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Socioeconomic Impact Analysis of Draft Rule 12-16 Regulation 12, Miscellaneous Standards of Performance; Rule 16, Petroleum Refining Greenhouse Gas Emissions Limits

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1. INTRODUCTION

In response to concerns of harmful pollutants emanating from petroleum refineries operating in the nine-county San Francisco Bay Area region, particularly with respect to greenhouse gases and toxic air contaminants and criteria pollutants, the Board of Directors of the Bay Area Air Quality Management District (District) directed staff to bring forward two draft rules for their consideration. At the request of the board, District staff has prepared one draft rule that reflect policies recommended by environmental advocacy organizations, and a second that follows an approach recommended by District staff. Air District staff has developed draft "Regulation 12, Miscellaneous Standards of Performance; Rule 16, Petroleum Refining Greenhouse Gas Emissions Limits (Rule 12-16)" based on input by a consortium of environmental groups in the region (CBE). A key provision sought by CBE is a cap on refinery combustion emissions at levels consistent with refineries' recent operations. In addition, draft Rule 12-16 establishes emissions limits for greenhouse gases (GHG's), nitrogen oxides (NOx), sulfur dioxide (SO₂), and particulate matter 10 microns and smaller (PM₁₀) and particulate matter 2.5 microns and smaller (PM_{2.5}). After reviewing and responding to comments on draft Rule 12-16, Air District staff recommended revising the rule to focus on GHG emissions.

After this introduction, this report discusses in greater detail proposed draft Rule 12-16 (Section Two). After that discussion, the report describes the socioeconomic impact analysis methodology and data sources (Section Three). The report describes population and economic trends in the nine-county San Francisco Bay Area (Section Four), which serves as a backdrop against which the Air District is contemplating the rule. Finally, the socioeconomic impacts stemming from the proposed rule changes are discussed in Section Five. The report is prepared pursuant to Section 40728.5 of the California Health and Safety Code, which requires an assessment of socioeconomic impacts of proposed air quality rules. The findings in this report can assist Air District staff in understanding the socioeconomic impacts of the proposed requirements, and can assist staff in preparing a refined version of the rule. Figure 1 is a map of the nine-county region that comprises the San Francisco Bay Area Air Basin.

Figure 1 – Map of San Francisco Bay Area Region



2. BACKGROUND AND OVERVIEW OF DRAFT RULE 12-16

Draft Rule 12-16 applies to the five large refineries operating in the Bay Area. These are Chevron Products Company (BAAQMD Plant #10 in Richmond), Phillips 66 Company Refinery (BAAQMD Plant #21359 I Rodeo), Shell Martinez Refinery (BAAQMD Plant #11 in Martinez), Tesoro Refining and Marketing Company (BAAQMD Plant #14628 in Martinez), and Valero Refining Company (BAAQMD Plant #12626 in Benicia). Three facilities that support a number of these facilities might be affected. These are Air Products and Chemicals hydrogen plant (BAAQMD Plant #10295), Air Liquide hydrogen plant (BAAQMD Plant #17419), and Martinez Cogen, L.P. (BAAQMD Plant #1820). Draft Rule 12-16 sets the emission limits for each affected facility. The emissions limits in the revised rule cover greenhouse gases (GHG).

Each refinery and support facility will report emissions based on the requirements in Rule 12-15, Section 401. The APCO will review and approve the annual emissions inventory per Rule 12-15, Section 402. Determination of compliance is described in the staff report prepared for Rule 12-16.

Particular types of emissions covered by the initially proposed cap included greenhouse gases (GHG), nitrogen oxides (NO_x), sulfur dioxide (SO₂), and particulate matter 10 microns and smaller (PM₁₀) and particulate matter 2.5 microns and smaller (PM_{2.5}). Initially, the District contemplated including criteria pollutant requirements as part of Rule 12-16 but subsequently decided to not do so at this time. Had criteria pollutant requirements been in place, affected sources may have elected to put in a wet scrubber to reduce PM and SO₂ emissions.

