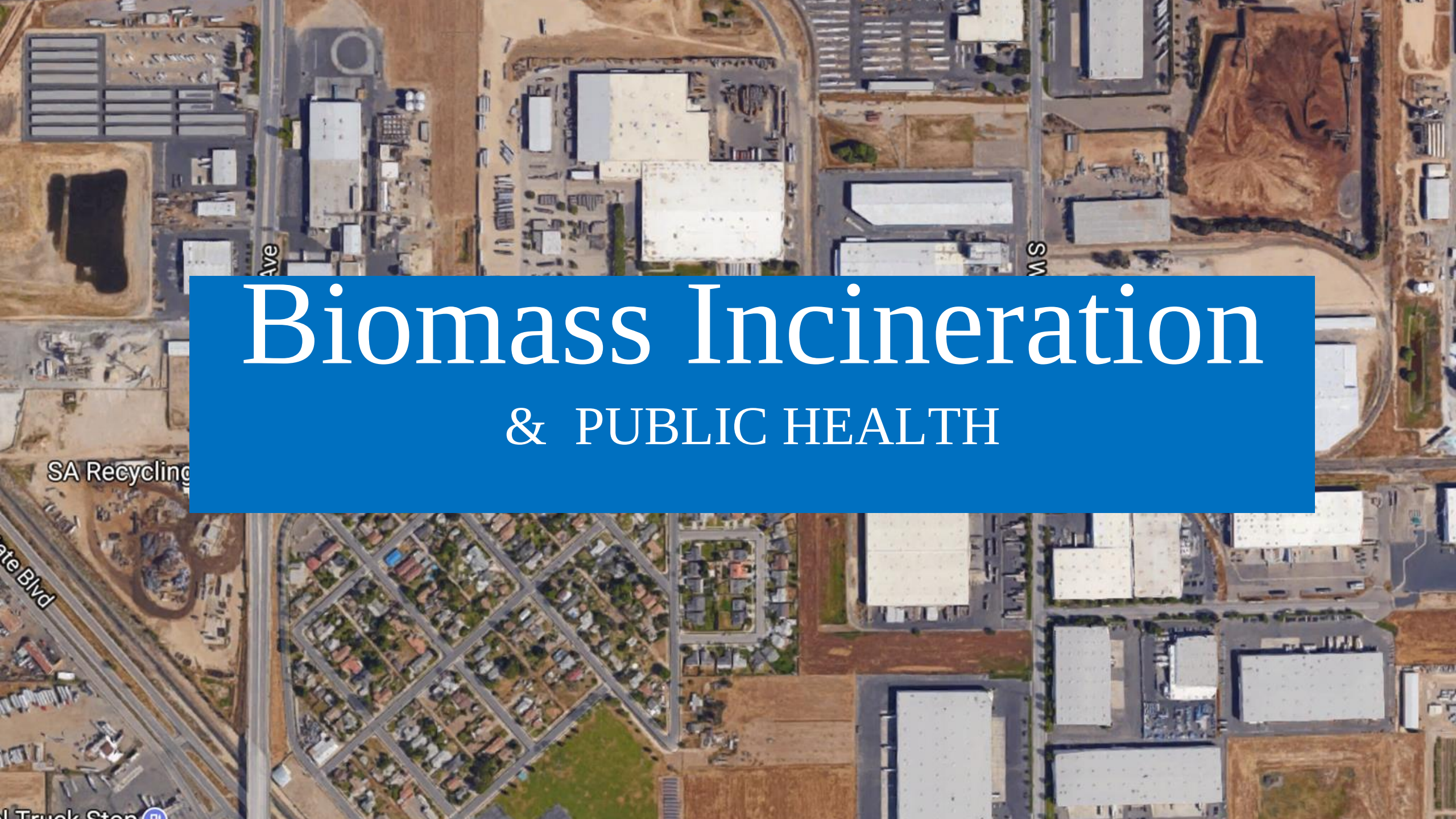


Biomass Incineration

& PUBLIC HEALTH

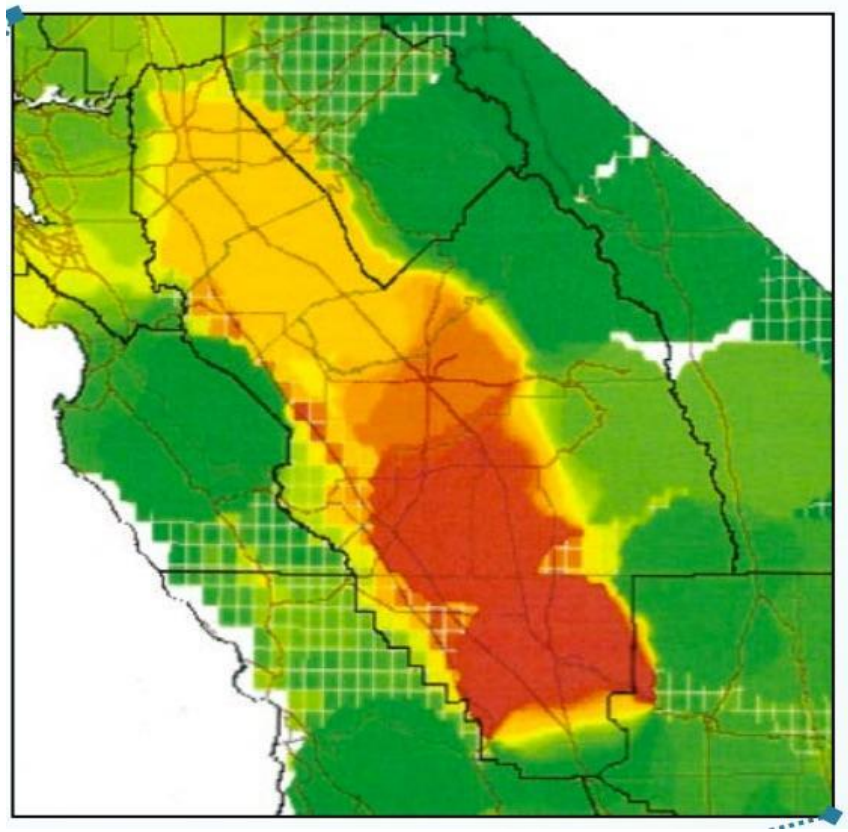
OVERVIEW

- Ambient Air Quality & Health Impacts of PM2.5
- Facility & Community Profiles
- Biomass Incinerators as Energy Producers
- Biomass Incineration vs. Open Burning

STATE OF THE AIR 2016

AMERICAN LUNG ASSOCIATION®

1	Bakersfield, CA
2	Fresno–Madera, CA
3	Visalia–Porterville–Hanford, CA
4	Modesto–Merced, CA
5	Fairbanks, AK



Compared to the national average, children in the San Joaquin Valley are **twice as likely** to be diagnosed with asthma before the age of 18.

