

Results of Wood Burning Survey – Sacramento, San Joaquin, and San Francisco Areas, University of California Berkeley/California Air Resources Board – GIS Study

Introduction

To support the model development for the spatial allocation of residential wood combustion PM_{2.5} emissions by GIS technology, the University of California Berkeley conducted a residential wood combustion survey, using a questionnaire developed in consultation with OMNI Consulting Services, Inc. The California Air Resources Board funded the University of California Berkeley study and the University of California Berkeley prepared a final report dated May 23, 2002 for the California Air Resources Board. The report was entitled, “Model Development for Spatial Allocation of PM_{2.5} Emissions Including Residential Wood Combustion.” The Principal Investigators were John D. Radke and Peng Gong. Other University of California Berkeley team members were Lan Mu, Yong Tian, Jianchun Xu, and Demin Zhou. A copy of the tabulated survey results were obtained from the California Air Resources Board by OMNI Consulting Services, Inc. so that wood-burning practices could be evaluated. Approximately 680 responses in three areas (Sacramento Valley, San Joaquin Valley, and the San Francisco Bay Area) of northern California were obtained with the survey. The survey data are summarized here.

While the areas defined in the University of California Berkeley study do not coincide with air quality management district boundaries all but 21 responses of 268 of the San Francisco Bay Area responses were inside of BAAQMD jurisdiction. (Twenty-one were in Santa Cruz County.) In addition, all but 15 of the 127 responses in the San Joaquin area were within the SJVAPCD jurisdiction. (The 15 not in the SJVAPCD jurisdiction were in Calaveras, Tuolumne, and Mariposa counties.)

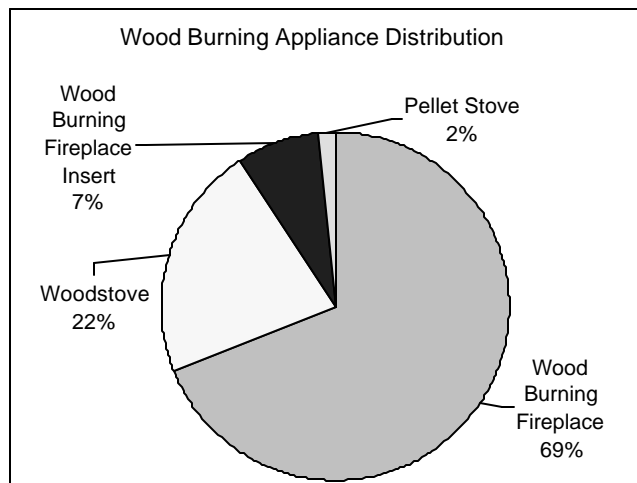
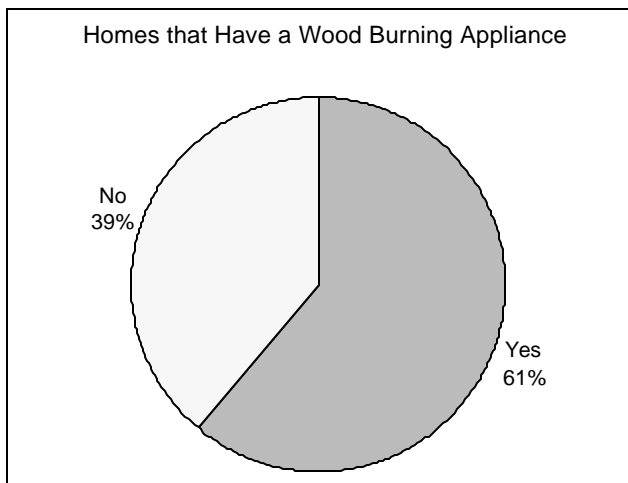
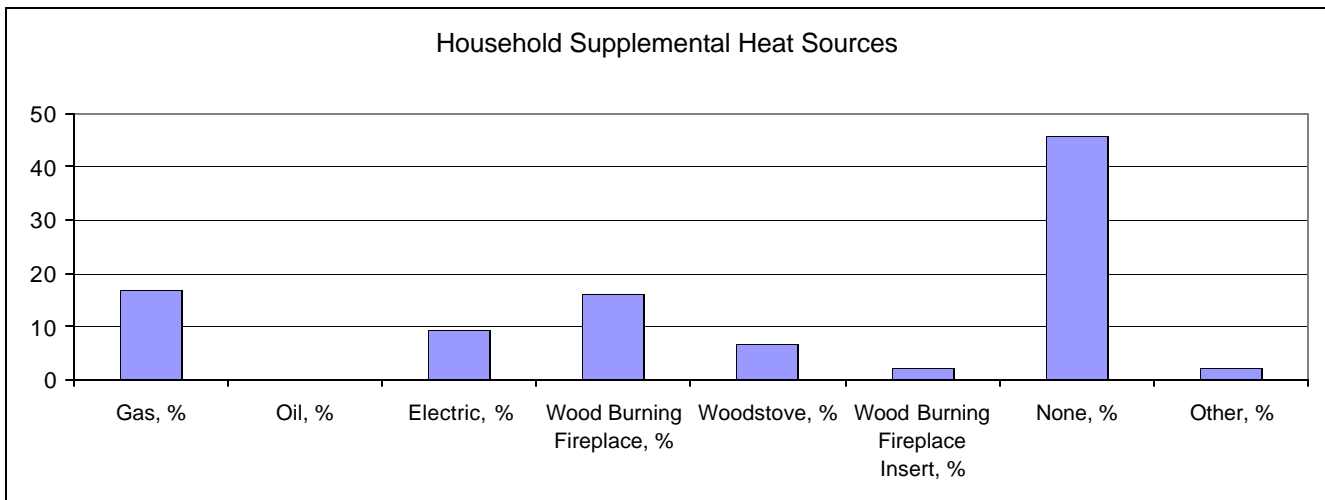
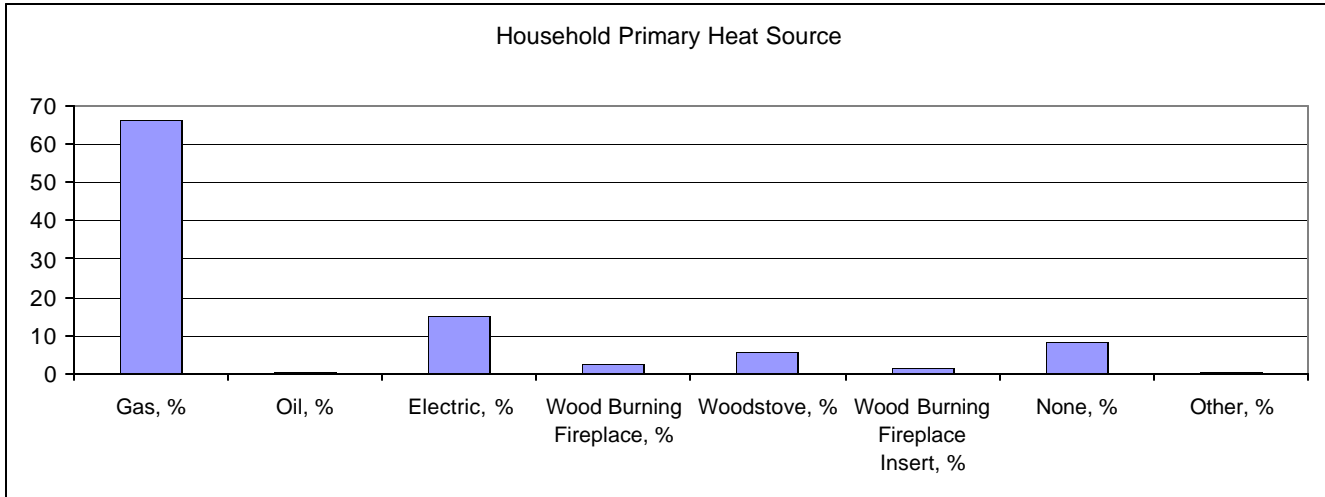
It should be noted that the term “wood burning fireplace” is used throughout this document to refer to fireplaces that burn both cordwood and/or wood/wax firelogs. It should also be noted that the number of respondents for the San Joaquin area is much less than for the other two areas. Since the Sacramento area and the San Joaquin area have similar climates and a similar socio-demographic character, it would be reasonable to combine the results from the two areas to form one California central valley area category.

The survey questionnaire is attached as an appendix.