In the case of draft Rule 12-16, District staff report that there are two general scenarios to consider when evaluating the impact of fixed capping refining emissions. In one general scenario, the refineries decide to make physical improvements in order to reduce GHG emissions to allow for increases in refining capacity while staying below the cap. However, at this time, it is not clear what technologies affected sources would deploy to this end. In the other general scenario, refineries elect to limit production to a level consistent with the cap. The potential for any constraint on production due to the emissions limit is discussed in Section Five below, which follows a discussion on refinery trends in the San Francisco Bay Area.

3. METHODOLOGY

Applied Development Economics (ADE) began this analysis by preparing a statistical description of the industry groups of which the affected sources are a part, analyzing data on the number of establishments, jobs, and payroll. We also estimated sales generated by impacted industries, as well as net profits for each affected industry.

This report relies heavily on the most current data available from a variety of sources, particularly InfoUSA. In addition, this report relies on data from the US Census County Business Patterns, as well as from the US Internal Revenue Service. ADE also utilized employment data from the California Employment Development Department – Labor Market Information Division (EDD LMID).

With the above information, ADE was able to estimate net after tax profit ratios for sources affected by the proposed rule. ADE calculated ratios of profit per dollar of revenue for affected industries. The result of the socioeconomic analysis shows what proportion of profits the compliance costs represent. Based on assumed thresholds of significance, ADE discusses in the report whether the affected sources are likely to reduce jobs as a means of recouping the cost of rule compliance or as a result of reducing business operations. To the extent that such job losses appear likely, the indirect multiplier effects of the jobs losses are estimated using a regional IMPLAN input-output model. In some instances, particularly where consumers are the ultimately end-users of goods and services provided by the affected sources, we also analyzed whether costs could be passed to households in the region.

When analyzing the socioeconomic impacts of proposed new rules and amendments, ADE attempts to work closely within the parameters of accepted methodologies discussed in a 1995 California Air Resources Board (ARB) report called “Development of a Methodology to Assess the Economic Impact Required by SB513/AB969” (by Peter Berck, PhD, UC Berkeley Department of Agricultural and Resources Economics, Contract No. 93-314, August, 1995). The author of this report reviewed a methodology to assess the impact that California Environmental Protection Agency proposed regulations would have on the ability of California businesses to compete. The ARB has incorporated the methodologies described in this report in its own assessment of socioeconomic impacts of rules generated by the ARB. One methodology relates to determining a level above or below which a rule and its associated costs is deemed to have significant impacts. When analyzing the degree to which its rules are significant or insignificant, the ARB employs a threshold of significance that ADE follows. Berck reviewed the threshold in his analysis and wrote, “The Air Resources Board’s (ARB) use of a 10 percent change in [Return on Equity] ROE (i.e. a change in ROE from 10 percent to a ROE of 9 percent) as a threshold for a finding of no significant, adverse impact on either competitiveness or jobs seems reasonable or even conservative.”

4. ECONOMIC AND DEMOGRAPHIC TRENDS

This section of the report discusses the larger context within which the Air District is contemplating the draft Rule 12-16. This section begins with a broad overview of demographic and economic trends, with discussion then narrowing to industries and sources affected by the proposed rule changes.

REGIONAL POPULATION TRENDS

Table 1 tracks population growth in the nine-county San Francisco Bay Area between 2006 and 2016, including data for the year 2011. Between 2006 and 2017, the region grew by approximately 1.0 percent a year. Between 2011 and 2016, the region grew annually at a somewhat faster rate of 1.2 percent per year. Overall, there are 7,649,565 people in the region. At 1,927,888 Santa Clara County has the most people, while Napa has the least, at 142,028. Santa Clara grew the fastest between 2011 and 2016, at 1.3 percent a year, while Marin grew by the slowest rate (0.6 percent a year) over the same period.

