

EXECUTIVE SUMMARY
for
USE OF FUEL OILS BY STATIONARY SOURCES

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EXECUTIVE SUMMARY

Notwithstanding mobile source fuels, the primary emphasis of energy consumption research in the State of California has historically focused on electricity and natural gas usage. Consequently, there is a wide spectrum of detailed information available (i.e., end user, temporal, and so forth) at all geographical levels for these two energy sources. This is due, in part, to the fact that these are California's two primary sources of energy. Conversely, end user specific information on non-power plant consumption of fuel oils is relatively unavailable at all levels. Most of the work effort in compiling data on fuel oils has been predicated on the Department of Energy's (DOE) annual statewide estimates. The accuracy of these data are suspect due to the rough mass balance techniques used in developing the totals nationwide.

Thus, the ARB sponsored this study for the primary purpose of closing these data gaps by compiling a comprehensive stationary combustion source fuel oils inventory for the year calendar 1977. Utility power plants were the only end user excluded since the ARB tracks these sources through other reporting mechanisms. In summary, the three main objectives of this study were to:

- Compile an accurate annual fuel oils combustion inventory for non-power plant stationary sources in each county of the state.
- Develop monthly consumption profiles by county, by fuel oil type, and by end user.
- Resolve the inventories for the counties in the state's three major metropolitan air basins [i.e., San Diego, Los Angeles (South Coast), and San Francisco (Bay Area)], on grid systems of 10 km by 10 km grid cells.

The approach taken to achieve the above objectives involved (1) a qualitative review of the subject area, (2) the distilling of the acquired knowledge to plausible methodologies, and (3) the execution of those methodologies.

Accordingly, the technical approach focused on inventory techniques that allow for the most direct approach possible within project constraints. To this end, for instance, all potential fuel oil users identified in the industrial, commercial, and institutional sectors were queried via a mailout questionnaire survey. Development of a mailing list for these sources centered around information contained in air pollution control agency files augmented with information collected from many state and local governments and trade associations.

For the residential and agricultural sectors, where a survey of end users is neither prudent nor economically beneficial because of their inaccessibility and vast number, a less direct approach was required. All county air pollution control districts (APCD) with the exception of two (Santa Barbara and Yolo-Solano APCDs declined to participate in this study) were questioned with regard to these sectors. Also, numerous state and local governments and end user associations were contacted for local/county specific data. From these discussions and subsequent data collected, specific algorithms were developed and executed for these sectors.

Lastly, local planning organizations were contacted to acquire necessary land use data for the three gridded air basins. Industrial, commercial and institutional establishments were gridded based on the spatial information provided on questionnaires while the land use maps were used to grid residential and agricultural data.

Table 1 summarizes the county consumption estimates of total fuel oil that were generated by end user sector during this study. It comes as no surprise that the industrial, commercial, and institutional sectors comprise the majority of the county totals. In fact, these sectors account for more than 88 percent of the non-power plant fuel oil consumed in the state. Moreover, the

