Supporting Information

Table S1 The PM profiles used for each source type were specified as weighted averages from each of the detailed sources within each broad category

Source Type	PM Source Profile
On-road gasoline vehicles	10% Non-catalyst vehicle + 90% Catalyst Vehicle
Off-road gasoline vehicles	100% Non-catalyst vehicle
On-road diesel vehicles	100% On-road diesel vehicle
Off-road diesel vehicles	90% 1970's diesel vehicle + 7% 1980's diesel vehicle + 3% on-road diesel vehicle
Food Cooking	85% meat frying + 15% charbroiling
Biomass burning	95% residential wood smoke + 5% waste burning
Natural gas combustion	100% natural gas combustion
Other	70% construction & demolition + 10% paved road travel + 4% farming ops + 3% brake wear + 2% cattle feedlot + 2% mining ops + 1% process heaters + 1% cement manufacturing + 3% wood processing + 1% solid waste disposal + 2% mineral processing + 1% asphalt production + 1% organic solvent

Table S2 Meteorology evaluation metrics for the entire simulation period in SFBA counties (Alameda (ALA) county, Contra Costa (CC) county, Napa (NAP) county, San Francisco (SF) county, Santa Clara (SCL) county, San Mateo (SM) county, Solano (SOL) county) and two counties in Southern California (Los Angeles county (LA) and Riverside county (RV)).

	Temperature ˚C		Wind			Relative Humidity		
County	MB	RMSE	MFB	MFE	RMSE m/s	MFB	MFE	RMSE %
ALA	0.21	4.02	-0.05	0.56	1.39	-0.28	0.39	28.81
CC	0.14	4.36	0.03	0.62	1.63	-0.33	0.47	31.16
NAP	0.12	4.25	0.05	0.59	1.71	-0.38	0.49	35.96
SF	0.11	4.14	-0.08	0.64	2.14	-0.33	0.46	35.49
SCL	0.16	4.23	-0.08	0.57	1.62	-0.28	0.42	30.42
SM	0.15	5.49	-0.05	0.6	1.75	-0.26	0.43	32.49
SOL	0.13	4.67	0.10	0.56	1.37	-0.36	0.47	35.23
LA	0.10	3.91	-0.12	0.58	1.66	-0.14	0.35	27.31
RV	0.12	4.34	0.07	0.59	1.28	-0.11	0.38	26.28

Table S3 Locations of PNC for measurement sites used in the analysis

Station name	Address	Latitude	Longitude
Anaheim	1630 Pampas Ln Anaheim, CA 92802	33.83	-117.94
Central LA	1630 North Main Street, Los Angeles, CA 90012	34.07	-118.23
Compton	700 North Bullis Rd Compton, CA 90221	33.90	-118.21
Hunnington Park	6301 S. Santa Fe Ave. 90221	33.87	-118.22
Inland Valley	14360 Arrow Highway	34.11	-117.96
Rubidoux	5891 Mission Blvd Riverside, CA 92509	34.00	-117.42
Livermore	793 Rincon Avenue, Livermore, CA 94551	37.69	-121.78
San Pablo	1865 Rumrill Boulevard, San Pablo, CA 94806	37.96	-122.36
Redwood City	897 Barron Avenue, Redwood City, CA 94063	37.48	-122.20
Santa Rosa	837 5th Street, Santa Rosa, CA 95404	38.44	-122.71

Table S4 Statistics of $PM_{2.5}$ and $PM_{2.5}$ species

	MASS $PM_{2.5}$	EC $PM_{2.5}$	OC $PM_{2.5}$	Nitrate	Sulfate	Ammonium
MFB	-0.11	-0.18	-0.32	-0.2	-0.41	0.22
MFE	0.26	0.32	0.46	0.51	0.6	0.49

Table S5 Statistics of key gaseous pollutants

	O3	NO	NO2	CO	SO2
MFB	-0.05	-0.14	0.22	-0.21	-0.23
MFE	0.12	0.3	0.28	0.27	0.21
RMSE (ppm)	0.005	0.012	0.011	0.09	-0.008

Table S6 ultrafine PM emission inventory from natural gas combustion in the commercial, industrial and electricity sectors for the entire SoCAB region and SFBA region during the summer and winter months.