Table 1: Population Trends: Bay Area Counties, Region, and California

JURISDICTION	2006	2011	2016	06-11 CAGR	11-16 CAGR	06-16 CAGR
California	36,116,202	37,536,835	39,255,883	0.8%	0.9%	0.8%
SF Bay Area	6,915,872	7,220,443	7,649,565	0.9%	1.2%	1.0%
Alameda	1,462,371	1,525,695	1,627,865	0.9%	1.3%	1.1%
Contra Costa	1,007,169	1,059,495	1,123,429	1.0%	1.2%	1.1%
Marin	246,969	253,964	262,274	0.6%	0.6%	0.6%
Napa	131,330	136,913	142,028	0.8%	0.7%	0.8%
San Francisco	781,295	815,854	866,583	0.9%	1.2%	1.0%
San Mateo	699,347	726,305	766,041	0.8%	1.1%	0.9%
Santa Clara	1,706,676	1,803,362	1,927,888	1.1%	1.3%	1.2%
Solano	410,964	413,438	431,498	0.1%	0.9%	0.5%
Sonoma	469,751	485,417	501,959	0.7%	0.7%	0.7%

Source: ADE, Inc., based on California Dept. of Finance E-5 Reports (note: CAGR = compound annual growth rate)

REGIONAL ECONOMIC TRENDS

Data in Table 2 describe the larger economic context within which officials are contemplating the draft Rule 12-16. Businesses in the region employ almost three and a half million workers, or 3,431,643. The number of private and public sector jobs in the region grew annually by 3.0 percent between 2010 and 2015, after having declined slightly between 2005 and 2010 by 0.6 percent a year. Of the 3,431,643 workers, 168,837, or 4.9 percent, are civil servants in the public sector. This figure does not include public sector education, which was combined with private sector education and placed in the private sector portion of the table, in an effort to present a picture as to the total number of

persons in the education profession in the Bay Area. The most current annual employment data is for the year 2015 as California EDD has not yet posted detailed all-year 2016 employment data.

Table 2 — San Francisco Bay Area Employment Trends By Sector: 2005 - 2015

INDUSTRY SECTOR		2005	2010	2015	2015	2015 CA	SFBA CAGR* 05-10	SFBA CAGR 10-15	CA CAGR 05-10	CA CAGR 10-15
Total		3,049,802	2,963,021	3,431,643	100.0%	100.0%	-0.6%	3.0%	-1.1%	2.3%
Private Sector		2,869,200	2,774,555	3,262,806			-0.7%	-0.7%	3.3%	2.6%
62	Health	300,775	340,492	453,880	13.2%	13.9%	2.5%	5.9%	2.5%	6.5%
54	Prof., Scientific	293,262	322,617	417,902	12.2%	7.4%	1.9%	5.3%	1.2%	3.2%
44-45	Retail	335,744	306,798	340,197	9.9%	10.2%	-1.8%	2.1%	-1.8%	1.8%
31-33	Manufacturing	350,962	305,378	326,362	9.5%	7.9%	-2.7%	1.3%	-3.8%	0.7%
722	Food Srv, Drnkng	214,142	227,750	288,896	8.4%	8.0%	1.2%	4.9%	0.6%	4.2%
561	Admin. Support	170,727	157,319	192,097	5.6%	6.2%	-1.6%	4.1%	-2.4%	4.2%
61	Education	185,310	192,195	180,382	5.3%	8.5%	0.7%	-1.3%	0.1%	0.8%
23	Construction	188,473	129,820	171,403	5.0%	4.4%	-7.2%	5.7%	-9.2%	4.9%
51	Information	112,690	110,725	158,943	4.6%	2.9%	-0.4%	7.5%	-2.1%	2.2%
42	Wholesale	124,390	113,072	125,215	3.6%	4.4%	-1.9%	2.1%	-0.9%	2.1%
81	Other Services	140,159	155,133	121,676	3.5%	3.2%	2.1%	-4.7%	0.9%	-6.6%
52	Finance, Insrnce	151,375	118,163	120,272	3.5%	3.2%	-4.8%	0.4%	-4.4%	0.4%
55	Mgt. of Comp.	54,856	55,605	75,726	2.2%	1.4%	0.3%	6.4%	-2.9%	3.6%
48-49	Trnsprt-Warehsng	51,880	46,721	72,947	2.1%	2.9%	-2.1%	9.3%	-1.0%	3.6%
71	Culture	49,572	52,315	58,669	1.7%	1.8%	1.1%	2.3%	0.6%	3.0%
53	Real Estate	61,402	52,676	57,463	1.7%	1.7%	-3.0%	1.8%	-2.7%	1.6%
721	Accommodation	46,156	44,734	49,490	1.4%	1.3%	-0.6%	2.0%	-0.5%	1.9%
99	Unclassified	338	6,846	18,517	0.5%	0.6%	82.5%	22.0%	-5.5%	12.2%
11	Agriculture	20,082	18,009	14,069	0.4%	2.6%	-2.2%	-4.8%	0.1%	1.9%
562	Waste Mgt.	10,333	11,018	11,866	0.3%	0.3%	1.3%	1.5%	0.7%	3.1%
22	Utilities	4,603	6,367	5,254	0.2%	0.4%	6.7%	-3.8%	0.4%	0.1%
21	Mining	1,969	802	1,584	0.0%	0.2%	-16.4%	14.6%	2.1%	2.1%
Public Sector**		180,602	188,466	168,837	5.0%	6.8%	0.9%	-2.2%	0.4%	-0.8%