Table 1. TOTAL FUEL OIL CONSUMPTION BY SECTOR BY COUNTY, 1977

COUNTY	AGRICULTURAL	RESIDENTIAL	INDUSTRIAL/ COMMERCIAL/ INSTITUTIONAL	COUNTY TOTALS
Alameda	40	0	8,090	8,130
Alpine	0	40	0	40
Amador	30	270	0	300
Butte	340	480	1,840	2,660
Calaveras	20	120	142	282
Colusa	220	60	0	280
Contra Costa	190	0	41,600	41,800
Del Norte	30	420	491	941
El Dorado	80	920	222	1,220
Fresno	6,640	1,090	11,500	19,230
Glenn	210	140	1,430	1,780
Humboldt	80	830	10,900	11,800
Imperial	190	0	22,800	23,000
Inyo	70	220	3,800	4,090
Kern	4,300	0	83,900	88,200
Kings	2,260	90	2,920	5,270
Lake	1,750	530	119	2,400
Lassen	70	1,200	1,710	2,990
Los Angeles	340	0	73,300	73,600
Madera	1,140	60	1,200	2,400
Marin	3	0	0	3
Mariposa	Neg.	170	0	170
Mendocino	940	1,610	9,340	11,900
Merced	1,540	220	1,920	3,680
Modoc	160	790	52	942
Mono	70	290	0	360
Monterey	480	0	15,900	16,400
Napa	780	0	57	837
Nevada	10	2,250	403	2,660
Orange	260	0	5,970	6,230
Placer	90	1,180	106	1,380
Plumas	30	1,010	923	1,960
Riverside	3,240	0	10,400	13,600
Sacramento	210	0	4,800	5,010
San Benito	80	0	233	313
San Bernardino	2,400	0	82,500	84,900
San Diego	790	0	7,130	7,920
San Francisco	0	0	203	203
San Joaquin	640	370	16,200	17,200
San Luis Obispo	310	0	1,260	1,570
San Mateo	10	0	355	365
Santa Barbara	210	0	5,330	5,540
Santa Clara	110	0	372	482
Santa Cruz	80	0	11,900	11,200
Shasta	50	900	1,200	1,340
Sierra	30	330	0	360
Siskiyou	610	2,110	599	3,320
Solano	220	0	2,200	2,240
Sonoma	140	0	1,100	1,240
Stanislaus	1,340	290	7,720	9,350
Sutter	250	0	89	339
Tehama	120	360	0	480
Trinity	2	160	14	174
Tulare	4,520	380	2,990	7,890
Tuolumne	10	120	2,150	2,280
Ventura	400	0	4,180	4,580
Yolo	100	0	1,680	1,780
Yuba	110	180	576	866
STATE TOTALS	38,300	19,200	466,000	524,000

^aExpressed in thousands of gallons.

largest end user category is the industrial sector which has a consumption rate of more than 75 percent of this study's totals. If power plant usage were included in these estimates, then the industrial sector's proportion would be more than 94 percent of the statewide consumption rate (based on DOE power plant figures for 1977).

In general, the county estimates shown in Table 1 are possibly on the lean side of the "actual" consumption values. This conclusion is based on two observations. First, the questionnaire survey of the sources identified in the industrial, commercial, and institutional sectors was somewhat less than 100 percent successful in terms of the response rate. Secondly, there is the distinct possibility that there are a relatively minor number of small fuel oil end users that were not identified for survey. To appreciate this latter remark, it should be noted that the survey mailing list was very carefully constructed from the best available information, and that the unidentified sources are believed to be isolated to the smaller consuming sectors (i.e., the commercial and institutional sectors).

Finally, the survey response rate (71 percent) should not be construed as being linearly related to the estimates. This is because a significant proportion of the work effort was aimed at acquiring information on the presumed large sources. For the most part, this effort was very successful.

In the case of the residential and agricultural sectors where secondary (nondirectly acquired) locale-specific data were incorporated into preconstructed fuel oil estimating algorithms, the estimates are considered to be of high quality in terms of the overall effort. Briefly, the estimates were generated by incorporating secondary data into area-specific algorithms.

Figure 1 illustrates the monthly temporal distribution of the total fuel oil consumed in each sector at the state level.