Circulation

AHA SCIENTIFIC STATEMENT (2010)

“strong” level of evidence supporting a relationship between fine particle pollution and **heart disease**;

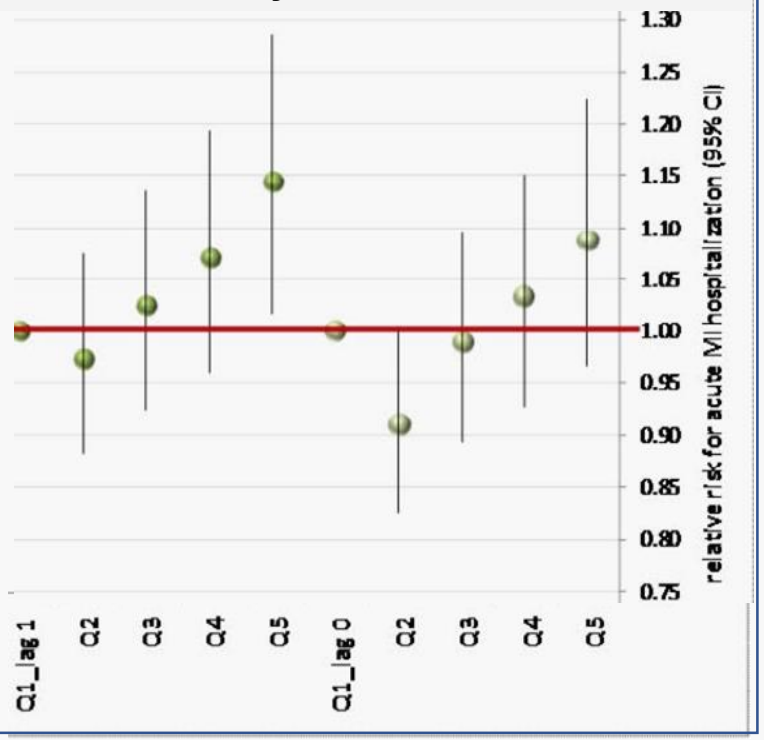
"moderate, yet growing link" between fine particle pollution and **heart failure** and **stroke**; and

*"**small yet consistent**"* association between short-term exposure and **pre-mature death**.

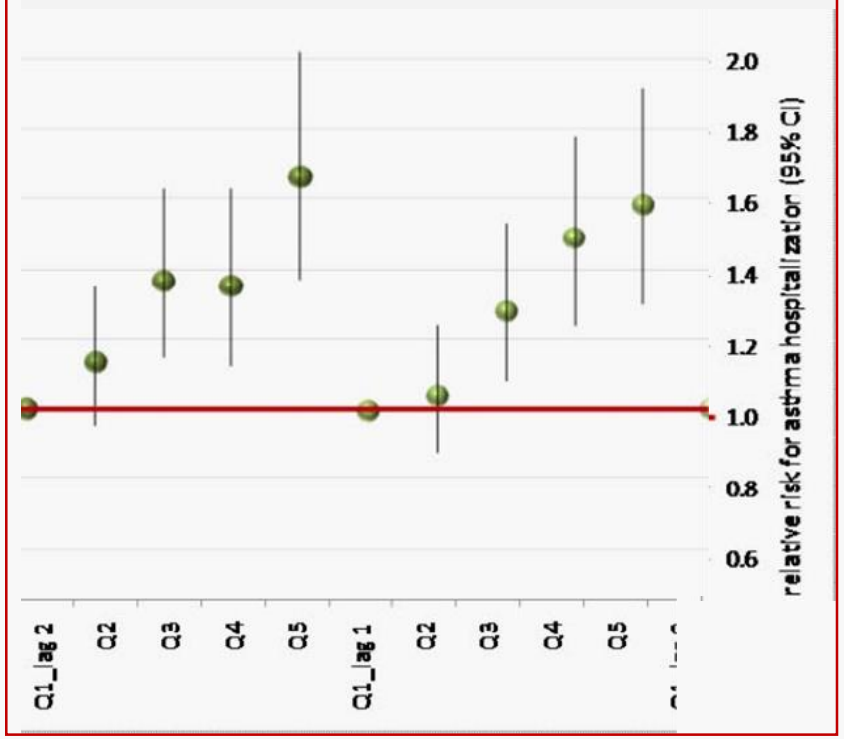
The Impacts of Short-Term Changes in Air Quality on Emergency Room and Hospital Use in California's San Joaquin Valley

PM2.5 Quintiles	Regional
Q5	43.4+
Q4	29.1 - 43.3
Q3	20.1 - 29.0
Q2	12.4 - 20.0
Q1	<= 12.3

Relative Risk for PM2.5 Associated Acute Myocardial Infarction, Regional, 20+ yrs, 2002-2007



Relative Risk for PM2.5 Associated Asthma Hospitalization, Regional, 0-19 yrs, 2002-2007



