry.org/tools/protocols/general-reporting-protocol.html. 1 therm of natural gas multiplied by 0.1 = MMBTU (one million British thermal units)

Fireplace Emissions
City of Hesperia + Sphere of Influence
Prepared by Michael Brandman Associates
Edited 7/20/2010

Year	2009	2020	2030
Population	102,896	176,527	243,465
SFR	30,715	51,812	70,991
MFR	3,835	6,469	8,864

Wood Stove Assumptions	
Wood burned (cords/yr/stove)	0.49
Pounds in a cord of wood	2458
Percent noncatalytic	50%
Percent catalytic	50%

Emission Factors	CO2
Natural Gas (lbs/MMBTU)	117.6
Noncatalytic wood stove (lbs/ton fuel)	3400
Catalytic wood stove (lbs/ton fuel)	3400
Wood fireplace (lbs/ton fuel)	3400

Natural Gas Assumptions	BTU/year	MMBTU/ year
SFR	2250000	2.25
MFR	1500000	1.50

Wood Fireplace Assumptions	
Wood burned (cords/yr/fireplace)	0.22
Pounds in cord of wood (lbs)	2458

	2009 Percentage			2009			2020			2030		
Business as Usual	Wood stoves	Natural gas fireplaces	Wood Fireplaces	Wood stoves	Natural gas fireplaces	Wood Fireplaces	Wood stoves	Natural gas fireplaces	Wood Fireplaces	Wood stoves	Natural gas fireplaces	Wood Fireplaces
SFR	5%	40%	55%	1536	12286	16893	2591	20725	28497	3550	28396	39045
MFR	5%	40%	55%	192	1534	2109	323	2588	3558	443	3546	4875
With Fireplace Ordinance												
SFR				1536	12286	16893	1536	33383	16893	1536	52562	16893
MFR				192	1534	2109	192	4168	2109	192	6563	2109

CO2 Emissions (tons/year)	Business as Usual		
Year	**2009**	**2020**	**2030**
Wood Stoves			
SFR - Noncatalytic	786	1326	1817
SFR - Catalytic	786	1326	1817
MFR - Noncatalytic	98	166	227
MFR - Catalytic	98	166	227
Wood Fireplaces			
SFR	7765	13098	17947
MFR	970	1635	2241
Total (tons/year)	**10503**	**17717**	**24275**
Total (MTCO2e/year)	**9528**	**16073**	**22023**

Notes for Fireplace Emissions
SFR = single family residential dwelling unit; MFR = multi-family residential dwelling unit; MCF = million cubic feet
- Wood stove, natural gas, and fireplace assumptions from URBEMIS2007 (for San Bernardino County)
- Emission factors from URBEMIS2007
- 2009 percentage from personal conversation with City of Hesperia planning department.
- Natural gas emission factor: US EPA AP-42. Section 1.4, Natural Gas Combustion. www.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf

Fugitive Refrigerant Operating Emissions

City of Hesperia, Business as Usual

Prepared by Michael Brandman Associates

Global Warming Potentials	
Refrigerants	3785
A/C	1725

Type of Unit	Units	Type of System	Capacity of Unit (pounds)	Annual Leak Rate in percent of capacity	Emissions (pounds/year)	Emissions (tons/year)	Emissions (MTCO2e/yr)
Year 2009							
Refrigeration: Residential	34,550	RES	1	0.5%	173	0.09	297
Refrigeration: Commercial/Ind.	203	SRCU	122	14%	3472	1.74	5,962
Refrigeration: Large Grocery Stores	6	LCS	2486	21%	3132	1.57	5,378
A/C: Residential	34,550	RES	1	10%	3455	1.73	2,703
A/C: Commercial	1,111	SU	100	11%	12226	6.11	9,566
A/C: Industrial	922	SU	100	11%	10137	5.07	7,932
Total					**22458**	**11.23**	**23,906**
Year 2020							
Refrigeration: Residential	58,281	RES	1	0.5%	291	0.15	500
Refrigeration: Commercial/Ind.	580	SRCU	122	14%	9908	4.95	17,010
Refrigeration: Large Grocery Stores	10	LCS	2486	21%	5221	2.61	8,963
A/C: Residential	58,281	RES	1	10%	5828	2.91	4,560
A/C: Commercial	3,346	SU	100	11%	36809	18.40	28,802
A/C: Industrial	2,454	SU	100	11%	26999	13.50	21,125
Total					**58057**	**29.03**	**59,836**
Year 2030							
Refrigeration: Residential	79,855	RES	1	0.5%	399	0.20	686
Refrigeration: Commercial/Ind.	923	SRCU	122	14%	15758	7.88	27,054
Refrigeration: Large Grocery Stores	14	LCS	2486	21%	7309	3.65	12,548
A/C: Residential	79,855	RES	1	10%	7986	3.99	6,248
A/C: Commercial	5,378	SU	100	11%	59158	29.58	46,289
A/C: Industrial	3,848	SU	100	11%	42328	21.16	33,120
Total					**90609**	**45.30**	**92,825**

1 commercial/ind. Refrig. Unit per:	100000 square feet	1 commercial A/C unit per:	10000 square feet
1 industrial A/C unit per:	10000 square feet		

- Source for general methodology and residential A/C leak rates: U.S. Environmental Protection Agency, Climate Leaders. May 2008. Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment. EPA430-K-03-004. www.epa.gov/stateply/documents/resources/mfgrfg.pdf
- Global warming potential for refrigeration assumed to be R404a (GWP = 3300) from Forane 404a technical data sheet, April 2006, www.arkema-inc.com/tds/451.pdf; for A/C (air conditioning) assumed to be R410a (GWP = 1725).
- Assumed residential units have one refrigeration and A/C per unit. Grocery stores determined by a Yahoo! Local search within Hesperia.
- Annual leak rate (for all except residential A/C) in percent of capacity and capacity: California Air Resources Board. Public Hearing Notice and Related Material. Appendix B, California Facilities and Greenhouse Gas Emissions Inventory – High-Global Warming Potential Stationary Source Refrigerant Management Program www.arb.ca.gov/regact/2009/gwprmp09/refappb.pdf. Leak rates are from Table 8. Capacity is from information on pages 3 and 4 and Table 4.
- Type of System: LCS - large centralized refrigeration system; SRCU - small refrigeration condensing units; SU - small unitary air conditioning system; RES - residential.

