California Total Energy Demands (TBtu/Yr)
Difference Between Reference Case and Cap-and-Trade No Offsets 2020

02/26/2010

	Asphalt	Aviation Fuel	Biomass	Coal	Coke	Coke Oven Gas	Diesel	Net Electric	Ethanol	Geothermal	Heavy Fuel Oil	Hydro	Hydrogen	Kerosene	Landfill Gases/Waste	Light Fuel Oil	LPG	Lubricants	Motor Gasoline	Naphtha Specialties	Natural Gas	Nuclear	Oil,UnSpecified	Other Non-Energy Products	Petrochemical Feedstocks	Petroleum Coke	Solar	Steam	Still Gas	Wave	Wind	Unknown 1 (Ethanol)	Unknown 2 (Biodiesel)	Total (Net)
Single Family	0	0	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	-39	0	0	0	0	0	0	0	0	0	0	0	0	53
Multi Family	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	-19	0	0	0	0	0	0	0	0	0	0	0	0	14
Other Residential	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	-28	0	0	0	0	0	0	0	0	0	0	0	0	-23
Transportation Services	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Pipelines	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Communication	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Utilities	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	10
Wholesale	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	7
Retail	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	31
FIRE	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	18
Offices - Business Services	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	28
Education	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	16
Health & Social	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	10
Food, Lodging, Recreation	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	18
Government	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	10
Food & Tobacco	0	0	-1	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	6
Textiles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	-1
Apparel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumber	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Furniture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	4
Printing	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Chemical	0	0	0	-4	0	0	0	-3	0	0	0	0	0	0	0	0	-1	0	-1	0	7	0	-3	0	0	0	0	0	0	0	0	0	0	-5
Petroleum Products	0	0	0	0	0	0	0	-8	0	0	0	0	0	0	0	0	0	0	0	0	-15	0	0	0	0	-4	0	0	-1	0	0	0	0	-28
Rubber	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	3
Leather	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonmetallic Minerals	0	0	0	-9	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	-1
Primary Metals	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fabricated Metals	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	1
Machines	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Computers	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	6
Electric Equipment	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Transport Equipment	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Other Manufacturing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
Mining Except Oil & Gas	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	-1
Oil & Gas Extraction	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	-27	0	0	0	0	0	0	0	0	0	0	0	0	-23
Construction	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Forestry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agriculture	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	-6	0	0	0	0	0	0	0	0	0	0	21
Passenger	0	-37	0	0	0	0	-9	6	-8	0	0	0	0	0	0	0	0	0	-298	0	0	0	0	0	0	0	0	0	0	0	0	177	6	-165
Freight	0	0	0	0	0	0	-93	3	0	0	-23	0	0	0	0	0	0	0	-10	0	0	0	0	0	0	0	0	0	0	0	0	5	64	-53
Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Misc. and Streetlighting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electric Resale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utility Electric Generation	0	0	8	-34	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	-473	0	0	0	0	0	48	0	0	0	38	0	0	-398
Industry Electric Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Steam Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solid Trash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Incineration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (Net)	0	-37	8	-49	0	0	-102	306	-8	14	-23	0	0	0	0	0	-1	0	-311	0	-551	0	-6	0	0	-4	48	0	-1	0	38	182	70	-426

-86	Res
-473	Elec Gen
9	CHP/Other

Fuel Equivalent

	Asphalt	Aviation Fuel	Biomass	Coal	Coke	Coke Oven Gas	Diesel	Net Electric	Ethanol	Geothermal	Heavy Fuel Oil	Hydro	Hydrogen	Kerosene	Landfill Gases/Waste	Light Fuel Oil	LPG	Lubricants	Motor Gasoline	Naphtha Specialties	Natural Gas	Nuclear	Oil,UnSpecified	Other Non-Energy Products	Petrochemical Feedstocks	Petroleum Coke	Solar	Steam	Still Gas	Wave	Wind	Unknown 1 (Ethanol)	Unknown 2 (Biodiesel)
Conversion Factor BTU		120,190	7,690	9,985			138,700	1,027	90,500	1,027							707,143		124,238		1,027		138,690			15,060	1,027	1,027	142,857	1,027	1,027	90,500	130,000
fuel unit		btu/gal	btu/lb.	btu/lb.			btu/gal	btu/cuft	btu/gal	btu/cuft							btu/cuft		btu/gal		btu/cuft		btu/gal			btu/lb.	btu/cuft	btu/cuft	btu/gal	btu/cuft	btu/cuft	btu/gal	btu/gal
Estimated Fuel Equivalent		-310,696,400	1,065,149,500	-4,952,969,500			-735,756,300	298,350,925,000	-89,098,300	13,429,600,800							-1,659,200		-2,500,256,800		-536,224,927,000		-43,396,800			-285,292,200	47,062,706,900	0	-8,344,000	0	37,144,693,300	2,011,435,400	541,023,100
(rounded nearest 100)		gals	lbs.	lbs.			gals	cuft	gals	cuft							cuft		gals		cuft		gals			lbs.	cuft	cuft	gals	cuft	cuft	gals	gals
NOTES								Estimated as Nat Gas used for Elec Gen	Based on btu of E85 fuel	Estimated as Nat Gas used for Elec Gen																	Estimated as Nat Gas used for Elec Gen	Estimated as Nat Gas used for Elec Gen		Estimated as Nat Gas used for Elec Gen	Estimated as Nat Gas used for Elec Gen	Based on btu of E85 fuel		