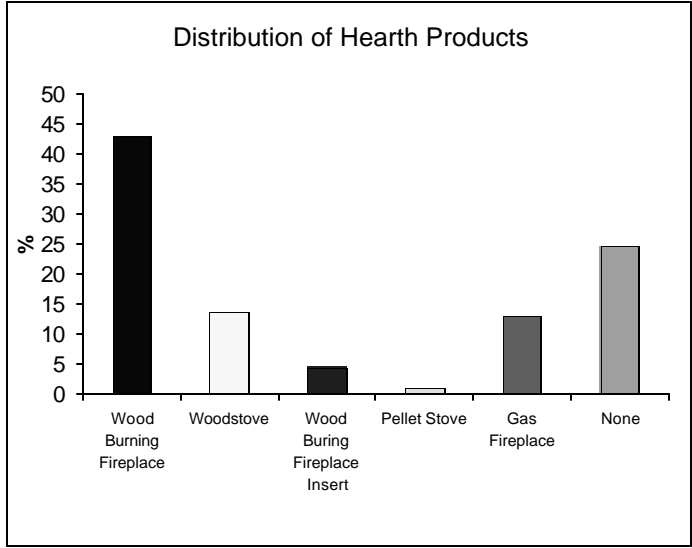
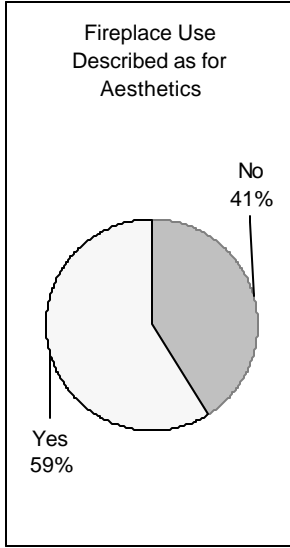
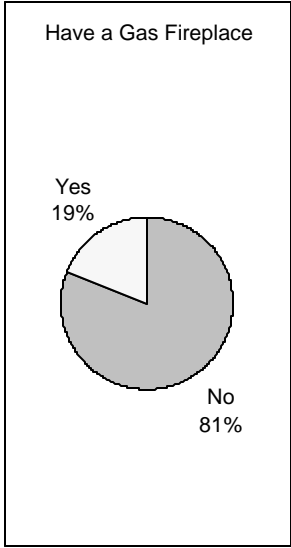
Survey Area Key

Area	Code	Responses	Counties
All Data	All	680	Alameda, Calaveras, Contra Costa, El Dorado, Lake, Madera, Marin, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tuolumne, Yolo, and Yuba
San Francisco Bay Area	SF	286	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma
San Joaquin Valley	SJ	127	Calaveras, Madera, Mariposa, Merced, San Joaquin, Stanislaus, and Tuolumne
Sacramento Valley	SAC	285	El Dorado, Lake, Nevada, Placer, Sacramento, Sutter, Yolo, and Yuba

Key Results – All Respondents

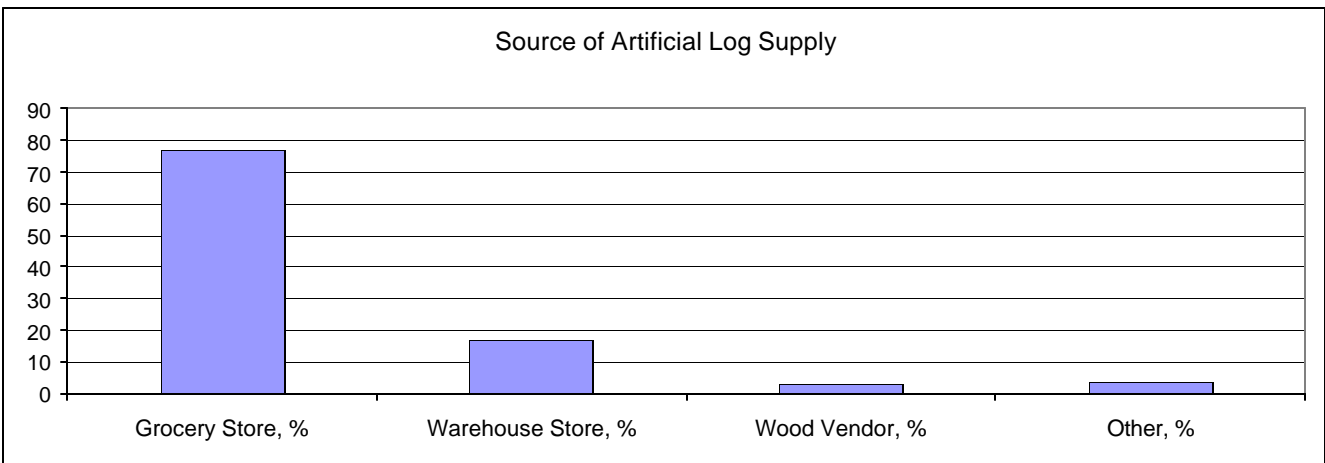
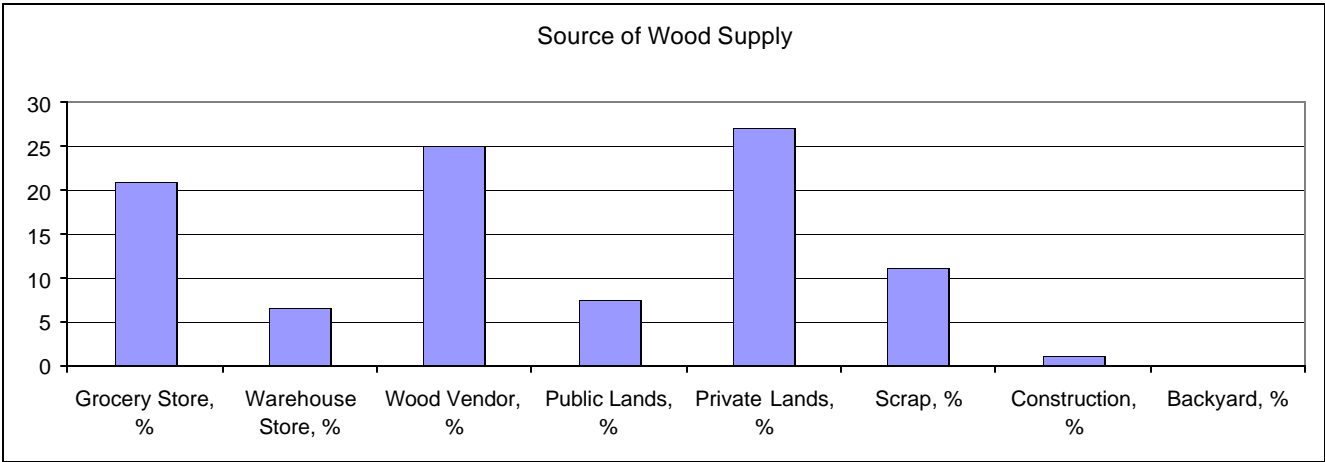


Note: Many homes have more than one wood burning appliance, this is a distribution of appliances not homes with appliances.

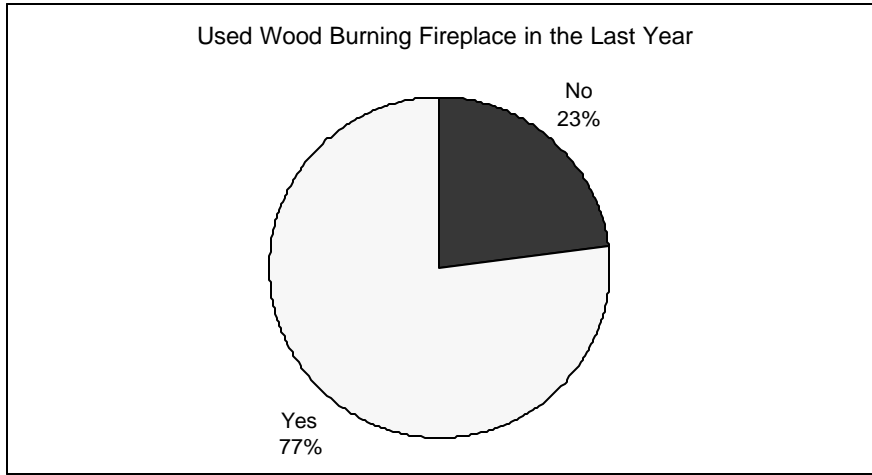


Note: This graph includes both wood burning and gas fireplaces.

Note: Percentages do not add up to 100% since some homes have more than one appliance type.



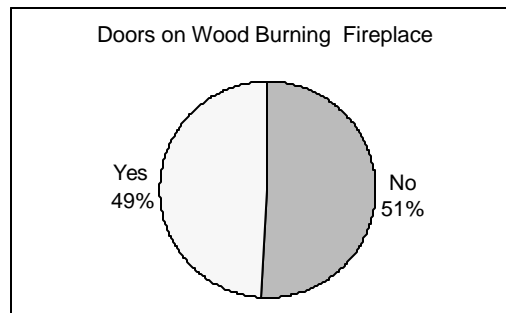
Key Results – Wood Burning Fireplace Usage



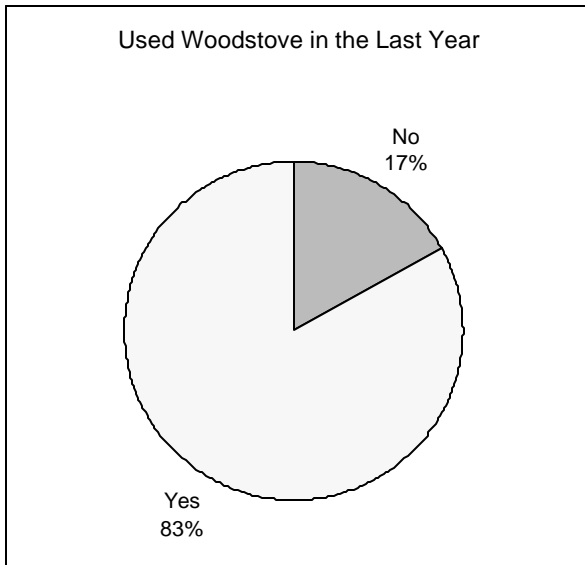
Average number of cords used per year in fireplace	0.83	cords
Percent of people who used their fireplace who bought bundled wood	21	%
Average number of bundles purchased by bundle users	4.1	bundles
Percent of people who used their fireplace who bought wood/wax firelogs	42	%
Average number of wood/wax firelogs purchased by wood/wax firelog users	16	firelogs