Fugitive Refrigerant Operating Emissions

City of Hesperia, with Regulations

Prepared by Michael Brandman Associates

Global Warming Potentials	
Refrigerants	3785
A/C	1725

Type of Unit	Units	Type of System	Capacity of Unit (pounds)	Annual Leak Rate in percent of capacity	Emissions (pounds/year)	Emissions (tons/year)	Emissions (MTCO2e/yr)
Year 2009							
Refrigeration: Residential	34,550	RES	1	0.5%	173	0.09	297
Refrigeration: Commercial/Ind.	203	SRCU	122	14%	3472	1.74	5,962
Refrigeration: Large Grocery Stores	6	LCS	2486	21%	3132	1.57	5,378
A/C: Residential	34,550	RES	1	10%	3455	1.73	2,703
A/C: Commercial	1,111	SU	100	11%	12226	6.11	9,566
A/C: Industrial	922	SU	100	11%	10137	5.07	7,932
Total					**22458**	**11.23**	**23,906**
Year 2020							
Refrigeration: Residential	58,281	RES	1	0.5%	291	0.15	500
Refrigeration: Commercial/Ind.	580	SRCU	122	5%	3538	1.77	6,075
Refrigeration: Large Grocery Stores	10	LCS	2486	10%	2486	1.24	4,268
A/C: Residential	58,281	RES	1	10%	5828	2.91	4,560
A/C: Commercial	3,346	SU	100	5%	16731	8.37	13,092
A/C: Industrial	2,454	SU	100	5%	12272	6.14	9,602
Total (with Regulations)					**28875**	**14.44**	**28,496**
Business as Usual							**59,836**
Reduction from Regulations							**52.4%**
Year 2030							
Refrigeration: Residential	79,855	RES	1	0.5%	399	0.20	686
Refrigeration: Commercial/Ind.	923	SRCU	122	5%	5628	2.81	9,662
Refrigeration: Large Grocery Stores	14	LCS	2486	10%	3480	1.74	5,975
A/C: Residential	79,855	RES	1	10%	7986	3.99	6,248
A/C: Commercial	5,378	SU	100	5%	26890	13.44	21,040
A/C: Industrial	3,848	SU	100	5%	19240	9.62	15,054
Total					**44383**	**22.19**	**43,612**

1 commercial/ind. Refrig. Unit per:	100000	square feet	1 commercial A/C unit per:	10000	square feet
1 industrial A/C unit per:	10000	square feet			

Note:

The sources and notes are the same as for the Business as Usual scenario, except that the leak rates have been reduced pursuant to information in the document: California Air Resources Board. Public Hearing Notice and Related Material. Appendix B, California Facilities and Greenhouse Gas Emissions Inventory – High-Global Warming Potential Stationary Source Refrigerant Management Program www.arb.ca.gov/regact/2009/gwprmp09/refappb.pdf.

Vehicle Emissions
Emission Inventory for City of Hesperia, CA
Prepared by Michael Brandman Associates

Vehicle Miles Traveled - 2008/2009

Daily rural+urban VMT in Hesperia	1,280,750	miles per day	Ref 1
Highway miles in Hesperia	24.7	miles	Ref 2
Highway miles in SB County	1,189	miles	Ref 1
% Hesperia highway miles in SB County	2.1%		
Total Daily highway VMT in SB County	35,884,050	miles per day	Ref 1
Highway daily VMT in Hesperia	745,202	miles per day	
Percent highway attributable to Hesperia	50%		
VMT in Hesperia	**1,653,351**	**miles per day**	
Annual rural+urban+highway VMT in Hesperia	603,473,150	miles per year	
% Hesperia rural+urban+highway of SB County highway	4.6%		

Assumption 1: VMT estimates in 2008 are applicable to 2009

Estimate of Vehicle Miles Traveled

Assumption 2: % Hesperia VMT to SB County is the same as % Hesperia VMT to MDAB
% Hesperia rural+urban+highway of SB County highway 4.6%

	(Ref 3)	(Ref 3)		
	MDAB VMT/day	**MDAB VMT/year**	**Hesperia VMT/day**	**Hesperia VMT /year**
2020	44,739,000	16,329,735,000	2,061,341	752,389,579
2030	54,122,000	19,754,530,000	2,493,661	910,186,387

EMFAC2007 BURDEN Calculations of Emissions and VMT for the MDAB - 2009 Ref 3

Pollutant	**MDAB Emissions (tons/day)**	**2009 MDAB VMT/day**	**Emission Factor (grams/mile)**
CO2	24770	33,821,000	665
CH4	1.89	33,821,000	0.05

Percentage of Emissions Based on Population difference - Existing and Proposed GP

	2009	2020	2030
Total Population	102896	176527	243465
Increase (GP)	0	526	1,005
Percent change	0.00%	0.30%	0.41%

