bae urban economics

Socio-Economic Impact Study of Proposed Amendments to Regulation 6: Particulate Matter and Visible Emissions, Rule 3: Wood-Burning Devices

Submitted to: Bay Area Air Quality Management District

September 5, 2019

bae urban economics

Table of Contents

San Francisco
2600 10th St., Suite 300
Berkeley, CA 94710
510.547.9380

Sacramento
803 2nd St., Suite A
Davis, CA 95616
530.750.2195

Los Angeles
448 South Hill St., Suite 701
Los Angeles, CA 90013
213.471.2666

Washington DC
700 Pennsylvania Ave. SE, 2nd Floor
Washington, DC 20003
202.588.8945

New York City
234 5th Ave.
New York, NY 10001
212.683.4486

www.bae1.com

List of Tables

EXECUTIVE SUMMARY

Description of Proposed Rule

Wildfire smoke presents immediate impacts to local air quality and public health, and atmospheric conditions can quickly transport smoke great distances, with even distant fires affecting the air quality throughout the Bay Area. The fires in Napa and Sonoma County in 2017 and in Butte County in 2018 generated unprecedented levels of particulate matter, including hazardous levels never before experienced in the Bay Area.

The Bay Area Air Quality Management District ("Air District" or "BAAQMD") proposes to amend Regulation 6, Rule 3 (Rule 6-3) to further protect public health when wildfire smoke affects air quality in the Bay Area, since the current rule limits the Air District's ability to ban wood burning only during the wintertime November through February period. The proposed 6-3 amendments would extend the Air District's authority to announce a Spare the Air Alert and ban wood burning or combustion in wood-burning devices year-round whenever particulate matter is forecasted to exceed 35 micrograms per cubic meter (35µg/m3). The draft amendment will allow the Air District to ban wood burning any time unhealthy levels of particulate matter are forecasted, further protecting public health when wildfire smoke affects air quality in the Bay Area.

Socio-Economic Impacts

Affected Industries

The direct impacts of the proposed amendments to Rule 6-3 will fall on households and others burning wood either as a heat source or for ambiance, rather than on particular industries. Since the direct impacts would result in reduced purchased of firewood, households would see an increase in dollars available for other expenditures rather than negative impacts. One small subsector that might be affected is Direct Selling Firewood Dealers (a subset of NAICS 454310, Fuel Dealers) who could see sales decline as consumption drops due to an increase in days with a Mandatory Burn Ban.

There are no direct compliance costs to consumers associated with the ban; it merely prohibits the burning of wood in stoves and fireplaces on certain days of the year. As a result the analysis here assumes no socio-economic impacts on households or other users affected by the ban, and no further analysis of impacts on households and others using firewood is

undertaken. The following analysis focuses solely on any potential loss of sales at firewood dealers.

Impacts on Firewood Dealers

As noted previously, firewood dealers may see direct impacts on sales due to possible limitations on the use of firewood on certain additional days of the year. The current rule already bans wood burning on certain days from November through February; impacts of the current ban are not considered here. However, as a result of possible restrictions on certain additional days, firewood dealers may face lower sales and reduced revenues.

Economic Profile of Affected Industry

Firewood dealers are part of the category defined in the North American Industry Classification System (NAICS) as "Fuel Dealers," an industry comprising "establishments primarily engaged in retailing heating oil, liquefied petroleum (LP) gas, and other fuels via direct selling," in NAICS category 454310. More specifically, the Economic Census provides some data specifically for "Other Fuel Dealers," which are "establishments primarily engaged in retailing fuels, such as coal, wood, or other fuels (except liquefied petroleum gas and heating oil) via direct selling."

There are a very small number of Bay Area establishments in the Other Fuel Dealers category. According to the 2012 Economic Census (most recent data available), there were only 22 establishments in this category in all of California, and only eight in the San Jose-San Francisco-Oakland Combined Statistical Area (CSA), which encompasses the Air District's region. Based on the data available, the dealers in the state employed only 79 workers, and the CSA's dealers employed a total of between 20 and 79 employees.

