

## California Nitrous Oxide Inventory for 2000-2019 — by IPCC Category

*million tonnes of CO2 equivalent - (based upon IPCC Fourth Assessment Report's 100-yr Global Warming Potentials)*

**Included Emissions**

**2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019**

<b>1 - Energy</b>	<b>7.6</b>	<b>7.3</b>	<b>7.2</b>	<b>7.0</b>	<b>6.7</b>	<b>6.3</b>	<b>5.9</b>	<b>5.6</b>	<b>5.1</b>	<b>4.6</b>	<b>4.5</b>	<b>4.3</b>	<b>4.1</b>	<b>4.0</b>	<b>3.9</b>	<b>3.7</b>	<b>3.7</b>	<b>3.6</b>	<b>3.5</b>	<b>3.3</b>	
<b>1A - Fuel Combustion Activities</b>	<b>7.57</b>	<b>7.34</b>	<b>7.22</b>	<b>7.02</b>	<b>6.69</b>	<b>6.30</b>	<b>5.88</b>	<b>5.58</b>	<b>5.11</b>	<b>4.63</b>	<b>4.50</b>	<b>4.27</b>	<b>4.07</b>	<b>3.99</b>	<b>3.86</b>	<b>3.72</b>	<b>3.66</b>	<b>3.60</b>	<b>3.45</b>	<b>3.34</b>	
<b>1A1 - Energy Industries</b>	<b>0.49</b>	<b>0.55</b>	<b>0.53</b>	<b>0.56</b>	<b>0.55</b>	<b>0.55</b>	<b>0.50</b>	<b>0.52</b>	<b>0.54</b>	<b>0.40</b>	<b>0.39</b>	<b>0.34</b>	<b>0.34</b>	<b>0.34</b>	<b>0.32</b>	<b>0.29</b>	<b>0.26</b>	<b>0.25</b>	<b>0.24</b>	<b>0.22</b>	
1A1a - Main Activity Electricity and Heat Production	0.40	0.46	0.44	0.46	0.46	0.45	0.41	0.43	0.46	0.31	0.30	0.28	0.28	0.27	0.26	0.23	0.19	0.19	0.17	0.16	
1A1ai - Electricity Generation	0.313	0.366	0.359	0.383	0.379	0.369	0.328	0.350	0.383	0.237	0.230	0.215	0.215	0.214	0.202	0.184	0.143	0.138	0.119	0.111	
1A1aii - Combined Heat and Power Generation (CHP)	0.091	0.091	0.078	0.080	0.081	0.084	0.084	0.082	0.076	0.073	0.069	0.065	0.070	0.058	0.055	0.046	0.051	0.050	0.051	0.051	
1A1b - Petroleum Refining	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.06	0.05	
1A1c - Manufacture of Solid Fuels and Other Energy Industries	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
1A1cii - Other Energy Industries	0.010	0.011	0.010	0.011	0.011	0.010	0.009	0.009	0.010	0.009	0.008	0.008	0.009	0.010	0.010	0.010	0.009	0.009	0.009	0.009	
<b>1A2 - Manufacturing Industries and Construction</b>	<b>0.09</b>	<b>0.09</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.06</b>	<b>0.06</b>	<b>0.07</b>	<b>0.06</b>	<b>0.06</b>
1A2c - Chemicals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2d - Pulp, Paper and Print	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2e - Food Processing, Beverages and Tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2f - Non-Metallic Minerals	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
1A2g - Transport Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2h - Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2i - Mining (excluding fuels) and Quarrying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2j - Wood and Wood Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2k - Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2l - Textile and Leather	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1A2m - Non-specified Industry.	0.06	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
<b>1A3 - Transport</b>	<b>6.91</b>	<b>6.61</b>	<b>6.53</b>	<b>6.30</b>	<b>5.97</b>	<b>5.60</b>	<b>5.23</b>	<b>4.92</b>	<b>4.43</b>	<b>4.09</b>	<b>3.95</b>	<b>3.76</b>	<b>3.58</b>	<b>3.49</b>	<b>3.37</b>	<b>3.29</b>	<b>3.27</b>	<b>3.22</b>	<b>3.08</b>	<b>2.99</b>	
1A3a - Civil Aviation	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	
1A3aii - Domestic Aviation	0.033	0.031	0.032	0.033	0.035	0.036	0.037	0.040	0.036	0.033	0.031	0.030	0.030	0.032	0.031	0.034	0.037	0.039	0.039	0.037	
1A3b - Road Transportation	6.85	6.56	6.48	6.24	5.91	5.54	5.17	4.85	4.37	4.03	3.90	3.71	3.53	3.43	3.32	3.23	3.21	3.16	3.02	2.93	
1A3bi - Cars	2.846	2.654	2.572	2.364	2.142	1.896	1.696	1.513	1.331	1.237	1.165	1.067	0.988	0.917	0.851	0.804	0.745	0.701	0.658	0.623	
1A3bii - Light-duty Trucks	2.470	2.385	2.349	2.336	2.157	1.986	1.806	1.641	1.474	1.372	1.314	1.222	1.139	1.063	1.003	0.960	0.912	0.852	0.791	0.736	
1A3biii - Heavy-duty Trucks and Buses	1.517	1.497	1.524	1.505	1.577	1.620	1.624	1.654	1.516	1.381	1.378	1.380	1.358	1.412	1.420	1.427	1.511	1.557	1.525	1.523	
1A3biv - Motorcycles	0.020	0.026	0.030	0.032	0.033	0.037	0.040	0.043	0.045	0.043	0.043	0.042	0.042	0.042	0.042	0.044	0.044	0.045	0.046	0.046	
1A3c - Railways	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	
1A3d - Water-borne Navigation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
1A3di - International Water-borne Navigation (International Bunkers)	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	
1A3dii - Domestic Water-borne Navigation	0.005	0.004	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.006	0.005	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	
1A3e - Other Transportation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
1A3eii - Off-road	0.006	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.007	0.005	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.007	0.007	0.007	