On-road Vehicle Exhaust Emissions

Existing			
	2009	**2020**	**2030**
Pollutant	**(tons/year)**	**(tons/year)**	**(tons/year)**
CO2	441,975	551,039	666,607
CH4	34	42	51
N2O	20	25	30
Total	*442,028*	*551,106*	*666,688*
Total (MTCO2e)	*407,138*	*507,606*	*614,064*

New with Proposed General Plan (with percent change)			
	2009	**2020**	**2030**
Pollutant	**(tons/year)**	**(tons/year)**	**(tons/year)**
CO2	-	1,643	2,752
CH4	-	0.13	0.21
N2O	-	0.07	0.12
Total	-	*1,643*	*2,752*
Total (MTCO2e)	-	*1,514*	*2,535*

Existing + Proposed			
	2009	**2020**	**2030**
Pollutant	**(tons/year)**	**(tons/year)**	**(tons/year)**
CO2	441,975	552,682	669,359
CH4	34	42	51
N2O	20	25	30
Total	*442,028*	*552,749*	*669,440*
Total (MTCO2e)	*407,138*	*509,119*	*616,599*

Emissions per Vehicle Class (MTCO2e)

(Ref 4)

%	**Vehicle Class**	**2009**	**2020**	**2030**
20%	Automobiles	81,990	102,527	124,171
20%	Light Duty Trucks	82,601	103,291	125,096
9%	Medium Duty Trucks	34,824	43,547	52,740
49%	Heavy Duty Trucks	200,392	250,587	303,488
2%	Other	7,454	9,321	11,288
	Total	*407,260*	*509,272*	*616,784*

References for Vehicle Emissions Spreadsheet

Reference 1: California Department of Transportation, 2009. 2008 California Public Road Data; http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2008PRD.pdf

Reference 2: Google Earth highway lengths in the City of Hesperia and Sphere of Influence

Reference 3: EMFAC2007 BURDEN Model for the Mojave Desert Air Basin; emission factors derived by the dividing the daily emission totals by the daily VMT from all vehicle classes

Reference 4: Vehicle percentages are from the EMFAC2007 BURDEN Model for the Mojave Desert Air Basin; see next spreadsheet

Abbreviations

MDAB = Mojave Desert Air Basin, VMT = vehicle miles traveled, SB = San Bernardino, CH4 = methane

MTCO2e = metric tons of carbon dioxide equivalents, calculated by multiplying the tons by the global warming potential (CH4 = 21) and converting to metric tons, multiplying by 0.9072

N2O = nitrous oxide (see separate worksheets for emissions estimations)

EMFAC Burden Carbon Dioxide Emissions

Title : Burden 2020 MDAB
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2010/04/14 22:13:27
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : January
Area : Mojave Desert Air Basin Average
I/M Stat : Enhanced Basic (2005) -- Using I/M schedule for area 69 San Bernardino (MD)
Emissions: Tons Per Day

****

Emissions
Carbon Dioxide (000)

	LDA-TOT	LDT1-TOT	LDT2-TOT	MDV-TOT	LHDT1-TOT	LHDT2-TOT	MHDT-TOT	HHDT-TOT	OBUS-TOT	SBUS-TOT	UB-TOT	MH-TOT	MCY-TOT	ALL-TOT
Total Ex	6.71	2.67	4.09	2.85	0.67	0.24	0.68	14.81	0.05	0.14	0.06	0.21	0.15	33.32
Percent of total	20%	8%	12%	9%	2%	1%	2%	44%	0%	0%	0%	1%	0%	

****

Summary

Automobiles	20%
Light Duty Trucks	20%
Medium Duty Trucks	9%
Heavy Duty Trucks	49%
Other	2%
Total	100%

Mobile Emissions - Nitrous Oxide

Year 2008/2009 **Vehicle Miles Traveled** 1,653,351

Prepared by Michael Brandman Associates **Total Trips** 82668 (20 miles/trip)

Edited July 20, 2010

	Pounds/day	Tons/day	Tons/year	MTCO2e/yr
Starting Emissions	21.30	0.0106	3.89	1093
Running Emissions	86.56	0.0433	15.80	4443
Total	107.86	0.0539	19.68	5536

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Automobile	20.1	0.6	99.2	0.2
Light and medium duty trucks	28.8	1.4	95.9	2.7
Heavy duty trucks and buses	49.2	0.4	99.6	0.0
Motorcycle	1.8	0.9	99.1	0.0

Running Emission Factors (mg/km)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	8	20	1
Light duty truck	9	26	1
Heavy duty trucks and buses	20	55	3
Motorcycle	3	3	3

Running Emission Factors (g/mile)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.0050	0.0124	0.0006
Light and medium duty trucks	0.0056	0.0162	0.0006
Heavy duty trucks and buses	0.0124	0.0342	0.0019
Motorcycle	0.0019	0.0019	0.0019

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.02	9.03	0.00
Light and medium duty trucks	0.08	16.25	0.02
Heavy duty trucks and buses	0.09	60.94	0.00
Motorcycle	0.00	0.12	0.00
Total	0.19	86.35	0.02

Starting Emission Factors (mg/start)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	**28**	72	0
Light duty truck	**9**	26	-1
Heavy duty trucks and buses	**70**	194	-2
Motorcycle	**12**	12	0

Starting Emission Factors (g/start)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.028	0.072	0
Light duty truck	0.009	0.026	-0.001
Heavy duty trucks and buses	0.07	0.194	-0.002
Motorcycle	0.012	0.012	0

Trip Distribution

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	99.9	16514.5	33.3
Light duty truck	333.8	22865.0	643.8
Heavy duty trucks and buses	162.8	40526.0	0.0
Motorcycle	13.6	1499.8	0.0