BAE also queried Dun & Bradstreet data and conducted online searches, and obtained a list of firewood dealers in the Bay Area. This research shows 14 dealers, with 60 employees and annual revenues estimated at approximately $6.2 million. While this information varies somewhat from the Economic Census for a variety of reasons related to the source,[1] it confirms that there are a limited number of firewood dealers in the Bay Area, and that they have limited employment.

[1] For example, the Duns data may include businesses with no paid wage and salary employees (e.g., sole proprietorships), even though DUNS reports employees at each site. Also, the Economic Census data are from a different time frame, and the DUNS data cannot be confirmed via administrative records that the Census Bureau may have access to.

While firewood and other fuel dealers are not the only source for firewood, it is unlikely that decreased sales of firewood products at other retail outlets (e.g., supermarkets or hardware stores) would be substantial enough to impact business adversely. The 2012 Economic Census data indicate that firewood sales do not account for a significant portion of sales for other types of retailers. For example, firewood sales make up less than one percent of sales at gasoline stations that carry the product; for fuel dealers selling firewood, 22 percent of revenues come from sales of firewood.

Estimated Rate of Return

Firewood dealers are part of the larger category of nonstore retailers (NAICS 454), which is the most specific category available in the IRS data on net corporate income. For this analysis, 10-year averages were used as a benchmark such that the impacts of any particular year's performance due to economic fluctuations are lessened. For nonstore retail corporations as a group, the 10-year average net income as a percent of total receipts for nonstore retailers is 4.3 percent.

Compliance Costs

Firewood dealers do not have costs related to compliance with the amended Rule. The potentially significant losses are related to decreased business, not compliance costs. The decreased business would result from decreased wood burning on Mandatory Burn Ban days.

As indicated by data from recent years, the number of such burn ban days may vary considerably by year due to short-term weather changes, and may change long-term due to climate change. Additionally, some of the exceedance days occur within the existing ban period, and thus the proposed rule change would not result in any changes in impacts for those days. Over the 2015 through 2018 period, there were an average of 4.75 exceedance days per year due to wildfires outside the current ban period, but the variation has been considerable over the four years, ranging from zero days in 2016 to 14 days in 2017. So far in 2019, there have been no exceedance days.

Assuming that households and others consume firewood at an even rate throughout the year, and that in an average year they would be restricted from burning on 4.75 additional days, in an average year their firewood consumption would be reduced by only approximately 1.3 percent. Using the "worst case" year (14 additional days of banned wood-burning) as the benchmark, firewood consumption would decline by 3.8 percent over the year.

However, these "back of the envelope" estimates of lost sales do not take into account seasonal variations in demand. The expanded burn ban period would cover warmer seasons

where the need to burn wood for heating would be less than during the current November to February period. In fact, the summer fire season is often associated with unusually hot weather on days where wood-burning for heat would be unlikely. Many of the exceedance days from 2015 through 2018 were days of extreme heat in the Bay Area; on one of those days (September 1, 2017) San Francisco recorded its hottest temperature ever.

Further analysis indicates that for San Francisco, only one of the 19 additional exceedance days between 2015 and 2018 had temperatures below the annual average; for Livermore, only four additional exceedance days had temperatures below the annual average. This indicates that overall, firewood consumption for heating on the additional exceedance days would be below annual per day averages. Nevertheless, to be conservative, the estimate of sales loss here is assumed to range from 1.3 to 3.8 percent of annual revenues. It is assumed that the losses will be sustained by these types of businesses; households and businesses heating with wood as their primary fuel are unlikely to be purchasing the kinds of small packages typically available at gasoline stations and other retailers such as supermarkets.