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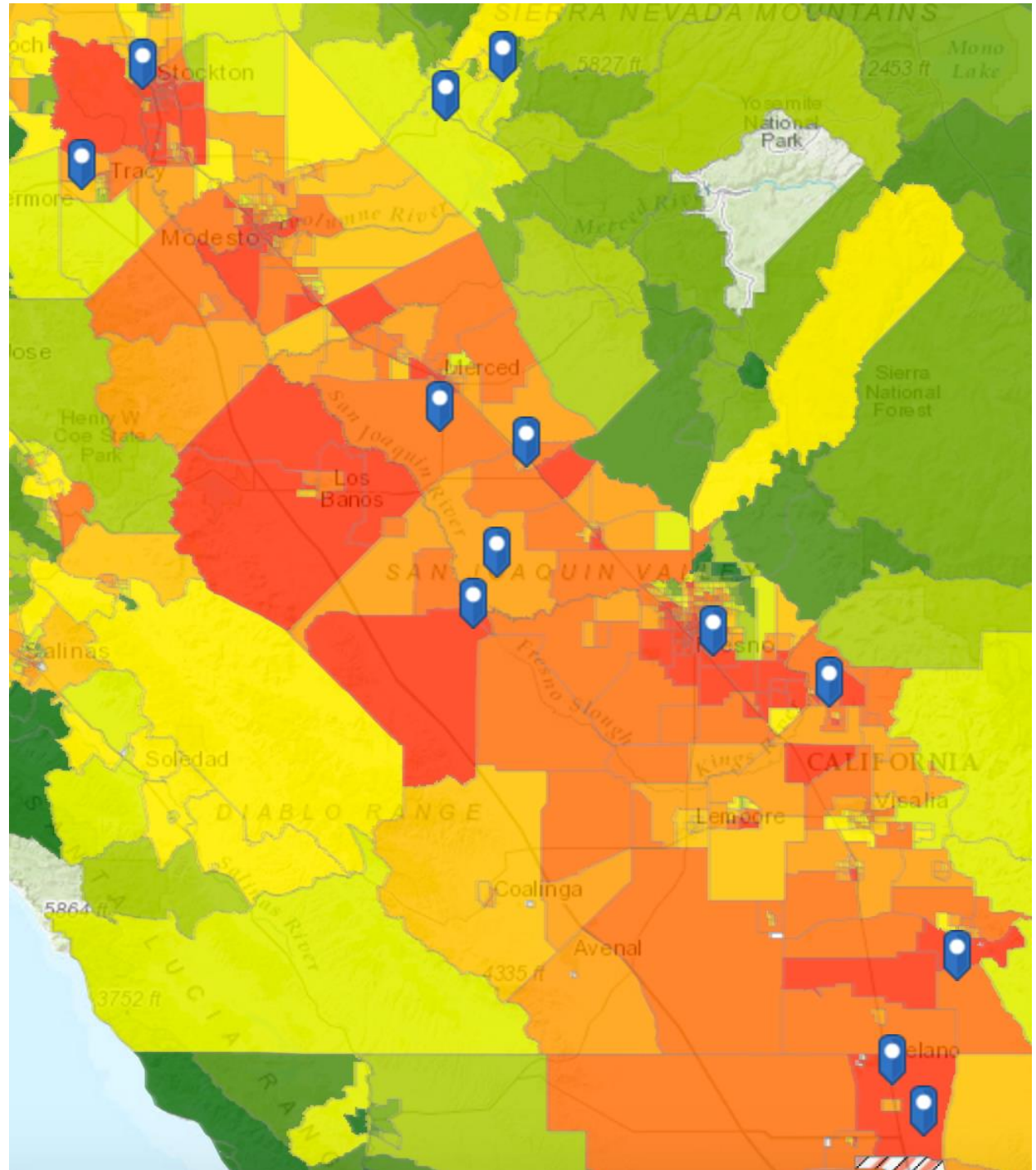
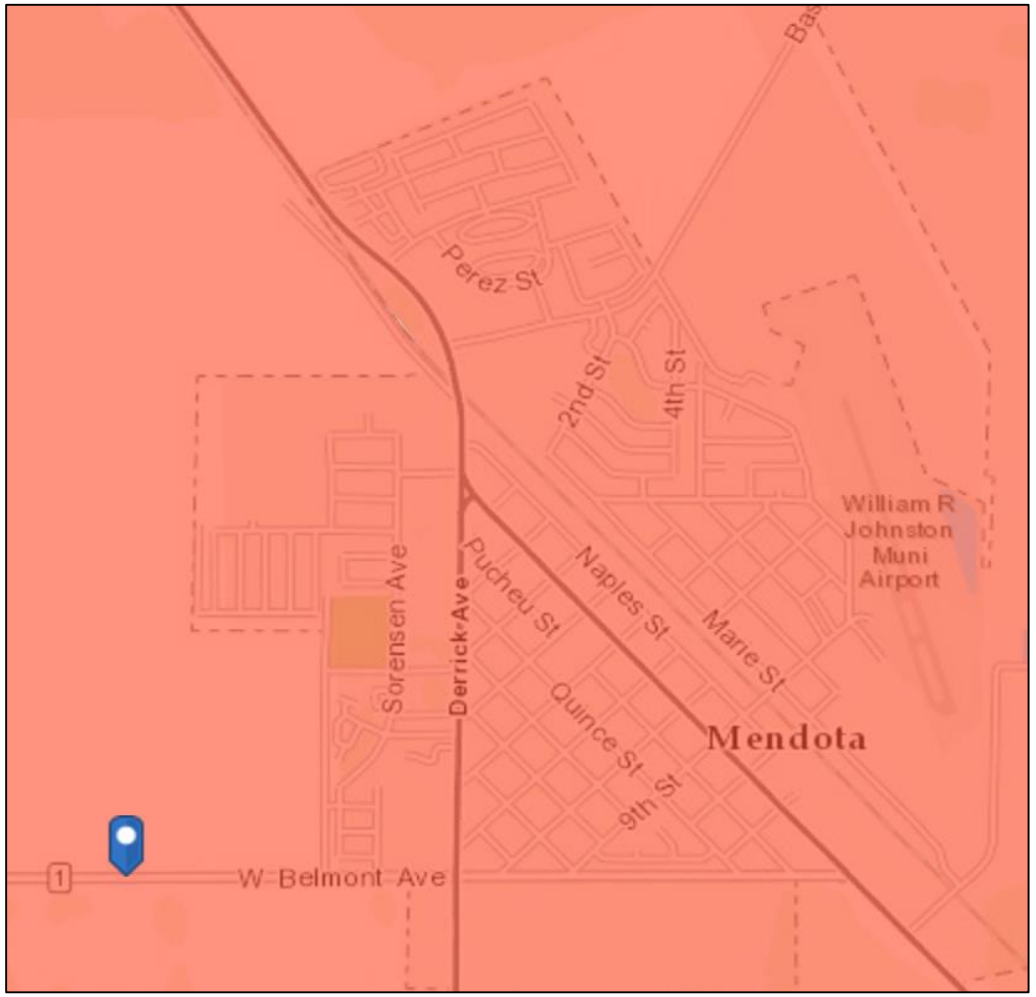
Top Stationary Sources of Direct PM2.5