Fireplace Usage, Wood Fires		
Average number of fires in fireplace per year	32	fires
Average fire duration, weekdays	4.4	hours
Average fire duration, weekends	5.1	hours
Average number of pieces of wood, weekdays	6.2	pieces
Average number of pieces of wood, weekends	6.8	pieces

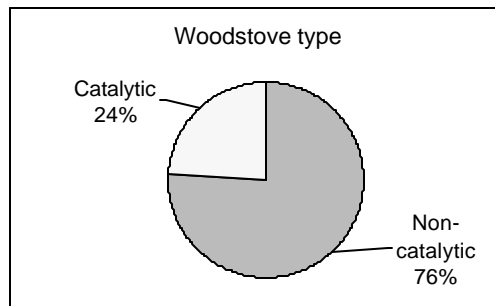
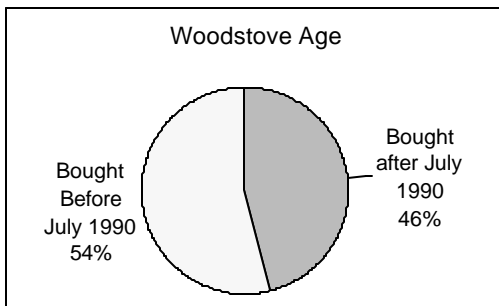
Fireplace Usage, Wood/Wax Firelog Fires		
Average number of fires in fireplace per year	14	fires
Average fire duration, weekdays	3.3	hours
Average fire duration, weekends	3.4	hours
Average number of wood/wax firelogs, weekdays	1.5	firelogs
Average number of wood/wax firelogs, weekends	1.8	firelogs



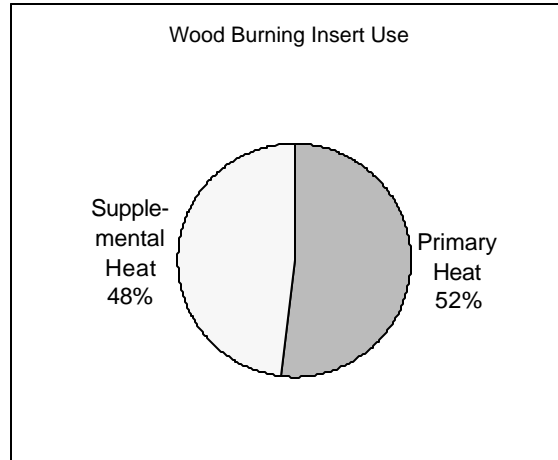
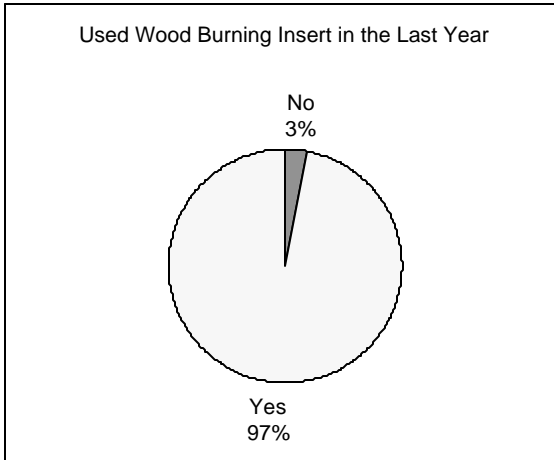
Key Results – Woodstove Usage



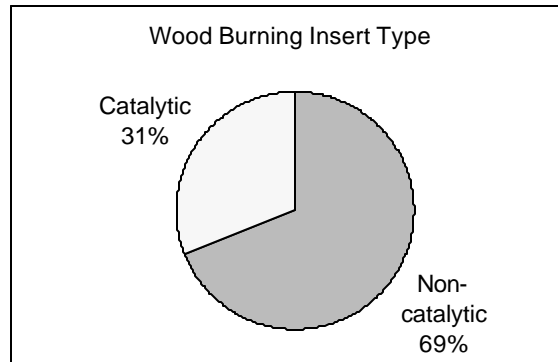
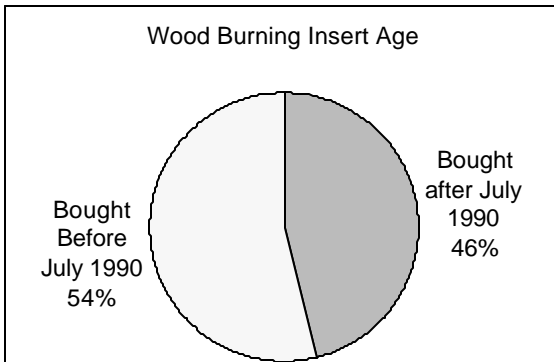
Average number of cords used per year in woodstove	1.5	cords
Percent of people who used their woodstove who bought bundled wood	0	%
Average number of bundles purchased by bundle users	--	bundles
Percent of people who used their woodstove who bought compressed wood logs	2.1	%
Average number of compressed wood logs purchased by compressed wood log users	--	logs
Woodstove Usage, Wood Fires		
Average number of fires in woodstove per year	100	fires
Average fire duration, weekdays	11	hours
Average fire duration, weekends	12	hours
Average number of pieces of wood, weekdays	7.0	pieces
Average number of pieces of wood, weekends	7.8	pieces
Woodstove Usage, Compressed Wood Log Fires		
Average number of fires in woodstove per year	52	fires
Average fire duration, weekdays	8.7	hours
Average fire duration, weekends	9.0	hours
Average number of compressed wood logs, weekdays	6.7	logs
Average number of compressed wood logs, weekends	6.7	logs



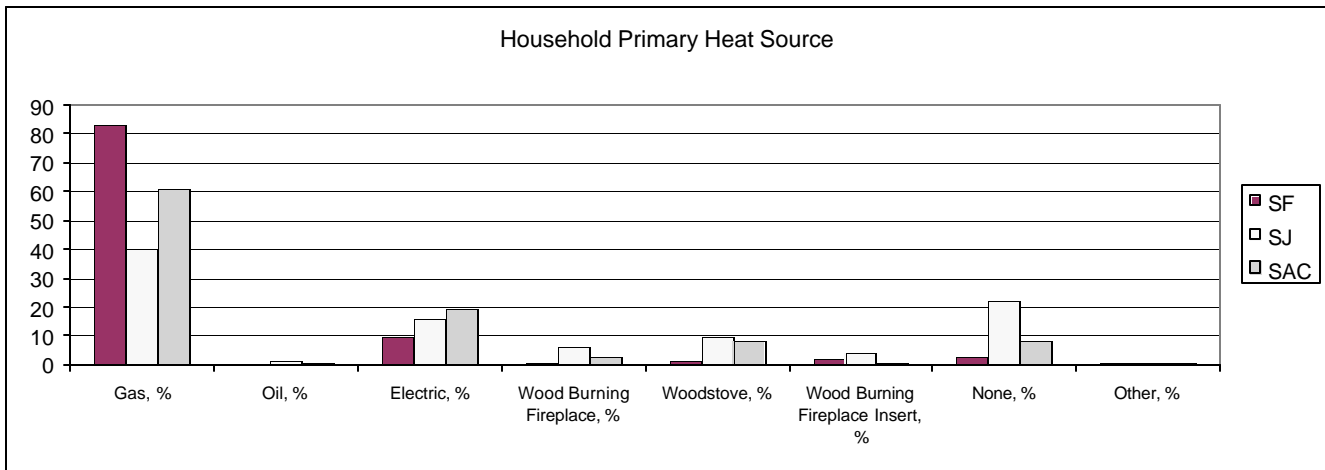
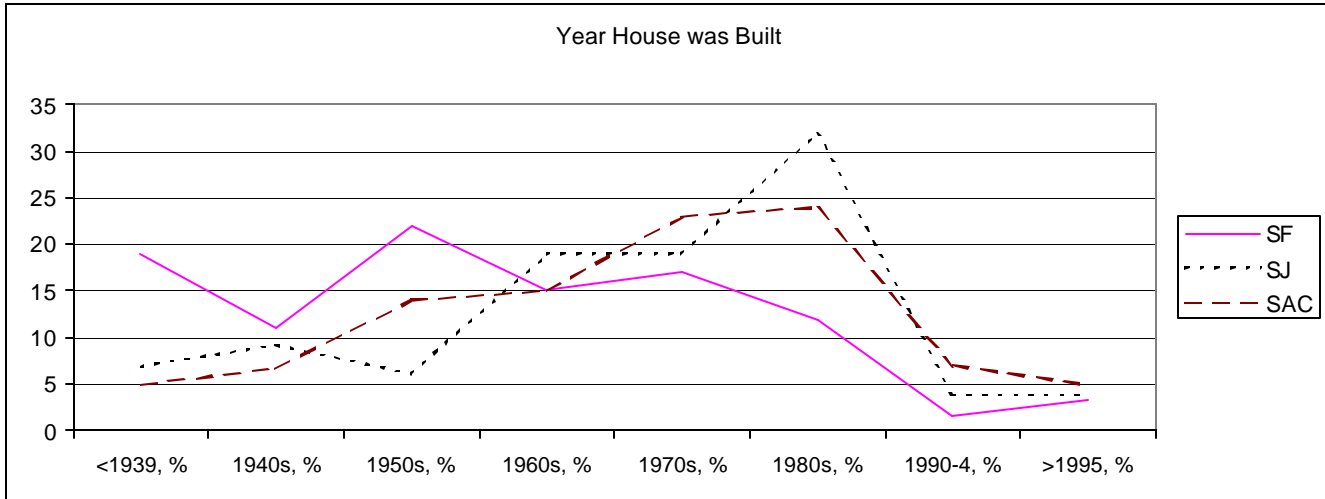
Key Results – Wood Burning Fireplace Insert Usage