Impacts on Affected Industry

In order to determine the impacts of these measures on firewood dealers affected by the proposed Rule amendments, the analysis that follows considers lost revenues relative to estimated net income for these dealers, estimating losses in an average year (4.75 days of additional Mandatory Burn Bans) and a "peak" year (14 days of Mandatory Burn Ban). Based on the estimates of revenue for firewood dealers as shown in Table 4 in the body of this report below, this would amount to an annual decline in sales of between approximately $78,000 and $230,000 distributed among the total estimated $6.21 million in annual sales for all the dealers. Assuming that firewood dealer expenses are directly proportional to revenues, net income and profits would decline by the same percentage. While some costs (obtaining the firewood at wholesale or otherwise, and staffing levels to some degree) would decrease with lower sales, other costs, such as rent or property taxes, are fixed such that operating expenses would actually not decline proportionally, and net income would decrease more than gross revenues on a proportional basis. However, the estimate of impacts is likely overstated, and it is thus unlikely that the decline in net income would be greater than the ARB 10 percent threshold used by the Air District as a benchmark for significant economic impacts. This indicates that the proposed loss in sales related to the proposed rule change does not have the potential for significant adverse economic impacts.

Impacts on Small Businesses

According to California Government Code 14835, a small business is any business that meets the following requirements:

- Must be independently owned and operated;
- Cannot be dominant in its field of operation;
- Must have its principal office located in California;
- Must have its owners (or officers in the case of a corporation) domiciled in California; and
- Together with its affiliates, be either:
    - A business with 100 or fewer employees, and an average annual gross receipts of $10 million or less over the previous three tax years, or
    - A manufacturer with 100 or fewer employees.

Assuming these retail firewood sales establishments are independently owned, they would all meet the criteria of California Government Code 14835 for categorization as small businesses, based on having 100 or fewer employees and annual revenues of less than $10 million, because even as a group they have fewer employees and less revenue than these thresholds. As discussed above, based on impacts on profits, there is no expected potential for significant impacts for any of these businesses meeting the definition of a small business. It should also be noted that this is a very limited number of businesses with few employees and limited revenues.

DESCRIPTION OF PROPOSED RULE AMENDMENT

Over the last several years, California has experienced some of the deadliest and most destructive wildfires in its history, with wildfire events becoming the "new normal." As a result, new wildfire prevention initiatives and actions are needed. Climate change is causing higher temperatures and longer dry periods, as well as lengthening the fire season and increasing the risk of wildfires. In addition to destroying entire communities and burning everything in their path, wildfires generate a mixture of fine particulate matter and hazardous chemicals and compounds in the air.

Wildfire smoke presents immediate impacts to local air quality and public health, and atmospheric conditions can quickly transport smoke great distances, with even distant fires affecting the air quality throughout the Bay Area. The fires in Napa and Sonoma County in 2017 and in Butte County in 2018 generated unprecedented levels of particulate matter, which reached hazardous levels never before experienced in the Bay Area.

As a result, the Bay Area Air Quality Management District ("Air District" or "BAAQMD") proposes to amend Regulation 6, Rule 3 (Rule 6-3) to further protect public health when wildfire smoke affects air quality in the Bay Area, since the current rule limits the Air District's ability to ban wood burning only during the wintertime November through February period. The proposed 6-3 amendments would extend the Air District's authority to announce a Spare the Air Alert and ban wood burning or combustion in wood-burning devices year-round whenever particulate matter is forecasted to exceed 35 micrograms per cubic meter (35µg/m3). The draft amendment will allow the Air District to ban wood burning any time unhealthy levels of particulate matter are forecasted, and further protect public health when wildfire smoke affects air quality in the Bay Area.

REGIONAL TRENDS

This section provides background information on the demographic and economic trends for the nine-county San Francisco Bay Area, which represents the Air District's jurisdiction.[2] Regional trends are compared to statewide demographic and economic patterns since 2000, in order to show the region's unique characteristics relative to the State and to provide context for the impact analysis.