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Automobile	LDA	0.0062	2.6159	0.0000
Light duty truck	LDT1	0.0066	1.3079	-0.0014
Heavy duty trucks and buses	LDT2	0.0251	17.2965	0.0000
Motorcycle	MDV	0.0004	0.0396	0.0000
Total		0.0382	21.2598	-0.0014

Emission Factors (mg/km and mg/start): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Table 3.2.3, www.ipcc-nggip.iges.or.jp/EFDB/find_ef_main.php

Mobile Emissions - Nitrous Oxide

Year 2020 **Vehicle Miles Traveled** 2,061,341

Prepared by Michael Brandman Associates **Total Trips** 103067 (20 miles/trip)

Edited July 20, 2010

	Pounds/day	Tons/day	Tons/year	MTCO2e/yr
Starting Emissions	26.55	0.0133	4.85	1363
Running Emissions	107.92	0.0540	19.70	5539
Total	134.48	0.0672	24.54	6902

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Automobile	20.1	0.6	99.2	0.2
Light duty truck	28.8	1.4	95.9	2.7
Heavy duty trucks and buses	49.2	0.4	99.6	0.0
Motorcycle	1.8	0.9	99.1	0.0

Running Emission Factors (mg/km)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	8	20	1
Light duty truck	9	26	1
Heavy duty trucks and buses	20	55	3
Motorcycle	3	3	3

Running Emission Factors (g/mile)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.0050	0.0124	0.0006
Light duty truck	0.0056	0.0162	0.0006
Heavy duty trucks and buses	0.0124	0.0342	0.0019
Motorcycle	0.0019	0.0019	0.0019

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.03	11.26	0.00
Light duty truck	0.10	20.27	0.02
Heavy duty trucks and buses	0.11	75.98	0.00
Motorcycle	0.00	0.15	0.00
Total	0.24	107.66	0.02

Starting Emission Factors (mg/start)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	**28**	72	0
Light duty truck	**9**	26	-1
Heavy duty trucks and buses	**70**	194	-2
Motorcycle	**12**	12	0

Starting Emission Factors (g/start)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.028	0.072	0
Light duty truck	0.009	0.026	-0.001
Heavy duty trucks and buses	0.07	0.194	-0.002
Motorcycle	0.012	0.012	0

Trip Distribution

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	124.5	20589.7	41.5
Light duty truck	416.2	28507.4	802.6
Heavy duty trucks and buses	202.9	50526.4	0.0
Motorcycle	17.0	1869.9	0.0

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Automobile	LDA	0.0077	3.2614	0.0000
Light duty truck	LDT1	0.0082	1.6306	-0.0018
Heavy duty trucks and buses	LDT2	0.0312	21.5647	0.0000
Motorcycle	MDV	0.0004	0.0494	0.0000
Total		0.0476	26.5060	-0.0018

Emission Factors (mg/km and mg/start): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Table 3.2.3, www.ipcc-nggip.iges.or.jp/EFDB/find_ef_main.php

Mobile Emissions - Nitrous Oxide

Year 2030 **Vehicle Miles Traveled** 2,493,661

Prepared by Michael Brandman Associates **Total Trips** 124683 (20 miles/trip)

Edited July 20, 2010

	Pounds/day	Tons/day	Tons/year	MTCO2e/yr
Starting Emissions	32.12	0.0161	5.86	1649
Running Emissions	130.56	0.0653	23.83	6701
Total	162.68	0.0813	29.69	8349

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Automobile	20.1	0.6	99.2	0.2
Light duty truck	28.8	1.4	95.9	2.7
Heavy duty trucks and buses	49.2	0.4	99.6	0.0
Motorcycle	1.8	0.9	99.1	0.0

Running Emission Factors (mg/km)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	8	20	1
Light duty truck	9	26	1
Heavy duty trucks and buses	20	55	3
Motorcycle	3	3	3

Running Emission Factors (g/mile)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.0050	0.0124	0.0006
Light duty truck	0.0056	0.0162	0.0006
Heavy duty trucks and buses	0.0124	0.0342	0.0019
Motorcycle	0.0019	0.0019	0.0019

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.03	13.62	0.00
Light duty truck	0.12	24.52	0.03
Heavy duty trucks and buses	0.13	91.92	0.00
Motorcycle	0.00	0.19	0.00
Total	0.29	130.24	0.03

Starting Emission Factors (mg/start)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	**28**	72	0
Light duty truck	**9**	26	-1
Heavy duty trucks and buses	**70**	194	-2
Motorcycle	**12**	12	0

Starting Emission Factors (g/start)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	0.028	0.072	0
Light duty truck	0.009	0.026	-0.001
Heavy duty trucks and buses	0.07	0.194	-0.002
Motorcycle	0.012	0.012	0

Trip Distribution

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Automobile	150.7	24907.9	50.2
Light duty truck	503.4	34486.1	970.9
Heavy duty trucks and buses	245.5	61123.1	0.0
Motorcycle	20.5	2262.1	0.0

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Automobile	LDA	0.0093	3.9454	0.0000
Light duty truck	LDT1	0.0100	1.9726	-0.0021
Heavy duty trucks and buses	LDT2	0.0378	26.0874	0.0000
Motorcycle	MDV	0.0005	0.0597	0.0000
Total		0.0576	32.0651	-0.0021

Emission Factors (mg/km and mg/start): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Table 3.2.3, www.ipcc-nggip.iges.or.jp/EFDB/find_ef_main.php

Waste - Year 2009

Prepared by: Michael Brandman Associates

Waste generated in 2008 (tons)	67,474
Population in 2008	87,260
Waste per capita (estimated from 2008)	0.773
Population in 2009	102,896
Waste (tons per year)	**79,565**