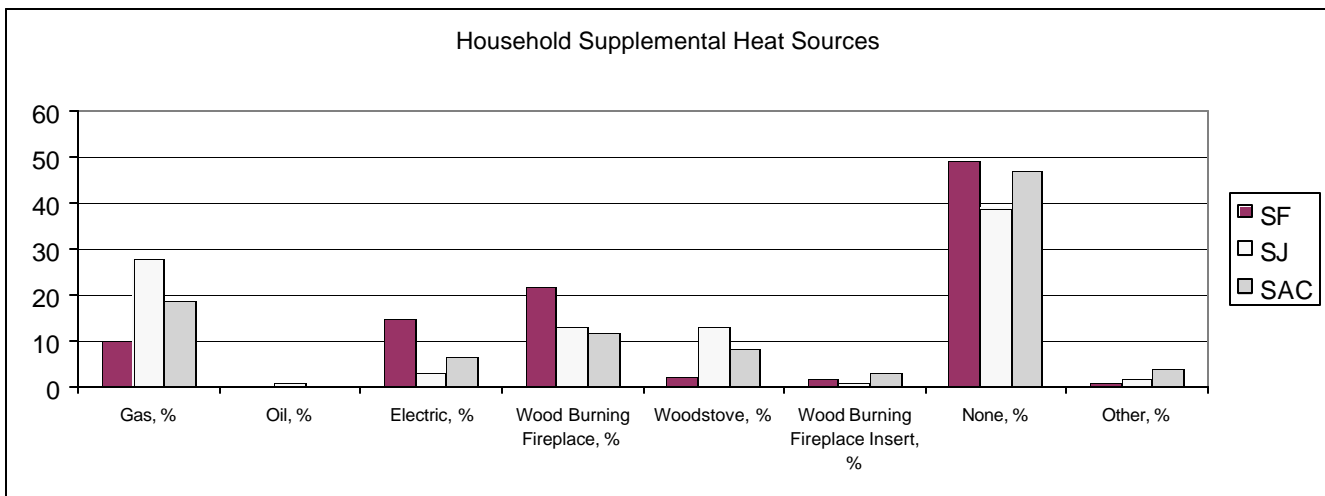
Average number of cords used per year in inserts	1.4	cords
Percent of people who used their fireplace insert who bought bundled wood	9.4	%
Average number of bundles purchased by bundle users	2.2	bundles
Percent of people who used their fireplace insert who bought compressed wood logs	3.1	%
Average number of compressed wood logs purchased by compressed wood log users	30	logs
Wood Burning Insert Usage, Wood Fires		
Average number of fires in insert per year	92	fires
Average fire duration, weekdays	9.2	hours
Average fire duration, weekends	11	hours
Average number of pieces of wood, weekdays	7.2	pieces
Average number of pieces of wood, weekends	8.0	pieces
Wood Burning Insert Usage, Compressed Wood Log Fires		
Average number of fires in insert per year	10	fires
Average fire duration, weekdays	2.8	hours
Average fire duration, weekends	2.8	hours
Average number of compressed wood logs, weekdays	1.5	logs
Average number of compressed wood logs, weekends	1.5	logs



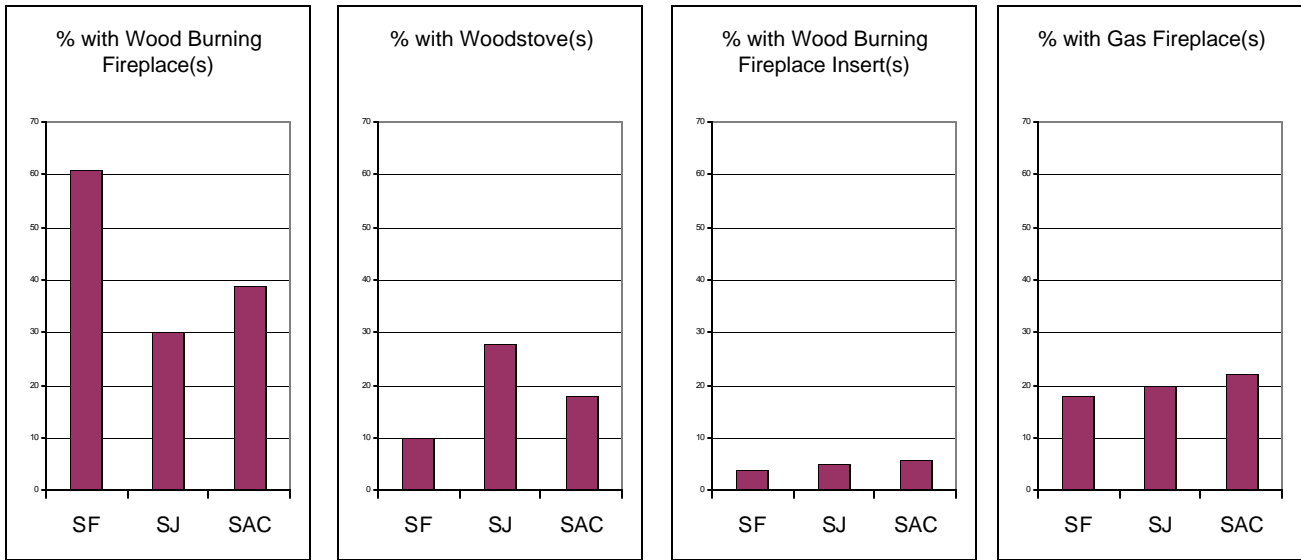
Key Results – Differences in Geographic Areas



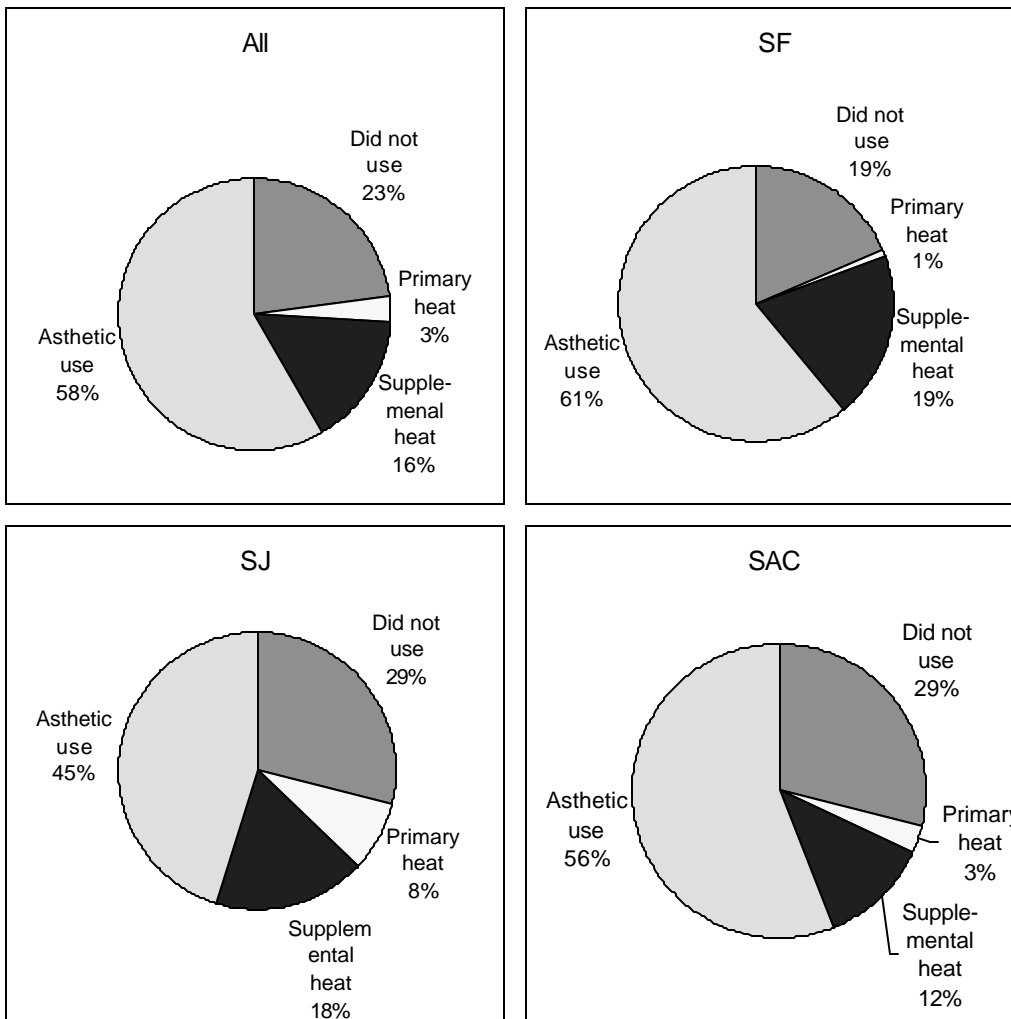
Note: It is unclear and not intuitively reasonable why 22% of the homes in the SJ area reported no primary heat source. It is believed that some home occupants and surveyors counted having more than one type of heat as not having a 'primary' heat source. This is consistent with the SJ area having the lowest 'none' category for supplemental heat sources. Another possible explanation may be that some homes with non-functioning or unused furnaces counted hearth or portable heater appliances as supplemental heat sources even though they used them as primary heat sources.