Regional Demographic Trends

Table 1 shows the population and household trends for the nine-county Bay Area and California between 2000 and 2019. During this time, the Bay Area's population increased by 14.7 percent, compared to 17.9 percent for California as a whole. Similarly, the number of Bay Area households grew by 10.4 percent, compared to 13.8 percent growth statewide, as average household size increased in both geographies.

Table 1: Population and Household Trends, 2000-2019

Bay Area (a)	**2000**	**2019**	**Total Change 2000-2019**	**% Change 2000-2019**
Population	6,784,348	7,783,460	999,112	14.7%
Households	2,466,020	2,723,550	257,530	10.4%
Average Household Size	2.69	2.80		
California				
Population	33,873,086	39,927,315	6,054,229	17.9%
Households	11,502,871	13,085,036	1,582,165	13.8%
Average Household Size	2.87	2.99		

Notes:
(a) Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

Sources: California State Department of Finance, 2019; US Census, 2000; BAE 2019.

The Bay Area's slower growth is tied to its relatively built-out environment, compared to the state overall. While Central Valley locations, such as the Sacramento region, experienced large increases in the number of housing units, the Bay Area experienced more moderate

[2] The Air District's jurisdiction consists of nine counties, including all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, as well as the western portion of Solano County and the southern portion of Sonoma County. See http://www.arb.ca.gov/app/dislookup/dislookup.php

increases in housing units. Nevertheless, the region has still gained almost one million residents since 2000.

Regional Economic Trends

Table 2 shows jobs by sector in 2013 and 2018 for the Bay Area and California. In the five-year period between 2013 and 2018, the Bay Area's employment base grew by 16.2 percent, increasing from 3.44 million jobs to almost 4.00 million jobs, as the economy has shown strong growth. Statewide employment only increased by 13.1 percent from 15.56 million jobs in 2013 to 17.60 million jobs in 2018. The rate of job growth for both the Bay Area and the State over the five-year period was far higher than the rate of population growth, another indicator of the strong recovery from recession.

The largest major economic sectors in the Bay Area economy are Professional & Business Services, Educational & Health Services, Government, and Leisure & Hospitality. Each of these sectors accounted for over 10 percent of all wage and salary employment in the region. Overall, the Bay Area's economic base largely resembles the state's base, sharing a similar distribution of employment across sectors. One noteworthy variation is the higher Bay Area employment in the Professional, Scientific, & Technical Services sector, which makes up 19.3 percent of employment in the Bay Area compared to only 15.1 percent statewide.

All major industry sectors showed an increase in employment in the Bay Area between 2013 and 2018, with increases of greater than 20 percent in Information; Mining, Logging, and Construction; and Transportation, Warehousing, and Utilities. The growth of over 50 percent in Information is especially noteworthy, indicating the continuing importance of the technology economy in the region. Statewide, the same three major sectors showed employment growth of more than 20 percent, but the growth in Information jobs was only 21 percent.

Table 2: Jobs by Sector, 2013-2018 (a)