EPA Waste Reduction Model (WARM) Inputs

Material	% Generated	Tons Generated
Aluminum Cans	0.1%	79.6
Steel Cans	0.6%	477.4
Copper Wire		0.0
Glass	1.4%	1113.9
HDPE	0.4%	318.3
LDPE		0.0
PET	0.5%	397.8
Corrugated Cardboard	4.8%	3819.1
Magazines/Third-class Mail	0.7%	557.0
Newspaper	1.3%	1034.3
Office Paper		0.0
Phonebooks	0.1%	79.6
Textbooks		0.0
Dimensional Lumber	14.5%	11536.9
Medium-density Fiberboard	1.6%	1273.0
Food Scraps	15.5%	12332.5
Yard Trimmings	2.7%	2148.2
Grass	1.9%	1511.7
Leaves	1.9%	1511.7
Branches	0.6%	477.4
Mixed Paper (general)	8.5%	6763.0
Mixed Paper (primarily residential)		0.0
Mixed Paper (primarily from offices)	1.9%	1511.7
Mixed Metals	4.0%	3182.6
Mixed Plastics	8.7%	6922.1
Mixed Recyclables		0.0
Mixed Organics	4.3%	3421.3
Mixed MSW	18.8%	14958.1
Carpet	3.2%	2546.1
Personal Computers	0.5%	397.8
Clay Bricks		0.0
Concrete	1.2%	954.8
Fly Ash	0.1%	79.6
Tires	0.2%	159.1
Total	100.0%	79,565

- WARM - U.S. Environmental Protection Agency. November 2009. Waste Reduction Model. www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.htm
- Waste generation rate 2008: CalRecycle. Jurisdiction Profile for the City of Hesperia. www.calrecycle.ca.gov/Profiles/Juris/JurProfile2.asp?RG=C&JURID=196&JUR=Hesperia
- Population in 2008: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark. Sacramento, California, May 2009. www.dof.ca.gov/research/demographic/reports/estimates/e-4_2001-07/
- Percent waste generated: California Integrated Waste Management Board, prepared by Cascadia Consulting Group. August 2009. 2008 California Statewide Waste Characterization Study. (Table 7: Composition of California's Overall Waste Stream) www.calrecycle.ca.gov/Publications/General/2009023.pdf

GHG Emissions Analysis -- Summary Report

Version 10 (10/09)

GHG Emissions Waste Management Analysis for City of Hesperia 2009

Prepared by: Michael Brandman Associates

Project Period for this Analysis: 01/01/09 to 12/31/09

Note: If you wish to save these results, rename this file (e.g., WARM-MN1) and save it. Then the "Analysis Inputs" sheet of the "WARM" file will be blank when you are ready to make another model run.

GHG Emissions from Baseline Waste Management ($MTCO_2E$): 28,394

Commodity	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	79.6	-	NA	3
Steel Cans	-	477.4	-	NA	18
Glass	-	1,113.9	-	NA	43
HDPE	-	318.3	-	NA	12
PET	-	397.8	-	NA	15
Corrugated Cardboard	-	3,819.1	-	NA	1468
Magazines/third-class mail	-	557.0	-	NA	(171)
Newspaper	-	1,034.3	-	NA	(904)
Phonebooks	-	79.6	-	NA	(70)
Dimensional Lumber	-	11,536.9	-	NA	(5719)
Medium Density Fiberboard	-	1,273.0	-	NA	(631)
Food Scraps	NA	12,332.5	-	-	8800
Yard Trimmings	NA	2,148.2	-	-	(393)
Grass	NA	1,511.7	-	-	253
Leaves	NA	1,511.7	-	-	(861)
Branches	NA	477.4	-	-	(237)
Mixed Paper, Broad	-	6,763.0	-	NA	2169
Mixed Paper, Office	-	1,511.7	-	NA	648
Mixed Metals	-	3,182.6	-	NA	122
Mixed Plastics	-	6,922.1	-	NA	266
Mixed Organics	NA	3,421.3	-	-	884
Mixed MSW	NA	14,958.1	-	NA	22519
Carpet	-	2,546.1	-	NA	98
Personal Computers	-	397.8	-	NA	15
Concrete	-	954.8	NA	NA	37
Fly Ash	-	79.6	NA	NA	3
Tires	-	159.1	-	NA	6
					0
					0
					0
					0
					0
					0
					0

GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$): 28,394

Commodity	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$	Change (Alt - Base) $MTCO_2E$
Aluminum Cans	0.0	0.0	79.6	0.0	NA	3	0
Steel Cans	0.0	0.0	477.4	0.0	NA	18	0
Glass	0.0	0.0	1113.9	0.0	NA	43	0
HDPE	0.0	0.0	318.3	0.0	NA	12	0
PET	0.0	0.0	397.8	0.0	NA	15	0
Corrugated Cardboard	0.0	0.0	3819.1	0.0	NA	1468	0
Magazines/third-class mail	0.0	0.0	557.0	0.0	NA	(171)	0
Newspaper	0.0	0.0	1034.3	0.0	NA	(904)	0
Phonebooks	0.0	0.0	79.6	0.0	NA	(70)	0
Dimensional Lumber	0.0	0.0	11536.9	0.0	NA	(5719)	0
Medium Density Fiberboard	0.0	0.0	1273.0	0.0	NA	(631)	0
Food Scraps	0.0	NA	12332.5	0.0	0.0	8800	0
Yard Trimmings	0.0	NA	2148.2	0.0	0.0	(393)	0
Grass	0.0	NA	1511.7	0.0	0.0	253	0
Leaves	0.0	NA	1511.7	0.0	0.0	(861)	0
Branches	0.0	NA	477.4	0.0	0.0	(237)	0
Mixed Paper, Broad	NA	0.0	6763.0	0.0	NA	2169	0
Mixed Paper, Office	NA	0.0	1511.7	0.0	NA	648	0
Mixed Metals	NA	0.0	3182.6	0.0	NA	122	0
Mixed Plastics	NA	0.0	6922.1	0.0	NA	266	0
Mixed Organics	NA	NA	3421.3	0.0	0.0	884	0
Mixed MSW	NA	NA	14958.1	0.0	NA	22519	0
Carpet	0.0	0.0	2546.1	0.0	NA	98	0
Personal Computers	0.0	0.0	397.8	0.0	NA	15	0
Concrete	NA	0.0	954.8	NA	NA	37	0
Fly Ash	NA	0.0	79.6	NA	NA	3	0
Tires	0.0	0.0	159.1	0.0	NA	6	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0