San Joaquin Valley Air Basin (2015)

		Tons Per Year			
	COMPANY NAME	CO	NOX	SOX	PM2.5
	CHEVRON USA INC*	238.9	355	119	552
	LINN OPERATING, INC*	282.8	244.2	68.8	121.2
	AERA ENERGY LLC*	150.4	407.7	29	111.1
	FREEPORT-MC MORAN OIL & GAS	54.5	88.5	84.9	78
5	ELK HILLS POWER LLC	2.7	37.1	51.2	63.5
	SUNRISE POWER COMPANY	12.3	47.2	5.6	58.5
	CERTAINTEED CORPORATION	66.5	77.5	12.5	57.3
	CA RESOURCES PRODUCTION*	876.1	280.3	30.8	52.4
	WALNUT ENERGY CENTER AUTHORI	3.8	41.4	3.9	44.7
10	LA PALOMA GENERATING CO LLC	30.9	116.7	11.7	38.9
	RIO BRAVO FRESNO	1.5	100.7	0.5	36.7
	PASTORIA ENERGY FACILITY, LLC	19.8	103.5	10.2	33.1
	COVANTA DELANO INC	142.7	294.3	32.6	29.9
	SYCAMORE COGENERATION CO	157.2	96.7	3.2	26.5
15	NORTHERN CALIFORNIA POWER	36.3	30.6	3.6	25.2
	ARDAGH GLASS INC	4.9	139.9	30.8	21.2
	PPG INDUSTRIES	0.4	340.4	52	18.4
	KERN RIVER COGENERATION CO	62.4	53.3	1	17.3
	STEWART & JASPER	0	0	0	16.5
20	PANOCHE ENERGY CENTER LLC	17	36.6	1.1	16.1
	NAS LEMOORE	68.3	50.7	6.4	15
	ALON BAKERSFIELD REFINING	16.1	7.4	0.15	14.8
	MB TECHNOLOGY	0	0	0	14.7
	FOSTER FOOD PRODUCTS	12.7	4.9	4.4	12.2
25	COVANTA STANISLAUS, INC	20.3	305.5	19.1	11.7
	GUARDIAN INDUSTRIES CORP	33.7	309.4	144.2	11.6
	NESTLE PURINA PETCARE COMPANY	1.4	0.5	0.5	11.5
	MT POSO COGENERATION COMPAN	7.8	137.4	2.1	10.6
	CALAVERAS MATERIALS INC.	5.3	1.7	0.3	10.2
30	DTE STOCKTON, LLC	113.6	95.8	1.9	10.2
	MODESTO IRRIGATION DISTRICT	15.9	17.7	1.4	10

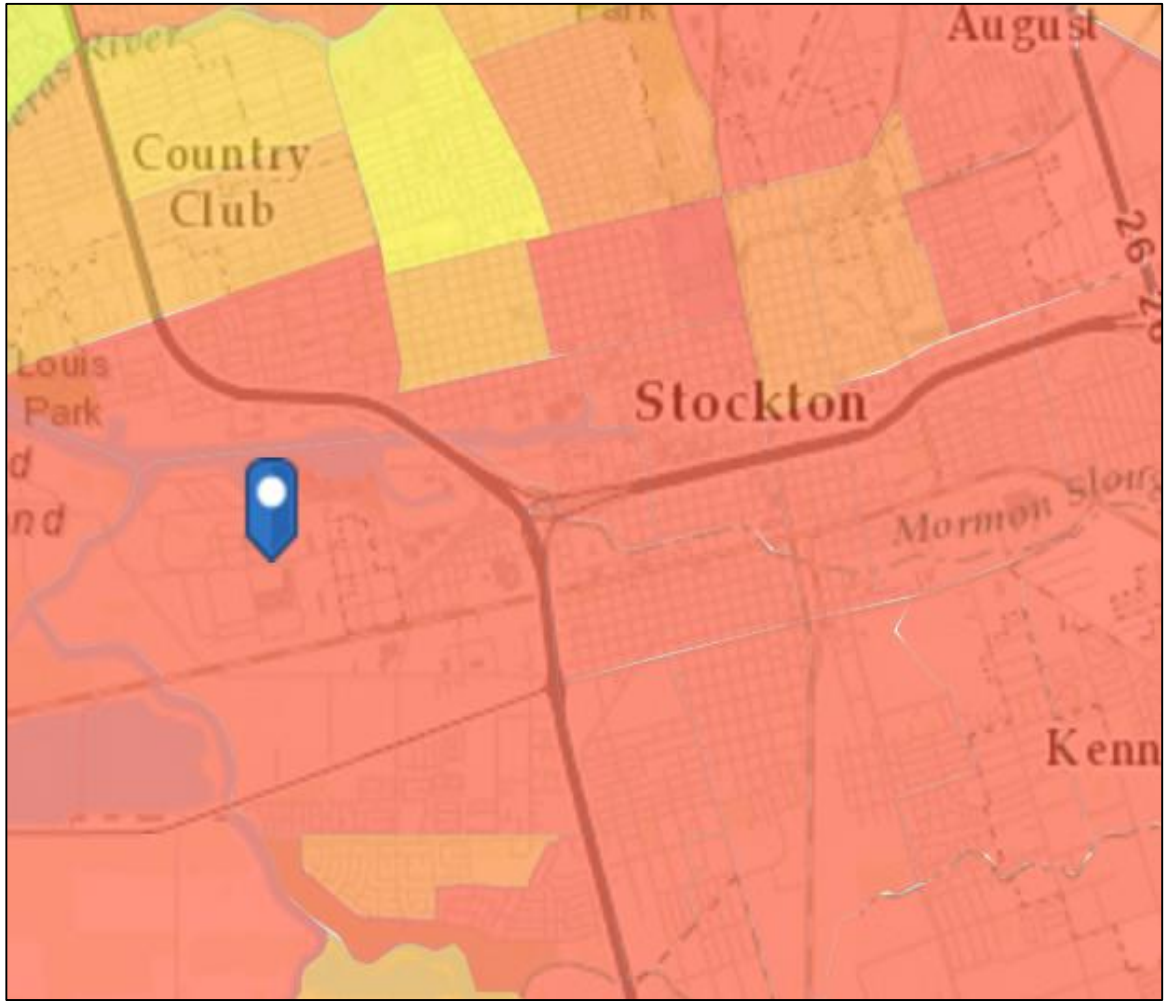
5351 total regulated facilities in the San Joaquin Valley Air Basin