	Bay Area					California				
	2013 (b)		2018 (c)		% Change	2013 (b)		2018 (c)		% Change
Industry Sector	**Jobs**	**% Total**	**Jobs**	**% Total**	**2013-2018**	**Jobs**	**% Total**	**Jobs**	**% Total**	**2013-2018**
Agriculture	19,900	0.6%	20,100	0.5%	1.0%	412,400	2.6%	424,200	2.4%	2.9%
Mining, Logging, and Construction	152,400	4.4%	205,400	5.1%	34.8%	666,000	4.3%	882,400	5.0%	32.5%
Manufacturing	313,800	9.1%	362,700	9.1%	15.6%	1,262,500	8.1%	1,325,400	7.5%	5.0%
Wholesale Trade	119,600	3.5%	122,900	3.1%	2.8%	671,300	4.3%	698,900	4.0%	4.1%
Retail Trade	328,100	9.5%	346,000	8.7%	5.5%	1,593,900	10.2%	1,688,600	9.6%	5.9%
Transportation, Warehousing, and Utilities	90,000	2.6%	116,700	2.9%	29.7%	503,800	3.2%	664,000	3.8%	31.8%
Information	138,400	4.0%	211,500	5.3%	52.8%	449,800	2.9%	543,700	3.1%	20.9%
Financial Activities	177,200	5.2%	194,500	4.9%	9.8%	781,200	5.0%	836,300	4.8%	7.1%
Professional & Business Services	645,500	18.8%	771,500	19.3%	19.5%	2,349,200	15.1%	2,663,700	15.1%	13.4%
Educational & Health Services	516,700	15.0%	599,500	15.0%	16.0%	2,309,000	14.8%	2,726,500	15.5%	18.1%
Leisure & Hospitality	371,500	10.8%	432,100	10.8%	16.3%	1,674,800	10.8%	1,986,100	11.3%	18.6%
Other Services, except Public Administration	117,400	3.4%	129,900	3.3%	10.6%	515,500	3.3%	572,100	3.3%	11.0%
Government (d)	449,500	13.1%	483,000	12.1%	7.5%	2,374,300	15.3%	2,587,400	14.7%	9.0%
Total, All Employment (e)	**3,440,000**	**100.0%**	**3,995,800**	**100.0%**	**16.2%**	**15,563,700**	**100.0%**	**17,599,400**	**100.0%**	**13.1%**
Population	**7,417,430**		**7,751,650**		**4.5%**	**38,321,459**		**39,740,508**		**3.7%**

Notes:
(a) Includes all wage and salary employment.
(b) Represents annual average employment for calendar year 2013.
(c) Represents annual average employment for calendar year 2018.
(d) Government employment includes workers in all local, state and Federal workers, not just those in public administration. For example, all public school staff is in the Government category.
(e) Totals may not sum from parts due to independent rounding.

Sources: California Employment Development Department, 2019; CA Department of Finance, 2019; BAE, 2019.

AFFECTED INDUSTRIES

The direct impacts of the proposed amendments to Rule 6-3 will fall on households and others burning wood either as a heat source or for ambiance, rather than on particular industries. Since the direct impacts would result in reduced purchased of firewood, households would see an increase in dollars available for other expenditures rather than negative impacts. One small subsector that might be affected is Direct Selling Firewood Dealers (a subset of NAICS 454310, Fuel Dealers) who could see sales decline due to more limited sales as consumption drops due to an increase in days with a Mandatory Burn Ban.

SOCIO-ECONOMIC IMPACTS

This section describes the potential direct impacts on users of wood-burning stoves (typically households) and firewood dealers related to the expansion of the Mandatory Burn Ban to being year-round.

There are no direct compliance costs to consumers associated with the ban; it merely prohibits the burning of wood in stoves and fireplaces on certain days of the year. As a result the analysis here assumes no socio-economic impacts on households or other users affected by the ban, and no further analysis of impacts on households and other firewood users is undertaken. The following analysis focuses solely on any potential loss of sales at firewood dealers.

Impacts on Firewood Dealers

As noted previously, firewood dealers may see direct impacts on sales due to possible limitations on the use of firewood on certain additional days of the year. The current rule already bans wood burning on certain days from November through February; impacts of the current ban are thus not considered here. However, as a result of possible restrictions on certain additional days, firewood dealers may face lower sales and reduced revenues.

Economic Profile of Affected Industry

Firewood dealers are part of the category defined in the North American Industry Classification System (NAICS) as "Fuel Dealers," an industry comprising "establishments primarily engaged in retailing heating oil, liquefied petroleum (LP) gas, and other fuels via direct selling," in NAICS category 454310. More specifically, the Economic Census provides some data specifically for "Other Fuel Dealers," which are "establishments primarily engaged in retailing fuels, such as coal, wood, or other fuels (except liquefied petroleum gas and heating oil) via direct selling."