Total Change in GHG Emissions: - $MTCO_2E$

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

a) For explanation of methodology, see the EPA report:
Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (EPA530-R-06-004)
-- available on the Internet at http://epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf (5.6 Mb PDF file).
b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

This is equivalent to...

Removing	-	Passenger Cars from the Roadway Each Year
Conserving	-	Gallons of Gasoline
Conserving	-	Cylinders of Propane Used for Home Barbeques
Conserving	-	Railway Cars of Coal

0.00000% Annual CO_2 emissions from the U.S. transportation sector

0.00000% Annual CO_2 emissions from the U.S. electricity sector

Waste - Year 2020

Prepared by: Michael Brandman Associates

Waste generated in 2008 (tons)	67,474
Population in 2008	87,260
Waste per capita (estimated from 2008)	0.773
Population in 2020	176,527
Waste (tons per year)	**136,500**

Alternative Scenario refers to diverting waste to 60%. In 2006, diversion was 53%. Thus, 8% is needed to divert to 60%, which is 10920 tons

EPA Waste Reduction Model (WARM) Inputs

Material	% Generated	Tons Generated
Aluminum Cans	0.1%	136.5
Steel Cans	0.6%	819.0
Copper Wire		0.0
Glass	1.4%	1911.0
HDPE	0.4%	546.0
LDPE		0.0
PET	0.5%	682.5
Corrugated Cardboard	4.8%	6552.0
Magazines/Third-class Mail	0.7%	955.5
Newspaper	1.3%	1774.5
Office Paper		0.0
Phonebooks	0.1%	136.5
Textbooks		0.0
Dimensional Lumber	14.5%	19792.5
Medium-density Fiberboard	1.6%	2184.0
Food Scraps	15.5%	21157.5
Yard Trimmings	2.7%	3685.5
Grass	1.9%	2593.5
Leaves	1.9%	2593.5
Branches	0.6%	819.0
Mixed Paper (general)	8.5%	11602.5
Mixed Paper (primarily residential)		0.0
Mixed Paper (primarily from offices)	1.9%	2593.5
Mixed Metals	4.0%	5460.0
Mixed Plastics	8.7%	11875.5
Mixed Recyclables		0.0
Mixed Organics	4.3%	5869.5
Mixed MSW	18.8%	25662.0
Carpet	3.2%	4368.0
Personal Computers	0.5%	682.5
Clay Bricks		0.0
Concrete	1.2%	1638.0
Fly Ash	0.1%	136.5
Tires	0.2%	273.0
Total	100.0%	136,500

- WARM - U.S. Environmental Protection Agency. November 2009. Waste Reduction Model. www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.htm
- Waste generation rate 2008: CalRecycle. Jurisdiction Profile for the City of Hesperia. www.calrecycle.ca.gov/Profiles/Juris/JurProfile2.asp?RG=C&JURID=196&JUR=Hesperia
- Population in 2008: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark. Sacramento, California, May 2009. www.dof.ca.gov/research/demographic/reports/estimates/e-4_2001-07/
- Percent waste generated: California Integrated Waste Management Board, prepared by Cascadia Consulting Group. August 2009. 2008 California Statewide Waste Characterization Study. (Table 7: Composition of California's Overall Waste Stream) www.calrecycle.ca.gov/Publications/General/2009023.pdf

GHG Emissions Analysis -- Summary Report

Version 10 (10/09)

GHG Emissions Waste Management Analysis for City of Hesperia 2020

Prepared by: Michael Brandman Associates

Project Period for this Analysis: 01/01/20 to 12/31/20

Note: If you wish to save these results, rename this file (e.g., WARM-MN1) and save it. Then the "Analysis Inputs" sheet of the "WARM" file will be blank when you are ready to make another model run.

GHG Emissions from Baseline Waste Management ($MTCO_2E$): 48,713

Commodity	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	136.5	-	NA	5
Steel Cans	-	819.0	-	NA	31
Glass	-	1,911.0	-	NA	73
HDPE	-	546.0	-	NA	21
PET	-	682.5	-	NA	26
Corrugated Cardboard	-	6,552.0	-	NA	2518
Magazines/third-class mail	-	955.5	-	NA	(294)
Newspaper	-	1,774.5	-	NA	(1550)
Phonebooks	-	136.5	-	NA	(119)
Dimensional Lumber	-	19,792.5	-	NA	(9812)
Medium Density Fiberboard	-	2,184.0	-	NA	(1083)
Food Scraps	NA	21,157.5	-	-	15096
Yard Trimmings	NA	3,685.5	-	-	(674)
Grass	NA	2,593.5	-	-	433
Leaves	NA	2,593.5	-	-	(1478)
Branches	NA	819.0	-	-	(406)
Mixed Paper, Broad	-	11,602.5	-	NA	3721
Mixed Paper, Office	-	2,593.5	-	NA	1113
Mixed Metals	-	5,460.0	-	NA	210
Mixed Plastics	-	11,875.5	-	NA	456
Mixed Organics	NA	5,869.5	-	-	1517
Mixed MSW	NA	25,662.0	-	NA	38634
Carpet	-	4,368.0	-	NA	168
Personal Computers	-	682.5	-	NA	26
Concrete	-	1,638.0	NA	NA	63
Fly Ash	-	136.5	NA	NA	5
Tires	-	273.0	-	NA	10
					0
					0
					0
					0
					0
					0
					0

GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$): 30,243

Commodity	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$	Change (Alt - Base) $MTCO_2E$
Aluminum Cans	0.0	0.0	136.5	0.0	NA	5	0
Steel Cans	0.0	0.0	819.0	0.0	NA	31	0
Glass	0.0	382.2	1528.8	0.0	NA	(48)	(121)
HDPE	0.0	109.2	436.8	0.0	NA	(136)	(157)
PET	0.0	136.5	546.0	0.0	NA	(191)	(217)
Corrugated Cardboard	0.0	1310.4	5241.6	0.0	NA	(2052)	(4570)
Magazines/third-class mail	0.0	191.1	764.4	0.0	NA	(822)	(528)
Newspaper	0.0	354.9	1419.6	0.0	NA	(2233)	(682)
Phonebooks	0.0	13.7	122.9	0.0	NA	(144)	(24)
Dimensional Lumber	0.0	1979.3	17813.3	0.0	NA	(13691)	(3879)
Medium Density Fiberboard	0.0	0.0	2184.0	0.0	NA	(1083)	0
Food Scraps	0.0	NA	17983.9	0.0	3173.6	12203	(2893)
Yard Trimmings	0.0	NA	2948.4	0.0	737.1	(685)	(11)
Grass	0.0	NA	2074.8	0.0	518.7	244	(189)
Leaves	0.0	NA	2074.8	0.0	518.7	(1285)	193
Branches	0.0	NA	655.2	0.0	163.8	(357)	49
Mixed Paper, Broad	NA	1160.3	10442.3	0.0	NA	(719)	(4440)
Mixed Paper, Office	NA	259.4	2334.2	0.0	NA	115	(998)
Mixed Metals	NA	0.0	5460.0	0.0	NA	210	0
Mixed Plastics	NA	0.0	11875.5	0.0	NA	456	0
Mixed Organics	NA	NA	5869.5	0.0	0.0	1517	0
Mixed MSW	NA	NA	25662.0	0.0	NA	38634	0
Carpet	0.0	0.0	4368.0	0.0	NA	168	0
Personal Computers	0.0	0.0	682.5	0.0	NA	26	0
Concrete	NA	0.0	1638.0	NA	NA	63	0
Fly Ash	NA	0.0	136.5	NA	NA	5	0
Tires	0.0	0.0	273.0	0.0	NA	10	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0

Total Change in GHG Emissions: (18,470) $MTCO_2E$

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

a) For explanation of methodology, see the EPA report:
Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (EPA530-R-06-004)
-- available on the Internet at http://epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf (5.6 Mb PDF file).
b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

This is equivalent to...

Removing	**3,383**	Passenger Cars from the Roadway Each Year
Conserving	**2,096,457**	Gallons of Gasoline
Conserving	**7,695,743**	Cylinders of Propane Used for Home Barbeques
Conserving	**96**	Railway Cars of Coal
	0.00098%	Annual CO_2 emissions from the U.S. transportation sector
	0.00077%	Annual CO_2 emissions from the U.S. electricity sector

Waste - Year 2030

Prepared by: Michael Brandman Associates

Waste generated in 2008 (tons)	67,474
Population in 2008	87,260
Waste per capita (estimated from 2008)	0.773
Population in 2030	243,465
Waste (tons per year)	**188,260**

EPA Waste Reduction Model (WARM) Inputs

Material	% Generated	Tons Generated
Aluminum Cans	0.1%	188.3
Steel Cans	0.6%	1129.6
Copper Wire		0.0
Glass	1.4%	2635.6
HDPE	0.4%	753.0
LDPE		0.0
PET	0.5%	941.3
Corrugated Cardboard	4.8%	9036.5
Magazines/Third-class Mail	0.7%	1317.8
Newspaper	1.3%	2447.4
Office Paper		0.0
Phonebooks	0.1%	188.3
Textbooks		0.0
Dimensional Lumber	14.5%	27297.7
Medium-density Fiberboard	1.6%	3012.2
Food Scraps	15.5%	29180.3
Yard Trimmings	2.7%	5083.0
Grass	1.9%	3576.9
Leaves	1.9%	3576.9
Branches	0.6%	1129.6
Mixed Paper (general)	8.5%	16002.1
Mixed Paper (primarily residential)		0.0
Mixed Paper (primarily from offices)	1.9%	3576.9
Mixed Metals	4.0%	7530.4
Mixed Plastics	8.7%	16378.6
Mixed Recyclables		0.0
Mixed Organics	4.3%	8095.2
Mixed MSW	18.8%	35392.9
Carpet	3.2%	6024.3
Personal Computers	0.5%	941.3
Clay Bricks		0.0
Concrete	1.2%	2259.1
Fly Ash	0.1%	188.3
Tires	0.2%	376.5
Total	100.0%	188,260