Source: Applied Development Economics, based on State of California, Employment Development Department Labor Market Information Division, "Quarterly Census of Employment and Wages" (*Note: CAGR = compound annual growth rate \ **Note: Public sector education placed in Private Sector NAICS 61 -- similarly Public sector health placed into NAICS 62).

Economic sectors in the table above are sorted by the share of total employment. The top-five sectors in the Bay Area in terms of total number of workers are Health and Social Assistance (NAICS 62) (453,880 workers), Professional/Technical Services (NAICS 54) (417,902 workers), Retail (NAICS 44-45) (340,197), Manufacturing (NAICS 31-33) (326,362) and Food Services (288,896). Of the top-ten leading sectors in terms of employment, six exhibited high rates of annual growth from 2010 to 2015, growing annually by more than four percent. These sectors are Health and Social Assistance (5.9 percent per year), Professional/Technical Services (5.3 percent), Food Services (4.9 percent), Administrative Support (NAICS 561) (4.1 percent), Construction (NAICS 23) (5.7 percent per year) and Information (NAICS 51), which grew at a phenomenal annual rate of 7.5 percent. Combined, these five sectors employ 49 percent of total employment, or 1,683,121 out of 3,374,902. Moreover,

of the top-ten leading sectors in the Bay Area, only one (Public Sector) had less workers in 2015 than in 2010, underscoring the resilience of the regional economy in the aftermath of the Great Recession. The table also demonstrates the advanced nature of the regional economy, as 12.2 percent of all workers are in the Professional, Scientific and Technical (NAICS 54), whereas in the state as a whole, 7.4 percent of all workers are in this sector. Interestingly, at 1.3 percent per year, manufacturing employment growth in the Bay Area almost doubled statewide manufacturing growth rates (0.7 percent), underscoring the diversity of the regional economy.

TRENDS FOR INDUSTRIES SUBJECT TO PROPOSED DRAFT RULE 12-16

Proposed draft Rule 12-16 primarily affects refineries (NAICS 324110). However, two support industries (containing three non-refinery firms) will be affected as well. Two of the three non-refineries (Air Liquide and Air Products and Chemicals) operate hydrogen plants, and these are within the industry known as industrial gas manufacturing (NAICS 325120). A third firm is a co-generation plant (Martinez Cogen, L.P), which is classified as "other electric power" (NAICS 221118). The economic data in the table below comes from the US Census County Business Patterns.¹ As indicated in the table below, all industries subject to the draft rule have yet to recover the Great Recession, the lowest national point of which occurred in the years 2009 and 2010. In 2009, large refineries employed an estimated 3,976 workers in the Bay Area, which is almost 700 more workers than today, or 3,269. Similarly, industrial gas manufacturing (NAICS 325120) has yet to recover from the Great Recession, at 252 workers today versus 413 in 2009.