There are a very small number of Bay Area establishments in the Other Fuel Dealers category. According to the 2012 Economic Census (most recent data available), there were only 22 establishments in this category in all of California, and only eight in the San Jose-San Francisco-

Oakland Combined Statistical Area (CSA), which encompasses the Air District's region.[3] Based on the data available, the dealers in the state employed only 79 workers, and the CSA's dealers employed a total of between 20 and 79 employees.

Table 3: Profile of Other Fuel Dealers Industry

Area	Number of Establishments	2012 Revenues	Number of Employees	Annual Payrolll
San Jose-San Francisco-Oakland, CA CSA (a)	8	(b)	(c)	(b)
California	22	$8,030,000	79	$1,516,000
United States	156	$108,702,000	495	$12,711,000

Note: "Other Fuel Dealers" includes establishments primarily engaged in retailing fuels, such as coal, wood, or other fuels (except liquefied petroleum gas and heating oil) via direct selling. Includes only establishments with payroll.
(a) This Combined Statistical Area (CSA) is the smallest area for which data were available that covered the entire BAAQMD region. CSA includes the nine-county ABAG region plus San Joaquin, Santa Cruz, and San Benito Counties.
(b) Data withheld to avoid disclosing data for individual companies.
(c) 20-99 employees; more detailed data withheld to avoid disclosing data for individual companies.

Source: 2012 Economic Census.

BAE also queried Dun & Bradstreet data and conducted online searches, and obtained the following list of firewood dealers in the Bay Area (see Table 4). This research shows 14 dealers, with 60 employees and annual revenues estimated at approximately $6.2 million. While this information varies somewhat from the Economic Census for a variety of reasons related to the source,[4] it confirms that there are a limited number of firewood dealers in the Bay Area, and that they have limited employment.

[3] See footnote in table defining the Combined Statistical Area. This was the smallest area for which data were available.

[4] For example, the Duns data may include businesses with no paid wage and salary employees (e.g., sole proprietorships), even though DUNS reports employees at each site. Also, the Economic Census data are from a different time frame, and the DUNS data cannot be confirmed via administrative records that the Census Bureau may have access to.

Table 4: Firewood Dealers in the Bay Area

Business Name	City	Number of Employees	Sales Volume
All Seasons Firewood Llc	Santa Rosa	6	$510,000
Bahara's Firewood	Sunnyvale	5	$719,000
Bear Bottom Farms	Richmond	4	$871,000
Evergreen Firewood	San Jose	2	$45,000
Firewood Farms	Half Moon Bay	1	$50,000
Huertaz Firewood Sale	San Jose	3	$300,000
Hurst Firewood	Vallejo	3	$980,000
Kosich Firewood	Danville	3	$142,000
Nero's Designer Firewood	Novato	15	$1,000,000
Northwinds Firewood Tree Service	Not found	2	$150,000
Oconnell Ranches-Apple & Firewood Prdct	Sebastopol	4	$223,000
Summit Tree & Firewood Company	Petaluma	2	$90,000
Valley Firewood	Novato	3	$190,000
Xinar Com	Santa Rosa	7	$940,000
Total		**60**	**$6,210,000**

Sources: Dun & Bradstreet; Online Searches; BAE, 2019.

While firewood and other fuel dealers are not the only source for firewood, it is unlikely that decreased sales of firewood products at other retail outlets (e.g., supermarkets or hardware stores) would be substantial enough to impact business adversely. Economic Census data from 2012 indicate that firewood sales do not account for a substantial portion of sales for other types of retailers. For example, as shown in the table below, firewood sales make up less than one percent of sales at gasoline stations that carry the product; for fuel dealers selling firewood, 22 percent of revenues come from sales of firewood.