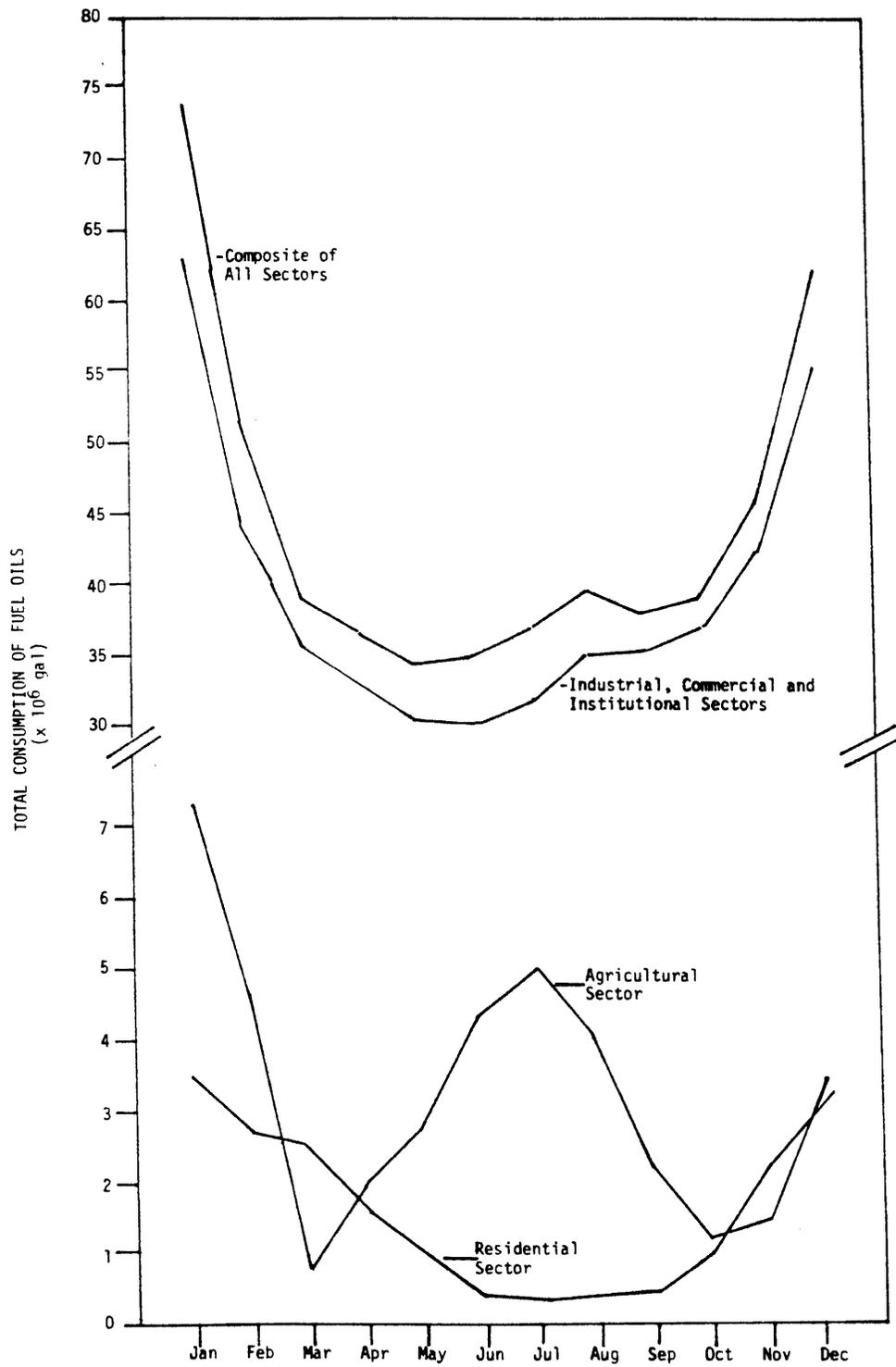


Figure 1. Monthly Consumption of Fuel Oils in California, Excluding Power Plants, 1977

Since the majority of the total fuel oil is accounted for by the industrial, commercial, and institutional sectors, the composite graph most closely represents these sectors.

Finally, Table 2 indicates the estimated distribution of the state's fuel oil total by type and by sector. The pattern for the industrial, commercial and institutional sectors is "hard" data in that it was determined through direct contact of end users. The two area source sectors, on the other hand, represent PES appraisal stemming from the knowledge gained during the course of this study. In reality, however, the fuel oil consumed in these two sectors may better be classified as simply middle distillates.

Table 2. TOTAL FUEL OIL CONSUMPTION^a
BY SECTOR, BY TYPE, 1977

SECTOR	FUEL OIL TYPE				
	No. 1	No. 2	No. 4	No. 5	No. 6
Industrial, Commercial and Institutional	2.41	105	6.8	42.7	309
Agricultural		38.0			
Residential		19.0			
TOTAL	2.41	162	6.8	42.7	309

^aExpressed in millions of gallons.