ESTIMATED CHANGE IN 2020 ENERGY DEMAND AND CRITERIA POLLUTANT EMISSIONS BASED ON ENERGY2020 MODELING FOR SELECTED FUELS AND SECTORS

CHANGE IN ENERGY DEMAND (Tbtu/YR)

	Biomass	Coal (ElecGen Only)	Diesel	Ethanol	Motor Gasoline	Natural Gas (Elec Gen)	Natural Gas (Residential)	Natural Gas (CHP/Other)	Petroleum Coke	Still Gas	Unknwn1 Ethanol	Unknwn2 Biodiesel
Change from Reference Case to Complementary Measures												
Tbtu	8	0	-73	-8	-296	-150	-23	118	-1	-2	184	75
Change from Reference Case to Cap-and-Trade With Offsets												
Tbtu	8	-9	-88	-8	-299	-231	-52	74	-3	-6	183	73
Change from Reference Case to Cap-and-Trade No Offsets												
Tbtu	8	-34	-102	-8	-311	-473	-86	9	-4	-1	182	70

2020 EMISSION FACTOR ESTIMATES (TONS/Tbtu)

These Emission Factor Estimates were developed specifically for this analysis and should not be used for general application.

	Biomass	Coal (ElecGen Only)	Diesel	Ethanol	Motor Gasoline	Natural Gas (Elec Gen)	Natural Gas (Residential)	Natural Gas (CHP/Other)	Petroleum Coke	Still Gas	Unknwn1 Ethanol	Unknwn2 Biodiesel
TOG	7.40	7.46	13.80	33.72	33.72	7.66	5.16	7.66	1.14	8.35	33.72	13.80
ROG	3.24	0.34	11.30	30.51	30.51	1.21	2.18	1.21	0.32	3.57	30.51	11.30
NOx	41.56	20.38	163.06	25.54	25.54	8.85	35.82	8.85	6.73	34.35	25.54	163.06
SOx	4.67	13.91	0.77	0.75	0.75	0.36	0.28	0.36	309.03	13.36	0.75	0.77
CO	155.47	13.21	92.75	317.03	317.03	8.84	18.81	8.84	0.00	22.45	317.03	92.75
PM10	10.21	2.63	7.03	6.95	6.95	1.76	3.58	1.76	9.00	4.81	6.95	7.03
PM2.5	9.39	0.99	4.68	4.44	4.44	1.75	3.58	1.75	7.59	4.73	4.44	4.68

ESTIMATED CHANGE IN EMISSIONS (TONS/DAY)