Table 5: Major Sellers of Wood for Fuel, United States

Type of Retailer (a)	Number of Establishments	Revenues from All Sales (b)	Revenues from Sales of Firewood	As Percent of Total Sales
Gasoline Stations (c)	1,470	$7,123,480,000	$12,189,000	0.2%
Fuel Dealers (d)	131	$210,157,000	$42,689,000	20.3%

(a) Includes retailers where wood sales are listed as a separate product line. Does not include all retailers selling wood for fuel.
(b) Total sales of establishments reporting sales of wood for fuel.
(c) Includes gasoline stations with convenience stores.
(d) Includes all retail fuel dealers, not just Other Fuel Dealers. Data not available for Other Fuel Dealers only.

Source: 2012 Economic Census, Product Line Sales.

Estimated Rate of Return

Firewood dealers are part of the larger category of nonstore retailers (NAICS 454), which is the most specific category available in the IRS data on net income. For this analysis, 10-year averages were used as a benchmark such that the impacts of any particular year's performance due to economic

fluctuations are lessened. As shown in Table 6, the 10-year average net income as a percent of total receipts for nonstore retailers is 4.3 percent.

Table 6: Returns on Total Receipts for Nonstore Retailers, 2005-2014, for Active Corporations

Nonstore Retailers (NAICS 454)	Total Receipts 2005-2014 (in $000)	Net Income 2005-2014 (in $000)	Net Income as % of Total Receipts
2005	$136,893,042	$5,992,177	4.4%
2006	$147,442,841	$8,188,569	5.6%
2007	$168,372,805	$7,920,365	4.7%
2008	$175,536,983	$6,834,111	3.9%
2009	$169,826,919	$7,896,418	4.6%
2010	$197,730,286	$7,614,474	3.9%
2011	$197,347,659	$7,621,441	3.9%
2012	$209,855,271	$9,938,409	4.7%
2013	$265,206,835	$8,713,098	3.3%
2014	$277,516,066	$10,580,191	3.8%
Average annual net income as % of total receipts (a)			**4.3%**

(a) Computed based on average net income percentage each year; sums of receipts and net income not used, in order to control for inflation over the time period.

Source: Internal Revenue Service, Returns of Active Corporations, Table 1; BAE, 2019.

Compliance Costs

Firewood dealers do not have costs related to compliance with the amended Rule. The potentially significant losses are related to decreased business, not compliance costs. The decreased business would result from decreased wood burning on Mandatory Burn Ban days.

As shown below in Table 7, the number of such days may vary considerably by year due to short-term weather changes, and long-term due to climate change. Additionally, some of the exceedance days occur within the existing ban period, and thus the proposed rule change would not result in any changes in impacts for those days. Over the 2015 through 2018 period, there were an average of 4.75 exceedance days per year due to wildfires outside the current ban period, but the variation has been considerable over the four years, ranging from zero days in 2016 to 14 days in 2017. So far in 2019, there have been no exceedance days.

Table 7: Bay Area PM2.5 Exceedances 2015-2019

	Exceedance Days Due to Wildfires (a)	
Year	Total	Days Outside Current Ban Period
2015	3	3
2016	0	0
2017	14	14
2018	16	2
Average Days Outside Current Ban Period		4.75

(a) Exceedance level is >35 mg/m^3 ($PM_{2.5}$).

Source: BAAQMD

Assuming that households and others consume firewood at an even rate throughout the year, and that in an average year they would be restricted from burning on 4.75 additional days, in an average year their firewood consumption would be reduced by approximately 1.3 percent. Using the "worst case" year (14 additional days of banned wood-burning) as the benchmark, firewood consumption would decline by 3.8 percent over the year.

However, these "back of the envelope" estimates of lost sales do not take into account seasonal variations in demand. The expanded burn ban period would cover warmer seasons where the need to burn wood for heating would be less than during the current November to February period. Furthermore, the summer fire season is often associated with unusually hot weather. Many of the exceedance days from 2015 through 2018 were days of extreme heat in the Bay Area, as shown in Table 8; on one of those days (September 1, 2017) San Francisco recorded its hottest temperature ever.

