AREA SOURCE EMISSIONS FOR CALENDAR YEAR 2023
METHODOLOGY DOCUMENTATION
RESIDENTIAL NATURAL GAS CONSUMPTION

DESCRIPTION OF CATEGORY

This category estimates the emissions of TSP, SOX, NOX, TOG, and CO from the combustion of natural gas in the residential sector, disaggregated into the four categories listed below.

CES	EIC	Description
54569	610-606-0110-0000	Residential Fuel Combustion – Natural Gas – Space Heating
54577	610-608-0110-0000	Residential Fuel Combustion – Natural Gas – Water Heating
54585	610-610-0110-0000	Residential Fuel Combustion – Natural Gas – Cooking
47191	610-995-0110-0000	Residential Fuel Combustion – Natural Gas – Other

METHODOLOGY

Natural gas throughput data was provided by SoCalGas for the residential sector. Throughput data for Long Beach, provided separately by SoCalGas, was incorporated into the total. The data was further segregated by end use (see Table 1) assuming constant factors specified by SoCalGas. All data were consistent with the 2024 California Gas Report.[1]

Table 1. 2023 total residential natural gas throughput by end use.

End use	Throughput (therms)
Space Heating	979,460,000
Water Heating	584,880,000
Cooking	115,380,000
Other	242,490,000

Throughput was allocated to the county level using population data as provided in SCAG's 2024 RTP/SCS (see Figure 1).2 The same allocation factor was assumed for all end uses.

[1] https://www.socalgas.com/sites/default/files/2024-08/2024-California-Gas-Report-Final.pdf
[2] https://scag.ca.gov/connect-socal

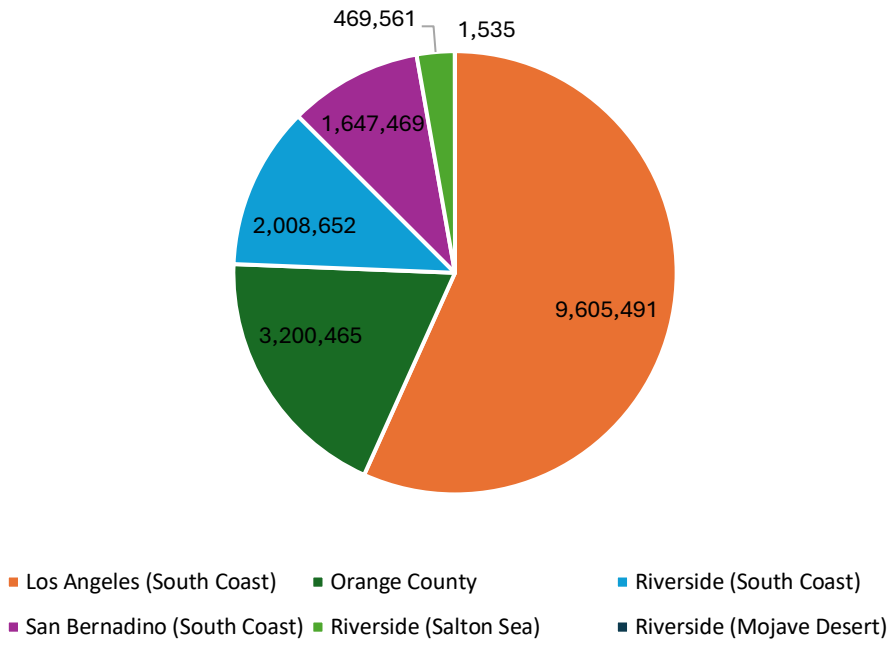

Figure 1. 2023 population by county and air basin as provided by SCAG.

With the exception of the 'cooking' and 'other' categories, for which no controls exist, NOx emission factors for the base year were determined based on compliance with South Coast AQMD's rules (see Table 2). Emission factors from AP-42 were assumed for all other pollutants (see Table 3).

Table 2. NOx emission factors (lbs/mmscf) by residential category.