Covanta Mendota (idle)
Mendota, Fresno County
25 MWs Biomass Facility
Emits 84.3 tons PM2.5/year (2014)

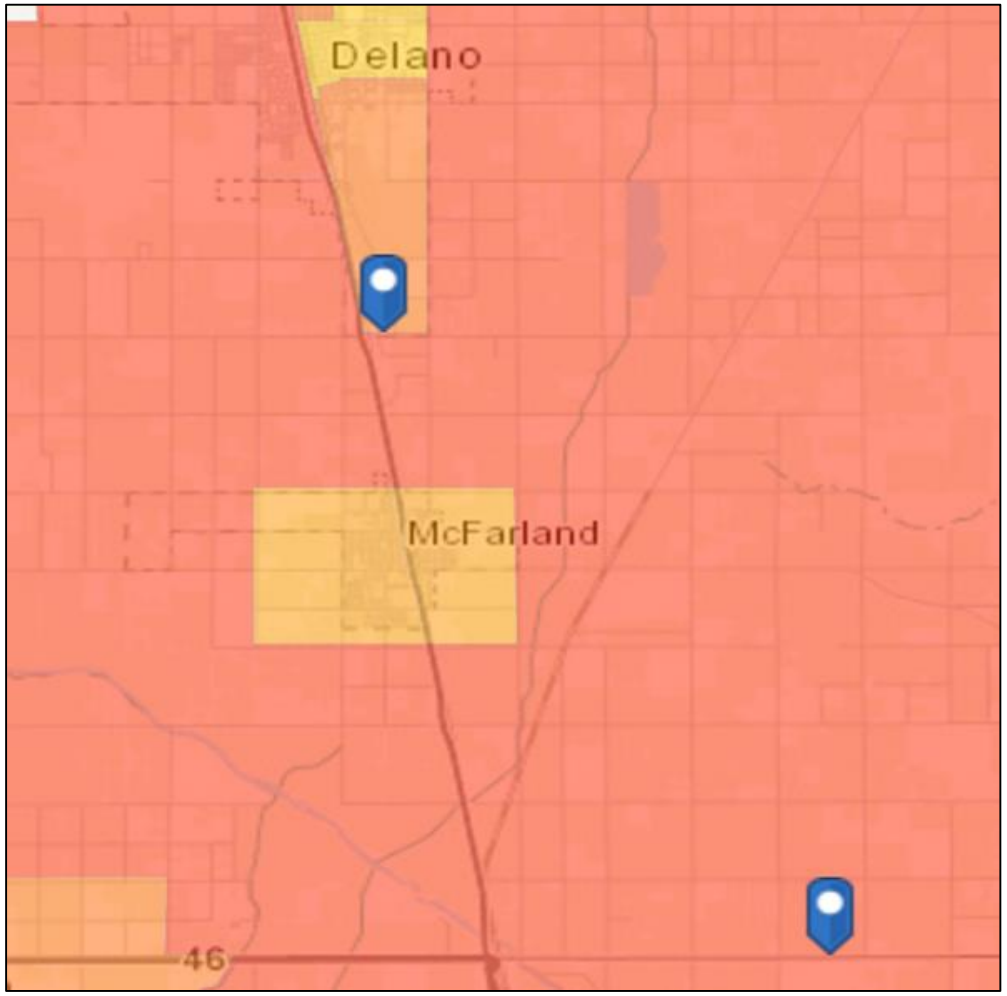
Census Tract: 6019008302 City of Mendota	
Population:	**6,562**
CalEnviroScreen 3.0 Percentile:	96 - 100%
Pollution Burden Percentile:	73
Population Characteristics Percentile:	99
Ozone:	78
PM 2.5:	84
Asthma:	88
Low Birth Weight:	71
Cardiovascular Rate:	93



DTE Stockton (active)
Stockton, Stanislaus County
45 MWs Biomass Facility
Emits 10.2 tons PM2.5/year (2015)

Census Tract: 6077000801	
Port of Stockton	
Population:	6,692
CalEnviroScreen 3.0 Percentile:	96 - 100%
Pollution Burden Percentile:	100
Population Characteristics Percentile:	98
Ozone:	53
PM 2.5:	84
Asthma:	98
Low Birth Weight:	81
Cardiovascular Rate:	97


S Chestnut Ave
S Willow Ave
SA Recycling
Malaga
ate Blvd



Census Tract: 6029004604 Areas surrounding **Delano and McFarland**	
Population:	15,845
CalEnviroScreen 3.0 Percentile:	96 - 100%
Pollution Burden Percentile:	92
Population Characteristics Percentile:	90
Ozone:	91
PM 2.5:	99
Asthma:	60
Low Birth Weight:	85
Cardiovascular Rate:	72

Covanta Delano (idle)
Delano, Kern County
49 MWs Biomass Facility
Emits 49.2 tons PM2.5/year (2014)

Mt. Poso Cogeneration (active)
Bakersfield, Kern County
45 MWs Biomass Facility
Emits 10.6 tons PM2.5/year (2015)