		Electricity short tons/day	Industrial short tons/day	Commercial short tons/day
SoCAB	Summer	1.95	0.57	0.69
	Winter	2.02	0.58	0.93
SFBA	Summer	0.18	0.07	0.88
	Winter	0.19	0.25	1.50

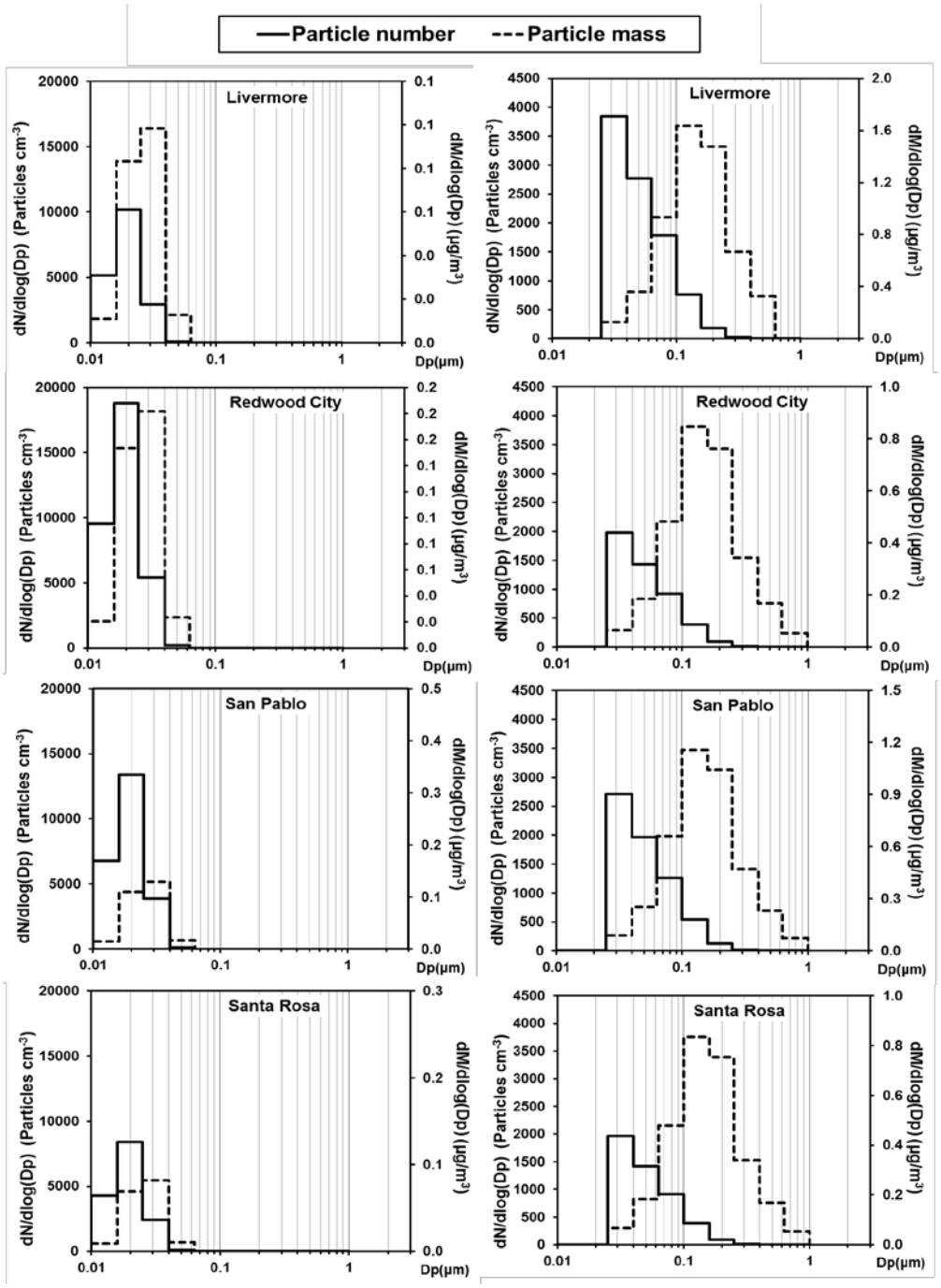

Figure S1 Particle number-size distribution and particle mass-size distribution for natural gas (left panel) and wood burning sources (right panel) at four evaluated sites in SFBA.