- WARM - U.S. Environmental Protection Agency. November 2009. Waste Reduction Model. www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.htm
- Waste generation rate 2008: CalRecycle. Jurisdiction Profile for the City of Hesperia. www.calrecycle.ca.gov/Profiles/Juris/JurProfile2.asp?RG=C&JURID=196&JUR=Hesperia
- Population in 2008: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2009, with 2000 Benchmark. Sacramento, California, May 2009. www.dof.ca.gov/research/demographic/reports/estimates/e-4_2001-07/
- Percent waste generated: California Integrated Waste Management Board, prepared by Cascadia Consulting Group. August 2009. 2008 California Statewide Waste Characterization Study. (Table 7: Composition of California's Overall Waste Stream) www.calrecycle.ca.gov/Publications/General/2009023.pdf

GHG Emissions Analysis -- Summary Report

Version 10 (10/09)

GHG Emissions Waste Management Analysis for City of Hesperia 2030

Prepared by: Michael Brandman Associates

Project Period for this Analysis: 01/01/30 to 12/31/30

Note: If you wish to save these results, rename this file (e.g., WARM-MN1) and save it. Then the "Analysis Inputs" sheet of the "WARM" file will be blank when you are ready to make another model run.

GHG Emissions from Baseline Waste Management ($MTCO_2E$): 67,184

Commodity	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	188.3	-	NA	7
Steel Cans	-	1,129.6	-	NA	43
Glass	-	2,635.6	-	NA	101
HDPE	-	753.0	-	NA	29
PET	-	941.3	-	NA	36
Corrugated Cardboard	-	9,036.5	-	NA	3473
Magazines/third-class mail	-	1,317.8	-	NA	(405)
Newspaper	-	2,447.4	-	NA	(2138)
Phonebooks	-	188.3	-	NA	(164)
Dimensional Lumber	-	27,297.7	-	NA	(13532)
Medium Density Fiberboard	-	3,012.2	-	NA	(1493)
Food Scraps	NA	29,180.3	-	-	20821
Yard Trimmings	NA	5,083.0	-	-	(929)
Grass	NA	3,576.9	-	-	598
Leaves	NA	3,576.9	-	-	(2038)
Branches	NA	1,129.6	-	-	(560)
Mixed Paper, Broad	-	16,002.1	-	NA	5132
Mixed Paper, Office	-	3,576.9	-	NA	1534
Mixed Metals	-	7,530.4	-	NA	289
Mixed Plastics	-	16,378.6	-	NA	629
Mixed Organics	NA	8,095.2	-	-	2093
Mixed MSW	NA	35,392.9	-	NA	53284
Carpet	-	6,024.3	-	NA	231
Personal Computers	-	941.3	-	NA	36
Concrete	-	2,259.1	NA	NA	87
Fly Ash	-	188.3	NA	NA	7
Tires	-	376.5	-	NA	14
					0
					0
					0
					0
					0
					0
					0

GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$): 41,711

Commodity	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$	Change (Alt - Base) $MTCO_2E$
Aluminum Cans	0.0	0.0	188.3	0.0	NA	7	0
Steel Cans	0.0	0.0	1129.6	0.0	NA	43	0
Glass	0.0	527.1	2108.5	0.0	NA	(66)	(167)
HDPE	0.0	150.6	602.4	0.0	NA	(188)	(217)
PET	0.0	188.3	753.0	0.0	NA	(263)	(299)
Corrugated Cardboard	0.0	1807.3	7229.2	0.0	NA	(2830)	(6304)
Magazines/third-class mail	0.0	263.6	1054.2	0.0	NA	(1133)	(728)
Newspaper	0.0	489.5	1957.9	0.0	NA	(3079)	(941)
Phonebooks	0.0	18.8	169.5	0.0	NA	(198)	(34)
Dimensional Lumber	0.0	2729.8	24567.9	0.0	NA	(18882)	(5350)
Medium Density Fiberboard	0.0	0.0	3012.2	0.0	NA	(1493)	0
Food Scraps	0.0	NA	24803.3	0.0	4377.0	16830	(3990)
Yard Trimmings	0.0	NA	4066.4	0.0	1016.6	(945)	(16)
Grass	0.0	NA	2861.5	0.0	715.4	336	(261)
Leaves	0.0	NA	2861.5	0.0	715.4	(1772)	266
Branches	0.0	NA	903.7	0.0	225.9	(493)	67
Mixed Paper, Broad	NA	1600.2	14401.9	0.0	NA	(992)	(6123)
Mixed Paper, Office	NA	357.7	3219.2	0.0	NA	158	(1376)
Mixed Metals	NA	0.0	7530.4	0.0	NA	289	0
Mixed Plastics	NA	0.0	16378.6	0.0	NA	629	0
Mixed Organics	NA	NA	8095.2	0.0	0.0	2093	0
Mixed MSW	NA	NA	35392.9	0.0	NA	53284	0
Carpet	0.0	0.0	6024.3	0.0	NA	231	0
Personal Computers	0.0	0.0	941.3	0.0	NA	36	0
Concrete	NA	0.0	2259.1	NA	NA	87	0
Fly Ash	NA	0.0	188.3	NA	NA	7	0
Tires	0.0	0.0	376.5	0.0	NA	14	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0

Total Change in GHG Emissions: (25,473) $MTCO_2E$

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

a) For explanation of methodology, see the EPA report:
Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (EPA530-R-06-004)
-- available on the Internet at http://epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf (5.6 Mb PDF file).
b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

This is equivalent to...

Removing	**4,666**	Passenger Cars from the Roadway Each Year
Conserving	**2,891,419**	Gallons of Gasoline
Conserving	**10,613,917**	Cylinders of Propane Used for Home Barbeques
Conserving	**133**	Railway Cars of Coal
	0.00135%	Annual CO_2 emissions from the U.S. transportation sector
	0.00106%	Annual CO_2 emissions from the U.S. electricity sector