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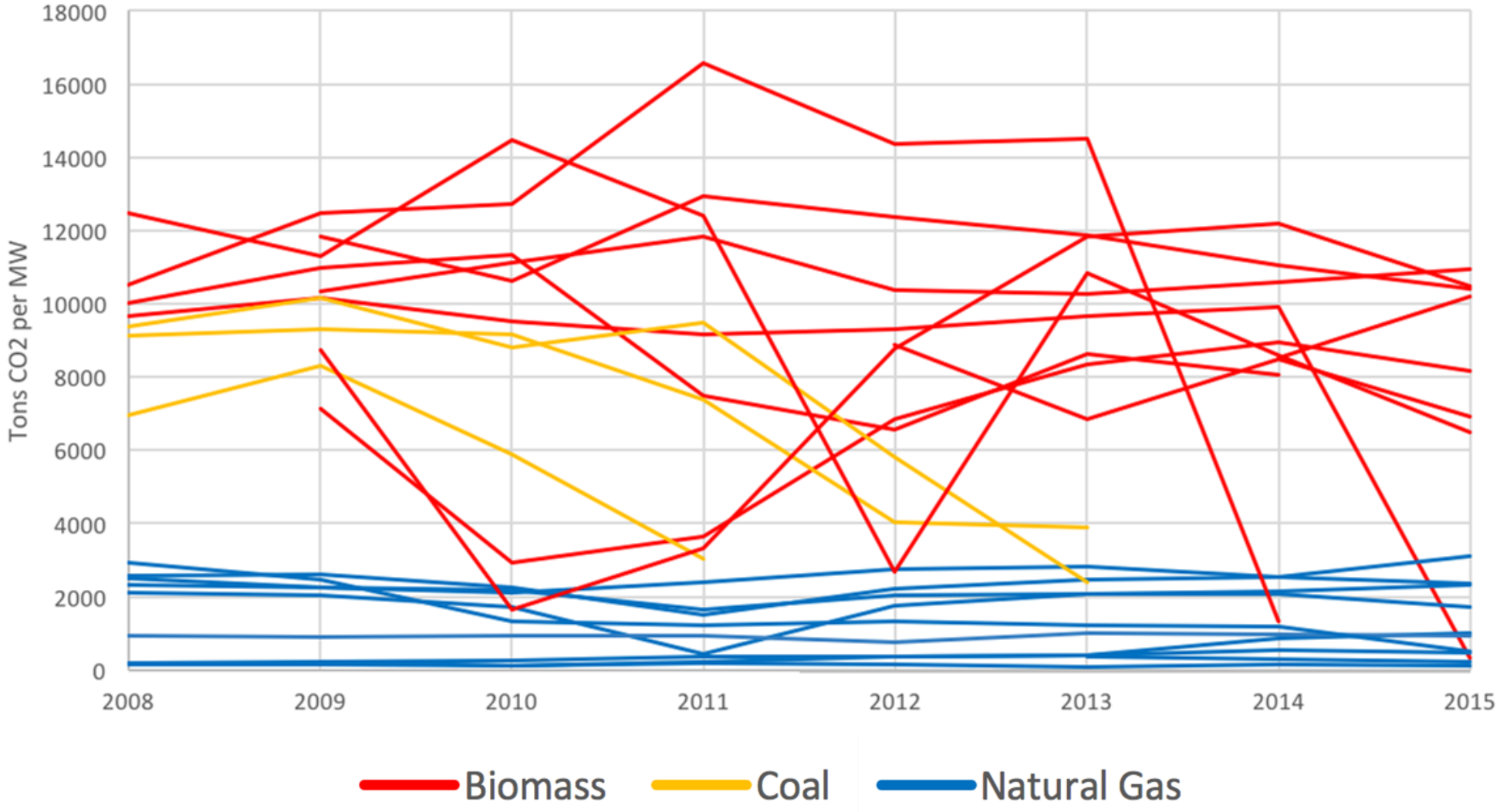
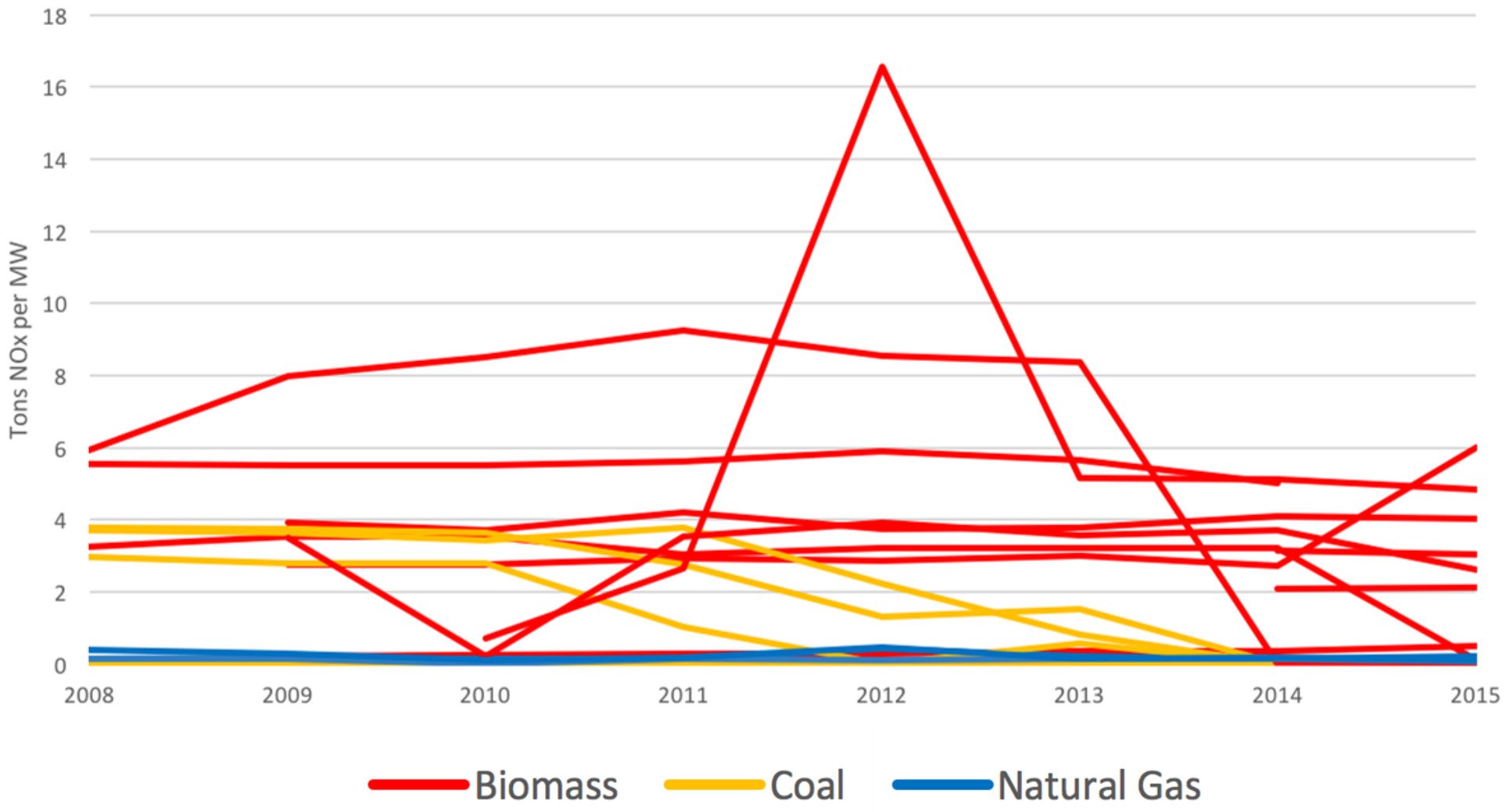
CO2 Emissions