	Biomass	Coal (ElecGen Only)	Diesel	Ethanol	Motor Gasoline	Natural Gas (Elec Gen)	Natural Gas (Residential)	Natural Gas (CHP/Other)	Petroleum Coke	Still Gas	Unknwn1 Ethanol	Unknwn2 Biodiesel	Total
Change from Reference Case to Complementary Measures													
TOG	0.2	0.0	-2.8	-0.7	-27.4	-3.2	-0.3	2.5	0.0	0.0	17.0	2.9	-11.9
ROG	0.1	0.0	-2.3	-0.7	-24.8	-0.5	-0.1	0.4	0.0	0.0	15.3	2.3	-10.2
NOx	0.9	0.0	-32.5	-0.6	-20.7	-3.6	-2.2	2.9	0.0	-0.1	12.9	33.7	-9.5
SOx	0.1	0.0	-0.2	0.0	-0.6	-0.1	0.0	0.1	-0.4	-0.1	0.4	0.2	-0.7
CO	3.5	0.0	-18.5	-7.0	-257.5	-3.6	-1.2	2.9	0.0	-0.1	159.5	19.2	-102.8
PM10	0.2	0.0	-1.4	-0.2	-5.6	-0.7	-0.2	0.6	0.0	0.0	3.5	1.5	-2.4
PM2.5	0.2	0.0	-0.9	-0.1	-3.6	-0.7	-0.2	0.6	0.0	0.0	2.2	1.0	-1.6
Change from Reference Case to Cap-and-Trade With Offsets													
TOG	0.2	-0.2	-3.3	-0.7	-27.7	-4.8	-0.7	1.6	0.0	-0.1	16.9	2.8	-16.2
ROG	0.1	0.0	-2.7	-0.7	-25.0	-0.8	-0.3	0.2	0.0	-0.1	15.3	2.3	-11.7
NOx	0.9	-0.5	-39.3	-0.6	-21.0	-5.6	-5.1	1.8	-0.1	-0.5	12.8	32.5	-24.4
SOx	0.1	-0.3	-0.2	0.0	-0.6	-0.2	0.0	0.1	-2.5	-0.2	0.4	0.2	-3.4
CO	3.5	-0.3	-22.3	-7.0	-260.1	-5.6	-2.7	1.8	0.0	-0.4	159.2	18.5	-115.3
PM10	0.2	-0.1	-1.7	-0.2	-5.7	-1.1	-0.5	0.4	-0.1	-0.1	3.5	1.4	-3.9
PM2.5	0.2	0.0	-1.1	-0.1	-3.6	-1.1	-0.5	0.4	-0.1	-0.1	2.2	0.9	-2.9
Change from Reference Case to Cap-and-Trade No Offsets													
TOG	0.2	-0.7	-3.9	-0.7	-28.7	-9.9	-1.2	0.2	0.0	0.0	16.8	2.7	-25.4
ROG	0.1	0.0	-3.2	-0.7	-26.0	-1.6	-0.5	0.0	0.0	0.0	15.2	2.2	-14.4
NOx	0.9	-1.9	-45.6	-0.6	-21.7	-11.5	-8.4	0.2	-0.1	-0.1	12.7	31.4	-44.6
SOx	0.1	-1.3	-0.2	0.0	-0.6	-0.5	-0.1	0.0	-3.6	0.0	0.4	0.1	-5.7
CO	3.5	-1.2	-25.9	-7.0	-269.8	-11.5	-4.4	0.2	0.0	-0.1	158.1	17.9	-140.2
PM10	0.2	-0.2	-2.0	-0.2	-5.9	-2.3	-0.8	0.0	-0.1	0.0	3.5	1.4	-6.4
PM2.5	0.2	-0.1	-1.3	-0.1	-3.8	-2.3	-0.8	0.0	-0.1	0.0	2.2	0.9	-5.1

Coal estimates are based on coal used for Electricity Generation
Natural Gas estimates are based on Electricity Generation and Residential Use

Difference Between Reference Case and Complementary Policies

		SCAQMD MSBACT Guidelines		CALEPA CAT Updated Macroeconomic Report	
Criteria Pollutant	**Estimated Change (TPD)**	**$/Ton**	**Value $1,000/Yr**	**$/Ton**	**Value $1,000/Yr**
Reactive Organic Gases (ROG)	-10.2	$ 22,297	($83,029)	$ 12,813	($47,712)
Oxides of Nitrogen (NOx)	-9.5	$ 21,083	($72,948)	$ 21,320	($73,768)
Oxides of Sulfur (SOx)	-0.7	$ 11,149	($2,715)		
Carbon Monoxide (CO)	-102.8	$ 442	($16,590)		
Particulate Matter (PM10)	-2.4	$ 4,967	($4,402)	$ 20,500	($18,170)
Total	-125.6		($179,684)		($139,651)

Difference Between Reference Case and Cap-and-Trade With Offsets

		SCAQMD MSBACT Guidelines		CALEPA CAT Updated Macroeconomic Report	
Criteria Pollutant	**Estimated Change (TPD)**	**$/Ton**	**Value $1,000/Yr**	**$/Ton**	**Value $1,000/Yr**
Reactive Organic Gases (ROG)	-11.7	$ 22,297	($94,956)	$ 12,813	($54,567)
Oxides of Nitrogen (NOx)	-24.4	$ 21,083	($187,893)	$ 21,320	($190,005)
Oxides of Sulfur (SOx)	-3.4	$ 11,149	($14,012)		
Carbon Monoxide (CO)	-115.3	$ 442	($18,605)		
Particulate Matter (PM10)	-3.9	$ 4,967	($7,067)	$ 20,500	($29,166)
Total	-158.7		($322,533)		($273,738)

Difference Between Reference Case and Cap-and-Trade No Offsets

		SCAQMD MSBACT Guidelines		CALEPA CAT Updated Macroeconomic Report	
Criteria Pollutant	**Estimated Change (TPD)**	**$/Ton**	**Value $1,000/Yr**	**$/Ton**	**Value $1,000/Yr**
Reactive Organic Gases (ROG)	-14.4	$ 22,297	($117,433)	$ 12,813	($67,483)
Oxides of Nitrogen (NOx)	-44.6	$ 21,083	($343,025)	$ 21,320	($346,881)
Oxides of Sulfur (SOx)	-5.7	$ 11,149	($23,325)		
Carbon Monoxide (CO)	-140.2	$ 442	($22,625)		
Particulate Matter (PM10)	-6.4	$ 4,967	($11,655)	$ 20,500	($48,103)
Total	-211.4		($518,063)		($462,467)