Category	Applicable Rule	NOx Emission Factor (lbs/mmscf)
Space Heating	1111. Reduction of NOx Emissions from Natural Gas Fired, Fan-Type Central Furnaces	86.04
Water Heating	1121. Control of Nitrogen Oxides from Residential Type, Natural Gas Fired Water Heaters	24.44
Cooking/Other	US EPA AP-42	94

Table 3. US EPA AP-42 emission factors (lbs/mmscf) for residential furnaces.

TOG	CO	SO2	PM
11	40	0.6	7.6

SUMMARY AND NEW EMISSIONS

Presented below is a comparison of 2023 emissions from this update, which may be used in a prospective SIP/AQMP, with 2023 emissions projected in the 2022 AQMP (Table 4 to Table 7).

Table 4. SCAB residential space heating emissions for year 2023, in tons per year (tpy)

Pollutants	2022 AQMP	Prospective SIP/AQMP
TOG[1]	515	522.1
NOx	4028	4084.0
CO	1872	1898.7
SOx	28.1	28.5
PM2.5	356	360.8

[1] 2027 AQMP emissions use the emissions factor for TOG, consistent with AP-42

Table 5. SCAB residential cooking emissions for year 2023 (tpy)

Pollutants	2022 AQMP	Prospective SIP/AQMP
TOG	58.6	61.2
NOx	501	523.4
CO	213	222.7
SOx	3.2	3.3
PM2.5	40.5	42.3

Table 6. SCAB residential water heating emissions for year 2023 (tpy)

Pollutants	2022 AQMP	Prospective SIP/AQMP
TOG	332	311.8
NOx	737	692.8
CO	1206	1133.8
SOx	18.1	17.0
PM2.5	229	215.4

Table 7. SCAB residential other emissions for year 2023 (tpy)

Pollutants	2022 AQMP	Prospective SIP/AQMP
TOG	101	129.3
NOx	863	1104.7
CO	367	470.1
SOx	5.5	7.1
PM2.5	69.8	89.3

APPENDIX

Overall, NOx emissions are higher in the current inventory compared to the previous inventory, with most of the increase stemming from the 'Other' category.

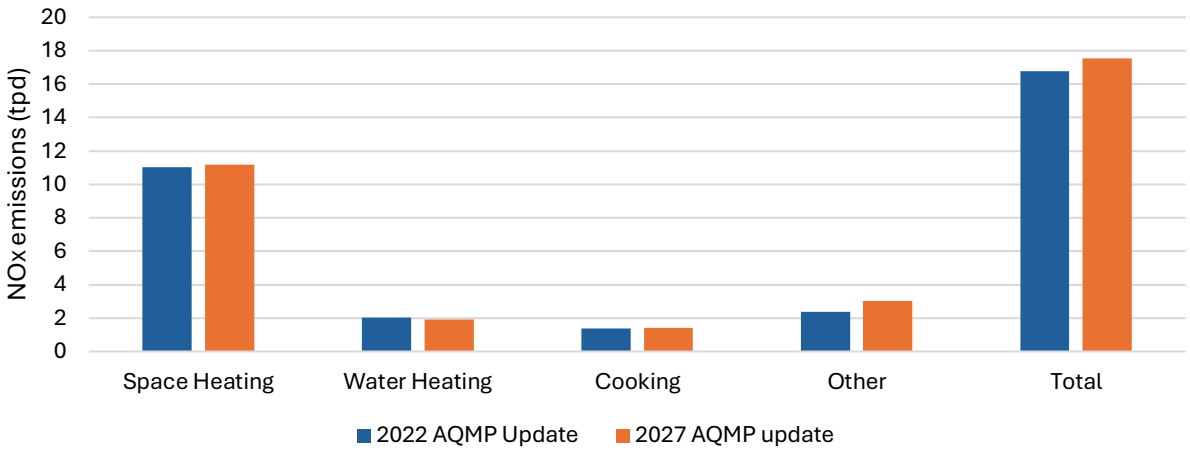

Figure 2. A comparison of the updated and previous emissions inventories for NOx emissions related to residential natural gas combustion.