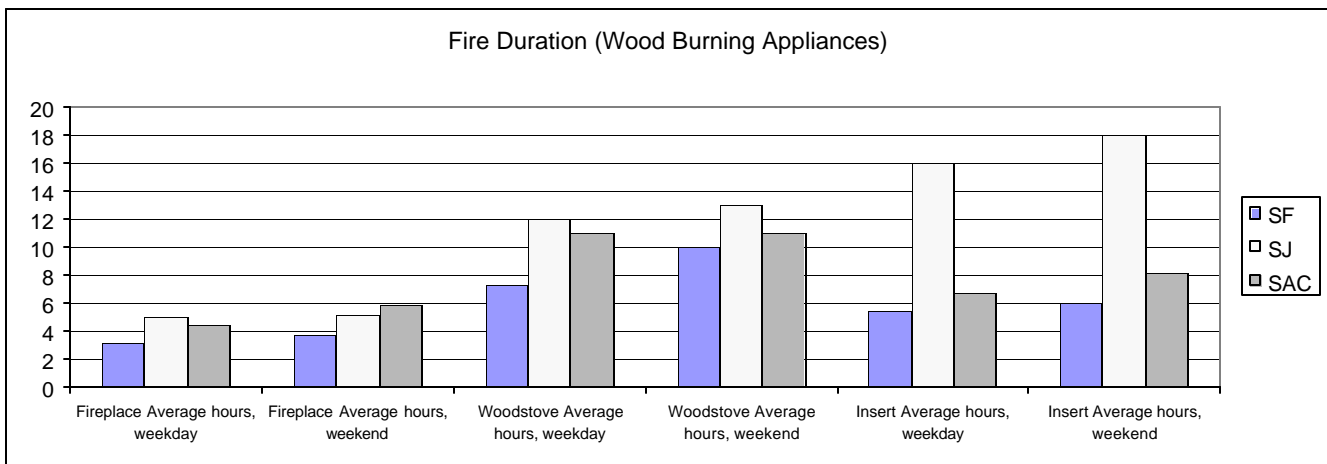
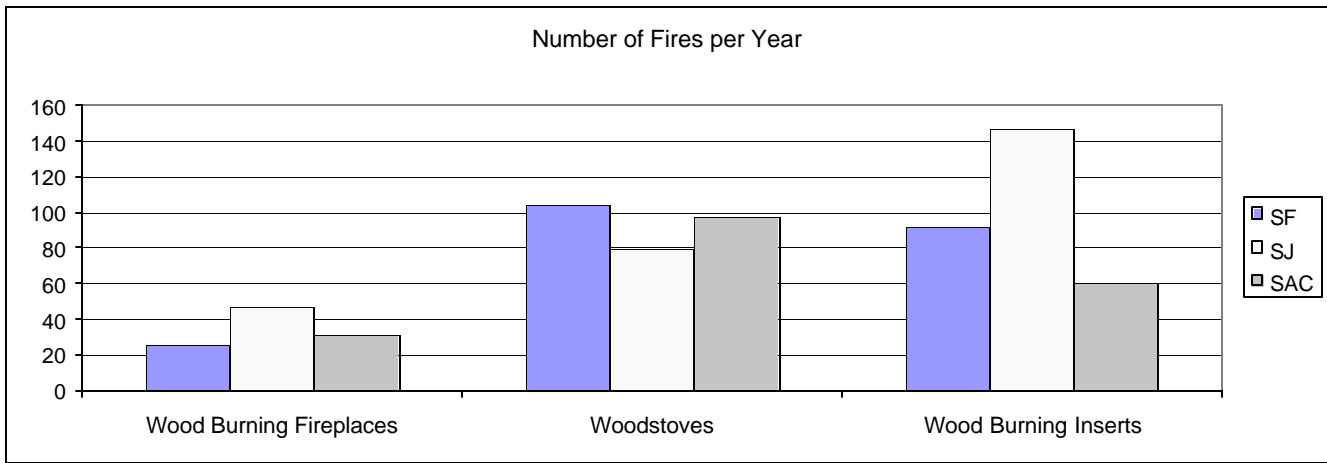
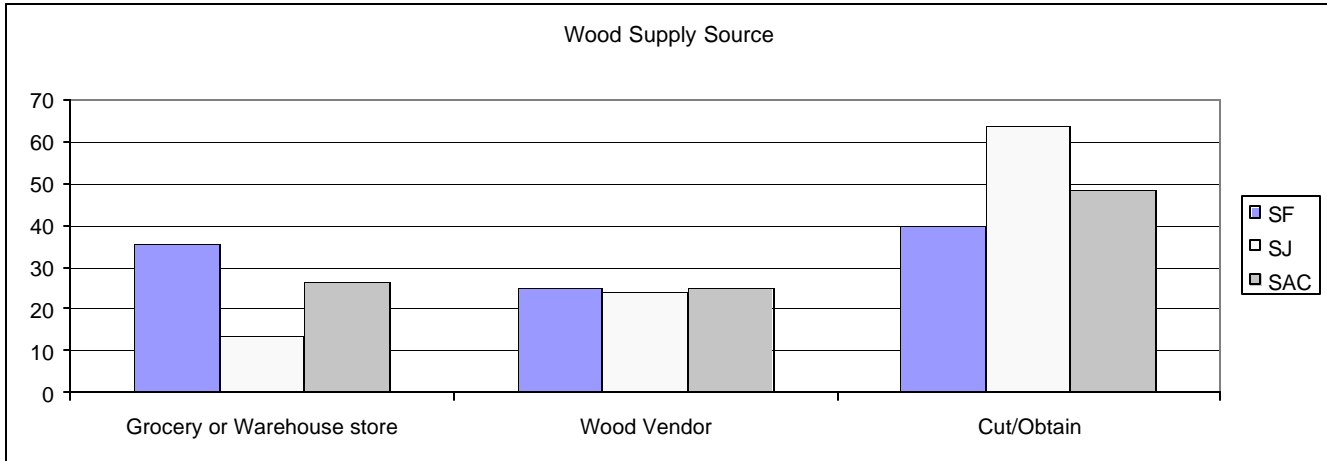
Regional Household Hearth Product Distribution