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*million tonnes of CO2 equivalent - (based upon IPCC Fourth Assessment Report's 100-yr Global Warming Potentials)*

<b>Included Emissions</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>1A4 - Other Sectors</b>	0.09	0.09	0.09	0.09	0.10	0.08	0.07	0.07	0.08	0.09	0.10	0.10	0.08	0.10	0.10	0.07	0.07	0.06	0.07	0.07
1A4a - Commercial/Institutional	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
1A4b - Residential	0.07	0.06	0.06	0.07	0.07	0.05	0.05	0.05	0.06	0.07	0.07	0.07	0.06	0.07	0.07	0.04	0.04	0.04	0.04	0.05
1A4c - Agriculture/Forestry/Fishing/Fish Farms	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
<b>1B - Fugitive Emissions from Fuels</b>	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>1B2 - Oil and Natural Gas</b>	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1B2a - Oil	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1B2ai - Venting												0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1B2aii - Flaring	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1B2aiii - All Other												0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1B2b - Natural Gas																				
<b>1B3 - Geothermal Energy Production</b>										0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>2 - Industrial Processes and Product Use</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
<b>2B - Chemical Industry</b>	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.04	0.05	0.03	0.05	0.05	0.01	0.03	0.00	0.00	0.00	0.00
<b>2B2 - Nitric Acid Production</b>	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.04	0.05	0.03	0.05	0.05	0.01	0.03	0.00	0.00	0.00	0.00
<b>3 - Agriculture, Forestry and Other Land Use</b>	9.7	9.7	10.0	10.0	9.7	9.8	9.8	9.6	9.4	9.2	9.3	9.2	9.5	9.0	8.9	8.5	8.6	8.6	8.7	8.6
<b>3A - Livestock</b>	1.38	1.41	1.50	1.54	1.45	1.50	1.55	1.57	1.53	1.49	1.48	1.48	1.54	1.48	1.50	1.47	1.47	1.48	1.47	1.47
<b>3A2 - Manure Management</b>	1.38	1.41	1.50	1.54	1.45	1.50	1.55	1.57	1.53	1.49	1.48	1.48	1.54	1.48	1.50	1.47	1.47	1.48	1.47	1.47
3A2a - Cattle	1.28	1.30	1.39	1.44	1.35	1.40	1.45	1.47	1.43	1.39	1.39	1.38	1.45	1.39	1.41	1.39	1.38	1.39	1.39	1.38
3A2ai - Dairy Cows	1.059	1.082	1.144	1.164	1.091	1.127	1.161	1.185	1.151	1.128	1.130	1.128	1.177	1.121	1.118	1.092	1.086	1.096	1.090	1.085
3A2aii - Other Cattle	0.219	0.222	0.248	0.273	0.258	0.271	0.292	0.286	0.281	0.266	0.256	0.257	0.268	0.269	0.296	0.296	0.296	0.296	0.296	0.296
3A2c - Sheep	0.02	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
3A2d - Goats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3A2f - Horses	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
3A2h - Swine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3A2i - Poultry	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.04
<b>3C - Aggregate Sources and Non-CO2 Emissions Sources on Land</b>	8.28	8.27	8.47	8.45	8.30	8.30	8.25	8.01	7.88	7.75	7.83	7.74	8.00	7.50	7.36	7.03	7.16	7.16	7.23	7.12
<b>3C1 - Emissions from Biomass Burning</b>	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
3C1b - Biomass Burning in Croplands	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
<b>3C4 - Direct N2O Emissions from Managed Soils</b>	6.42	6.45	6.59	6.57	6.44	6.42	6.39	6.15	6.01	5.92	5.99	5.85	6.08	5.64	5.56	5.28	5.38	5.32	5.42	5.30
<b>3C5 - Indirect N2O Emissions from Managed Soils</b>	1.81	1.78	1.84	1.84	1.82	1.83	1.82	1.82	1.82	1.78	1.80	1.84	1.86	1.80	1.74	1.70	1.73	1.78	1.76	1.76

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<b>4 - Waste</b>	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1
<b>4A - Solid Waste Disposal</b>	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10
<b>4A1 - Managed Waste Disposal Sites</b>	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10
<b>4B - Biological Treatment of Solid Waste</b>	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12
<b>4D - Wastewater Treatment and Discharge</b>	0.67	0.67	0.68	0.69	0.71	0.70	0.71	0.72	0.73	0.74	0.79	0.79	0.80	0.81	0.85	0.85	0.85	0.87	0.91
<b>4D1 - Domestic Wastewater Treatment and Discharge</b>	0.67	0.67	0.68	0.69	0.71	0.70	0.71	0.72	0.73	0.74	0.79	0.79	0.80	0.81	0.85	0.85	0.85	0.87	0.91

**Summary for Included Emissions**
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California N2O Emissions 18.1 17.9 18.1 17.9 17.3 17.0 16.6 16.1 15.5 14.8 14.8 14.5 14.6 14.0 13.8 13.3 13.3 13.3 13.3 13.1