Table 3: Trends for Industries Subject to Draft rule 12-16: SF Bay Area: 2009-2014

ESTABLISHMENTS	NAICS	2009	2010	2011	2012	2013	2014	09-14 CHG	09-14 CAGR**
Refineries*	324110	7	8	7	5	17	12	5	11.4%
Large refineries		5	5	5	5	5	5	0	0.0%
Industrial Gas Manuf.	325120	16	14	14	15	13	12	-4	-5.6%
Other Electric Power	221118	18	23	29	11	7	8	-10	-15.0%
EMPLOYMENT									
Refineries	324110	4,051	3,706	3,704	3,622	3,726	3,574	-477	-2.5%
Large refineries		3,976	3,622	3,622	3,622	3,622	3,269	-708	-3.8%
Industrial Gas Manuf.	325120	413	295	396	397	210	252	-161	-9.4%
Other Electric Power	221118	146	218	358	139	104	130	-17	-2.4%

Source: Applied Development Economics, based on US Census County Business Patterns 2009-2014. *Note: The proposed rule changes affect five refineries. Both County Business Patterns and the EDD LMID report more than five refineries in the nine-county region, which is because both apply a broader definition for refinery operations. **CAGR= compound annual growth rate.

¹When analyzing industry employment trends, we typically use California EDD LMID data. However, while the EDD LMID indicate the presence of a number of establishments in any of the three industries above in Bay Area counties, for a number of Bay Area counties, the EDD LMID data set did not precisely identify the number of establishments or number of workers, replacing numbers with an asterisk mark, thus making difficult any analysis of EDD LMID data. As a result, we used US Census County Business Patterns, which provides enough county-level data to allow us to track trends. However, the most current County Business Pattern data is for the year 2014.

Table 4 below identifies the businesses in the Bay Area that are full-scale refineries. The list comes from the CEC, which also included each refinery's throughput capacity. Of the five operating refineries in the region, Chevron is the largest, with the capacity to refine 245,271 42-gallon barrels of crude oil per day. At 78,400, ConocoPhillips has the lowest throughput capacity. The five affected sources employ an estimated 3,269 workers, who make, on average, \$173,700.

Table 4 — Bay Area Refineries (California Energy Commission) and Crude Oil Capacity

Refinery	Barrels Per Day
Chevron U.S.A. Inc., Richmond Refinery	245,271
Tesoro Refining & Marketing Company, Golden Eagle (Avon/Rodeo) Refinery	166,000
Shell Oil Products US, Martinez Refinery	156,400
Valero Benicia Refinery	132,000
ConocoPhillips, Rodeo San Francisco Refinery	78,400

Source: Applied Development Economics, Inc., based on California Energy Commission

The five affected sources' combined throughput capacity is approximately 674,582 42-gallon barrels per day, which takes into consideration periods when refineries may be off-line. While the affected sources refine 674,582 barrels of crude oil per day, they generate an estimated 693,044 gallons of refined products a day. Assuming a 87 percent utilization rate, and further estimating the price of refined product at \$104 per barrel, we estimate the affected refineries in total generate \$26.3 billion in revenues a year, from which is generated \$1.1 billion in after-tax net profits (Table 5).

Table 5 — Estimated Revenues and Net Profits Generated By San Francisco Bay Area Refineries

	ALL SOURCES	CHEVRON	TESORO	SHELL	VALERO	CONOCO PHILLIPS
Effective Barrels Per Day	674,582	212,648	143,921	135,598	114,443	67,972
Est. Revenues	\$26.3 billion	\$8.3 billion	\$5.6 billion	\$5.3 billion	\$4.7 billion	\$2.6 billion
Est. Net Profits	\$1.1 billion	\$332.6 million	\$225.1 million	\$212.1 million	\$178.9 million	\$106.3 million

Source: Applied Development Economics, based on California Energy Commission (2015-2017), EIA, and US IRS SOI

5. SOCIOECONOMIC IMPACT ANALYSIS OF DRAFT RULE 12-16

This section of the report analyzes socioeconomic impacts stemming from proposed Draft Rule 12-16. Below we present our determination of possible impacts resulting from a production limit.