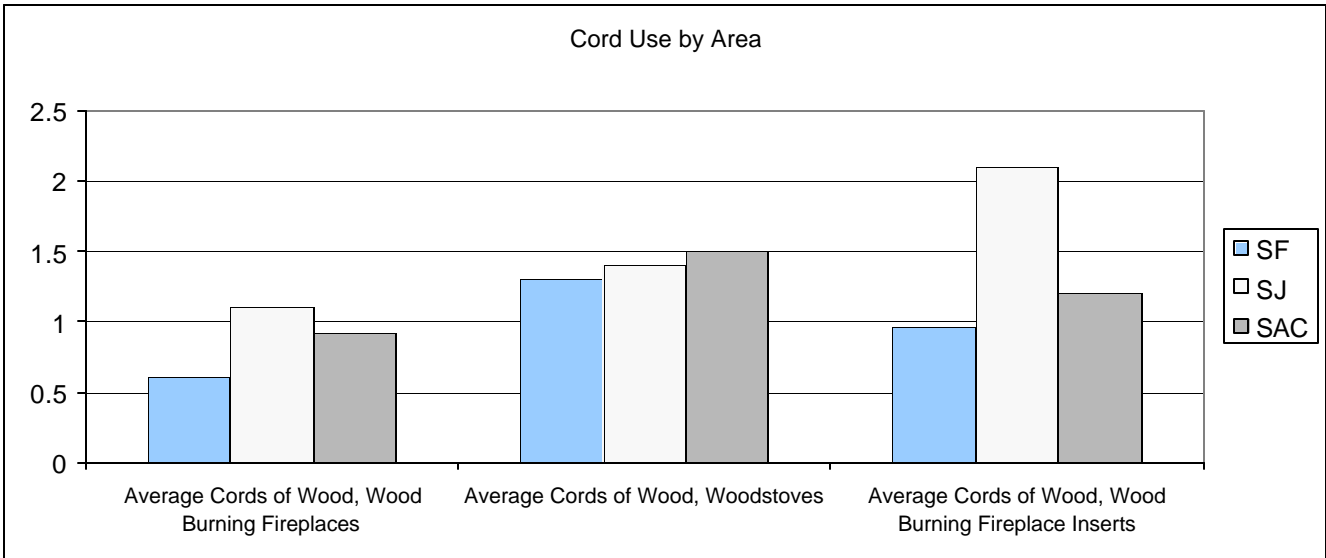
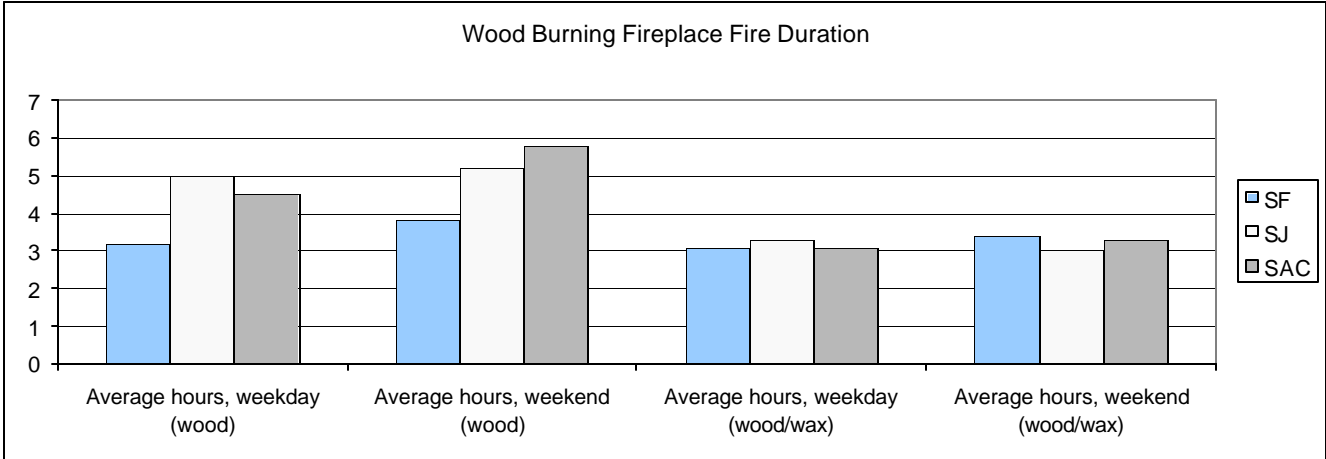
Wood Burning Fireplace Use Breakdown



Note: Data were normalized to 100%.



Note: Fireplace hours based on wood fires only.



Data Summary

Section 1: Household/Demographic Questions

1.1 Type of Household

Area	n	House, %	Duplex/Triplex, %	Apartment/Condo, %	Mobile Home, %
All	680	88	5.9	5.7	0.6
SF	268	87	6.7	5.6	0.4
SJ	127	87	10	1.6	1.6
SAC	285	89	3.2	7.7	3.5

1.2 Tenure

Area	n	Owner, %	Renter, %
All	617	80	20
SF	265	77	23
SJ	93	83	17
SAC	259	81	19

1.3 Year Housing Unit Built

Area	n	<1939, %	1940s, %	1950s, %	1960s, %	1970s, %	1980s, %	1990-4, %	>1995, %
All	681	11	9.0	16	16	20	21	4.3	4.1
SF	266	19	11	22	15	17	12	1.5	3.4
SJ	131	6.9	9.2	6.1	19	19	32	3.8	3.8
SAC	284	4.9	6.7	14	15	23	24	7.0	4.9

1.4 Age of Oldest Family Member

Area	n	<20, %	20s, %	30s, %	40s, %	50s, %	>60, %
All	699	0.7	8.6	16	22	22	31
SF	276	0.4	6.5	17	27	21	28
SJ	132	2.3	17	14	19	18	29
SAC	291	0.3	6.5	15	19	26	34

1.5 Education Attainment

Area	n	No High School Diploma, %	High School Diploma, %	Attended College, %	College Degree, %	Attended Graduate School, %
All	675	10	14	26	33	17
SF	266	6.8	15	21	34	23
SJ	125	22	12	31	27	7.2
SAC	284	8.1	14	27	35	16

Section 2: Wood Burning Device & Activity Questions

2.1 Household Primary Heat Source

Area	n	Gas, %	Oil, %	Electric, %	Wood Burning Fireplace, %	Wood-stove, %	Wood Burning Fireplace Insert, %	None, %	Other, %
All	694	66	0.4	15	2.6	5.6	1.7	8.5	0.6
SF	274	83	0	9.9	0.7	1.1	1.8	2.9	0.7
SJ	129	40	1.6	16	6.2	9.3	3.9	22	0.8
SAC	291	61	0.3	19	2.7	8.2	0.7	7.9	0.3

Note: Fuel is not specified for fireplace or fireplace insert, but it is assumed based on the questionnaire format, that they are wood burning appliances.

2.2 Household Supplemental Heat Sources

Area	n	Gas, %	Oil, %	Electric, %	Wood Burning Fireplace, %	Wood-stove, %	Wood Burning Fireplace Insert, %	None, %	Other, %
All	616	17	0.2	9.4	16	6.7	2.3	46	2.3
SF	255	10	0	15	22	2.4	2.0	49	0.8
SJ	98	28	1.0	3.1	13	13	1.0	39	2.0
SAC	263	19	0	6.8	12	8.4	3.0	47	3.8

Note: Fuel is not specified for fireplace or fireplace insert, but it is assumed based on the questionnaire format, that they are wood burning appliances.

2.3 Households that Have a Wood Burning Appliance

Area	n	Yes, %	No, %
All	629	61	39
SF	262	70	30
SJ	100	54	46
SAC	267	55	45

2.3a Wood Burning Fireplaces

Area	n	% with Fireplace(s)	% of homes with FP, with 1 FP	% of homes with FP, with 2 FP	% of homes with FP, with 3 or more FP	Avg. FP units per total Home	Avg. per home with FP units
All	292	46	90	8.2	1.7	0.52	1.1
SF	159	61	89	10	1.3	0.69	1.1
SJ	30	30	90	10	0	0.33	1.1
SAC	103	39	92	4.9	2.9	0.43	1.1

2.3b Woodstoves

Area	n	% with Woodstoves	% of homes with WS, with 1 WS	% of homes with WS, with 2 WS	% of homes with WS, with 3 or more WS	Avg. WS units per total Home	Avg. per home with WS units
All	93	15	94	3.2	3.2	0.16	1.1
SF	16	10	94	0	6.3	0.069	1.1
SJ	28	28	93	3.6	3.6	0.31	1.1
SAC	49	18	94	4.1	2.0	0.20	1.1

2.3c Wood Burning Fireplace Inserts

Area	n	% with Fireplace Inserts	% of homes with Fireplace Inserts, with 1 Insert	%, with Fireplace Inserts, 2 Inserts	%, with Fireplace Insert, 3 or more	Avg. Fireplace Inserts per total Home	Avg. per home with Fireplace Inserts
All	31	4.9	94	6.5	0.0	0.052	1.1
SF	10	3.8	100	0	0	0.038	1.0
SJ	5	5.0	100	0	0	0.050	1.0
SAC	16	6.0	88	12	0	0.067	1.1

Note: Small n value.

2.3d Pellet Stoves

Area	n	% with Pellet Stove	% of homes with PS, with 1 PS	% of homes with PS, with 2 PS	% of homes with PS, 3 or more units	Avg. units per total Home	Avg. per home with units
All	8	1.3	100	0	0	0.013	1
SF	4	1.5	100	0	0	0.015	1
SJ	3	3.0	100	0	0	0.030	1
SAC	1	0.4	100	0	0	0.0037	1

Note: Small n value.

2.4 Household that Have a Gas Fireplace

Area	n	No, %	Yes, %	Yes with One, %	Yes with Two, %
All	457	81	19	18	1.5
SF	235	82	18	17	0.9
SJ	66	80	20	20	0
SAC	156	78	22	19	3

2.5 Fireplace use Described as Aesthetic

Area	n	No, %	Yes, %
All	397	41	59
SF	198	31	69
SJ	64	67	33
SAC	135	44	56

Note: Includes both wood burning and gas fireplaces.