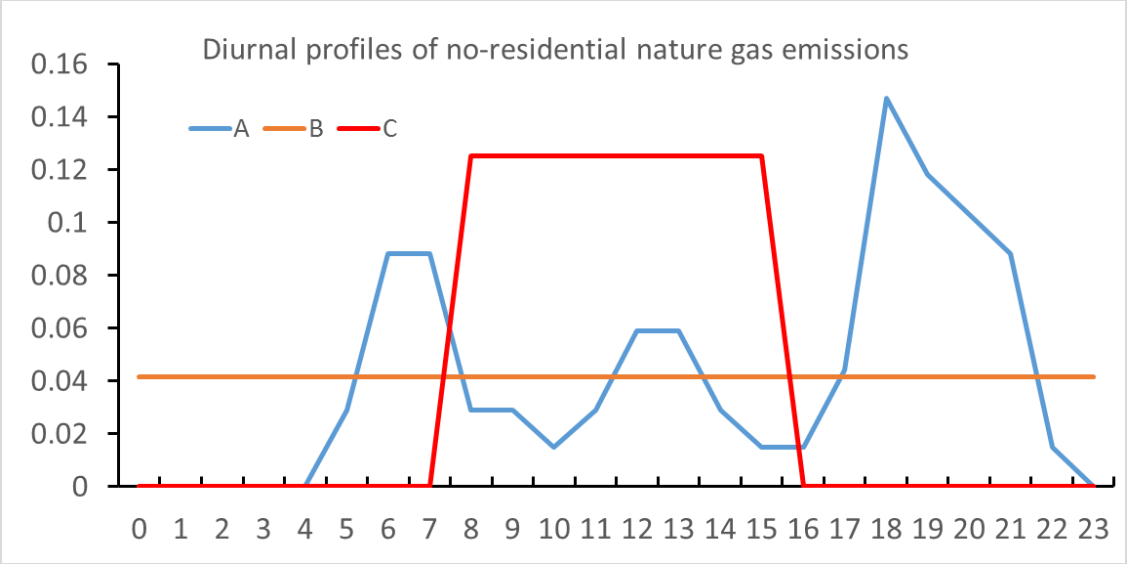

Figure S2. Diurnal profiles of no-residential natural gas emissions.

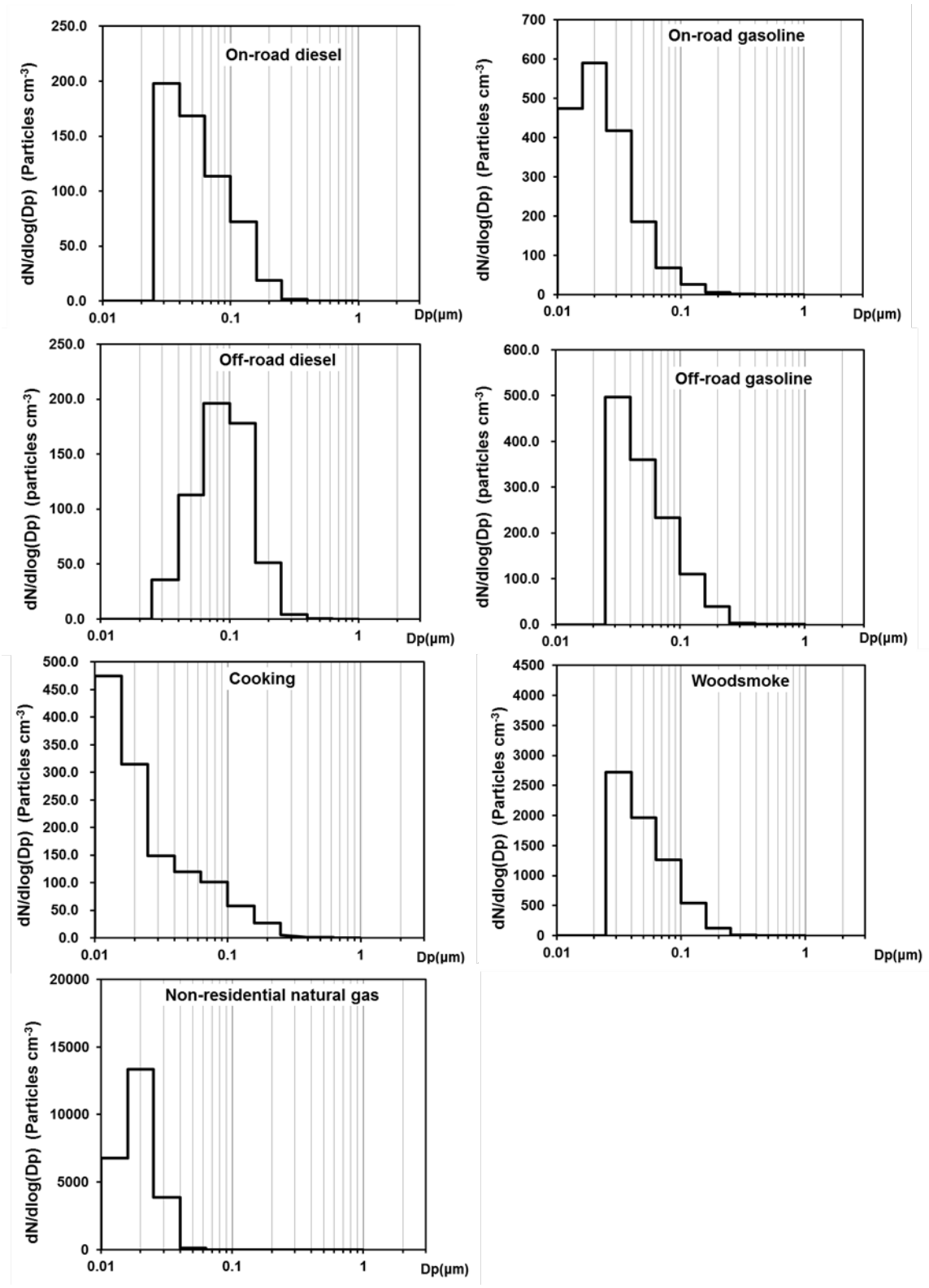

Figure S3 Particle size distributions of major sources calculated by UCD/CIT model at San Pablo.