Tons Per Megawatt of Energy Produced



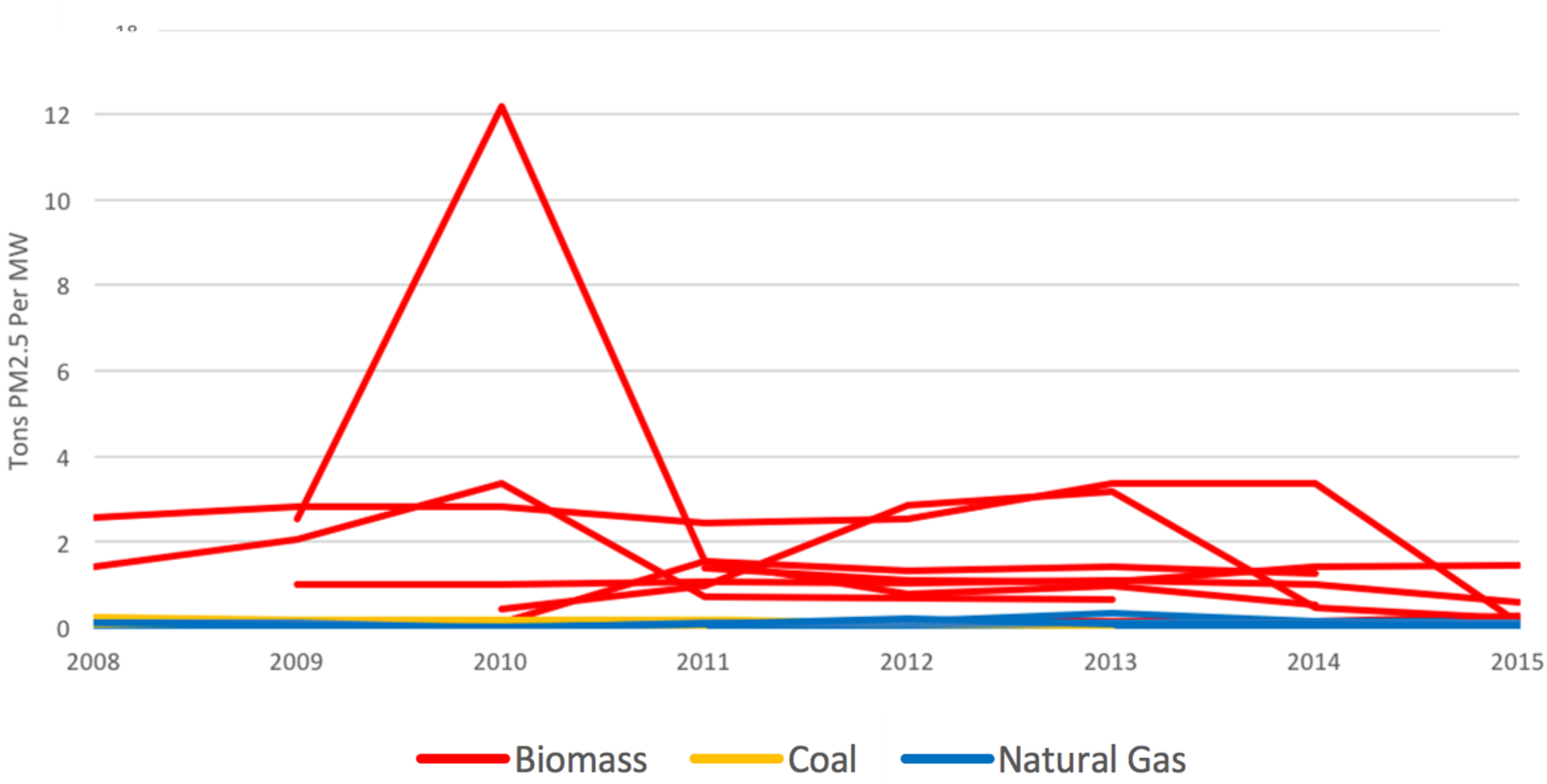
NOX Emissions

Tons Per Megawatt of Energy Produced



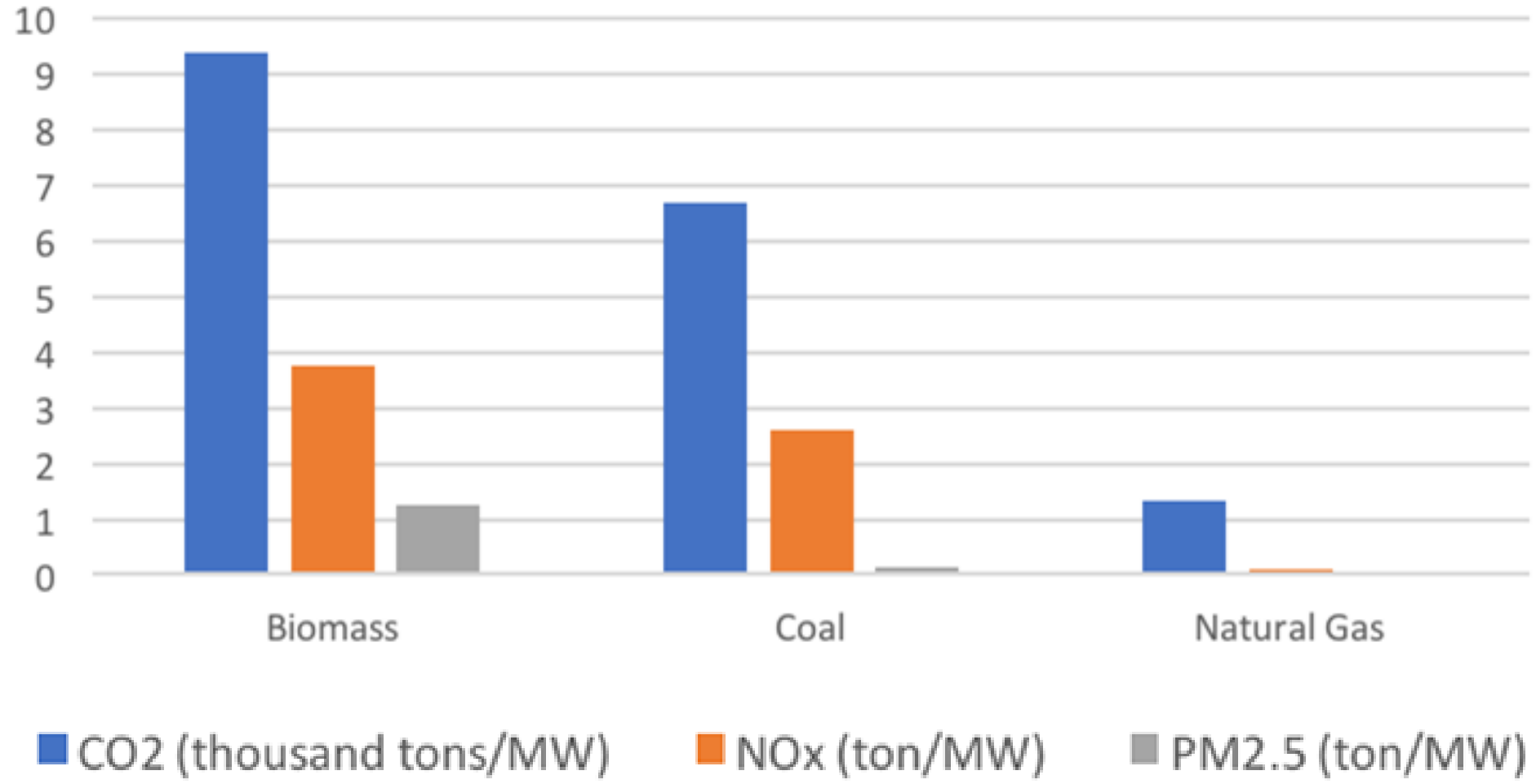
PM2.5 Emissions

Tons Per Megawatt of Energy Produced



Emissions

Per Megawatt of Energy Produced



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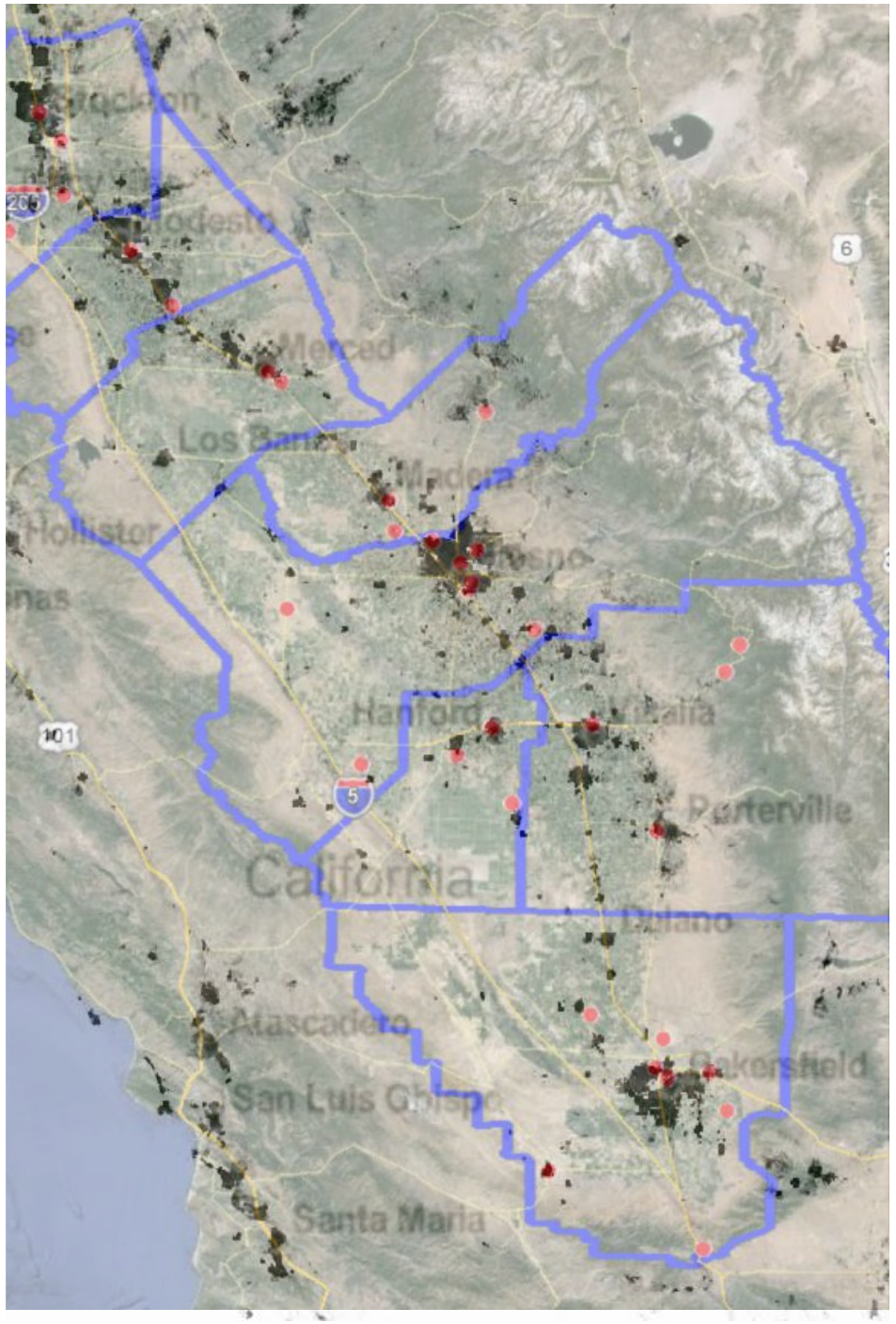
Tons of Emissions

vs.

Impact on Air Monitors

(Public Health)



ANNUAL

24-HOUR

CONCLUSIONS

- Biomass incinerators are significant point sources of PM2.5;
- Biomass incinerators disproportionately impact DACs;
- Per megawatt of energy produced, biomass incinerators emit more GHGs and criteria pollutants than the 10 natural gas and four coal plants examined; and
- Biomass incineration is oftentimes worse for regional air quality than open burning.