LIMITING REFINERY PRODUCTION

In this part of the socioeconomic analysis, we present our determination of possible impacts resulting from a limit on production at refineries. In its staff report for the draft measure, District staff analyzed a variety of data sources on refinery capacity and utilization, and observed that emissions limits contemplated in Draft Rule 12-16 do not appear to inhibit refining capacity, as the caps in the draft rule appear to be consistent with the current maximum production capability of area refineries.

Based on an analysis of US Energy Information Administration's (EIA) and the California Air Resources Board's year 2050 projections of demand in California for a variety of types of delivered energy (i.e. motor gasoline, jet fuel, liquid petroleum gases, kerosene, distillate fuel oils, etc), BAAQMD projected the amount of fuel that the five Bay Area refineries would need to generate each year beyond 2015, to fulfill either EIA's or CARB's demand projections. BAAQMD then determined that GHG emissions generated by refineries' activity associated with either EIA's or CARB's projections would not exceed the proposed annual limit of 19 million metric tons contemplated in Rule 12-16. Thus, the proposed GHG limits should not inhibit the refining system as a whole in meeting future transportation fuel demand.

BAAQMD staff also reviewed whether the imposition of a GHG emissions limit would render the region at greater risk to supply disruptions that could result upward spikes in the price of fuel in the short-term or long-terms. In other words, staff sought to determine whether there is enough slack in the refining system to be able to weather an unplanned outage of a limited duration. BAAQMD determined that any lack of supply due to an unplanned outage of no more than two weeks at one refinery for could be made up from other refineries in PADD 5, as well as the four remaining refineries operating in the Bay Area.² One caveat BAAQMD staff noted was that incidents on the order of the Chevron fire of 2012 or the Exxon-Mobil FCC explosion in Southern California in 2015 could result in significant disruptions to supply.

Another caveat expressed by District staff is that they do not expect the cap in Rule 12-16 to have significant impacts on the market for refined fuels so long as fuel consumption does not significantly increase above level projected by either EIA and CARB. Consumption for fuel can increase in absolute and relative terms for a variety of reasons, with a corresponding increase in price of fuel at the retail level. For example, population growth and an increase in the number of persons commuting into the

² PADD5 = "PADD 5" refers to a US EIA acronym for "Petroleum Administration for Defense Districts 5", which consists of the states of Alaska, Washington, Oregon, California, Nevada, and Arizona.

area would result in greater demand for fuel whose supply could be limited by Draft Rule 12-16, resulting in a bidding-up of the price of fuel.

While the impact of a limited supply of refined product relative to demand on the retail price of fuel is observable in that prices tend to go up, how much prices increase can vary widely. Price spikes tend to be an inherent, if latent, feature of the oil refining-gasoline consuming activity, due to the combined facts that people tend to keep buying gas to drive their cars to work and other places even as the price of gas rises, and that California refineries tend to operate very close to capacity, meaning that refineries are unable to boost supply significantly when they need to. As Mr. Severin Borenstein notes, "The market can easily become out of balance if there is an unexpected jump in demand, or more commonly, if a refinery experiences a supply disruption or outage and output is reduced."³ Thus, in the case of the temporary shut-down of the southern Californian refinery in Torrance in 2015, BAAQMD staff quoted a California Energy Commission report that found that the 10 percent reduction in supply led to 27.6 cents increase in the cost of gasoline.⁴ ADE estimates that between February 12, 2015 and March 13, 2015 the average price of gasoline in the City of Los Angeles increased by 32 percent as a result of the Torrance shutdown, which occurred on February 18, going from \$2.65 a gallon to \$3.51 a gallon.⁵ The peculiarities of the California market also explain the magnitude of price increases in California when supply shocks occur. By way of example, Phoenix, Arizona in 2003 experienced a 30 percent drop in volume resulting from a pipeline failure, which then led to a 37 percent increase in price of gas in Phoenix.⁶ The FTC observed that prices in Phoenix in 2003 did not rise even faster largely because West Coast refineries were able to ship more gasoline into Arizona to hold down prices. The unique blend required in California makes it difficult (but not impossible) to ameliorate the effects of supply shocks along the lines of Phoenix in 2003, which perhaps explains why in one instance a ten percent drop in supply in southern California leads to almost 32 percent increase in price while a steeper 30 percent supply drop in Phoenix at another instance led to 37 percent price increase there.⁷