2.6 Percent increase (over normal) of wood burning activity due to the PG&E price increase or concern over future energy shortages; values are in percent. Note: the survey was conducted in 2001

Area	n	None	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
All	386	76	6.0	4.1	3.9	2.1	5.2	3.9	0.3	0.8	0.5	1.0
SF	183	81	6.6	4.9	1.6	1.1	2.7	1.6	0	0.5	0	0
SJ	57	61	8.8	1.8	5.3	0	11	7.0	0	0	1.8	3.5
SAC	146	66	4.1	4.1	6.2	4.1	6.2	5.5	0.7	1.4	0.7	1.4

2.7 Source of Wood Supply

Area	n	Purchased			Cut/Obtained				
		Grocery Store, %	Ware-house Store, %	Wood Vendor, %	Public Lands, %	Private Lands, %	Scrap, %	Construction, %	Backyard, %
All	241	21	6.6	25	7.5	27	11	1.2	0
SF	96	28	7.3	25	7.3	23	7.3	2.1	0
SJ	38	11	2.6	24	7.9	45	11	0	0
SAC	107	19	7.4	25	7.5	25	15	0.9	0

2.8 Artificial Wood Log Supply

Area	n	Grocery Store, %	Ware-house Store, %	Wood Vendor, %	Other, %
All	112	77	17	2.7	3.6
SF	51	76	22	0	2.0
SJ	14	71	7.1	21	0
SAC	47	79	15	0	6.4

Section 3: Wood Burning Fireplace Questions

3.1 Used in last year

Area	n	No, %	Yes, %
All	228	23	77
SF	102	21	79
SJ	38	21	79
SAC	83	29	71

3.2 Cords

Area	n	Average Cords Used	% of people who used their fireplace who used Bundles	% of people with fireplaces who used Bundles	Average Bundles of those who Purchased Bundles
All	162	0.83	21	16	4.1
SF	67	0.61	30	24	3.2
SJ	28	1.1	6.7	5.3	2.0
SAC	63	0.92	15	11	7.0

Note: 92% of those who purchased bundles did not purchase any other cord wood.

3.3 Wood/Wax Firelogs

Area	n	Number of Yes Answers	% of people who used their fireplace who used Firelogs	% of people with fireplaces who used Firelogs	Average # of Firelogs used per user of Firelogs
All	154	74	42	32	16
SF	77	34	42	33	16
SJ	19	10	33	26	7.5
SAC	54	29	49	35	19

3.4 Fire History, Wood

Area	n	Average # of Fires	Average hours, weekday	Average pieces, weekday	Average hours, weekend	Average pieces, weekend
All	139	32	4.4	6.2	5.1	6.8
SF	60	26	3.2	5.6	3.8	6.3
SJ	23	47	5.0	7.4	5.2	7.6
SAC	52	31	4.5	6.0	5.8	6.8

3.5 Fire History, Wood/Wax Firelogs

Area	n	Average # of Fires	Average hours, weekday	Average pieces, weekday	Average hours, weekend	Average pieces, weekend
All	66	14	3.3	1.5	3.4	1.8
SF	32	16	3.1	1.3	3.4	1.8
SJ	8	8.1	3.3	1.8	3.0	1.6
SAC	24	14	3.1	1.6	3.3	2.0

3.6 Type of Wood Burning Fireplace

Area	n	Masonry, %	Manufactured, %
All	217	88	12
SF	100	88	12
SJ	38	92	8
SAC	74	88	12

Note: The values reported for this question are not reasonable. It is common knowledge that there are more manufactured fireplaces than masonry fireplaces. It is believed that since some manufactured fireplaces have stone or masonry facades that the home occupant or surveyor counted them as masonry fireplaces.

3.7 Wood Burning Fireplace has Doors

Area	n	No, %	Yes, %
All	213	51	49
SF	99	59	41
SJ	35	43	57
SAC	74	49	51

Section 4: Woodstove Questions

4.1 Used in last year

Area	n	No, %	Yes, %
All	113	17	83
SF	16	0	100
SJ	34	24	76
SAC	55	15	85

4.2 Fuel

Area	n	Average Cords of Wood	% of people who used their Woodstove who used Bundles	% of people with Woodstoves who used Bundles	Average Bundles of those who Purchased Bundles	% of people who used their Woodstove who used Compressed Wood Logs	% of people with Woodstove who used Compressed Wood Logs	Average Sawdust logs of those who Purchased Compressed Wood Logs
All	96	1.5	0	0	ND	2.1	1.8	ND
SF	16	1.3	0	0	ND	0	0	ND
SJ	25	1.4	0	0	ND	3.8	2.9	ND
SAC	52	1.5	0	0	ND	2.1	1.8	ND

Note: ND is reported when there are too few responses to calculate a significant average.

4.3 Fire History, Wood

Area	n	Average # of Fires	Average hours, weekday	Average pieces, weekday	Average hours, weekend	Average pieces, weekend
All	87	100	11	7.0	12	7.8
SF	15	104	7.3	5.9	10	7.1
SJ	24	79	12	7.4	13	7.6
SAC	45	97	11	5.2	11	8.0

4.4 Fire History, Compressed Wood Logs

Area	n	Average # of Fires	Average hours, weekday	Average pieces, weekday	Average hours, weekend	Average pieces, weekend
All	14	52	8.7	6.7	9.0	6.7
SF	4	24	4.0	1.3	4.0	1.3
SJ	2	77	14	11	16	11
SAC	7	68	11	11	11	11

4.5 Age of Stove

Area	n	Average Years	Purchased After July 1990, %
All	108	15	46
SF	15	17	40
SJ	34	15	59
SAC	52	14	43

4.6 Catalytic

Area	n	No, %	Yes, %
All	92	76	24
SF	14	71	29
SJ	26	62	38
SAC	46	83	17

4.8 Use

Area	n	Primary Heat, %	Supplemental Heat, %
All	111	48	52
SF	16	63	37
SJ	44	42	58
SAC	56	46	54

Section 5: Wood Burning Fireplace Insert Questions

5.1 Used in last year

Area	n	No, %	Yes, %
All	33	3.0	97
SF	10	0	100
SJ	8	13	87
SAC	13	0	100

5.2 Fuel

Area	n	Average Cords of Wood	% of people who used their Insert who used Bundles	% of people with Insert who used Bundles	Average Bundles of those who Purchased Bundles	% of people who used their Insert who used Compressed Wood Logs	% of people with Insert who used Compressed Wood Logs	Average Sawdust logs of those who Purchased Compressed Wood Logs
All	32	1.4	9.4	9.1	2.2	3.1	3.0	30
SF	9	0.97	33	30	2.2	0	0	ND
SJ	7	2.1	0	0	ND	0	0	ND
SAC	14	1.2	0	0	ND	7.7	7.7	30

Note: ND is reported when there are too few responses to calculate a significant average.

5.3 Fire History, Wood

Area	n	Average # of Fires	Average hours, weekday	Average pieces, weekday	Average hours, weekend	Average pieces, weekend
All	31	92	9.2	7.2	11	8.0
SF	10	92	5.4	5.4	6	5.6
SJ	7	146	16	9.4	18	10
SAC	12	60	6.8	5.5	8.1	7.2

5.4 Fire History, Compressed Wood Logs

Area	n	Average # of Fires	Average hours, weekday	Average pieces, weekday	Average hours, weekend	Average pieces, weekend
All	5	10	2.8	1.5	2.8	1.5
SF	1	2	3	2	3	2
SJ	0	ND	ND	ND	ND	ND
SAC	4	12	2.8	1.4	2.8	1.4

5.5 Age of Wood Burning Insert

Area	n	Average Years, %	Purchased After July 1990, %
All	28	13	46
SF	7	9.7	83
SJ	7	19	0
SAC	12	12	45

5.6 Catalytic

Area	n	No, %	Yes, %
All	26	69	31
SF	5	60	40
SJ	7	100	0
SAC	12	50	50

5.8 Use

Area	n	Primary Heat, %	Supplemental Heat, %
All	29	52	48
SF	7	57	43
SJ	7	86	14
SAC	13	31	69

Question 5.9 (a gas insert question) was not included due to bias caused by its placement in the wood burning fireplace insert section.

Section 6: Other Appliance Questions

6.1 Use in last Year

Area	n	No, %	Yes, %
All	6	0	100
SF	2	0	100
SJ	2	0	100
SAC	2	0	100

6.2 Type

Area	n	Pellet Stove, %
All	6	100
SF	2	100
SJ	2	100
SAC	2	100

6.7 Fuel

Area	n	Average Sacks
All	5	100
SF	1	50
SJ	2	125
SAC	2	100

6.8 Fire History, Pellets

Area	n	Average # of Fires	Average hours, weekday	Average sacks, weekday	Average hours, weekend	Average sacks, weekend
All	5	130	15	0.7	15	0.8
SF	1	30	14	0.5	14	0.5
SJ	2	175	24	1.0	24	1
SAC	2	135	5.5	0.7	6.5	0.7

Wood Burning Survey Questionnaire

By California Air Resources Board and University of California

Objective: To surveying home heating practices for air quality research.

The information gathered here is for research only and all information is confidential.

Surveyor's name _____,

Home address _____, City _____, Zip code _____

Section 1. Household/demographic Questions

1. **Type** of Household (check one)

2. **Tenure** (check one)

3. **Age** of housing unit (check one)

4. Age of the **oldest family member** (check one)

5. Education Attainment (check highest obtained):

Section 2. Wood Burning Devise & Activity Questions

1. How do you primarily heat your home?

gas	oil	electric	None	Other
Fireplace Woodstove	Fireplace insert			

2. Do you use a supplemental heating source for your home?

gas	oil	electric	None	Other
Fireplace Woodstove	Fireplace insert			

3. Do you **have** a wood-burning appliance (e.g., a fireplace, a woodstove, or a fireplace insert) in your home? Yes No . If **Yes**, fill out the following relevant items. (*note: a detailed listing needs to be filled out for each wood burning appliance*).

a. _____ # of wood burning- fireplaces	COMPLETE SECTION 3 ►
b. _____ # of wood burning stoves	COMPLETE SECTION 4 ►
c. _____ # of woodstove-like fireplace inserts	COMPLETE SECTION 5 ►
d. _____ # and type of other wood burning appliances	COMPLETE SECTION 6 ►

4. Do you have a **gas burning** fireplace in your home? Yes-how many? _____ No

5. If you have a fireplace, is it more appropriately described as **aesthetic** and used for **pleasure** rather than supplemental heat? Yes No.