Further analysis indicates that for San Francisco, only one of the 19 additional exceedance days between 2015 and 2018 had temperatures below the annual average; for Livermore, only four exceedance days had temperatures below the annual average. This indicates that overall, firewood consumption for heating on those days would be below annual per day averages. Nevertheless, to be conservative, the estimate of sales loss here is assumed to range from 1.3 to 3.8 percent of annual revenues. It is assumed that the losses will be sustained by these types of businesses; households and businesses heating with wood as their primary fuel are unlikely to be purchasing the kinds of small packages typically available at gasoline stations and other retailers such as supermarkets.

Table 8: High and Low Temperatures for San Francisco and Livermore (°F)

	San Francisco			Livermore		
Date	High	Low	Average	High	Low	Average
6/30/2015	75	56	65.5	108	64	86.0
8/15/2015	86	62	74.0	101	59	80.0
8/16/2015	90	60	75.0	106	65	85.5
9/1/2017	106	59	87.5	109	66	87.5
9/2/2017	102	75	88.5	108	69	88.5
9/3/2017	84	65	74.5	106	76	91.0
9/4/2017	79	64	71.5	88	69	78.5
10/9/2017	79	62	70.5	82	54	68.0
10/10/2017	72	52	62.0	85	49	67.0
10/11/2017	66	52	59.0	74	46	60.0
10/12/2017	66	52	59.0	75	41	58.0
10/13/2017	71	52	61.5	78	42	60.0
10/14/2017	77	55	66.0	74	46	60.0
10/15/2017	80	56	68.0	80	43	61.5
10/16/2017	82	60	71.0	85	47	66.0
10/17/2017	75	50	62.5	85	50	67.5
10/18/2017	60	49	54.5	82	44	63.0
8/23/2018	66	59	62.5	76	56	67.0
8/24/2018	66	56	61.0	79	56	67.5
Annual Average	64	51	57.3	73	48	60.3

= days below annual average

Sources: National Weather Service; https://www.usclimatedata.com; BAE, 2019.

Economic Impacts Analysis for Affected Industry

In order to determine the impacts of these measures on firewood dealers affected by the proposed Rule amendments, the analysis that follows considers lost revenues relative to estimated net income for these dealers, estimating losses in an average year (4.75 days of additional Mandatory Burn Bans) and a "peak" year (14 days of Mandatory Burn Ban). Based on the estimates of revenue for firewood dealers as shown in Table 4 above, this would amount to an annual decline in sales of between approximately $78,000 and $230,000 distributed among the total estimated $6.21 million in annual sales for all the dealers. Assuming that firewood dealer expenses are directly proportional to revenues, net income and profits would decline by the same percentage. While some costs (obtaining the firewood at wholesale or otherwise, and staffing levels to some degree) would decrease with lower sales, other costs, such as rent or property taxes, are fixed such that operating expenses would actually not decline proportionally, and net income would decrease more than gross revenues on a proportional basis. However, the estimate of impacts is likely overstated, and it is thus unlikely that the decline in net income would be greater than the ARB 10 percent threshold used by the Air District as a benchmark for significant economic impacts. This indicates that the proposed loss in sales related to the proposed rule change does not have the potential for significant adverse economic impacts.

Small Business Impacts

According to California Government Code 14835, a small business is any business that meets the following requirements:

- Must be independently owned and operated;
- Cannot be dominant in its field of operation;
- Must have its principal office located in California;
- Must have its owners (or officers in the case of a corporation) domiciled in California; and
- Together with its affiliates, be either:
    - A business with 100 or fewer employees, and an average annual gross receipts of $10 million or less over the previous three tax years, or
    - A manufacturer with 100 or fewer employees.

Assuming these firewood-selling establishments are independently owned, they would all meet the criteria of California Government Code 14835 for categorization as small businesses, based on having 100 or fewer employees and annual revenues of less than $10 million; even as a group they have fewer employees and less revenue than these thresholds. As discussed above, based on impacts on profits, there is no expected potential for significant impacts for any of these businesses meeting the definition of a small business.