While the Torrance and the Phoenix examples demonstrate prices could rise by 32 to 37 percent in a short-time due to supply cuts, projecting changes to price following supply shocks is still not an exact science. One could apply the Torrance and Phoenix examples to roughly estimate price impacts. Thus, if production at refineries is capped per the limits contemplated in draft Rule 12-16, then a percentage increase in population over some time period would be equivalent to a reduction in supply of gasoline

³ Borenstein, Bushnell, and Lewis, "Market Power in California's Gasoline Market" (May 2004), page 8

⁴ Bay Area Air Quality Management District, Draft 12-16 and Draft 11-18 (Draft Staff Report: October 2016) page 23 (citing California Energy Commission)

⁵ GasBuddy California <http://archive.is/tIKBy>

⁶ Federal Trade Commission, Gasoline Price Changes: The Dynamic of Supply, Demand, and Competition (2005), page 29

⁷ While it is true that California's market for refined product is almost a closed market due to the special blends generated only for Californians, there are some refiners outside of California who produce to California's standard, although delivery of their products takes 2 to 5 weeks and entails prohibitive transport costs. See Borenstein, Bushnell, and Lewis, "Market Power in California's Gasoline Market" (May 2004), page 20 ; see also US EIA, "California's gasoline imports increase 10-fold after major refinery outage" (October 2015) <http://archive.is/oRGoi>

by a similar percentage over the same period. Since ABAG projects the nine-county San Francisco Bay Area region to grow by 9.2 percent over the ten-year 2015-2025 period, when we apply the Torrance example, we arrive at an estimated 29.4 percent increase in price over the same ten-year period.⁸ This price increase would average less than three percent a year, which would have a cumulative effect but would be much less than a short-term price shock such as occurred in the Torrance incident, or other price fluctuations that occur due to market conditions. For example, in January 2015, regular gasoline in California cost \$2.68 per gallon, of which \$1.29 was attributable to the price of crude oil purchased by the refinery. Six months later, a gallon of regular gas was \$3.45, of which \$1.45 was attributable to crude oil, for a 12 percent increase over a six-month period in the cost of a gallon of gas attributable to crude oil.⁹ The overall price of gas in this six month-period increased by 29 percent, from \$2.68 to \$3.45 a gallon. In short, draft Rule 12-16 would introduce a regime to limit the production of refined petroleum products, but for various reasons, the price of these refined products can go up and down, consequently lessening the effect in modelling the socioeconomic impacts of a limit on the production of refined petroleum products supply on the wider economy.

Small Business Disproportionate Impacts

According to the State of California, among other things, small businesses generate annual sales of less than \$10 million.¹⁰ Of the eight sources affected by the proposed draft rule, none are small businesses. As a result, small businesses are not disproportionately impacted by proposed Draft Rule 12-16.

⁸ See <http://archive.is/qGomH>: The nine-county San Francisco Bay Area region is projected to grow over the ten-year 2015-2025 period by 672,600 persons, from 7,461,400 to 8,134,000. Including estimated number of non-residents commuting daily into the Bay Area for jobs, the total number of persons in the Bay Area will go from 7,938,800 in 2015 to 8,668,700 in 2025, for a 9.2 percent increase over the ten-year 2015-2025 period.

⁹ See <http://bit.ly/2mkDgLW>

¹⁰ <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=gov&group=14001-15000&file=14835-14843>