6. Did the PG&E price increase or concern over future shortages change your activity in using wood-burning appliances this year? Yes No. If Yes, what percent **increase (over normal) of wood burning** did you do?

10%	20%	80%	50%
60%	70%	40%	100%
	30%	90%	

7. If you burn **wood**, where do you get it?

Purchase it:

grocery store (safeway),	warehouse (costco),	wood vendor,	other _____
--------------------------	---------------------	--------------	-------------

Cut it:

public lands,	private lands,	other _____
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8. If you burn **artificial** logs (compressed sawdust logs), where do you get them?

Purchase it:

grocery store (safeway),	warehouse (costco),	wood vendor,	other _____
--------------------------	---------------------	--------------	-------------

Section 3. Wood Burning Fireplace Questions

Location ID# Sample # Fireplace #

1. Did you use your wood burning fireplace during the last 12 months? Yes No

2. How much wood fuel (**not counting** artificial fireplace logs) did you use during the last 12 months? (*The average weight of a cord on a dry basis is 1.163tons*)

(number of) full cords (stack of wood 4 ft X 4 ft X 8 ft = 128 cubic feet)

face or "fireplace" cords (stack of wood 2 ft X 4 ft X 8 ft = 64 cubic feet = 1/2 of a full cord)

pick-up truck loads (average pick-up truck load = 0.35 full cords)

bundles of wood (usually from a grocery store, typically 1 ft X 1 ft X 2 ft or 1/64 of a full cord)

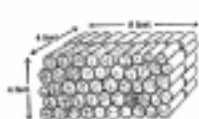


Figure 1. STANDARD CORD, Total Volume = 128 cu. ft.

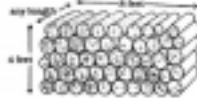


Figure 2. FACE CORD, Total Volume = 32 to 48 cu. ft. (Depends on piece length.)



Figure 3. PICKUP LOAD, Approximate Total Volume = 64 cu. ft.



3. How many **artificial** fireplace logs did you use during the last 12 months? (*e.g., Duraflame, Pine Mountain, and Hearthlogg*) (*Artificial fireplace logs range in weight from 2.5 to 6 lbs. average 4.95 lbs.*)

None, number of **artificial** fireplace logs during the last 12 months.

4. How many times # did you have a fire using **wood fuel** (not counting artificial fireplace logs) during the last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **wood fuel** fires usually last?

Weekdays - average hrs, average # pieces of wood burnt pieces

Weekend/holidays - average hrs, average # pieces of wood burnt pieces

5. How many times # did you have a fire using **artificial** fireplace logs during last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **artificial** log fires usually last?

Weekdays - average hrs, average # **artificial** logs burnt logs

Weekend/holidays - average hrs, average # **artificial** logs burnt logs

6. Is your fireplace a masonry fireplace (stone, brick, concrete) or a metal factory manufactured fireplace?

Masonry Metal

7. Does your fireplace have a solid glass or metal door? Yes No (*Don't count screen doors*).

▶ **Section 4. Woodstove Questions**

Location ID# Sample # Woodstove #

1. Did you use your woodstove during the last 12 months? Yes No

2. How much **wood fuel** (not counting artificial fireplace logs) did you use during the last 12 months?

(number of) full cords (stack of wood 4 ft X 4 ft X 8 ft = 128 cubic feet)

face or "fireplace" cords (stack of wood 2 ft X 4 ft X 8 ft = 64 cubic feet = 1/2 of a full cord)

pick-up truck loads (average pick-up truck load = 0.35 full cords)

bundles of wood (usually from a grocery store, typically 1 ft X 1 ft X 2 ft or 1/64 of a full cord)

of artificial compressed sawdust logs (typical logs weigh 5 lbs.)

of pallets of compressed sawdust logs (A typical pallet contains about 400 logs and weighs 2000 lbs.)

3. How many times # did you have a fire using **wood fuel** (not counting artificial compressed sawdust logs) during the last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **wood fuel** fires usually last?

Weekdays - average hrs, average # pieces of wood burnt pieces

Weekend/holidays - average hrs, average # pieces of wood burnt pieces

4. How many times # did you have a fire using **artificial** compressed sawdust logs during last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **artificial** fuel fires usually last?

Weekdays - average hrs, average # **artificial** logs burnt logs

Weekend/holidays - average hrs, average # **artificial** logs burnt logs

5. How old is the woodstove? yrs. Was it purchased after July 1990? Yes No

6. Is it a catalytic stove? Yes No

7. What is the brand and model of the stove

8. Is the **woodstove** your primary source of heat or a supplemental source of heat?

primary source of heat, supplemental source of heat

▶ **Section 5. Woodstove-Like Fireplace Insert Questions**

Location ID# Sample # Fireplace Insert #

1. Did you use your wood burning **fireplace insert** during the last 12 months? Yes No

2. How much **wood fuel** did you use during the last 12 months?

(*number of*) full cords (stack of wood 4 ft X 4 ft X 8 ft = 128 cubic feet)

face or "fireplace" cords (stack of wood 2 ft X 4 ft X 8 ft = 64 cubic feet = 1/2 of a full cord)

pick-up truck loads (average pick-up truck load = 0.35 full cords)

bundles of wood (*usually from a grocery store, typically 1 ft X 1 ft X 2 ft or 1/64 of a full cord*)

of artificial compressed sawdust logs (*typical logs weigh 5 lbs.*)

of pallets of compressed sawdust logs (*A typical pallet contains about 400 logs and weighs 2000lbs.*)

3. How many times # did you have a fire using **wood fuel** (not counting artificial compressed sawdust logs) during the last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **wood fuel** fires usually last?

Weekdays - average hrs, average # pieces of wood burnt pieces

Weekend/holidays - average hrs, average # pieces of wood burnt pieces

4. How many times # did you have a fire using **artificial** compressed sawdust logs during last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **artificial** fuel fires usually last?

Weekdays - average hrs, average # **artificial** logs burnt logs

Weekend/holidays - average hrs, average # **artificial** logs burnt logs

5. How old is the insert? yrs. Was it purchased after July 1990? Yes No

6. Is it a catalytic **fireplace insert**? Yes No

7. What is the brand and model of the **fireplace insert**?

8. Is the **fireplace insert** your primary source of heat or a supplemental source of heat?

primary source of heat, supplemental source of heat

9. Do you have a gas-fired **fireplace insert**? Yes No

▶ **Section 6. Other Wood Burning Appliance Questions**

Location ID# Sample # Wood Burning Appliance #

Type of other wood burning appliances: _____

1. Did you use your **wood burning appliance** during the last 12 months? Yes No

2. What type of wood burning (including pellet burning) appliance did you use?

Wood burning: Masonry heater, Furnance, Cookstove, Water heater, Other ▶ **GOTO 3**

Pellet burning: Stove, Furnance, Fireplace Insert, Other ▶ **GOTO 7 below**

▶ **3. How much wood fuel** (not counting artificial wood fuel logs) did you use during the last 12 months?

_____ # (number of) full cords (stack of wood 4 ft X 4 ft X 8 ft = 128 cubic feet)

_____ # face or "fireplace" cords (stack of wood 2 ft X 4 ft X 8 ft = 64 cubic feet = 1/2 of a full cord)

_____ # pick-up truck loads (average pick-up truck load = 0.35 full cords)

_____ # bundles of wood (usually from a grocery store, typically 1 ft X 1 ft X 2 ft or 1/64 of a full cord)

_____ # of artificial compressed sawdust logs (typical logs weigh 5 lbs.)

_____ # of pallets of compressed sawdust logs (A typical pallet contains about 400 logs and weighs 2000 lbs.)

4. How many **artificial** logs did you use during the last 12 months?

None, _____ number of **artificial** logs during the last 12 months.

5. How many times # did you have a fire using **wood fuel** (not counting artificial compressed sawdust logs) during the last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **wood fuel** fires usually last?

Weekdays - average hrs, average # pieces of wood burnt pieces

Weekend/holidays - average hrs, average # pieces of wood burnt pieces

6. How many times # did you have a fire using **artificial** logs during last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **artificial** fuel fires usually last?

Weekdays - average hrs, average # **artificial** logs burnt logs

Weekend/holidays - average hrs, average # **artificial** logs burnt logs

► 7. If you used a pellet burning appliance, how much fuel did you use?

sacks of pellets

pallets of pellet sacks

8. How many times # did you have a fire using **pellets** during last 12 months? Which of the following months did you use most?

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

How long do your **pellet** fires usually last?

Weekdays - average hrs, average # **pellets** burnt sacks

Weekend/holidays - average hrs, average # **pellets** burnt sacks